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Drivers of Goat-Coffee Integrated Farming System Adoption in East Java, Indonesia: An Extended Theory of Planned Behavior Approach

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ABSTRACT: Integrated farming systems are increasingly promoted as farm-level strategies to improve resource-use efficiency, reduce dependence on external inputs, and strengthen smallholder resilience. In coffee-based farming areas, goat–coffee integration offers a circular model in which goat manure can be processed as organic fertilizer for coffee plantations, while farm vegetation and surrounding biomass may support livestock feed availability. This study examines the behavioral determinants of farmers' intention and adoption of goat–coffee integrated farming systems in East Java, Indonesia, using an extended Theory of Planned Behavior framework. Survey data were collected from 230 coffee farmers in Madiun (n = 110) and Bondowoso (n = 120) and analyzed using partial least squares structural equation modeling with SmartPLS 3.0. The results show that the model explained 56.9% of the variance in intention and 58.1% of the variance in adoption. Attitude, subjective norms, perceived behavioral control, injunctive group norms, and descriptive group norms positively and significantly influenced intention. Adoption was directly and significantly influenced by intention, perceived behavioral control, descriptive group norms, and attitude, whereas subjective norms and injunctive group norms had no significant direct effect on adoption. All indirect effects through intention were significant. These findings indicate that adoption is shaped by both motivational and implementation-capacity pathways. Extension programs should therefore combine benefit communication, peer-based demonstration, farmer-group mobilization, and practical assistance in manure processing, feed planning, and low-labor integration practices.

KEYWORDS: goat-coffee integration, integrated farming system, Theory of Planned Behavior, farmer adoption, group norms, PLS-SEM

INTRODUCTION

Smallholder agriculture in developing countries faces increasing pressure to sustain productivity while simultaneously reducing production costs and minimizing environmental degradation(1,2). This challenge is particularly pronounced in perennial cropping systems such as coffee, where farm income is determined not only by yield and market prices but also by long-term soil fertility management. In many producing regions, farmers remain highly dependent on chemical fertilizers to maintain productivity. However, rising input costs, limited financial capital, and progressive soil degradation pose significant constraints to the sustainability of coffee-based farming systems (3,4).

At the same time, many smallholder households integrate livestock production, particularly goats, into their farming systems. Nevertheless, livestock waste is frequently underutilized and not systematically managed as an input for crop production (5). This condition reflects a structural inefficiency within smallholder farming systems and highlights the potential for developing integrated crop–livestock approaches. Goat–coffee integration offers a circular agricultural model in which crop and livestock components are functionally connected within a single production system (6). Goat manure can be processed into organic fertilizer to improve soil fertility in coffee plantations, while coffee farms and surrounding biomass provide feed resources for livestock (7,8). This integration contributes to nutrient recycling, reduced reliance on external inputs, income diversification, and improved ecological sustainability. Despite its potential benefits, the adoption of goat–coffee integrated farming systems remains uneven. Farmers may recognize the agronomic advantages of organic fertilization; however, actual implementation requires additional labor, technical capacity, and resource allocation (9). Activities such as manure collection, composting, livestock management, feed provision, and field application introduce operational complexity. Moreover, farmers often face uncertainty regarding labor requirements, economic returns, odor management, sanitation issues, and delayed productivity responses associated with organic inputs. These conditions indicate that adoption is not solely a technical decision but also a behavioral process influenced by cognitive, social, and contextual factors.

Prior research on integrated farming systems has largely focused on technical efficiency, economic profitability, and environmental performance, including nutrient cycling, productivity improvement, and income diversification. While these studies provide important insights, they do not fully explain variations in farmer adoption behavior under similar agroecological conditions (10,11). Differences in perception, confidence, social influence, and exposure to peer experience often determine whether farmers adopt or reject agricultural innovations. This highlights the need for a behavioral approach to better understand adoption dynamics in smallholder contexts.

The Theory of Planned Behavior provides a robust theoretical foundation for analyzing adoption decisions. The framework posits that behavior is driven by intention, which is shaped by attitude, subjective norms, and perceived behavioral control. Attitude reflects farmers' evaluation of goat–coffee integration in terms of perceived benefits such as soil fertility improvement, cost reduction, and long-term sustainability. Subjective norms represent perceived social pressure from relevant referents, including community members, government institutions, extension agents, and agricultural organizations. Perceived behavioral control refers to farmers' perceived ability to implement the system based on knowledge, resource access, and management capacity (12).

However, in smallholder agricultural, behavioral decisions are also strongly influenced by group-based social dynamics that extend beyond conventional subjective norms. Farmer group interactions and peer learning play a central role in shaping innovation adoption. Accordingly, this study extends the Theory of Planned Behavior by incorporating injunctive group norms and descriptive group norms. Injunctive group norms capture perceived approval from respected farmers and farmer groups, while descriptive group norms reflect perceptions of adoption behavior among peer farmers. These constructs are particularly relevant in goat–coffee integration because the practice is observable, socially transmitted, and embedded in daily farming routines.

This study applies the extended Theory of Planned Behavior to examine farmers' intention and adoption of goat–coffee integrated farming systems in Madiun and Bondowoso, East Java, Indonesia. These two regions represent smallholder coffee production areas with differing socio-economic characteristics, particularly in terms of age structure, capital utilization, and labor arrangements. Such variation provides a relevant context for analyzing behavioral differences in adoption decisions under heterogeneous farming conditions (13).

The study contributes to existing literature in three main aspects. First, it applies an extended behavioral framework specifically to goat–coffee integrated farming, moving beyond general analyses of sustainable agricultural adoption. Second, it differentiates among subjective norms, injunctive group norms, and descriptive group norms to provide a more nuanced understanding of social influence. Third, it distinguishes between intention and actual adoption behavior, enabling analysis of whether behavioral determinants operate directly or indirectly through intention.

The objectives of this study are: (1) to analyze the effects of attitude, subjective norms, perceived behavioral control, injunctive group norms, and descriptive group norms on farmers' intention; (2) to examine the effect of intention on adoption level; (3) to test the direct effects of selected determinants on adoption; and (4) to evaluate the mediating role of intention in the relationship between behavioral determinants and adoption.

METHODOLOGY

This study employed a quantitative explanatory research design to examine the behavioral determinants of farmers' intention and adoption of goat–coffee integrated farming systems in East Java, Indonesia. The study was grounded in the extended Theory of Planned Behavior (TPB) framework, incorporating attitude, subjective norms, perceived behavioral control, injunctive group norms, and descriptive group norms as exogenous variables influencing intention and adoption behavior (14,15).

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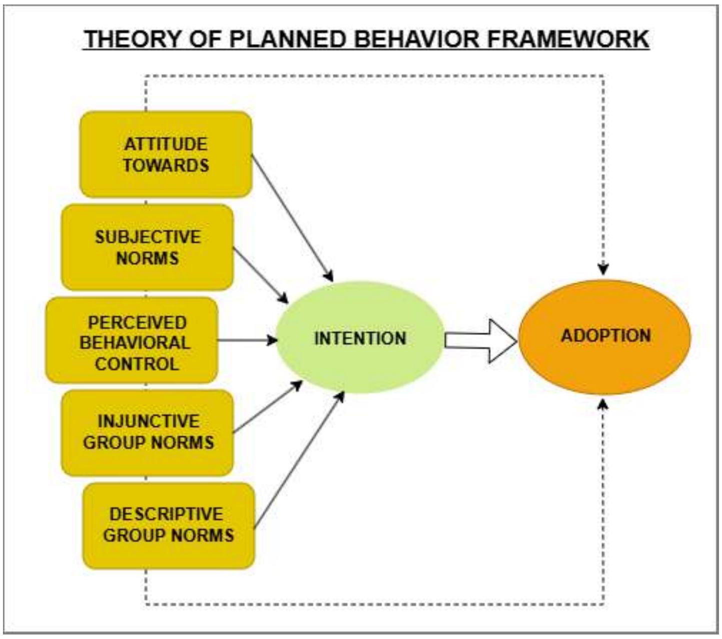

Figure I. Proposed extended TPB framework

Study Area

The research was conducted in two coffee-producing regions in East Java, Indonesia, namely Madiun and Bondowoso. These areas were selected purposively due to the presence of smallholder coffee farming systems combined with livestock ownership, particularly goats, which provide potential for integrated crop–livestock systems. The two regions also represent contrasting socio-economic and farming characteristics. Farmers in Madiun are generally older and have greater access to formal credit systems, whereas farmers in Bondowoso rely predominantly on own capital and exhibit a relatively younger age distribution. These differences allow for comparative behavioral analysis under heterogeneous farm conditions.

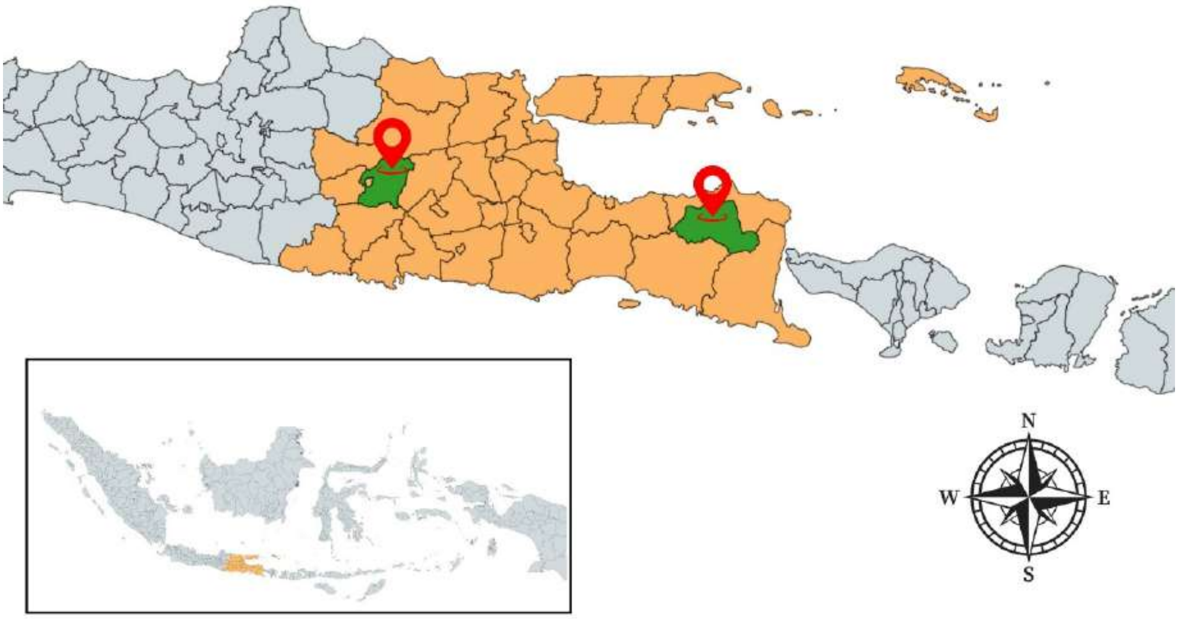

Figure II. Study Area

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Participants and Sampling Technique

The study involved 230 coffee farmers, consisting of 110 respondents from Madiun and 120 respondents from Bondowoso. Respondents were selected using a proportionate sampling approach based on farmer population distribution in each region. Eligibility criteria included active coffee farming status, ownership or management of goats, and involvement in farming decision-making at household level.

Data Collection

Primary data were collected using a structured questionnaire. The instrument captured socio-demographic characteristics (age, gender, education, capital source, farming experience, livestock ownership, labor availability, and land size) as well as behavioral constructs related to goat–coffee integration. Data collection was conducted through direct interviews with respondents to ensure clarity and accuracy, considering the relatively low formal education level of most farmers (16).

Measurement of Variables

Seven latent constructs were measured using reflective indicators: attitude, subjective norms, perceived behavioral control, injunctive group norms, descriptive group norms, intention, and adoption level. Attitude was operationalized through four indicators related to perceived soil fertility improvement, reduction in chemical fertilizer costs, long-term economic benefits, and sustainability (17,18). Subjective norms were measured using three indicators reflecting community expectations, government encouragement, and extension agent recommendations. Perceived behavioral control was measured using farmers' knowledge of goat management, access to production resources (feed, cages, and livestock inputs), and perceived capability to implement the system . Injunctive group norms were measured through perceived approval from respected farmers, farmer group acceptance, and environmental encouragement. Descriptive group norms were measured through awareness of successful adopters and motivation derived from peer success in implementing goat–coffee integration. Intention was measured using willingness, planning, and resource allocation readiness. Adoption level was measured through four stages, namely consideration, partial implementation, full integration into farming practices, and sustained application.

Table I. Measurement items

Variable	Indicator	Outer Loading	Code
Attitude Toward (19)	The goat–coffee integrated farming system can improve soil fertility in coffee plantations.	0.844	ATB1
	The goat–coffee integrated farming system can help reduce the cost of purchasing chemical fertilizers.	0.795	ATB2
	The goat–coffee integrated farming system can provide long-term economic benefits for farmers.	0.829	ATB3
	The goat–coffee integrated farming system is a profitable and sustainable farming system.	0.876	ATB4
Subjective Norms (20)	The community around me expects farmers to implement environmentally friendly farming systems.	0.846	SN1
	The government encourages farmers to implement the goat–coffee integrated farming system.	0.860	SN2
	Extension workers or agricultural organizations recommend the implementation of the goat–coffee integrated farming system.	0.861	SN3
Perceived Behavioral Control (12)	I have sufficient knowledge to understand goat management within coffee plantations.	0.864	PBC1
	I have access to the required resources, such as feed, housing, and goat breeds.	0.857	PBC2
	I feel capable of implementing the goat–coffee integrated farming system if adequate opportunities and support are available.	0.861	PBC3

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Variable	Indicator	Outer Loading	Code
Injunctive Group Norms (21)	Farmers whom I respect support the implementation of the goat–coffee integrated farming system.	0.881	IGN1
	My farmer group considers the goat–coffee integrated farming system appropriate to be implemented.	0.848	IGN2
	The farming environment provides positive encouragement for me to implement the goat–coffee integrated farming system.	0.837	IGN3
Descriptive Group Norms (22)	I am aware of farmers who have successfully implemented the goat–coffee integrated farming system.	0.908	DGN1
	The success of other farmers motivates me to try the goat–coffee integrated farming system.	0.901	DGN2
Intention (23)	I intend to implement the goat–coffee integrated farming system.	0.878	INT1
	I plan to implement the goat–coffee integrated farming system in the near future.	0.858	INT2
	I am willing to allocate resources to implement the goat–coffee integrated farming system.	0.867	INT3
Adoption (23)	I am at the stage of considering or beginning to implement the goat–coffee integrated farming system.	0.766	ADOP1
	I have tried to implement some components of the goat–coffee integrated farming system in my farming activities.	0.826	ADOP2
	The goat–coffee integrated farming system has become part of my farming practices.	0.798	ADOP3
	I implement the goat–coffee integrated farming system continuously, not merely as a temporary trial.	0.829	ADOP4

Data Analysis

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 3.0 software. The analysis followed a two-stage approach. The first stage evaluated the measurement model through indicator reliability (outer loadings), internal consistency, convergent validity, discriminant validity (cross-loadings and HTMT), and multicollinearity diagnostics. The second stage evaluated the structural model using path coefficients, t-statistics, p-values, coefficient of determination (R^2), and indirect effects (24,25).

Significance testing was conducted using bootstrapping procedures with resampling to estimate standard errors and t-values. Model fit was assessed using Standardized Root Mean Square Residual (SRMR), while multicollinearity was evaluated using inner Variance Inflation Factor (VIF). All statistical procedures were performed at a 5% significance level (26,27).

RESULTS

Respondent Characteristics

The study involved 230 coffee farmers, consisting of 110 respondents from Madiun and 120 respondents from Bondowoso. The sample was predominantly male (95.7%), while female respondents accounted for 4.3%, indicating that farming decisions in goat–coffee systems are largely controlled by male household members. Most respondents had primary education (64.8%), followed by junior secondary education (17.4%), senior secondary education (16.1%), and undergraduate education (1.7%). This indicates that extension strategies should emphasize practical, field-based, and visual learning approaches rather than formal written materials.

Regarding age distribution, the majority of farmers were above 50 years old (59.1%), followed by 30–50 years (40.4%), while only one respondent was aged 20–30 years. Madiun had a higher proportion of older farmers (75.5% >50 years), whereas Bondowoso had a higher proportion in the 30–50 age group (55.0%). In terms of capital structure, 78.7% of respondents used own capital, while 21.3% used bank loans. All respondents in Bondowoso relied on own capital, whereas 44.5% of Madiun farmers used bank financing, indicating regional differences in financial access.

Most respondents had long farming experience, with 98.3% having more than 11 years of experience. This indicates strong familiarity with coffee and livestock farming systems. Livestock ownership was dominated by medium-scale farmers (11–30 goats), representing 78.7% of respondents. Small-scale ownership accounted for 17.8%, while large-scale ownership was 3.5%.

Labor availability showed strong differences between regions. Overall, 46.1% had no hired workers. In Bondowoso, 85.8% relied on family labor only, whereas in Madiun only 2.7% had no hired labor. Landholding size was mostly between 1–2 hectares (49.1%), followed by <1 hectare (35.2%), and >2 hectares (15.7%).

Table II. Farm-level characteristics of respondents.

Indicator	Description	Madiun (n)	Madiun (%)	Bondowoso (n)	Bondowoso (%)	Total (n)	Total (%)
Gender							
Gender	Male	104	94.5%	116	96.7%	220	95.7%
	Female	6	5.5%	4	3.3%	10	4.3%
Education							
Education	No Education	0	0.0%	0	0.0%	0	0.0%
	Primary Education	61	55.5%	88	73.3%	149	64.8%
	Junior Education	34	30.9%	6	5.0%	40	17.4%
	Senior Education	15	13.6%	22	18.3%	37	16.1%
	Undergraduate	0	0.0%	4	3.3%	4	1.7%
Age							
Age	<20 years	0	0.0%	0	0.0%	0	0.0%
	20–30 years	0	0.0%	1	0.8%	1	0.4%
	30–50 years	27	24.5%	66	55.0%	93	40.4%
	>50 years	83	75.5%	53	44.2%	136	59.1%
Source of Capital							
Source of Capital	Own capital	61	55.5%	120	100.0%	181	78.7%
	Bank loan	49	44.5%	0	0.0%	49	21.3%
Business/Farming Experience							
Business/Farming Experience	<1 year	0	0.0%	0	0.0%	0	0.0%
	2–10 years	0	0.0%	4	3.3%	4	1.7%
	>11 years	110	100.0%	116	96.7%	226	98.3%
Number of Livestock							
Number of Livestock	Small scale (≤10 heads)	0	0.0%	41	34.2%	41	17.8%
	Medium scale (11–30 heads)	102	92.7%	79	65.8%	181	78.7%
	Large scale (>30 heads)	8	7.3%	0	0.0%	8	3.5%
Number of Employees							
Number of Employees	No employee	3	2.7%	103	85.8%	106	46.1%
	1 employee	34	30.9%	17	14.2%	51	22.2%

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Indicator	Description	Madiun (n)	Madiun (%)	Bondowoso (n)	Bondowoso (%)	Total (n)	Total (%)
	2 employees	36	32.7%	0	0.0%	36	15.7%
	3 employees	37	33.6%	0	0.0%	37	16.1%
Land Area							
Land Area	< 1 Ha	41	37.4%	40	33.3%	81	35.2%
	1-2 Ha	39	35.5%	74	61.7%	113	49.1%
	>2 Ha	30	27.3%	6	5.0%	36	15.7%

Measurement Model Assessment

The measurement model demonstrated satisfactory reliability and validity. All indicator loadings exceeded the recommended threshold of 0.70, ranging from 0.766 to 0.908, confirming indicator reliability across constructs. Discriminant validity was established using HTMT criteria, with all values below 0.85. The highest correlation was observed between intention and adoption (0.831), indicating acceptable discriminant validity. Model fit assessment indicated adequate results, with SRMR = 0.052. The maximum inner VIF value was 2.321, confirming that multicollinearity was not present among predictor constructs.

Structural Model Result

The structural model explained 56.9% of the variance in intention and 58.1% of the variance in adoption. The adjusted R-square values were 0.559 for intention and 0.570 for adoption. These results indicate that the extended TPB model has substantial explanatory relevance for both farmers' motivation and actual adoption level in goat-coffee integrated farming.

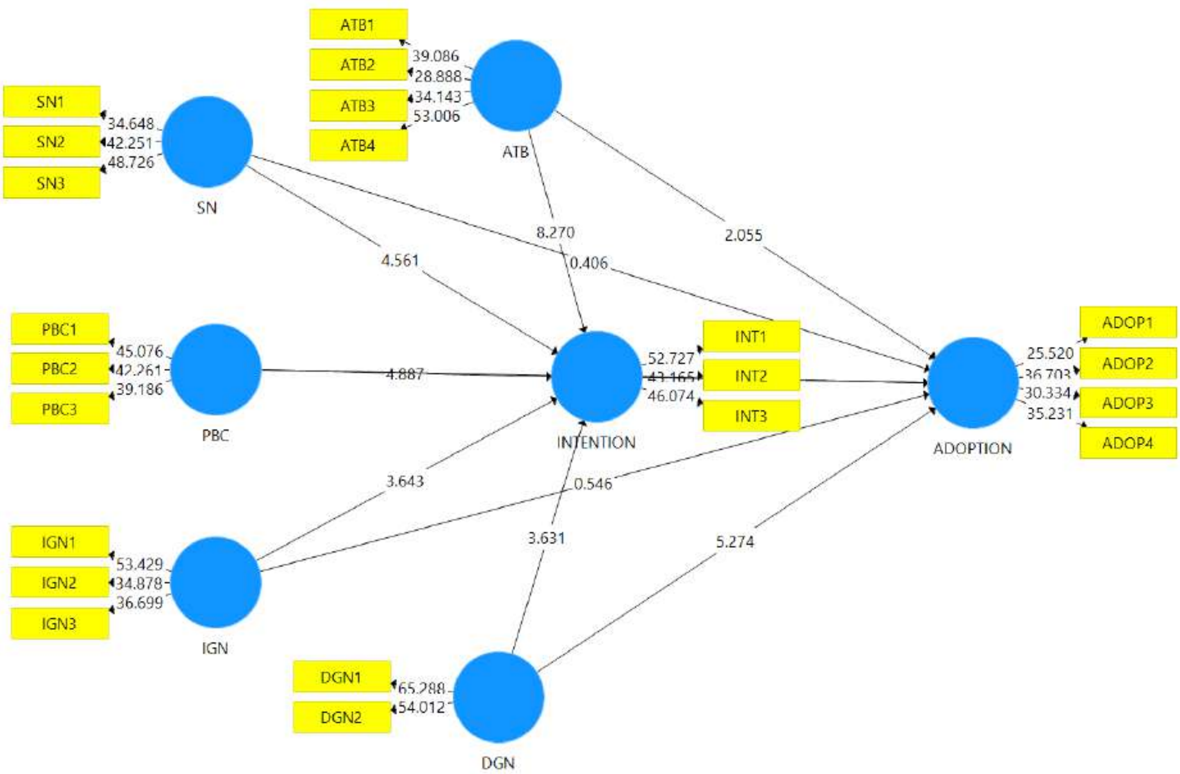

Figure III. Model Result

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Table III. Hypothesis Testing

Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
ATT -> ADOPTION	0.099	0.098	0.044	2.232	0.026**	Significant
ATT -> INTENTION	0.339	0.340	0.045	7.577	0.000***	Significant
DGN -> ADOPTION	0.238	0.235	0.048	4.979	0.000***	Significant
DGN -> INTENTION	0.169	0.167	0.046	3.666	0.000***	Significant
IGN -> ADOPTION	0.029	0.033	0.055	0.527	0.599	Not Significant
IGN -> INTENTION	0.192	0.197	0.052	3.703	0.000***	Significant
INTENTION -> ADOPTION	0.405	0.403	0.069	5.851	0.000***	Significant
PBC -> ADOPTION	0.244	0.247	0.048	5.072	0.000***	Significant
PBC -> INTENTION	0.230	0.227	0.048	4.746	0.000***	Significant
SN -> ADOPTION	0.021	0.021	0.054	0.386	0.700	Not Significant
SN -> INTENTION	0.243	0.239	0.054	4.534	0.000***	Significant
ATT -> INTENTION -> ADOPTION	0.137	0.137	0.030	4.534	0.000***	Significant
DGN -> INTENTION -> ADOPTION	0.068	0.067	0.023	2.954	0.003***	Significant
IGN -> INTENTION -> ADOPTION	0.078	0.079	0.025	3.084	0.002***	Significant
PBC -> INTENTION -> ADOPTION	0.093	0.091	0.023	4.035	0.000***	Significant
SN -> INTENTION -> ADOPTION	0.098	0.097	0.029	3.429	0.001***	Significant

The direct effect results show that all five behavioral determinants positively and significantly influenced intention. Attitude had the strongest effect on intention (beta = 0.339), followed by subjective norms (beta = 0.243), perceived behavioral control (beta = 0.230), injunctive group norms (beta = 0.192), and descriptive group norms (beta = 0.169). These findings indicate that farmers' intention is shaped by practical benefit evaluation, social encouragement, perceived implementation capacity, group approval, and visible peer success. Adoption was directly and significantly influenced by intention (beta = 0.405), perceived behavioral control (beta = 0.244), descriptive group norms (beta = 0.238), and attitude (beta = 0.099). Subjective norms (beta = 0.021, p = 0.700) and injunctive group norms (beta = 0.029, p = 0.599) did not have significant direct effects on adoption. Thus, broad social pressure and group approval are sufficient to strengthen intention, but they do not directly translate into adoption unless they are converted into implementable plans and practical capacity.

The mediation analysis showed that intention significantly mediated all indirect relationships between behavioral determinants and adoption. Attitude had the strongest indirect effect on adoption through intention (beta = 0.137), followed by subjective norms (beta = 0.098), perceived behavioral control (beta = 0.093), injunctive group norms (beta = 0.078), and descriptive group norms (beta = 0.068). These results confirm that farmers' positive evaluation, perceived ability, social encouragement, group approval, and peer examples influence adoption partly by strengthening intention. The results also show different adoption mechanisms across determinants. Perceived behavioral control and descriptive group norms influenced adoption both directly and indirectly, indicating that capacity and peer-based evidence are especially important for implementation. Subjective norms and injunctive group norms influenced adoption only through intention, meaning that institutional encouragement and group approval must be translated into concrete adoption plans before they affect actual practice.

DISCUSSION

Attitude as a Benefit-Based Driver of Behavioral Adoption

The results confirm that attitude is the most dominant predictor of farmers' intention and also exerts a significant direct effect on adoption. This finding is consistent with the Theory of Planned Behavior, which positions attitude as a primary cognitive determinant of behavioral intention. In agricultural adoption literature, positive attitude has consistently been associated with increased adoption likelihood, particularly when farmers perceive clear economic and agronomic benefits(28).

In the context of goat–coffee integration, farmers' attitude is primarily shaped by perceived improvements in soil fertility, reduction in chemical fertilizer dependency, and long-term income stability. Goat manure is perceived as an accessible and low-cost input that can be transformed into organic fertilizer, reinforcing the perception of economic efficiency. This aligns with previous findings in integrated crop–livestock systems, where resource circularity significantly strengthens farmers' positive evaluation of innovation.

However, the relatively smaller direct effect of attitude on adoption compared to intention and perceived behavioral control indicates that cognitive evaluation alone is insufficient to drive implementation. Similar findings were reported by (29), who emphasized that favorable perception must be accompanied by operational feasibility in smallholder systems. In this study, adoption requires additional constraints such as labor allocation, manure processing capability, and livestock management skills. Therefore, attitude functions primarily as a motivational trigger rather than an execution driver.

Perceived Behavioral Control and Implementation Feasibility

Perceived behavioral control significantly influences both intention and adoption, confirming its role as a key determinant of actual behavioral execution. This suggests that farmers' perceived capability is essential in translating behavioral intention into real implementation. In goat–coffee integration, perceived behavioral control reflects farmers' access to knowledge, livestock management skills, feed availability, and supporting infrastructure such as cages and composting facilities. The system requires dual management of crops and livestock, which increases operational complexity compared to conventional farming systems. Farmers with higher perceived control are more likely to implement the system effectively (30,31).

Differences in field conditions further support this mechanism. In areas where farmers rely heavily on family labor, adoption depends on labor efficiency and simplicity of implementation. In contrast, farmers with better access to hired labor and financial capital may face fewer operational constraints but greater attention to financial risk and investment decisions (32,33). This shows that perceived behavioral control is highly context-sensitive in influencing adoption behavior.

Social Influence and Multi-Layer Normative Structure

The findings show that subjective norms, injunctive group norms, and descriptive group norms significantly influence intention, confirming the importance of social structure in smallholder decision-making. This is consistent with TPB extensions in agricultural adoption studies, which highlight that farmers' decisions are strongly embedded in social networks and institutional environments (34,35). However, only descriptive group norms significantly affect adoption directly, while subjective norms and injunctive group norms influence adoption indirectly through intention. This suggests that normative pressure alone is insufficient for behavioral execution unless supported by observable evidence. This finding aligns with Rogers' Diffusion of Innovations theory (2003), which emphasizes that observational learning and visible success reduce uncertainty and accelerate adoption (36). Descriptive group norms representing peer success and observable adoption play a more operational role because they reduce perceived risk and provide behavioral templates. Farmers are more likely to adopt when they can directly observe successful implementation within their social environment. This strengthens the argument that demonstration-based learning is more effective than normative persuasion alone (37).

Intention as a Central Mediating Mechanism

Intention was found to be the strongest direct predictor of adoption and mediates all indirect relationships between exogenous variables and adoption. Similar results have been reported in sustainable agriculture adoption studies, where intention acts as a behavioral bridge between perception and action. However, the results also show that adoption is not fully explained by intention, as perceived behavioral control, attitude, and descriptive group norms exert additional direct effects. This indicates partial mediation

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and suggests that behavioral execution depends on both psychological readiness and enabling conditions. This pattern is consistent with integrated adoption models in agriculture that combine TPB with structural constraint theory.

Theoretical Contribution and Novelty

This study contributes to behavioral adoption literature by demonstrating that adoption in integrated farming systems is influenced by a combination of cognitive evaluation, perceived capability, and social learning mechanisms.

The results highlight that different types of social influence operate through different pathways. While subjective and injunctive norms primarily shape intention, descriptive norms influence both intention and adoption directly. This distinction provides a more precise understanding of how social environments affect agricultural decision-making (38,39).

In addition, the findings show that intention alone is insufficient to explain adoption behavior in complex farming systems. Adoption emerges from the interaction between motivational factors, behavioral capability, and observable peer experience.

Practical and Policy Implications

The findings have important implications for agricultural extension and rural development policy. First, extension programs should not only emphasize the benefits of goat–coffee integration but also strengthen farmers' perceived behavioral control through hands-on training in manure processing, livestock management, and organic fertilizer application. Second, farmer group-based interventions should be strengthened. Farmer groups should function not only as communication channels but also as operational platforms for compost production, demonstration plots, and peer learning systems (40–42).

Third, policy interventions should be location-specific. In Madiun, where farmers have better access to capital and labor, strategies should emphasize financial feasibility, investment risk management, and return-on-investment clarity. In Bondowoso, where labor is predominantly family-based, strategies should focus on low-cost and labor-efficient adoption models. At the policy level, goat–coffee integration can be positioned as a circular agriculture strategy that supports fertilizer reduction programs, soil health improvement, and livestock waste utilization policies (43,44).

Limitations and Future Research

This study has several limitations. First, the cross-sectional design limits the ability to capture dynamic behavioral changes from intention to long-term adoption. Future research should employ longitudinal designs to track adoption sustainability over time. Second, the study is limited to two regions in East Java, which may restrict generalizability to other agroecological contexts. Future studies should expand to other coffee-producing regions to validate the model. Third, the model does not include external structural variables such as market access, extension intensity, infrastructure availability, and climate variability, which may also influence adoption decisions. Future research should integrate behavioral models with institutional and environmental constraints to provide a more comprehensive adoption framework.

CONCLUSION

The study examined the behavioral determinants of goat–coffee integrated farming adoption in Madiun and Bondowoso, East Java, using an extended Theory of Planned Behavior framework. The findings confirm that attitude, subjective norms, perceived behavioral control, injunctive group norms, and descriptive group norms significantly influence farmers' intention to adopt the system. Intention is further confirmed as a significant predictor of adoption. In addition, perceived behavioral control, descriptive group norms, and attitude have direct effects on adoption, while subjective norms and injunctive group norms do not directly influence adoption. Overall, the results indicate that adoption of goat–coffee integrated farming is driven by a combination of motivational, capability-based, and social learning factors. Farmers' behavioral intention acts as the primary mechanism linking psychological and social determinants to actual adoption, while perceived behavioral control and descriptive group norms strengthen the translation of intention into implementation.

The study contributes to the understanding that agricultural adoption in integrated farming systems is not purely a technical decision but a behavioral process shaped by both internal perceptions and external social environments. This highlights the importance of aligning behavioral motivation with practical implementation capacity to support adoption.

From a practical perspective, extension programs should integrate benefit communication, technical capacity building, and farmer group-based demonstration approaches. Location-specific strategies are also required to accommodate differences in resource availability and labor conditions across regions. The study is limited by its cross-sectional design and geographic scope. Future

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research should employ longitudinal approaches and incorporate additional structural factors such as institutional support, market access, and farm-level economic outcomes to provide a more comprehensive understanding of adoption behavior.

REFERENCES

1. Chatterjee D, Kuotsu R, Ray SK, Patra MK, Thirugnanavel A, Kumar R, et al. Preventing soil degradation in shifting cultivation using integrated farming system models. Arch Agron Soil Sci. 2022 Nov 10;68(13):1841–57. doi:10.1080/03650340.2021.1937139
2. Popradit A, Nakhokwik Y, Robischon M, Saiki ST, Yoshimura J, Wanasiri A, et al. Soil degradation and herbicide pollution by repeated cassava monoculture within Thailand's conservation region. PLoS One. 2024 Aug 6;19(8):e0308284. doi:10.1371/journal.pone.0308284
3. Cui H, Hou SN, Wang XY, Zhu H. Organic fertilizer-mediated cultivated land conservation and pollution source control in agricultural ecosystem, Northeast China. Environ Technol Innov. 2025;37(December 2024):103945. doi:10.1016/j.eti.2024.103945
4. Fan P, Mishra AK, Feng S, Su M. The effect of agricultural subsidies on chemical fertilizer use : Evidence from a new policy in China. J Environ Manage. 2023;344(May):118423. doi:10.1016/j.jenvman.2023.118423
5. Shanmugam PM, Sangeetha SP, Prabu PC, Varshini S V., Renukadevi A, Ravisankar N, et al. Crop–livestock-integrated farming system: a strategy to achieve synergy between agricultural production, nutritional security, and environmental sustainability. Front Sustain Food Syst. 2024;8. doi:10.3389/fsufs.2024.1338299
6. Ginting A, Purba E, Chalil D, Diana N. Contribution of coffee farming and goat livestock based integration in Karo regency, north Sumatra province. IOP Conf Ser Earth Environ Sci. 2025;1441(1). doi:10.1088/1755-1315/1441/1/012011
7. Hida DAN, Rachmina D, Rifin A. Optimizing the Integrated Farming System of Coffee and Goat to Maximize Farmers' Income in North Sumatra, Indonesia. Agro Bali : Agricultural Journal. 2023;6(1):29–39. doi:10.37637/ab.v6i1.1147
8. Siswanto Y, Sumartono I, Kurniawan D. Effectiveness Of Eco Farming Photosynthesis Fertilizer and Goat Manure Fertilizer on The Vegetative Growth of Coffee Plant Seedlings (Coffea Sp). Vol. 1. 2024;1(3):329–40. doi:10.30596/jitcse
9. Maxiselly Y, Chiarawipa R, Somnuk K, Hamchara P, Cherdthong A, Suntara C, et al. Digestibility, Blood Parameters, Rumen Fermentation, Hematology, and Nitrogen Balance of Goats after Receiving Supplemental Coffee Cherry Pulp as a Source of Phytochemical Nutrients. Vet Sci. 2022;9(10). doi:10.3390/vetsci9100532
10. Kakamoukas G, Sarigiannidis P, Maropoulos A, Lagkas T, Zaralis K, Karaiskou C. Towards Climate Smart Farming—A Reference Architecture for Integrated Farming Systems. Telecom. 2021;2(1):52–74. doi:10.3390/telecom2010005
11. Singh VK, Rathore SS, Singh RK, Upadhyay PK, Shekhawat K. Integrated farming system approach for enhanced farm productivity, climate resilience and doubling farmers' income. Indian Journal of Agricultural Sciences. 2020;90(8):1378–88. doi:10.56093/ijas.v90i8.105884
12. Yang C, Zhang Y, Xue Y, Wang J, Zhang X. Exploring differences of farmers' intention to adopt agricultural low-carbon technologies: an application of TPB and VBN combination. Environ Dev Sustain. 2024 Feb 22;27(5):11023–46. doi:10.1007/s10668-023-04342-2
13. Notaro M, Gary C, Le Coq JF, Metay A, Rapidel B. How to increase the joint provision of ecosystem services by agricultural systems. Evidence from coffee-based agroforestry systems. Agric Syst. 2022;196(March 2021). doi:10.1016/j.agsy.2021.103332
14. Bonke V, Musshoff O. Understanding German farmer's intention to adopt mixed cropping using the theory of planned behavior. Agron Sustain Dev. 2020 Dec 9;40(6):48. doi:10.1007/s13593-020-00653-0
15. Dey S, Singh PK. Estimating farmers' intention towards institutional credit adoption by using extended theory of planned behavior. J Appl Soc Psychol. 2023 Jul 2;53(7):684–703. doi:10.1111/jasp.12952
16. Govindasamy P, Cumming TM, Abdullah N. Validity and reliability of a needs analysis questionnaire for the development of a creativity module. Journal of Research in Special Educational Needs . 2024;24(3):637–52. doi:10.1111/1471-3802.12659
17. Putri SN, Hartono B, Putritamara JA, Satria AT, Purwanti TS. Does Socio-Economics Factor Influence Beef Cattle Farmers' Ability to Adapt to Climate Change? Jurnal Ilmu-Ilmu Peternakan. 2023 Dec 1;33(3):308–26. doi:10.21776/ub.jiip.2023.033.03.02

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18. Rahman MS, Huang WC, Toiba H, Putritamara JA, Nugroho TW, Saeri M. Climate change adaptation and fishers' subjective well-being in Indonesia: Is there a link? Reg Stud Mar Sci. 2023 Oct;63:103030. doi:10.1016/j.rsma.2023.103030
19. Jalilian N, Mohammadi Y, Mahdei KN, Nael M, Neaman A. Land ownership rights enhance farmers' attitudes toward soil and soil conservation behavior: Insights from Iran Title Page (with Author Details). J Environ Manage. 2025;392(June):126821. doi:10.1016/j.jenvman.2025.126821
20. Mohammadrezaei M, Meredith D, McNamara J. Subjective norms influence advisors' reluctance to discuss farm health and safety. The Journal of Agricultural Education and Extension. 2023 Oct 20;29(5):627–51. doi:10.1080/1389224X.2022.2125410
21. Foolen-Torgerson KL, Sok J, Dicke M, Oude Lansink AGJM. Deciphering arable farmers' intentions: Attitudes, norms, perceived advantages, and the influential role of group discussions on insect frass adoption. NJAS: Impact in Agricultural and Life Sciences. 2025 Dec 31;97(1). doi:10.1080/27685241.2025.2501385
22. Tran-Nam Q, Tiet T. The role of peer influence and norms in organic farming adoption: Accounting for farmers' heterogeneity. J Environ Manage. 2022 Oct;320:115909. doi:10.1016/j.jenvman.2022.115909
23. Takahashi K, Muraoka R, Otsuka K. Technology adoption, impact, and extension in developing countries' agriculture: A review of the recent literature. Agricultural Economics. 2020 Jan 4;51(1):31–45. doi:10.1111/agec.12539
24. Putritamara JA, Satria AT, Purwanti TS, Habsari IK. Driving Innovation on the Farm: How Integrative Leadership and Absorptive Capacity Translate Social Network Site Use into Performance in the Indonesian Dairy Sector. Adv Anim Vet Sci. 2025 Nov 20;13(11). doi:10.17582/journal.aavs/2025/13.11.2508.2523
25. Aghniarahim Putritamara J, Hartono B, Kamilia Hapsari I, Tri Satria A, Sri Purwanti T. Psychological resilience of dairy farmers, life satisfaction, and the moderating role of age; Is there a link? BIO Web Conf. 2023 Dec 19;81:00023. doi:10.1051/bioconf/20238100023
26. Hair JF, Risher JJ, Sarstedt M, Ringle CM. When to use and how to report the results of PLS-SEM. European Business Review. Emerald Group Publishing Ltd.; 2019. p. 2–24. doi:10.1108/EBR-11-2018-0203
27. Wang H, Lu S, Liu Y. Missing data imputation in PLS-SEM. Qual Quant. 2022 Dec 19;56(6):4777–95. doi:10.1007/s11135-022-01338-4
28. Khalili F, Choobchian S, Abbasi E. Investigating the factors affecting farmers' intention to adopt contract farming. Sci Rep. 2024;14(1):1–16. doi:10.1038/s41598-024-60317-x PubMed PMID: 38671140.
29. Boye M, Ghafoor A, Wudil AH, Usman M, Prus P, Fehér A, et al. Youth Engagement in Agribusiness: Perception, Constraints, and Skill Training Interventions in Africa: A Systematic Review. Sustainability (Switzerland). 2024;16(3). doi:10.3390/su16031096
30. Sellare J, Meemken EM, Kouamé C, Qaim M. Do Sustainability Standards Benefit Smallholder Farmers Also When Accounting For Cooperative Effects? Evidence from Côte d'Ivoire. Am J Agric Econ. 2020;102(2):681–95. doi:10.1002/ajae.12015
31. Ruben R. What Smallholders Want: Effective Strategies for Rural Poverty Reduction. Sustainability (Switzerland) . 2024;16(13). doi:10.3390/su16135525
32. Li C, Ge Z, Dai L, Chen Y. Integrated Application of Biofloc Technology in Aquaculture: A Review. Water (Basel). 2025 Jul 15;17(14):2107. doi:10.3390/w17142107
33. Mujahed BA, Singh J, Saqib A. Integrated farming system: Trends, advantages and constraints - A review. RASSA Journal of Science for Society. 2023;5(2and3):65–9. doi:10.5958/2583-3715.2023.00011.4
34. van den Berg H, Phillips S, Dicke M, Fredrix M. Impacts of farmer field schools in the human, social, natural and financial domain: a qualitative review. Food Secur. 2020;12(6):1443–59. doi:10.1007/s12571-020-01046-7
35. McGuire E, Al-Zu'bi M, Boa-Alvarado M, Luu TTG, Sylvester JM, Leñero EMV. Equity principles: Using social theory for more effective social transformation in agricultural research for development. Agric Syst. 2024;218(May). doi:10.1016/j.agsy.2024.103999
36. Dachs B, Stehrer R, Wolfmayr A. Global value chains , technology sovereignty and the role of China in international knowledge diffusion. 2025;753–73.

37. Eugenio J, Alba G De, Londero L, André B, Deggau B. Proposal for a social certification model for agriculture in Latin America aligned with the sustainable development goals. Environment, Development and Sustainability [Internet]. Springer Netherlands; 2024. Available from: https://doi.org/10.1007/s10668-024-05343-5 doi:10.1007/s10668-024-05343-5
38. Barnes AP, McCalman H, Buckingham S, Thomson S. Farmer decision-making and risk perceptions towards outwintering cattle. J Environ Manage. 2013;129:9–17. doi:10.1016/j.jenvman.2013.05.026 PubMed PMID: 23792885.
39. Svenson F, Peuser M, Çetin F, Aidoo DC, Launer MA. Decision-making styles and trust across farmers and bankers: Global survey results. Decision Analytics Journal. 2024;10(4):100427. doi:10.1016/j.dajour.2024.100427
40. Hołaj-Krzak JT, Konieczna A, Borek K, Gryszkiewicz-Zalega D, Sitko E, Urbaniak M, et al. Goat Manure Potential as a Substrate for Biomethane Production—An Experiment for Photofermentation. Energies (Basel). 2024;17(16). doi:10.3390/en17163967
41. Washaya S, Washaya DD. Benefits, concerns and prospects of using goat manure in sub-Saharan Africa. Pastoralism. 2023;13(1). doi:10.1186/s13570-023-00288-2
42. Hoyos-Sebá JJ, Arias NP, Salcedo-Mendoza J, Aristizábal-Marulanda V. Animal manure in the context of renewable energy and value-added products: A review. Chemical Engineering and Processing - Process Intensification. 2024;196(October 2023). doi:10.1016/j.cep.2023.109660
43. Nugroho E, Fithron Z ul R, Dwiyanti R. Toward The Circular Economy Through Integrated Chicken and Catfish Farming in East Java, Indonesia. In. 2025. p. 250–7. doi:10.2991/978-94-6463-880-6_28
44. Zanten HHE Van, Simon W, Selm B Van, Wacker J, Maindl TI, Frehner A, et al. Circularity in Europe strengthens the sustainability of the global food system. Vol. 4. 2023;4(April). doi:10.1038/s43016-023-00734-9

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