PLANT SCIENCE TODAY
Vol 12(sp4): 01-07
https://doi.org/10.14719/pst.11983

eISSN 2348-1900

RESEARCH ARTICLE

Entrepreneurial behaviour of coconut (*Cocos nucifera*) farmers in Krishnagiri district, Tamil Nadu

Mohammed Ghouse L[1*], Aravind A[2], Vaishnavi P[3] & Yaasmeenthaj S K[4]

[1]Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, Coimbatore 641 003, Tamil Nadu, India
[2]Department of Social Sciences, S Thangapazham Agricultural College, Vasudevanallur 627 760, Tamil Nadu, India
[3]Department of Agricultural Extension, School of Agricultural Sciences, Dhanalakshmi Srinivasan University, Samayapuram, Trichy 621 112, Tamil Nadu, India
[4]Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore 641 003, Tamil Nadu, India

*Correspondence email - lmdghouse95@gmail.com

Received: 25 September 2025; Accepted: 10 November 2025; Available online: Version 1.0: 24 December 2025

Cite this article: Mohammed GL, Aravind A, Vaishnavi P, Yaasmeenthaj SK. Entrepreneurial behaviour of coconut (*Cocos nucifera*) farmers in Krishnagiri district, Tamil Nadu. Plant Science Today. 2025;12(sp4):01-07. https://doi.org/10.14719/pst.11983

Abstract

Coconut is a vital plantation crop sustaining millions of rural households in India, yet productivity and profitability remain constrained by ageing palms, fragmented holdings, pest and disease pressures and weak value chains. It is becoming more widely acknowledged that farmers can overcome these obstacles by engaging in entrepreneurial behaviour, which is characterised by innovativeness, risk orientation, planning and market orientation. The Theory of Planned Behaviour (TPB) was used as the analytical framework in this study to evaluate the entrepreneurial behaviour of coconut farmers in Krishnagiri district of Tamil Nadu. A structured interview schedule was used to gather data from 120 randomly chosen farmers and analysis of moment structures (AMOS)'s confirmatory factor analysis (CFA) and structural equation modelling (SEM) were used to test the extended TPB model. The findings of the study validate the applicability of TPB in perennial cash crops and offer actionable insights for policy and extension. The constructs showed high internal reliability (Cronbach's $\alpha > 0.70$) and acceptable fit indices for the measurement and structural models. Path analysis showed that behavioural intention (BI) significantly predicted actual entrepreneurial behaviour ($\beta = 0.832$, $p < 0.001$), while perceived behavioural control (PBC) had a strong positive influence on BI ($\beta = 0.492$, $p < 0.001$). Strengthening farmers' perceived control through training, credit access and infrastructural support can enhance entrepreneurial intentions and ensure their translation into sustainable agribusiness behaviour.

Keywords: agribusiness development; coconut farmers; theory of planned behaviour (TPB); structural equation modelling (SEM); perceived behaviour control (PCB)

Introduction

Coconut (*Cocos nucifera* L.) is a vital plantation crop of the humid tropics, serving as a source of food, oil, fibre, fuel and numerous value-added products. Globally, it is cultivated in more than 90 countries across 12 M ha, with India, Indonesia and the Philippines contributing nearly 75 % of the world's production (1). India ranks among the top producers, recording 21374 million nuts in 2023-24 and supporting the livelihoods of over 12 million people, particularly in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh (2, 3). However, coconut farming faces several challenges, including declining productivity, ageing palms, poor adoption of improved technologies and weak value chains that reduce farmers' income security (4).

Entrepreneurial behaviour has emerged as a key determinant of how coconut growers navigate these challenges. In the agricultural context, entrepreneurial behaviour is conceptualised as the farmer's ability to innovate, take risks, plan effectively, seek information and remain market-oriented (5). Despite this importance, coconut cultivation faces several long-term constraints. Productivity in many regions has stagnated or declined due to senile palms, limited replanting, small and fragmented holdings and suboptimal agronomic practices (6). Biotic stresses such as rhinoceros beetle (*Oryctes rhinoceros*), root (bud) feeders and lethal yellowing diseases continue to pose severe threats, while abiotic shocks such as cyclones and irregular rainfall further destabilise production (7).

A growing body of empirical research shows that these behavioural dimensions strongly influence farm-level innovation and market engagement. Studies have shown that entrepreneurial orientation significantly increases the adoption of crop diversification practices among smallholders (8). Similarly, rice farmers with higher entrepreneurial behaviour scores were more likely to choose high-value market outlets. These findings suggest that entrepreneurial traits are closely linked to farmers' capacity to move beyond subsistence markets into more remunerative value chains (9). In coconut systems, e-commerce readiness and the type of business model adopted significantly influenced Malaysian coconut farmers' ability to bypass

intermediaries and secure better prices (10).

Farmer producer company (FPC)-supported virgin coconut oil (VCO) processing clusters improved farmers' net margins and reduced seasonal income fluctuations (11). Several high-visibility program evaluations synthesised in the literature show that agribusiness incubators and FPC-led processing clusters can reduce seasonality in household incomes and enhance value capture, particularly when backed by stable output contracts or buyer linkages (12).

The majority of coconut growers in Tamil Nadu and Karnataka exhibit moderate levels of entrepreneurial behaviour, with innovativeness, risk-taking and decision-making as differentiating traits between high and low performers (13, 14). These studies collectively highlight both the latent potential and the gaps in entrepreneurial capacity among coconut growers.

It has been reported that leadership, strategic planning and opportunity scanning are key factors for successful agripreneurship in India (15). A study has documented how access to credit, extension and infrastructure form boundary conditions for entrepreneurial behaviour (16). Bibliometric analyses further reveal that although agricultural entrepreneurship research is expanding, there remains a dearth of empirical work specifically on perennial crops like coconut (17).

Sustainability-oriented studies also show that entrepreneurial behaviour enables farmers to exploit circular economy opportunities. A study reviewed how coconut residues, such as husk and coir pith, can be valorised into activated carbon, compost, or biochar, adding new revenue streams (18). Farmers with entrepreneurial orientation are more likely to adopt such waste-to-value practices (19). Thus, entrepreneurship not only enhances income but also contributes to environmental sustainability. Entrepreneurial behaviour is increasingly recognised as a driver of technology adoption, value addition and market participation across agricultural systems (20). Evidence from vegetable growers, mushroom farmers and farmer-producer organisations indicates that traits such as innovativeness, risk orientation and market orientation significantly shape entrepreneurial outcomes (21).

However, despite the socio-economic importance of coconut as a livelihood crop, empirical studies on the entrepreneurial behaviour of coconut farmers remain sparse and largely confined to descriptive analyses. Therefore, understanding the entrepreneurial behaviour of coconut growers is essential for designing effective policies and interventions that promote value addition, enhance technology adoption and strengthen the sustainability of coconut farming. The present study attempts to assess the entrepreneurial behaviour of coconut growers in the selected region, thereby contributing to evidence-based recommendations for farmer capacity building and agripreneurship promotion. This study has been carried out with the specific objective of measuring the entrepreneurial behaviour of coconut farmers using TPB.

Materials and Methods

The study was conducted in Krishnagiri district, Tamil Nadu, located between 12°15′ N and 78°13′ E, falling under the Eastern Plateau and Hill agro-climatic zone of India. Using a multi-stage random sampling technique, two leading coconut-producing blocks were purposively selected, from which six villages were randomly identified. A total of 120 coconut farmers were then randomly chosen as respondents. The sample size was determined based on the recommended minimum subject-to-parameter ratio of 10:1 for SEM, ensuring adequate statistical power and model stability. Data were collected through a pre-tested structured interview schedule covering socio-economic characteristics, farming practices and entrepreneurial attributes. The questionnaire, developed from TPB and validated by subject experts, was pre-tested with 15 non-sample farmers for clarity and reliability. The finalised version is provided as supplementary file S1.

Research model

The TPB provides a robust framework for understanding and predicting entrepreneurial behaviour based on individual attitudes, perceived social pressures and control beliefs (22). It is particularly relevant for assessing coconut growers' intentions and actions toward entrepreneurial activities. By integrating subjective norms, attitudes and perceived behavioural control, TPB captures the psychological dimensions influencing growers' decisions, which were shown in Table S1.

The TPB has been extensively applied to investigate entrepreneurial behaviour and related decision-making among farmers across diverse contexts. Studies in Germany identified PBC as the strongest predictor of entrepreneurial intention, supported by positive attitudes toward agribusiness (23). Research in Switzerland demonstrated that intentions toward adopting innovative livestock practices were largely shaped by attitudes and PBC, while subjective norms were context-dependent (24).

A systematic review of more than 100 TPB applications in farmer behaviour confirmed that intention consistently mediated the effects of attitudes, subjective norms and PBC on actual entrepreneurial outcomes, reinforcing TPB's robustness in agricultural entrepreneurship studies (25). Investigations on agro-entrepreneurial intention among youth reported that TPB constructs explained substantial variance in entrepreneurial orientation, highlighting its utility for agripreneurship development (26). Extensions of TPB that included risk perception and social capital significantly improved predictive power for sustainable agribusiness adoption in Vietnam (27). Evidence from Brazil indicated that attitudes and PBC significantly predicted technology adoption and entrepreneurial behaviour (28). Research in Italy on sustainable pest management highlighted intention as the key mediator between psychological constructs and actual behaviour (29). Similar applications in Belgium showed that positive attitudes and PBC encouraged entrepreneurial-like adoption decisions in soil conservation practices (30). In China, both attitudes and subjective norms significantly predicted farmers' willingness to start agribusiness ventures (31). In Iran, attitudes and PBC strongly influenced farmers' agribusiness orientation, thereby validating TPB in a developing country context (32). Collectively, these studies confirm that TPB has been successfully employed in similar research on farmers' entrepreneurial behaviour, consistently highlighting the importance of attitudes, social influences and perceived capability as determinants of agripreneurial intentions and actions.

TPB used in this study

The TPB framework was employed to measure entrepreneurial behaviour among coconut farmers. Considering its relevance of the scale, it was used to assess the entrepreneurial behaviour of coconut farmers and the components of TPB applied in this

Table 1. The components of TPB

S. No.	Components	Definition
1.	Attitude (ATT)	A person's positive or negative feeling about doing a particular action.
2.	Subjective Norm (SN)	The influence of people around (like family or friends) on a person's decision to act.
3.	Perceived Behaviour Control (PBC)	The individual's belief about how easy or difficult it is to carry out the behaviour, considering their resources and abilities.
4.	Behavioural Intention (BI)	It reflects a person's readiness or plan to perform a behaviour, influenced by attitude, subjective norms and perceived control.
5.	Behaviour (B)	Behaviour is the actual action performed by the individual, resulting from their intention and perceived control over the situation.

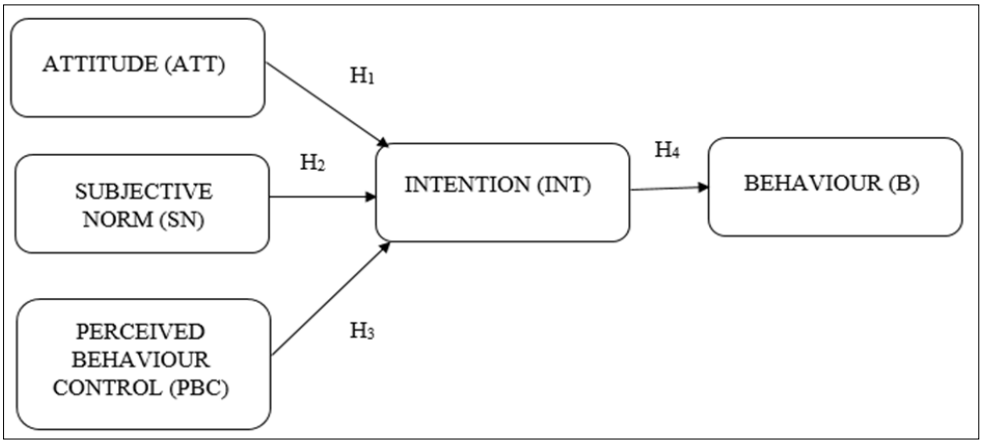

Fig. 1. Conceptual model of the study - TPB.

study are presented in Table 1 and Fig. 1. A questionnaire was developed that included all the components of the extended TPB model, which was shown in supplementary file S1. The data collected from the questionnaire were analysed using the SPSS software to examine their reliability and validity. The AMOS 27 software was then used to conduct SEM. It was carried out in three steps: first, the internal reliability of the constructs in the model was checked; second, CFA was performed to validate the measurement model; and third, the structural model was analysed.

Results

Internal reliability of constructs in the model

Cronbach's alpha reliability was used to assess the internal reliability indices of each construct using SPSS. Since all data were self-reported, common method bias was examined using Harman's single-factor test. The results indicated that a single factor explained less than 40 % of the total variance, confirming that common method bias did not pose a significant threat to the validity of the findings. Table 2 indicates that all the constructs are highly reliable (>0.70) as suggested in the model (33).

Table 2. Internal reliability of dimensions in the TPB model

S. No.	Constructs	Cronbach's alpha reliability
1.	Attitude (ATT)	0.865
2.	Subjective norm (SN)	0.746
3.	Perceived behaviour control (PBC)	0.889
4.	Behavioural intention (BI)	0.802
5.	Behaviour (B)	0.837

Confirmatory factor analysis (CFA) for validating the measurement model

To evaluate measurement reliability and construct validity, 120 respondents were included in CFA, in which four measures were used to assess the overall fit of the metric model. The four metrics were Tucker-Lewis Index (TLI), comparative fit index (CFI), normed fit index (NFI) and Chi-square Minimum divided by degrees of freedom (CMIN/DF). The CFA results revealed that the model obtained acceptable fit measures (34) as shown in Table 3.

Table 3. Model fit measures from CFA

Acceptable model fit measures	Obtained model fit measures
CFI ≥ 0.900	CFI = 0.985
TLI ≥ 0.900	TLI = 0.982
IFI ≥ 0.900	IFI = 0.986
CMIN/DF < 3.0	CMIN/DF = 1.111

Average Variance Extracted (AVE) of each construct was required to exceed 0.5 and have significant factor loadings, as shown in Table 4 and Fig. 2 (35). Standardised loadings, construct reliability (CR), AVE and Cronbach's alpha were generated by the

Table 4. CFA outcomes for the chosen measurement model

Items	Standardized loadings	CR	AVE	α
ATT1	0.832			
ATT2	0.823	0.865	0.682	0.826
ATT3	0.822			
SN1	0.538			
SN2	0.953	0.775	0.548	0.741
SN3	0.669			
PBC1	0.585			
PBC2	0.667			
PBC3	0.792	0.856	0.546	0.739
PBC4	0.807			
PBC5	0.816			
BI1	0.741			
BI2	0.786	0.811	0.589	0.767
BI3	0.774			
B1	0.976			
B2	0.691	0.846	0.653	0.808
B3	0.727			

Table 5. Path analysis through SEM

Path	B	SE	CR	Label
ATT→ BI	-0.076	0.079	-0.964	No
SN → BI	0.067	0.121	0.556	No
PBC → BI	0.492***	0.142	3.474	Yes
BI → B	0.832***	0.168	4.961	Yes

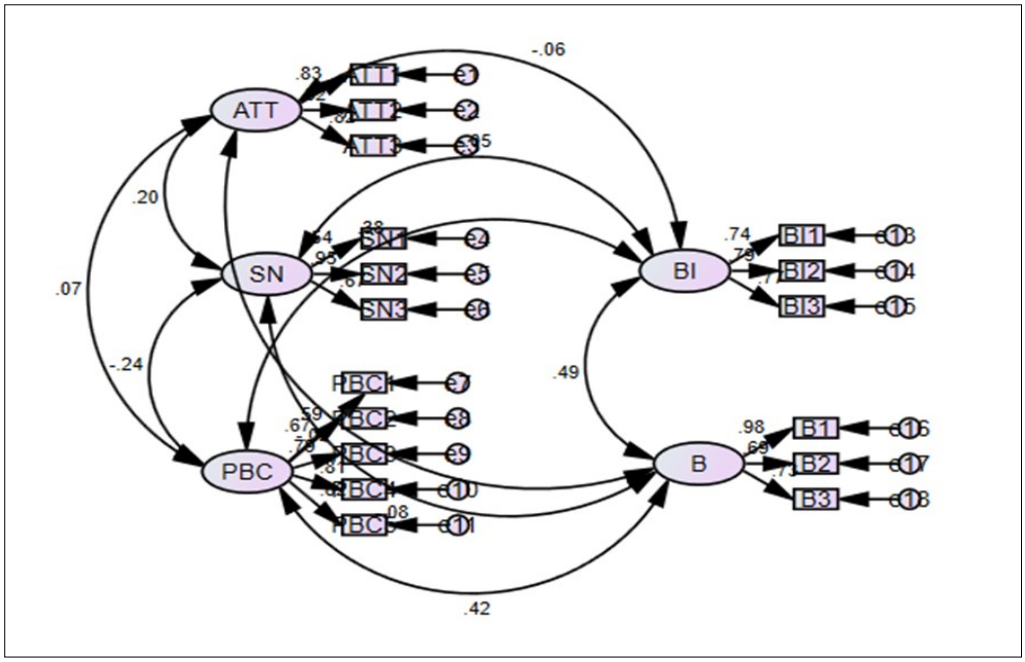

Fig. 2. Confirmatory factor analysis pathway.

CFA and are shown in Table 5 for the model. Results showed that all items had factor loadings greater than 0.50, the AVE of all constructs was above 0.5 and the CR values of all constructs were greater than 0.70.

Results of the structural model

Table 6. Model fit measures from SEM

Acceptable model fit measures	Obtained model fit measures
CFI ≥ 0.900	CFI = 0.980
TLI ≥ 0.900	TLI = 0.975
IFI ≥ 0.900	IFI = 0.980
RMSEA ≤ 0.060	RMSEA = 0.036

The Amos V23 software was used in this study to perform SEM and the path diagram is shown in Fig. 2. The final model's fit metrics were deemed to be acceptable. The results from the structural model revealed that the model obtained acceptable fit measures, as shown in Table 6 (36).

Path analysis through SEM

Standardised path coefficients and p-values were calculated to assess the significance of each proposed structural path. As shown in Table 6, two paths were significant at $p < 0.001$, out of four paths. The SEM results indicate that PBC has a direct and positive effect on BI ($\beta = 0.492$, $p < 0.001$) and BI has a direct and positive effect on behaviour (B) ($\beta = 0.832$, $p < 0.001$). Fig. 3 depicts this relationship.

Discussion

The strong effect of perceived behavioural control on intention and the high conversion of intention into behaviour among coconut farmers in Krishnagiri can be attributed to the district's well-established coconut economy, strong market linkages and institutional support from cooperatives and the Department of Horticulture. The perennial nature of the coconut production system with multiple value-added avenues (copra, oil, tender nuts and coir) reduces risk and enhances farmers' confidence in entrepreneurial ventures. In addition, farmer networks and exposure to extension services further strengthen perceived control and facilitate the rapid translation of intention into entrepreneurial behaviour.

The strong effect of PBC on BI aligns with recent studies highlighting that when farmers believe they can overcome technical,

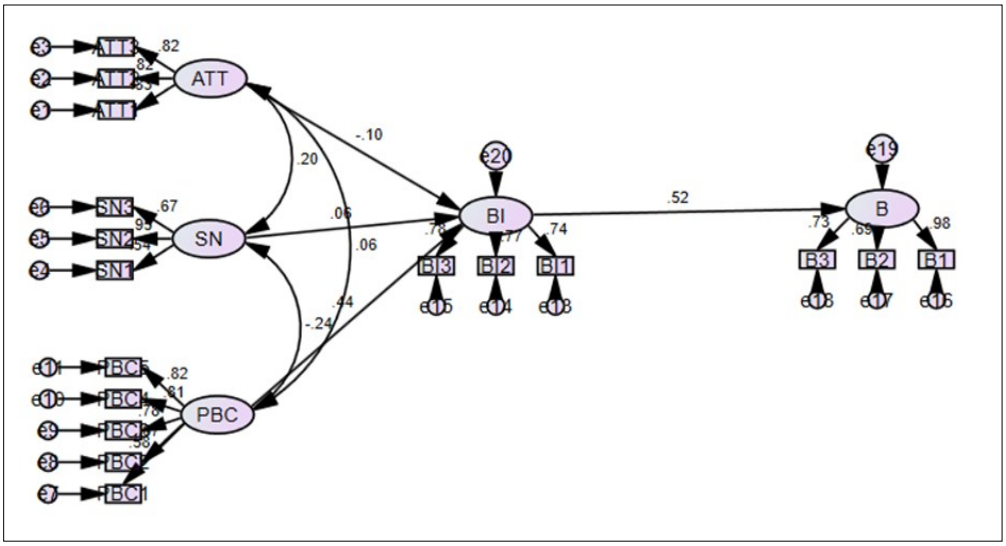

Fig. 3. Path diagram from SEM.

financial, or institutional constraints, their entrepreneurial intentions are substantially strengthened (37, 38). Such findings imply that building self-efficacy and resource accessibility directly enhances motivational readiness for entrepreneurship in agricultural systems.

The magnitude of the BI → B path observed in this study (β = 0.832) also emphasises the pivotal role of intention as the immediate determinant of entrepreneurial behaviour. Similar high-intention behaviour consistencies were reported in technology adoption research, where intention predicted adoption of spot spraying practices and where cognitive readiness explained farmers' transition from planned behaviour to observable agribusiness action (39, 40). This indicates that once intentions are formed, behavioural realisation is highly probable, provided that external barriers do not obstruct implementation. Research indicates that strong behavioural intentions among dairy farmers were critical to the uptake of precision technologies, despite varying perceptions of risk (41).

Comparative evidence also demonstrates that PBC consistently retains its influence across extended TPB models. For instance, a study showed that training interventions that targeted PBC significantly improved farmers' intentions regarding pesticide use reduction, while another study reported that even when risk perception and norm activation constructs were included, PBC remained the dominant predictor of intention in sustainable farming adoption (42, 43). This robustness of PBC across contexts suggests that policies enhancing farmers' operational skills, access to credit and institutional support would directly translate into stronger entrepreneurial intentions.

The satisfactory fit indices obtained in this study may be partly attributed to the adequate sample size used for the SEM analysis. With 120 respondents and a subject-to-parameter ratio exceeding the recommended 10:1 threshold, the model achieved sufficient statistical power to produce stable estimates and reliable fit measures. Taken together, these results suggest that PBC is not only a cognitive belief but also a reflection of structural enablers, such as resource access, credit facilities and institutional linkages, while BI functions as the primary conduit through which psychological readiness is transformed into action. The implications for practice are clear: interventions that strengthen farmers' sense of control through skill development, financial facilitation and supportive infrastructure can significantly elevate entrepreneurial intentions and ensure their translation into sustained behaviour. Thus, this study reinforces the relevance of TPB in agripreneurship research while also demonstrating that the interplay between PBC and BI provides actionable insights for designing farmer-oriented entrepreneurship programs.

This suggests that once farmers in the current setting form a clear entrepreneurial intention, behavioural realisation is more likely compared to other contexts, highlighting the effectiveness of intention-driven interventions and underscoring the centrality of PBC and BI in fostering agripreneurship.

Conclusion

The present study applied TPB to assess the entrepreneurial behaviour of coconut farmers in Krishnagiri district. This study demonstrated that PBC significantly influenced BI, while intention strongly translated into actual entrepreneurial behaviour. These results reaffirm the central role of PBC as a determinant of farmers' confidence, resource accessibility and capacity to initiate agribusiness activities. The notably high effect of BI on behaviour highlights that once farmers form a clear entrepreneurial intention, they are highly likely to act upon it, reflecting the supportive institutional environment and strong market linkages available in the study area. Collectively, the findings confirm the robustness of TPB in predicting entrepreneurial behaviour in perennial cash crops like coconut and underscore the importance of interventions that strengthen farmers' perceived control through training, financial facilitation and access to value-added opportunities. Future research could expand the framework by integrating constructs such as risk perception, social capital and innovation orientation to capture broader drivers of agripreneurship, while policymakers can use these insights to design targeted programmes that encourage and sustain entrepreneurial activity among farming communities. This study provides a clear policy direction by emphasising the need for interventions that strengthen farmers' perceived behavioural control through targeted training, credit facilitation and market infrastructure development. Such measures can translate behavioural intentions into sustained entrepreneurial actions, supporting rural livelihood resilience and agribusiness growth.

Acknowledgements

The authors would like to express their deepest gratitude to the Department of Agricultural Extension and Rural Sociology and the Department of Agricultural Economics for their invaluable guidance and support throughout this study. Special thanks are extended to Mr. J Kennady (Founder of Arasampatty Coconut Farmers Association) for helping and facilitating data collection.

Authors' contributions

MGL conceptualised, formulated the manuscript and analysed the data. AA contributed to developing the ideas, reviewed the manuscript and helped in the review. VP helped in editing and reviewing the original draft. YSK helped in summarising and statistical analysis of data. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: The authors do not have any conflicts of interest to declare.

Ethical issues: None

References

1. Food and Agriculture Organization (FAO). FAOSTAT statistical database: crops and livestock products. Rome: FAO; 2023. https://www.fao.org/faostat
2. Coconut Development Board. Coconut statistics 2023-24. Ministry of Agriculture and Farmers' Welfare, Government of India; 2024. https://coconutboard.gov.in/Statistics.aspx
3. India Brand Equity Foundation (IBEF). Indian coconut industry report. Ministry of Commerce & Industry, Government of India; 2024. https://www.ibef.org
4. Zainol FA, Arumugam N, Daud WNW, Suhaimi NAM, Ishola BD, Ishak AZ, et al. Coconut value chain analysis: a systematic

review. Agriculture. 2023;13(7):1379. https://doi.org/10.3390/agriculture13071379

5. Zainol FA, Arumugam N, Daud WNW, Suhaimi NAM, Ishola BD, Ishak AZ, et al. Coconut value chain analysis: a systematic review. Agriculture. 2023;13(7):1379. https://doi.org/10.3390/agriculture13071379
6. Tolinggi WK, Salman D, Rahmadanih, Iswoyo H. Farmer regeneration and knowledge co-creation in the sustainability of coconut agribusiness in Gorontalo, Indonesia. Open Agric. 2023;8(1):20220162. https://doi.org/10.1515/opag-2022-0162
7. Arumugam T, Hatta MAM. Improving coconut using modern breeding technologies: challenges and opportunities. Plants. 2022;11(24):3414. https://doi.org/10.3390/plants11243414
8. Mansfield S, Asigau B, van Koten C, Paudel S, Bowie M, Jackson TA, et al. Assessment of coconut palm damage caused by coconut rhinoceros beetle, *Oryctes rhinoceros* (Coleoptera: Scarabaeidae). N Z J Crop Hortic Sci. 2024;52(4):336-57. https://doi.org/10.1080/01140671.2023.2278791
9. Abbas K, Zhu Y, Yang Q. The role of entrepreneurial orientation on farmers' adoption of crop diversification under climate change: Evidence from rural Pakistan. Clim Risk Manag. 2025;100709. https://doi.org/10.1016/j.crm.2025.100709
10. Ntow TK, Wongnaa CA, Nyadu-Addo R, Addison M, Awunyo-Vitor D, Abokyi E. Effects of entrepreneurial behaviour on market outlets choice: Evidence from rice producers in Ashanti Region, Ghana. Sustain Technol Entrep. 2023;2(2):100037. https://doi.org/10.1016/j.stae.2023.100037
11. Jusoh A, Hassan AAG, Loganathan N, Kogid M, Latif HA, Zakaria NH, et al. Empowering smallholder coconut farmers through e-commerce: A preliminary study on current business models, opportunities and digital readiness in Malaysia. J Contemp Manag Stud. 2025;1(1):1-12.
12. Honlah E, Segbefia AY, Forkuo D, Abass K. The exports of dehusked coconuts from southwestern Ghana: Implications for coconut farmers' role in a rural virgin coconut oil value chain. Soc Sci Humanit Open. 2024;9:100851. https://doi.org/10.1016/j.ssaho.2024.100851
13. Ihou AFY, Paul MJ. Entrepreneurial landscape of farmers: a comprehensive review using bibliometric and systematic analysis. J Scientometr Res. 2025;14(2):1-14. https://doi.org/10.5530/jscires.20251405
14. Madhesh M, Parvathi S. Economic empowerment through coir industry: a study on production and market dynamics in Tamil Nadu's Namakkal District. J Econ Bus Issues. 2025;5(1):26-44. https://www.jebiacademic.org/index.php/jebi/article/view/116
15. Anil K, Gowda VG, Shivalingaiah Y, Pankaja H, Nandini HM. Harnessing coconut farming: entrepreneurial behaviour of growers in Hassan District, Karnataka, India. J Exp Agric Int. 2025;47(4):84-95. https://doi.org/10.9734/jeai/2025/v47i43359
16. Garima, Dhingra A, Centobelli P, Cerchione R. Factors and activities considered by first-generation agripreneurs for agribusiness sustainable development: a study of Haryana, India. Sustainability. 2023;15(9):7109. https://doi.org/10.3390/su15097109
17. Viswanathan PK. The rationalization of agriculture in Kerala: Implications for the natural environment, agro-ecosystems and livelihoods. Agrar South J Polit Econ. 2014;3(1):63-107. https://doi.org/10.1177/2277976014530232
18. Mansingh JP, Madhumithra M, Ihou AF, Nisha A, Vidhya AS, Anbarasan P. Entrepreneurial behaviour of farmers: a bibliometric analysis and systematic literature review. Multidiscip Rev. 2025;8(7):2025202. https://doi.org/10.31893/multirev.2025202
19. Vieira F, Santana HE, Jesus M, Santos J, Pires P, Vaz-Velho M, et al. Coconut waste: Discovering sustainable approaches to advance a circular economy. Sustainability. 2024;16(7):3066. https://doi.org/10.3390/su16073066
20. Divya PM, Roopa BS, Manusha C, Balannara P. A concise review on oil extraction methods, nutritional and therapeutic role of coconut products. J Food Sci Technol. 2023;60(2):441-52. https://doi.org/10.1007/s13197-022-05352-0
21. Partonezhad N, Safaei SA, Mousivand M, Ataei P. The formation of entrepreneurial behaviour among agriculture students in the academic environment: the integration of psychological and behavioural traits. Results Eng. 2025;105689. https://doi.org/10.1016/j.rineng.2025.105689
22. Thakur N, Sharma R, Thakur P, Shilpa, Chaturvedi A, Khushwaha R, et al. Exploring the entrepreneurial behaviour of vegetable growers: influential factors and implications for agricultural development. Front Sustain Food Syst. 2025;9:1512414. https://doi.org/10.3389/fsufs.2025.1512414
23. Ajzen I. The theory of planned behaviour. Organ Behav Hum Decis Process. 1991;50(2):179-211. https://doi.org/10.1016/0749-5978(91)90020-T
24. Senger I, Borges JAR, Machado JAD. Using the theory of planned behaviour to understand the intention of small farmers in diversifying their agricultural production. J Rural Stud. 2017;49:32-40. https://doi.org/10.1016/j.jrurstud.2016.10.006
25. Stauder J. Using the theory of planned behaviour to explore the intention of farmers to use livestock protection measures. Mt Res Dev. 2023;43(2):R22-30. https://doi.org/10.1659/mrd.2022.00034
26. Sok J, Borges JR, Schmidt P, Ajzen I. Farmer behaviour as reasoned action: a critical review of research with the theory of planned behaviour. J Agric Econ. 2021;72(2):388-412. https://doi.org/10.1111/1477-9552.12408
27. Che Nawi N, Mamun AA, Hassan AA, Wan Ibrahim WSA, Mohamed AF, Permarupan PY. Agro-entrepreneurial intention among university students: a study under the premises of the theory of planned behaviour. SAGE Open. 2022;12(1):21582440211069144. https://doi.org/10.1177/21582440211069144
28. Phung QA, Dao N. Farmers' perceptions of sustainable agriculture in the Red River Delta, Vietnam. Heliyon. 2024;10(7):e28576. https://doi.org/10.1016/j.heliyon.2024.e28576
29. Borges JAR, Oude Lansink AG, Ribeiro CM, Lutke V. Understanding farmers' intention to adopt improved natural grassland using the theory of planned behaviour. Livest Sci. 2014;169:163-74. https://doi.org/10.1016/j.livsci.2014.09.014
30. Menozzi D, Halawany-Darson R, Mora C, Giraud G. Motives towards traceable food choice: a comparison between French and Italian consumers. Food Control. 2015;49:40-8. https://doi.org/10.1016/j.foodcont.2013.09.006
31. Wauters E, Bielders C, Poesen J, Govers G, Mathijs E. Adoption of soil conservation practices in Belgium: an examination of the theory of planned behaviour in the agri-environmental domain. Land Use Policy. 2010;27(1):86-94. https://doi.org/10.1016/j.landusepol.2009.02.009
32. Lu M, Guo B, Li J. Using the extended theory of planned behaviour to explore the effect of farmer differentiation on their intention to revitalize idle homesteads: empirical evidence from Shaanxi, China. Sustainability. 2024;16(18):8252. https://doi.org/10.3390/su16188252
33. Shiri N, Mehdizadeh H, Khoshmaram M, Azadi H. Determinants of entrepreneurial alertness: towards sustainable agribusiness development. Br Food J. 2022;124(7):2279-98. https://doi.org/10.1108/BFJ-07-2021-0825
34. George D, Mallery P. SPSS for Windows step by step: a simple guide and reference. 11.0 update. Boston (MA): Allyn & Bacon; 2003.
35. Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Model. 1999;6(1):1-55. https://doi.org/10.1080/10705519909540118

36. Bagozzi RP, Yi Y. On the evaluation of structural equation models. J Acad Mark Sci. 1988;16(1):74-94. https://doi.org/10.1007/BF02723327

37. Adams AJ, Hodgson T. Calibration of casing/tubing design criteria by use of structural reliability techniques. SPE Drill Complet. 1999;14(1):21-7. https://doi.org/10.2118/55041-PA

38. Li J, Jiang R, Tang X. Assessing psychological factors on farmers' intention to apply organic manure: an application of the extended theory of planned behaviour. Environ Dev Sustain. 2024;26(1):2467-91. https://doi.org/10.1007/s10668-022-02829-y

39. Waiswa D, Muriithi BW, Murage AW, Ireri DM, Maina F, Chidawanyika F, et al. The role of social-psychological factors in the adoption of push-pull technology by small-scale farmers in East Africa: application of the theory of planned behaviour. Heliyon. 2025;11(1):e41449. https://doi.org/10.1016/j.heliyon.2024.e41449

40. Feisthauer P, Hartmann M, Börner J. Behavioural factors driving farmers' intentions to adopt spot spraying for sustainable weed control. J Environ Manag. 2024;353:120218. https://doi.org/10.1016/j.jenvman.2024.120218

41. Bi X, Zou W. The effect of farmers' cognition on the inconsistency between behaviour and intention in manure application. SAGE Open. 2024;14(4):21582440241286583. https://doi.org/10.1177/21582440241286583

42. Ahmed H, Ekman L, Lind N. Planned behaviour, social networks and perceived risks: understanding farmers' behaviour toward precision dairy technologies. J Dairy Sci. 2024;107(5):2968-82. https://doi.org/10.3168/jds.2023-23861

43. Batbay Ö, Kahramanoğlu İ. Using the theory of planned behaviour to understand and manage the factors affecting farmers' intention in pesticide use. Cleaner and Circular Bioeconomy. 2024;9:100126. https://doi.org/10.1016/j.clcb.2024.100126

Additional information

Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

Reprints & permissions information is available at https://horizonepublishing.com/journals/index.php/PST/open_access_policy

Publisher's Note: Horizon e-Publishing Group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Indexing: Plant Science Today, published by Horizon e-Publishing Group, is covered by Scopus, Web of Science, BIOSIS Previews, Clarivate Analytics, NAAS, UGC Care, etc
See https://horizonepublishing.com/journals/index.php/PST/indexing_abstracting

Publisher information: Plant Science Today is published by HORIZON e-Publishing Group with support from Empirion Publishers Private Limited, Thiruvananthapuram, India.