International Information and Engineering Technology Association
Advancing the World of Information and Engineering

Gap in Intentions and Behaviors as a Problem to be Solved in Preserving the Environment: A Study of the Development of the Kalimuru Tree (Litsea velutina)

Endah Novitarini[1], Mohamad Harisudin[2*], Kusnandar[2], Agoes Thony[3]

[1] Doctoral Student, Agricultural Science Program, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[2] Agribusiness Study Program, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[3] Agribusiness Study Program, Faculty of Agriculture, Universitas Sjakhyakirti, Palembang 30151, Indonesia

Corresponding Author Email: mohamad_h@staff.uns.ac.id

ABSTRACT

The Kalimuru tree (*Litsea velutina*) is an endemic species in West Nusa Tenggara Province whose development remains limited, despite its considerable ecological and economic potential. This study examines the behavioural mechanisms underlying farmers' decisions to develop Kalimuru trees by applying Behavioral Reasoning Theory (BRT). An explanatory quantitative research design was employed and supported by qualitative insights. Primary data were collected through structured questionnaires, interviews, and field observations involving 315 Kalimuru farmers in North Lombok and West Lombok Regencies. The proposed research model integrates values (X1), reasons for (X2), reasons against (X3), global motives (X4), intention (X5), farmers' actual behaviour (Y), and the moderating role of environmental benefits (Z), and was empirically tested using SEM-PLS. The findings indicate that values do not exert a direct influence on reasons, global motives, or farmers' behaviour, suggesting that values function as a relatively stable normative background. In contrast, reasons play a significant role in shaping global motives and intentions, but are not directly translated into behaviour. Notably, reasons against demonstrate a dynamic role by significantly strengthening global motives and farmers' behaviour, while exerting no significant effect on intention. Furthermore, global motives significantly influence intention, and intention emerges as the strongest predictor of behaviour, confirming that the intention–behaviour gap primarily occurs at the post-intention stage. Environmental benefits significantly moderate the relationship between reasons and intention by strengthening supportive reasons and weakening inhibiting ones.

1. INTRODUCTION

Dryland ecosystems in West Nusa Tenggara Province (NTB) are highly vulnerable to environmental degradation due to intensive agricultural practices, land-use changes, and the increasing impacts of climate change [1]. One strategic approach to addressing these challenges is environmental restoration through the cultivation and development of local plant species that provide both ecological and economic benefits [2, 3]. Among such species, the Kalimuru tree (*Litsea velutina*), an endemic plant in West Nusa Tenggara Province, plays a crucial ecological role in maintaining ecosystem stability, improving soil quality, and supporting land conservation [4]. In addition to its ecological functions, Kalimuru also holds potential to be developed as a regional flagship community, contributing to livelihood diversification and the welfare of farming communities [5, 6].

The successful development of Kalimuru cultivation is closely linked to farmers' environmentally responsible behaviour and their willingness to adopt conservation-oriented practices [2, 3, 7]. Understanding the behavioural factors that shape farmers' engagement in Kalimuru tree cultivation is therefore essential. Previous studies have shown that individual values play a crucial role in shaping pro-environmental behaviour among farmers [8-10]. However, values alone are often insufficient to explain actual behaviour, particularly in a context characterized by economic risk and structural constraints [11].

Beyond values, empirical evidence suggests that reasons and global motives, including attitudes, subjective norms, and perceived behavioral control, are key determinants of behavioral responses [12-15]. Within this context, reason can be distinguished into reasons for (arguments supporting adoption) and reasons against (arguments discouraging adoption), both of which play an essential role in shaping individual behaviour and decision-making processes [16, 17]. Values and reasons further influence attitudes, as values provide a fundamental normative framework, while reasons enable individuals to rationalize their actions, leading to either positive or negative attitudes toward specific behaviors [15,

18-20].

Behavioral Reasoning Theory (BRT) is a relatively recent theoretical framework that extends and refines the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA) [12, 18, 21]. While TPB and TRA focus primarily on factors driving behavioural acceptance, they tend to overlook resistance, hesitation, or opposition to particular behaviours [22-25]. BRT addresses this limitation by explicitly incorporating reasons for and against as a central explanatory mechanism in the decision-making process [26]. These two types of reasons are not merely opposites in valence but represent distinct cognitive justifications that may exert different effects on intention and behaviour [19, 27]. Moreover, BRT emphasized the role of values and beliefs as distal antecedents that shape reason, intention, and behaviour through context-specific cognitive processes [14, 28, 29].

The BRT framework has been widely applied across various research domains, including leadership decision-making making [30], beliefs behavior relationship [9], Industry 4.0 adoption in economic development [30], green consumption behaviour [24, 31], digital marketing [32], sustainable food purchasing [33-35], electronic waste management [20, 36-38], food waste reduction [38, 39]. Local food consumption [40-42], organic food purchasing decision [33, 43], agricultural drought risk assessment [44], brand attachment to natural products [16], farmers' adoption of drought insurance [18], and suboptimal food purchasing behaviour [41]. However, to the best of the authors' knowledge, no prior studies have examined the role of reasons for and against in explaining farmers' intentions and behaviors related to the cultivation of Kalimuru trees as part of environmental conservation efforts.

In the context of pro-environmental behaviour, numerous studies have identified the existence of an intention-behaviour gap, which refers to a condition in which individuals hold strong intentions to perform a particular action. Yet, these intentions are not fully translated into actual behaviour [11, 45, 46]. This gap often arises due to structural constraints, limited resources, economic risk, as well as institutional and social factors that restrict individuals' ability to realize their intention in practice [4, 7, 47]. In the sustainable forestry and agriculture sector, the intention-behaviour gap constitutes a critical issue, as the success of conservation programs largely depends on farmers' actual behavioural change in the field rather than merely on the formation of positive attitudes or intentions.

This study addresses this gap by applying BRT to analyze farmers' behaviour in cultivating Kalimuru trees in West Nusa Tenggara Province. BRT provides a comprehensive framework for understanding farmers' intentions and behaviours by examining the interrelationship among values, reasons for, reasons against, global motives, intention, and behaviour, while also considering the moderating role of perceived environmental benefit [14, 20]. Furthermore, BRT explains how farmers justify and maintain their behavioral choices in the presence of competing motivations and constraints [14].

Accordingly, this study aims to understand farmers' behaviour in cultivating Kalimuru trees in West Nusa Tenggara Province by exploring the factors that influence farmers' reasons for and reasons against in explaining their intentions/values and behaviors to develop Kalimuru cultivation, using BRT as the main analytical framework [9, 28]. BRT emphasises that individuals' behavioural decisions are shaped by comparative reasoning processes that integrate supportive and inhibitory reasons, which in turn influence global motives and intentions [14, 27]. Practically, the findings of this study are expected to provide insights into the intention-behavior gap, rational considerations, and barriers faced by farmers in West Nusa Tenggara [11, 31]. Such insights can serve as an empirical basis for formulating more adaptive and context-sensitive strategies for the development of Kalimuru. Thus, the development of Kalimuru trees not only supports the restoration of degraded land but also contributes to improving farmers' welfare through environmentally oriented and community-based approaches [28, 41, 48].

The novelty of this study lies in the first empirical application of BRT in the context of forestry plant development, particularly the cultivation of the endemic Kalimuru tree (*Litsea velutina*) in the area surrounding Mount Rinjani, West Nusa Tenggara Province. The main innovative element of this research is the identification of the intention-behaviour gap mechanism, demonstrating that reason (reason for and reason against) significantly shape global motives and intention, yet remain insufficient to explain farmers' actual behaviour directly [31]. This study adopts a farmer behaviour-based approach grounded in BRT by integrating values, reasons for, reasons against, global motives, intention, behaviour and the moderating role of environmental benefit, which are subsequently analysed using SEM-PLS [12, 27, 49-51]. The research focuses on understanding farmers' behaviour in developing Kalimuru trees as part of environmental conservation efforts and community-based sustainable plant management in West Nusa Tenggara Province [2, 41, 49, 52].

2. LITERATURE REVIEW

2.1 Kalimuru tree (*Litsea vvelutina*)

The plant species examined in this study was the Kalimuru tree (*Litsea velutina*), an endemic forestry species of West Nusa Tenggara Province. The Kalimuru tree belongs to the genus Litsea within the Lauraceae family, which primarily consists of tree and shrub species distributed in tropical and subtropical ecosystems [53, 54]. The genus Litsea comprises approximately 200-400 species, with the majority originating from Asia, while others are distributed across Australia, the Pacific, and to a lesser extent, the Americas [54, 55].

The Kalimuru tree (*Litsea velutina*) offers a wide range of benefits derived from its stem, leaves, and processing residues, which can be further developed into various value-added products. The Kalimuru tree has been widely utilized by local communities in West Nusa Tenggara Province as a source of timber, traditional medicine, and for its high economic value [53, 55]. The industrial applications include furniture production and essential oil extraction for aromatherapy and wellness products [54].

(a) Fruit and leaves of Kalimuru trees

(b) Kalimuru tree

Figure 1. Kalimuru tree

From an ecological perspective, Kalimuru is well-suited for conservation and reforestation programs, particularly on marginal and mountainous lands, due to its adaptive characteristics and contribution to soil protection and ecosystem stability [2, 3]. These attributes highlight the strategic importance of Kalimuru as a multipurpose forestry species that integrates environmental conservation with local economic development. An illustration of the Kalimuru tree is presented in Figure 1.

2.2 Theoretical Behavioral Reasoning Theory (BRT)

This study adopts BRT as the theoretical foundation for data analysis. Previous studies on farmers' intentions and behaviors in the agricultural and forestry sector have been extensively examined using behavioral theories, particularly the TPB [7, 21-25, 56], the TRA [11, 57], and hybrid models combining TPB and BRT [10, 18, 24]. Although these theories help explain farmers' behavioral intentions, they do not explicitly incorporate the role of reasons for and against behavior within a comprehensive theoretical framework, especially in the context of Kalimuru tree development.
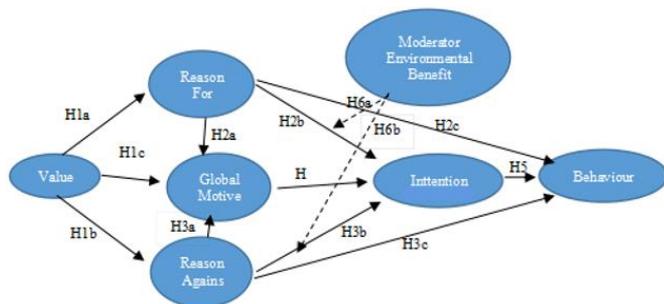

Figure 2. Research model based on Behavioral Reasoning Theory
Source: Westaby [13], Tandon et al. [17], Dhir et al. [20]

Integrating behavioral reasoning with farmers' intentions to cultivate Kalimuru trees is essential, as it provides richer cognitive explanations for understanding both intention formation and actual behavior [26]. The main advantage of BRT lies in its more comprehensive structure, which explicitly considers personal values and beliefs, as well as reasons for and against, as antecedents of global motives, including attitudes, subjective norms, and perceived behavioral control [57, 58]. Accordingly, BRT was employed in this study to

explain the intensity of farmers' behavior in cultivating Kalimuru trees by integrating motivational and inhibiting factors within an unfield analytical framework. The proposed research model, based on BRT, is illustrated in Figure 2.

3. METHODOLOGY

3.1 Research design

This study employed an explanatory quantitative research design to examine the behavioral mechanisms influencing farmers' decisions to develop Kalimuru trees. The research aimed to explain the causal relationship among behavioral determinants and actual adoption behavior by integrating BRT as the primary theoretical framework [14, 27]. A survey-based approach was applied to collect primary data from farmers cultivating Kalimuru trees in North Lombok Regency and West Lombok Regency. This approach enabled the systematic measurement of latent constructs related to farmers' values, reasons for and against adoption, global motives, intentions, and actual behavior [14, 15, 18].

The proposed research model was empirically tested using Structural Equation Modeling with Partial Least Squares (SEM-PLS). This analytic technique was selected due to its suitability for analyzing complex behavioral models with latent variables and its robustness when applied to heterogeneous samples, as well as its strong predictive capability in exploratory and theory extension research [51, 59]. Accordingly. The research design was appropriate for explaining the intention-behavior gap in the adoption of Kalimuru trees as a forestry crop [11, 60].

3.2 Research location

The research location was determined based on the distribution of the Kalimuru tree vegetation. Accordingly, the study was conducted in West Nusa Tenggara Province, covering two regencies: North Lombok Regency and West Lombok Regency. These locations were selected due to their ecological suitability for Kalimuru tree growth and their representativeness of the dynamics of community-based forestry management outside designated forest areas [48, 55].

In North Lombok Regency, four subdistricts were selected as the study sites, namely Bayan, Gangga, Pemenang, and Kayangan. Meanwhile, three subdistricts were designated in West Lombok Regency, namely Gunung Sari, Lingsar, and Narmada [53, 55, 61]. The geographical distribution of the study area is presented in Figures 3(a) and 3(b).

3.3 Sampling technique

The population in this study was distributed across two relatively large areas, namely North Lombok Regency and West Lombok Regency. Therefore, *cluster random sampling* was employed as the initial sampling technique to account for geographical dispersion and administrative clustering of respondents [59, 62]. To ensure adequate population representation, the sample size was determined using Slovin's formula. This is commonly applied in social and agricultural research when the population variance is unknown [59]. Based on data obtained from UPTD KPH West Rinjani and the Farmer Group Leaders in North Lombok and West Lombok Regencies in 2024, the total number of farmers cultivating

Kalimuru trees was recorded at 1,451 individuals, distributed across seven sub-districts. Using Slovin's formula, a total sample of 315 respondents was obtained.

The number of samples in each sub-district was determined proportionally to the population size. At the exact times, the selection of individual farmer respondents was conducted using *convenience sampling* [59, 62]. *Convenience sampling* is a non-probability sampling method in which respondents are selected based on accessibility and availability at a specific time and location. It is commonly used in field-based agricultural and forestry studies where sampling frames are limited [59, 63].

Data were collected using a combination of structured questionnaires, in-depth interviews, surveys, and field observations. The survey instrument was designed to capture farmers' socioeconomic characteristics, cultivation practices, and behavioral factors related to the development of the Kalimuru tree [61]. Interviews were conducted to obtain in-depth information and to validate survey responses, while field observations were used to support the collected data [25, 51, 59]. The distribution of the sample size across the sub-district is presented in Table 1.

(a) North Lombok Regency

(b) West Lombok Regency

Figure 3. Research location

Table 1. Number of respondents in each sub-district in North Lombok and West Lombok Regency

No.	District	Sub-District	Village	Total Farmers	Respondent
1	North	Kayangan	Salut	62	15
			Santong	96	15
			Sesait	69	15
		Gangga	Sambik Bangkol	97	11
			Rempek	86	11
			Genggelan	105	12
			Bentek	40	11
		Bayan	Mumbul Sari	76	12
			Akar Akar Anyar	64	11
			Sukadana	55	11
		Pemenang	Malaka	50	11
			Pemenang Barat	47	45
2	West	Narmada	Sesaot	94	12
			Sedau	46	11
			Surunadi	59	11
			Lebah Sempage	51	11
		Gunung Sari	Dopang	63	15
			Guntur Macan	48	15
			Taman Sari	39	15
		Lingsar	Gegerung	58	11
			Karang Bayan	41	11
			Langko	52	11
			Gegelang	49	12
			TOTAL	**1451**	**315**

Source: Author

3.4 Data collection techniques

Data was collected using a closed-ended questionnaire based on a 1–5 Likert scale, which was developed according to the indicators of each construct [62]. The Likert scale is widely used in socio-behavioral research to measure attitudes, perceptions, and behavioral tendencies in a structured and quantifiable manner [12, 28, 62]. The questionnaire was distributed directly, with the assistance of local farmers, to ensure the validity of the respondents' answers. Before large-scale distribution, the questionnaire underwent a pilot test involving 30 farmers to measure the reliability and clarity of each item [51, 64]. Each construct was measured using multiple indicators expressed as statements in the questionnaire. All constructs were adapted from relevant literature and refined to reflect the local context of communities cultivating Kalimuru trees. The constructs examined in this study include:

a. Value (X1)

Values significantly influence farmers' decision-making, affecting their choices in both personal and professional spheres [14, 26]. Values refer to an individual's thought patterns for processing appropriate behaviors before making future decisions [8, 65]. Individual norms, personal values, and beliefs play a pivotal role in determining reasons for and against, as well as shaping attitudes toward specific behaviour [13, 23, 66]. In the study by Dhir et al. [20]. Values were reported to have a positive influence on intention, as they drive intentions similarly to reasons. Accordingly, values are also expected to exert a negative influence on reasons against, as noted by Westaby et al. [26]. Other studies include Claudy et al. [58] and Claudy and Peterson [57]. It has also been reported that value constructs have a significant influence on attitudes. The identification of the value construct and the indicators is presented in Table 2.

Table 2. Values, constructs, and indicators

Construct	Definition	Code	Indicator	Reference
Value X1 [12, 14]	The individual's motivations guide an element that shapes the predominant behaviors of forest farmers [12,14].	X1.1	Benefit concern	Westaby et al. [15]; Marlina et al. [66]; Siswani et al. [47]
		X1.2	Past Experience	Conner Armitage [11], Siswani et al. [47]
		X1.3	Environmental Conservation	Burgos Espinoza et al. [50]; Steg and Vlek [67]
		X1.4	Environmental Concern	Burgos Espinoza et al. [50]; Sreen et al. [16]; Dhir et al. [20]

b. Reason for (X2)

Within the context of specific behaviors, 'reason for' functions as a motivational or facilitating factor that helps individuals develop favorable perceptions toward an action [14, 15, 19, 33, 68]. Previous studies have found that 'reason for' has a positive influence on attitude and intention [13, 58, 60]. The benefits of cultivating Kalimuru trees include enhancing farmers' economic and social conditions while maintaining environmental conservation, which can serve as a strong reason for developing Kalimuru trees [55, 69]. This study examines 'reason for' as a combination of social capital awareness, economic considerations, the potential of Kalimuru trees, external support, and the optimization of institutional frameworks for agricultural products [3, 33, 69].

The construct and indicators of 'reason for' are presented in   Table 3.

Table 3. Variable reason for X2 indicator

Construct,	Definition	Notation	Indicator	Reference
Reason for (RF) X2 [14]	A factor functioning as a motivational or facilitating agent in shaping positive perceptions [14,15].	X2.1	Social capital	Puspita et al. [53]; Puspita et al. [48]; Fahrunisa et al. [61]
		X2.2	Economy	Susanto [1]; Valentino and Juwita [5]; Li et al. [70]
		X2.3	Potential of Kalimuru trees	Farmer Interviews 2024
		X2.4	External support	Suprayitno et al. [71]; Puspita et al. [52]; Puspita et al. [48]
		X2.5	Institutional	Farmer Interviews 2024; Puspita et al. [52]; Puspita et al. [48]
		X2.6	Product optimization	Farmer Interviews 2024

c. Reason against (X3)

In certain behaviors, 'reason against' represents the opposite of 'reason for,' which can influence farmers to make negative evaluations, thereby leading them to oppose or refrain from engaging in the behavior [26, 38]. Findings from previous studies indicate that 'reason against' has a negative influence on attitude and intentions [15, 20, 72]. In addition, these studies also concluded that several barriers exist, including a lack of public understanding of Kalimuru tree cultivation, declining interest among farmers in developing Kalimuru trees, and limited knowledge among communities regarding environmental sustainability. This study considers 'reason against' as a combination of production risk, land conflict risk, financial risk, farmers' capacity, adoption of information technology, and farmers' accessibility [35, 43]. The 'reason against' construct and indicators are presented in Table 4.

Table 4. 'Reason against' construct (RA, X3) and indicators

Construct	Definition	Notation	Indicator	Reference
Reason Against (RA) X3 [14]	"A factor that serves as a motivator or facilitator for generating negative perceptions toward an individual." [8,14]	X3.1	Production risk	Siswani et al. [47]; Rezae et al. [2]; Kurniasih et al. [63]
		X3.2	Land conflict	Fahrunisa et al. [61]; Hidayat and Safitri [3]; Puspita et al. [52]
		X3.3	Financial risk	Siswani et al. [47]; Li et al. [70]; Malila et al. [73]
		X3.4	Farmers' capacity	Suprayitno et al. [71]
		X3.5	Adoption of technology and information	Omulo et al. [4]; Harisudin et al. [65]; Wu et al. [23]
		X3.6	Farmers' accessibility	Arfadi et al. [68]; Harisudin et al. [65]

Table 5. Global motives construct (X4) and indicators

Construct	Definition	Notation	Indicator	Reference
Global motives X4 [14]	BRT conceptualizes 'global motives' as comprising attitudes, subjective norms, and perceived behavioral control. Alongside reasons, these motives serve to predict intentions, which ultimately drive behavior [15, 28].	X4.1	Attitude	Wagner and Westaby [8]
		X4.2	Subjective Norm	Westaby et al. [26]
		X4.3	Perceived Behavioral Control	Cabeza-Ramírez et al. [18]

d. Global motives (X4)

Global motives are the drives or reasons that influence an individual's various behaviors across different situations [26]. Global motives are factors that consistently influence intentions across various behavioral domains [8, 14]. According to other researches [12, 14], they also reported that global motives influence intention, which in turn affects an individual's (farmers') behavior. Within the context of BRT, global motives refer to an individual's factors influencing an innovation, comprising attitudes, subjective norms, and perceived behavioral control, which serve as a link between beliefs, intentions, and actions associated with BRT [40, 42].

Attitudes are influenced by underlying belief structures, consisting of behavioral beliefs, normative beliefs, and control beliefs; consequently, they shape positive or negative feelings toward the relevant behavior. According to the BRT concept, individuals with positive attitudes toward a behavior are more likely to engage in it [15]. Subjective norm refers to an individual's perception of what is considered important or acceptable by others [15]. Perceived behavioral control refers to an individual's belief about the extent of control they have over the actions they perform. Within the BRT context, if an individual perceives high power, they are more motivated to engage in the behavior [8]. The motives within global motives do not operate independently; instead, they interact and influence an individual's intentions. BRT posits that the reasons individuals provide for engaging in or not engaging in a behavior also affect their overall motives [19]. The identification of the global motives construct and indicators is presented in Table 5.

e. Intention (X5)

BRT conceptualizes intention as an individual's propensity to carry out a specific action, which the reasons provided by the individual influence, and functions as the principal

determinant of behavior. BRT also identifies how individuals' reasons influence their intentions [13, 40, 49]. The intention construct and indicators are presented in Table 6.

Table 6. Intention construct (X5) and indicators

Construct	Definition	Notation	Indicator	Reference
Intentions X5 [13]	An objective or behavior that an individual both desires and plans to execute [9].	X5.1	*Desire*	Ajzen [12]; Westaby et al. [26]
		X5.2	*Willingness*	Nguyen and Drakau [41]; Li et al. [70]
		X5.3	*Expectation*	Tandon et al. [17]; Li et al. [70]
		X5.4	*Plan*	Wang et al. [31]; Sok et al. [25]

Table 7. Latent construct (Y): Farmers' behavior

Construct	Definition	Notation	Indicator	Reference
Farmers' Behavior in Developing Kalimuru Trees (Y)	Human behavior is elucidated through reasons that mediate the relationships among beliefs, motives, intentions, and actions [8].	Y1.1	Knowledge	Omulo et al. [4]; Wu et al. [23];
		Y1.2	Beliefs	Erekalo et al. [60]; Wicaksono [74];
		Y1.3	Skills	Khonintan and Utami [75]
		Y1.4	Participation	Wawancara petani 2024

f. Farmers' behavior in developing Kalimuru trees (Y)

BRT explains human behavior through the reasons that mediate the relationships among beliefs, motives, intentions, and actions [14, 46]. Farmers' behavior refers to the various activities carried out by farmers to meet their economic needs, which can be identified through several indicators. According to Siswani et al. [47]. The indicators of farmers' behavior in agribusiness development consist of knowledge, beliefs, skills, and participation. The indicators for the farmers' behavior construct can be presented in Table 7.

g. Moderating role of environmental benefit (Z)

Environmental benefits refer to a farmer's perception or understanding of the advantages gained from developing Kalimuru trees, which are believed to generate positive environmental outcomes, including land and soil conservation benefits, ecosystem and biodiversity protection benefits, and long-term ecological sustainability benefits [36, 52, 72, 76]. Environmental benefits, in contrast, reflect farmers' awareness of environmental issues, their belief that adopting certain behaviors can help mitigate these problems, and their willingness to act accordingly through the development of Kalimuru cultivation [20, 77, 78]. Meanwhile, previous studies have reported that perceived environmental benefit exerts a positive influence on farmers' intentions to adopt environmentally oriented practices. Therefore, environmental benefits are expected to play a significant role in shaping farmers' intentions to develop Kalimuru trees. Based on the discussion above, the indicators of ecological benefit are presented in Table 8.

Table 8. Moderating construct and indicators

Construct	Definition	Notation	Indicator	Reference
Environmental benefit (Z)	A farmer's perception or understanding of the benefits gained when they develop Kalimuru plants [77].	Z1.1	Land and Soil Conservation benefits	Vigués Jorba et al. [79]; Rezae et al. [2]; Savari [10]; Nguyen and Drakou [41]; Portus et al. [80]
		Z1.2	Ecosystem and biodiversity protection benefit	
		Z1.3	Long-term environmental sustainability benefit	

3.5 Data analysis

The collected data were analyzed using SEM-PLS. This method was selected due to its suitability for analyzing complex models with latent variables and its robustness when applied to relatively large and heterogeneous datasets [52, 81-83]. SEM-PLS is particularly suitable for exploratory and prediction-oriented research that focuses on explaining behavioral relationships. The analysis primarily focused on examining the relationship among key constructs related to farmers' behavior in developing Kalimuru trees. This approach enabled the assessment of both direct and indirect effects among constructs, providing a comprehensive understanding of the behavioral mechanisms underlying farmers' decisions and actions in Kalimuru tree cultivation [39, 51].

The SEM-PLS analysis was conducted in two main stages, namely the evaluation of the measurement model (outer model) and the assessment of the structural model (inner model) [60, 84]. The measurement model evaluation aimed to assess the validity and reliability of the constructs, while the structural model evaluation was performed to test the hypothesized relationships among latent constructs and to evaluate the explanatory and predictive power of the proposed research model.

Table 9. Criteria for testing validity and reliability

Test/Assessment	Criteria	Reference
Validity	Factor loading of each indicator ≥ 0.7 Average Variance Extracted (AVE) value greater than 0.5 Fornel Larcker and Heterotrait Monotrait ratio (HTMT) < 0.90	Fornell and Larcker [51]; Hair et al. [54]; Firmansyah and Dede [59]; Fong and Law [82]
Reliability	Cronbach's alpha value for each latent construct is greater than 0.7 The Composite Reliability (CR) value for each latent construct is greater than 0.7	

3.5.1 Testing measurement model (outer model)

The measurement model evaluations were conducted to assess the validity and reliability of constructs by examining the relationship between latent variables and their indicators. The research instruments were tested for validity and reliability using the PLS-SEM approach in the SmartPLS application. The summary of the criteria used to assess validity and reliability is presented in Table 9.

Based on Table 9, the measurement model is considered valid when all validity criteria are satisfied, as indicated by outer loading values of ≥ 0.70 and Average Variance Extracted (AVE) values of ≥ 0.5. Furthermore, a construct is considered reliable if the Cronbach's alpha value exceeds 0,70 and its Composite Reliability (CR) is also greater than 0,70 [83, 84].

3.5.2 Structural model testing (inner model)

The next stage is structural model analysis. This model tests the hypotheses or relationships between constructs [52, 81, 82]. Model fit and hypothesis testing are incorporated into this analysis, and the analytical tool employed is PLS-SEM. The software used is SmartPLS 4.0. The structural model is considered acceptable if it meets the fit criteria outlined in Table 10.

Table 10. Model fit and quality indices (goodness of fit)

Model Fit and Quality Indices	Fit Criteria	Reference
Average Path Coefficient (APC)	*p-value < 0.05*	
Average R-squared (ARS)	≥ 0.25 (moderate), $\geq 0,50$ (strong), $\geq 0,75$ (very strong)	
Average Adjusted R-squared (AARS)	≥ 0.25 (moderate), $\geq 0,50$ (strong), $\geq 0,75$ (very strong)	
Average Block VIF (AVIF)	≤ 5 (good), ≤ 3.3 (ideal)	
Average Full Collinearity VIF (AFVIF)	≤ 5 (good), ≤ 3.3 (ideal)	
Tenenhaus GoF (GoF)	≥ 0.10 (small), ≥ 0.25 (moderate), ≥ 0.36 (large)	
Sympson's Paradox Ratio (SPR)	≥ 0.70 (ideal = 1)	
R-squared Contribution Ratio (RSCR)	≥ 0.90 (ideal = 1)	
Statistical Suppression Ratio (SSR)	≥ 0.70	
Nonlinear Bivariate Causality Direction Ratio (NLBCDR)	≥ 0.70	Fornell and Larcker [50]; Hair et al. [51]; Firmansyah and Dede [59] Fong and Law [82]
SRMR (estimated)	< 0.08	
SRMR (saturated)	< 0.08	
NFI	> 0.90	
Chi-square	–	
Path Coefficient		
0,00 – 0,19	Very weak	
0,20-0,39	Weak	
0,40-0,59	Moderate	
0,60-0,79	Strong	
> 0,80	Very strong	
Hypothesis testing		
a. t-statistic	≥ 1.96, the hypothesis is accepted as significant at the 5% level ≤ 0.05, the hypothesis is accepted	
b. p-value	≥ 0.05, the hypothesis is rejected	

Table 11. Hypothesis

Direct Effect	Hypothesis
Value(X1) → Reason for(X2)	H1a. Value has a positive influence on global motives.
Value(X1) → Reason against(X3)	H1b. Value has a positive influence on 'reason for.'
Value(X1) → Global motives(X4)	H1c. Value has a negative influence on 'reason against.'
Reason for(X2) → global motives(X4)	H2a. 'Reason for' has a positive influence on global motives.
Reason for(X2) → Intention(X5)	H2b. 'Reason for' has a positive influence on intentions
Reason for(X2) → behavior(Y)	H2c. 'Reason for' has a positive influence on behavior.
Reason against(X3) → global motives(X4)	H3a. 'Reason against' has a negative influence on farmers' global motives.
Reason against(X3) → Intention(X5)	H3b. 'Reason against' has a negative influence on farmers' intentions.
Reason against (X3) → behavior(Y)	H3c. 'Reason against' has a negative influence on farmers' behavior.
Global motives(X4) → Intention(X5)	H4. Global motives have a positive influence on intentions.
Intention(X5) → behavior(Y)	H5. Intention has a positive influence on farmers' behavior.
Indirect Effect	
Envir.benefit (Z) x reason for (X2) → intention(X5)	H6a. Environmental benefit has a positive influence on the relationship between the reason for and intention.
Envir.benefit (Z) x reason against (X3) → intention(X5)	H6b. Environmental benefit has a positive influence on the relationship between reason against and intention.

Based on Table 10, the model goodness-of-fit test was conducted using several model fit indices, such as the APC, which is considered acceptable if the p-value is < 0.05 [51, 81], ARS and AARS are used to measure the predictive strength of the model on the dependent construct, with a criterion of $\geq$ 0.25 indicating a moderate level of prediction [50, 51]. To detect multicollinearity, AVIF and AFVIF are used, with a threshold. Values of ≤ 5 are considered good, and those of ≤ 3 are considered ideal [51]. In addition, the overall model fit was also assessed using Tenenhaus' GoF. Furthermore, to ensure no statistical anomalies occur, several additional measures were employed, namely SPR, RSCR, SSR, NLBCDR, SRMR,

and NFI [51, 81, 82].

3.6 Hypothesis testing

Hypothesis testing in this study was conducted using the Partial Least Squares (PLS) approach with a bootstrapping procedure. A significance level of 5 % was applied to evaluate the proposed hypotheses. The hypotheses were assessed based on the estimated path coefficients and their corresponding p-values, where a p-value of ≤ 0.05 indicates that the hypothesis is supported [18, 72, 81]. The hypothesis testing is presented in Table 11.

4. RESULT AND DISCUSSION

The analytical findings are demonstrated through an outer model assessment to examine construct validity and reliability. In contrast, the inner model evaluates the magnitude of associations among latent variables, as well as hypothesis testing covering both direct and indirect effects [51, 59, 81]. The research findings were critically analyzed in terms of the theoretical framework underlying the research and compared with findings from previous studies to identify consistency, differences, and new contributions in the context of strengthening the economic surroundings of the Mount Rinjani forest area through the development of Kalimuru trees. The measurement model analysis, conducted using the SmartPLS software, was performed in two ways [1, 2, 81]. The first is the exterior model, while the second is the interior model. This was followed by hypothesis testing, which included the assessment of both direct and indirect effects [51, 81].

4.1 Testing measurement model (outer model)

In the outer model evaluation, the data collected through the questionnaire were subsequently tested for validity and reliability to minimize potential bias [51]. The stage of the outer model evaluation can be explained as follows:

a. Outer loading

Outer Loading is a coefficient that indicates the strength of the relationship between an indicator and the construct being measured [51, 81]. An indicator is considered convergently valid if its outer loading value is greater than 0.7 [51]. The higher the outer loading value, the better the indicator explains the intended construct [44, 82]. Detailed information on the outer loading analysis results can be shown in Table 12.

Table 12. Outer loading result

	X1	X2	X3	X4	X5	Y1	Z	Z × X3	Z × X2
X11	0.843								
X12	0.900								
X13	0.893								
X14	0.898								
X21		0.897							
X22		0.781							
X23		0.903							
X24		0.812							
X25		0.781							
X26		0.902							
X31			0.799						
X32			0.716						
X33			0.736						
X34			0.869						
X35			0.815						
X36			0.843						
X41				0.799					
X42				0.818					
X43				0.853					
X5.1					0.794				
X5.2					0.979				
X5.3					0.972				
X5.4					0.856				
Y1.1						0.930			
Y1.2						0.807			
Y1.3						0.754			
Y1.4						0.929			
Z1							0.925		
Z2							0.838		
Z × X2									1.000
Z × X3								1.000	

Source: Data processing result from SmartPLS.4, 2025

Based on Table 12, the outer loading test results for all indicators reflecting the constructs show values above 0.7, thus meeting the criteria for convergent validity [46, 51]. Some indicators have values close to the minimum threshold, such as X2.2 (0.781), X2.5 (0.781), X3.2 (0.716), X3.3 (0.736), and Y1.3 (0.754). The other indicators have outer loading values above 0.80, and the outer loading for the moderating construct (Z) is 1.000. Overall, the outer loading test results confirm that all these indicators are valid and capable of representing the measured constructs. Therefore, these indicators are deemed suitable for use in the next stage, namely the structural model analysis.

b. Construct reliability and validity

The Construct Reliability and Validity of the research instrument were assessed using Cronbach's Alpha, rho_a, CR, and AVE to evaluate inter-indicator consistency and convergent validity for each construct [51, 81, 82]. Cronbach's Alpha and rho_a were employed to examine the internal consistency and reliability of the indicators within each construct, while CR and AVE were used to confirm construct reliability and convergent validity in the measurement model [59, 81]. Detailed results of the construct reliability and validity assessments are presented in Table 13.

Table 13. Construct reliability and validity

Construct	Cronbach's alpha	(rho_a)	Interpretation
Value X1	0.926	1.158	Very good reliability
Reason For X2	0.921	0.922	Very good reliability
Reason Against X3	0.887	0.904	Good reliability
Global Motives X4	0.762	0.762	Acceptable reliability, meeting the minimum threshold of 0.7
Intention X5	0.923	0.932	Very good reliability
Environmental benefit Z	0.879	0.901	Good reliability
Behaviour Y	0.725	0.791	Acceptable reliability, meeting the minimum threshold of 0.7

Source: Data processing result from SmartPLS.4, 2025

Based on Table 13, it can be explained that the constructs Value (X1), Reason for (X2), and Intention (X5) exhibit very good reliability, with Cronbach's Alpha and rho_a values exceeding 0.90. Furthermore, the constructs Reason Against (X3) and Environmental Benefit (Z) show reliability values ranging from 0.87 to 0.89. In contrast, the constructs Global Motives (X4) and Farmers' Behavior (Y) have reliability values in the range of 0.72 to 0.76. Overall, all research constructs demonstrate Cronbach's Alpha and rho_a values above 0.70 [84]. According to Hair et al. [52], Constructs with Cronbach's Alpha and rho_a values above 0.7 are considered reliable [84]. Therefore, it can be concluded that all constructs in this study meet the criteria for reliability. This indicates that all constructs are dependable and can proceed to the next stage, namely structural model analysis, to examine the relationships among the constructs in the model.

Composite Reliability (CR) and Average Variance Extracted (AVE) are two important measures used to assess the reliability and convergent validity of a construct [50, 62]. Composite Reliability (CR) represents the internal consistency of the indicators employed [51]. Generally, a good CR value is above 0.7; however, a value of 0.60 can still be accepted under certain conditions [50, 81]. Furthermore, AVE indicates the proportion of variance in the indicator that the construct can explain [81]. An AVE value of ≥ 0.50 suggests that the construct can explain the majority of its indicators; thus, convergent validity is considered satisfactory [82]. Accordingly, CR and AVE are complementary measures, and a sound construct is expected to exhibit both high reliability and strong convergent validity [10, 62]. Based on the information above, the calculated CR and AVE results are presented in Table 14.

Based on Table 14, Construct X1 has a CR of 0.93 and an AVE of 0.781; Construct X2 has a CR of 0.939 and an AVE of 0.719; Construct X3 has a CR of 0.913 and an AVE of 0.637; Construct X4 has a CR of 0.863 and an AVE of 0.678; Construct X5 has a CR of 0.947 and an AVE of 0.817; Construct Y has a CR of 0.917 and an AVE of 0.737; and Environmental Benefit has a CR of 0.876 and an AVE of 0.779. The results of the CR and AVE analysis indicate that all constructs in this study meet the established criteria, with CR values for each construct exceeding 0.70 [82], This indicates that the indicators within each construct are reliable. The results of this study are consistent with previous research, showing that all indicators of the constructs have CR values above 0.70. [51]. Meanwhile, the AVE values for all constructs are also above 0.50, indicating that their respective constructs can explain the majority of the indicators [20, 27, 51]. The AVE results are also consistent with previous studies, showing that all constructs have values above 0.5 [82]. Accordingly, it can be concluded that all constructs in this study demonstrate both reliability and validity, confirming that the instrument employed is dependable and appropriate for further analysis.

Table 14. Composite Reliability (CR) and Average Variance Extracted (AVE)

Construct	CR (ρc)	AVE	Criteria
Value X1	0.935	0.781	
Reason for X2	0.939	0.719	
Reason against X3	0.913	0.637	
Global Motives X4	0.863	0.678	Reliable and valid
Intention X5	0.947	0.817	
Behaviour Y	0.917	0.737	
Environ benefit Z	0.876	0.779	

Source: Data processing result from SmartPLS.4, 2025

4.2 Structural model testing (inner model)

The results of structural model analysis in PLS–SEM-based research typically present information regarding the relationships among constructs (hypotheses) that are tested [51, 82]. This analysis aims to examine the strength of the influence among constructs within the established model [59]. The structural model analysis comprises several key components, including:

a. Goodness of Fit (GoF) model

The Goodness of Fit (GoF) is a measure used to evaluate the suitability of the model, indicating the extent to which the model aligns with the empirical data [51, 82]. The GoF test results in this study are presented in Table 15.

Based on Table 15, the values of APC, ARS, and AARS are 0.0188, 0.537, and 0.535, respectively, with a p-value < 0.001. According to Hair et al. [81], a model is considered acceptable if the p-value is < 0.05. Therefore, the APC, ARS, and AARS values in this study meet the criteria for model adequacy. Furthermore, the AVIF value of 3.49 and the AFVIF value of 2.75 indicate good, even ideal, results. Moreover, the values of SPR, RSCR, SSR, and NLBCDR are 1.000, 0.978, 0.923, and 0.865, respectively. All of these values meet the adequacy criteria, indicating the absence of statistical issues such as suppression effects or bias in the direction of causality [51, 64, 82]. In addition, the SRMR values for the saturated model

(0.056) and the estimated model (0.0233) are below the maximum threshold of 0.08, indicating a good fit between the model and the empirical data. The NFI value of 0.996 also exceeds the criterion of 0.90, further confirming the appropriateness of the model. Thus, the overall GoF test results indicate that the research model meets all adequacy criteria and is therefore suitable for further hypothesis testing.

b. Path Coefficients

A path coefficient is a measure of the strength and direction of the relationship between constructs in a structural model [51, 81, 82]. The results of the analysis indicate that not all paths between constructs are statistically significant. The interpretation of each path is presented in Table 16.

Table 15. Goodness of Fit (GoF)

Model Fit and Quality Indices	Fit Criteria	Result	Interpretation
Average Path Coefficient (APC)	*p-value < 0.05*	0.0188	Good
Average R-squared (ARS)	≥ 0.25 (moderate)	0.537	Good
Average Adjusted R-squared (AARS)	≥ 0.25 (moderate)	0.535	Good
Average Block VIF (AVIF)	≤ 5 (good), ≤ 3.3 (ideal)	3.49	Good
Average Full Collinearity VIF (AFVIF)	≤ 5 (good), ≤ 3.3 (ideal)	2.75	Ideal
Tenenhaus GoF (GoF)	≥ 0.10 (small), ≥ 0.25 (moderate), ≥ 0.36 (large)	0.534	Large
Sympson's Paradox Ratio (SPR)	≥ 0.70	1.000	Ideal
R-squared Contribution Ratio (RSCR)	≥ 0.90	0.978	Ideal
Statistical Suppression Ratio (SSR)	≥ 0.70	0.923	Aceptable
Nonlinear Bivariate Causality Direction Ratio (NLBCDR)	≥ 0.70	0.865	Aceptable
SRMR (estimated)	< 0.08	0.0233	Good
SRMR (saturated)	< 0.08	0.056	Good
NFI	> 0.90	0.996	Good
Chi-square	–	3505.480	Interpretatif

Source: Data processing result from SmartPLS.4, 2025

Table 16. Path coefficients result

Path Relationship	Path Coefficients (β)	Strength of Effect	Information
Value (X1) → RF (X2)	0.131	Very weak	Almost no influence
Value (X1) → RA (X3)	0.105	Very weak	Almost no influence
Value (X1) → Gb Motives (X4)	0.029	Very weak	Almost no influence
RF (X2) → Gb Motives (X4)	0.128	Very weak	Almost no influence
Rf (X2) → Int (X5)	0.230	Weak	Increases intention but with low effect
RF(X2) → behaviour (Y)	0.049	Very weak	Almost no influence
RA (X3) → Gb Motives (X4)	0.787	Strong	Main factor shaping global motives
RA (X3) → Int (X5)	-0.073	Very weak	Slightly decreases intention
RA (X3) → behaviour (Y)	0.214	Weak	Low influence on behaviour
Int (X5) → behaviour (Y)	0.348	Moderate	Influence behaviour, but not the sole factor
Gb Motv (X4) → Int (X5)	0.635	Strong	Global motives strongly influence intention
Env Ben (Z) x RF (X2) → Int (X5)	0.131	Very weak	Interaction slightly increases intention
Env Ben (Z) x RA (X3) → Int (X5)	-0.167	Very weak	Interaction slightly increases intention

Source: Data processing result from SmartPLS.4, 2025

According to Table 16, the path coefficient analysis reveals varying levels of influence among the constructs within the research model. In general, the Value (X1) construct makes no meaningful contribution to the other constructs. This can be observed from its effects on Reason For (X2) ($\beta = 0.131$), Reason Against (X3) ($\beta = 0.105$), and Global Motives (X4) ($\beta = 0.029$), all of which fall into the very weak category. These results indicate that an individual's values do not serve as a basis for forming reasons or global motives, consistent with previous research [12, 25]. It is often argued that the value construct indirectly influences behavior; however, the findings of this study do not align with those of previous research [12, 14, 81]. The results of this study are not consistent with prior research that emphasizes the importance of values as a fundamental orientation for shaping individual behavior [25, 40]. The lack of influence of value constructs (X1) on reasons and intentions is due to farmers facing real constraints (labor, costs, markets, regulations, climate risks), making it difficult for values to "penetrate" because the situation demands practical adaptation. In studies of pro-environmental behavior and agricultural adoption, situational factors often prevent

intentions/considerations from automatically translating into action—especially more distal values [83, 84].

Furthermore, the Reason For (X2) construct shows a relatively positive, though still low, influence. The relationship between X2 and Intention (X5) ($\beta = 0.230$) falls into the weak category, indicating that reasons supporting farmers' behavior can increase their intention to develop Kalimuru trees, although the effect remains limited [15, 17, 27]. The impacts of X2 on Global Motives (X4) ($\beta = 0.128$) and on Behaviour (Y) ($\beta = 0.049$) are classified as very weak, demonstrating a minimal contribution to the formation of global motivation and behaviour. These results are consistent with findings that highlight the importance of reasons supporting a person's behavior [11, 14, 27].

In contrast to the Reason For construct, the Reason Against (X3) construct shows stronger results. The relationship between X3 and Global Motives (X4) ($\beta = 0.787$) is strong, indicating that reasons for opposition are a key factor in shaping farmers' global motivation. However, the influence of X3 on Intention (X5) is negative and very weak ($\beta = -0.073$), meaning that the greater the reasons for opposition, the lower

the intention that is formed. The effect of X3 on Behaviour (Y) ($\beta = 0.214$) is weak, suggesting that Reason Against is one of the factors influencing farmers' behavior toward the development of Kalimuru trees. These findings support the research of Ha, who reported that reasons for opposition play a significant role in shaping motivational orientation, even though their influence on intention and behavior is relatively very weak [14, 25, 56, 58, 81]. However, this study is not in line with those who emphasize that reasons for opposition do not have a significant effect on a person's motivation [56].

Global Motives (X4) were found to play a pivotal role, as evidenced by their strong effect on Intention (X5) ($\beta = 0.635$). This indicates that global motivation constitutes a dominant determinant in shaping farmers' intentions. These results are consistent with the theoretical perspective and empirical findings, which highlight motivation as a primary predictor of intention [15, 18, 25]. The primary reason global motives influence farmers is that, psychologically, they are closely related to intentions [10]. In addition, global motives are also a product of integrating benefit-cost evaluations and risks relevant to farming, so it is not surprising that global motives significantly influence farmers' intentions. This conclusion aligns with the research by Feisthauer et al. [85].

Furthermore, Intention (X5) is shown to exert a moderate effect on farmers' actual behaviour (Y) ($\beta = 0.348$), indicating that although intention plays an important role in shaping behaviour, it is not the sole determinant of farmers' action, as other constructs outside the model also contribute to the realisation of behaviour [11, 23, 46]. To gain a deeper insight into this relationship, a descriptive analysis was conducted using a cross-tabulation between levels of intention (X5) and actual behavior (Y), which were classified into high and low categories. The results reveal that 65,1% of respondent with a high level of intention were able to translate their intentions into actual behaviour, such as planting, maintenance, and the continued cultivation of Kalimuru trees. This finding supports the theoretical assumption that intention serves as a primary predictor of behaviour for the majority of farmers [11, 12, 25]. Nevertheless, 34.9% of respondents, despite having high levels of intention, were not fully able to translate these intentions into actual behavior. This group represents the phenomenon known as the intention-behaviour gap, in which an intentional commitment does not automatically lead to observable action in everyday practice. In the context of Kalimuru tree development, this gap indicates that the main barriers arise at the stage of intention implementation rather than at the stage of intention formation. These barriers include high production risk due to yield uncertainty and the relatively long production cycle of Kalimuru [47, 63], limited capital and financial risk particularly among subsistance farmers who depend on short term income potential land use conflicts arising from overlapping ownership claims and changing land use dynamics, limited access to markets, cultivation technologies, and technical information [6, 65, 68], as well as suboptimal institutional support, including inadequate technical assistance, restricted access to quality seedlings, and inconsistent policy suport [48, 52, 71].

Environmental Benefit (Z) serves as a moderating construct, where its effect on Reason For (X2) ($\beta = 0.131$) is classified as very weak, suggesting that its contribution to increasing farmers' intention to cultivate Kalimuru trees is relatively small [18, 58]. Moreover, the interaction between Environmental Benefit (Z) and Reason Against (X3) ($\beta = -$ 0.167) shows a very weak and negative effect, indicating that the perception of environmental benefits, when moderated by reasons for opposition, slightly reduces farmers' intention [20, 49, 72]. This result is consistent with previous research on pro-environmental behavior, which states that the perception of environmental benefits consistently exerts a strong influence on the intention to engage in pro-environmental actions [10, 16, 35, 80].

c. R² and Q²

In SEM PLS analysis, R² indicates the proportion of variance in endogenous variables explained by exogenous variables [51, 81], while Q² is used to evaluate the predictive capability of the model [83]. A model is considered to have predictive relevance when the Q² value is greater than zero. For further details, please refer to Table 17.

Table 17. Q², R², and adjusted R²

Construct Prediction Summary			
	Q²	R²	Adj. R²
Reason for(X2)	0.012	0.017	0.14
Reason against(X3)	0.006	0.011	0.008
Global motives(X4)	0.490	0.742	0.739
Intentio(X5)	0.640	0.820	0.816
Behavior(Y)	0.513	0.710	0.707

Source: Data processing result from SmartPLS.4, 2025

Based on Table 17, the construct Prediction Summary indicates that the R-square (R²) and Q-squared (Q²) values suggest that the explanatory and predictive power of the model varies across the construct [81]. The R² values for the reason for (X2) and reason against (X3) constructs are low, at 0.017 and 0.011, respectively, with corresponding Q² values of 0.012 and 0.006. These findings suggest that the formation of farmers' supportive and inhibiting reasons is still influenced by other factors beyond those included in the model [14, 27]. In contrast, the global motives X4) construct demonstrates strong model performance, with an R2 value of 0,0742 and a q2 value of 0,490, indicating excellent explanatory and predictive capability in explaining farmers' global motives [12, 14, 39]. The intention (X5) and behavior (Y) constructs also yield very strong results, with R² values of 0.820 and 0.710, respectively, and Q² values of 0.640 and 0.513. These results indicate that the variables included in the model substantially explain and predict farmers' intentions and behaviors [12, 51].

4.3 Model Partial Least Squares Structural Equation Modeling (PLS-SEM)

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to examine the causal relationships among the latent constructs in the research model [51, 81, 82]. The resulting SEM model is presented in Figure 4.

Overall, as illustrated in Figure 4, the research model indicates that Global Motivation (X4) and Intention (X5) exert a dominant influence in explaining behavior [14, 26]. In contrast, the Value (X1), Reason For (X2), and Reason Against (X3) constructs contribute relatively less [14, 40]. The moderating pathway through Z provides additional explanatory power. However, it is not dominant. These findings underscore the importance of focusing on key factors that make the most significant contribution to supporting farmers' behavior in developing Kalimuru trees [20, 42].

4.4 Hypothesis testing

Hypothesis testing was conducted to assess the significance of the relationships among constructs in the research model [62, 72, 82]. In this study, twelve hypotheses were tested, and the results of the data analysis are presented in Table 18.
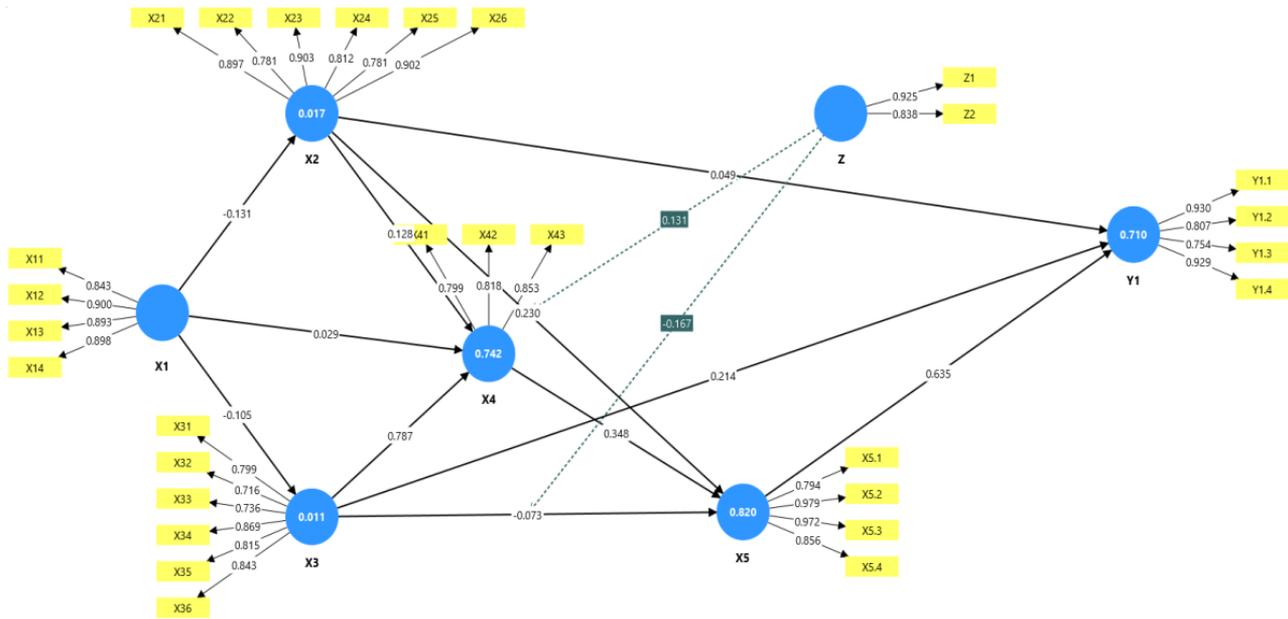

Figure 4. SEM model with Smart-PLS4 output, 2025
Source: Author

Table 18. Hypothesis test result

Hypothesis	Model	Original Sample (O)	t-statistic	P-Value	Notes	The Role of the Moderator
		Direct Effect				
H1a	X1 → X2	-0.131	1.358	0.087	Rejected	
H1b	X1 → X3	-0.105	1.689	0.046	Rejected	
H1c	X1 → X4	0.029	0.748	0.227	Rejected	
H2a	X2 → X4	0.128	3.156	0.001	Accepted	
H2b	X2 → X5	0.230	5.452	0.000	Accepted	
H2c	X2 → Y	0.049	1.018	0.154	Rejected	
H3a	X3 → X4	0.787	26.152	0.000	Accepted	
H3b	X3 → X5	-0.073	1.442	0.075	Rejected	
H3c	X3 → Y	0.214	4.023	0.000	Accepted	
H4	X4 → X5	0.348	7.759	0.000	Accepted	
H5	X5 → Y	0.635	11.130	0.000	Accepted	
		Indirect Effect				
H6a	Z×X2 → X5	0.131	3.385	0.000	Accepted	Competitive (partial moderator)
H6b	Z×X3 → X5	-0,167	4.282	0.000	Accepted	Competitive (partial moderator)

Source: SmartPLS output, 2025

a. Direct effect on the development of the Kalimuru tree

H1a. Value (X1) has a positive influence on Reason For (X2).

H1b. Value (X1) has a negative influence on Reason Against (X3).

H1c. Value (X1) has a positive influence on Global Motives (X4).

Based on the testing results presented in Table 17, all paths linking the Value construct (X1) to the core constructs within the BRT framework, namely Reason For (X2), Reason Against (X3), and Global Motives (X4), were found to be statistically insignificant [14, 15]. Accordingly, hypotheses H1a, H1b, and H1c are rejected. These findings indicate that the values held by respondents cannot be directly translated into specific reasons or global motives that drive farmers' actual behaviour [12, 14, 58]. Furthermore, the value construct

fails to explain the formation of reasons for or against, as well as global motives. This result suggests a disconnection between the value system and the cognitive-problematic processes underlying behavioral decision-making in the adoption of Kalimuru tree development [11, 80].

The results of hypothesis H1a show that the relationship between Value (X1) and Reason For (X2) is negative and statistically insignificant (β = -0.131; t = 1.358). This finding suggests that farmers' values do not directly shape supportive reasons (reasons for) in their decision to develop Kalimuru trees [14, 24]. Within the BRT framework, values are conceptualized as distal antecedents - fundamental factors that are abstract and relatively stable. In contrast, proximal reasons are context-specific and action-oriented constructs [13, 14]. Consequently, values are not automatically translated into supportive reasons without further cognitive processes triggered by direct experience, new information, or specific structural conditions [4, 41]. In other words, values merely

provide a normative framework, while reasons emerge when those values are activated by concrete situations relevant to decision-making [14, 18]. Field observations suggest that most farmers cultivating Kalimuru in West Nusa Tenggara Province hold values that support environmental conservation and resource sustainability [1, 52, 55]. However, these values do not necessarily translate into practical reasons, such as economic profitability, market certainty, or technical feasibility of cultivation. This finding is consistent with previous studies, which have shown that, in agricultural and smallholder forestry contexts, supportive reasons are more strongly shaped by instrumental and contextual factors than by value orientations alone [25, 70, 86, 87]. Similarly, Mitrofanova et al. [88] found that individual values do not significantly influence the formation of adoption-related reasons when rational considerations and field-based experience dominate decisions. This result also aligns with earlier studies by Cabeza-Ramírez et al. [18], Claudy et al. [58], and Westaby et al. [26], which demonstrate that values often exert only indirect effects and become relevant only when mediated by specific beliefs, outcome expectations, or articulable reasons. In the context of subsistence farmers, as examined in this study, limited resources, production risks, and dependence on short-term income lead to supportive reasons being driven primarily by immediate benefits rather than long-term normative values [18, 47, 63]. Thus, the non-significant effect of values on reasons does not contradict BRT; instead, it confirms the theory's core proposition that reasons serve as the key mechanism bridging values and behaviour [14, 17]. This finding contributes to the study's novelty by demonstrating that the intention–weak farmer values do not cause behaviour gap within the BRT framework, but by the inability of those values to be converted into operational supportive reasons [11, 46, 80, 59]. As a result, intentions and actual behaviour in Kalimuru tree development do not emerge directly from values.

The results of hypothesis H1b indicate that the relationship between Value (X1) and Reason Against (X3) is also insignificant, with a negative coefficient ($\beta = -0.105$; $t = 1.689$). This finding suggests that farmers' values do not directly shape constraining reasons (reasons against) in decisions related to Kalimuru tree development. Conceptually, within the BRT framework, values function as general and relatively stable distal antecedents, whereas reasons against are proximal constructs arising from risk perceptions, structural barriers, and situational constraints [14, 87, 90]. Accordingly, constraining reasons are more likely to be shaped by the concrete conditions faced by farmers - such as limited capital, production failure risks, uncertain market access, and technical constraints - than by abstract normative value orientations [47, 63]. This finding is consistent with prior research, which shows that reasons against are more strongly influenced by contextual factors than by personal values. Karapanos et al. [86] and Cabeza-Ramírez et al. [18] found that adoption decisions are primarily determined by rational considerations and actual risks, rather than by value orientations. Other studies by Masten [91] and Shepherd et al. [45] Similarly, reports that barriers and rejection-related reasons mainly arise from evaluations of risk and practical constraints, rather than from individuals' value systems. In subsistence farming contexts, short-term economic pressures often play a more dominant role in shaping reasons against than long-term value considerations [25, 47]. Empirically, the context of Kalimuru farmers around the Mount Rinjani area reinforces this

explanation. Although farmers possess relatively strong conservation values and local wisdom [1, 55], these values are insufficient to offset the perception of real constraints they face [65]. Consequently, reasons against emerge as adaptive responses to structural and operational conditions rather than as direct reflections of personal values. This finding strengthens the study's novelty by demonstrating that the intention–behaviour gap within the BRT framework is not attributable to weak farmer values, but instead to the dominance of structural barriers and contextual risks that shape reasons independently of values [18, 80]. As a result, values cannot function as a direct buffer against constraining reasons in the development of Kalimuru trees.

Regarding hypothesis H1c, the relationship between Value (X1) and Global Motives (X4) shows a very weak and statistically insignificant positive coefficient ($\beta = 0.029$; $t = 0.748$). This result indicates that farmers' values do not directly shape global motives, whose indicators consist of attitudes, subjective norms, and perceived behavioural control. In other words, values do not function as direct drivers determining farmers' overall motivational levels. This finding is consistent with previous studies suggesting that values are abstract in nature and rarely exert direct effects on proximal motivational constructs in the absence of clear mediating mechanisms. [18, 87, 88]. Within BRT, values are positioned as distal and relatively stable constructs, whereas global motives are conceptualised as proximal constructs formed through more concrete cognitive processes [8, 14]. This implies that values do not operate directly but require specific, context-relevant reasons to exert influence [87]. When values are not articulated into operational reasons, they tend to have little effect on the formation of global motives. Field observations suggest that farmers cultivating Kalimuru in the Mount Rinjani area generally possess relatively homogeneous cultural and environmental values that are deeply ingrained in their daily lives, resulting in low inter-individual variation in values [1, 89]. Under such conditions, values function as a normative background rather than as a differentiating factor in the formation of motivation. Instead, farmers' global motives are more strongly influenced by direct experience, social pressure from farmer groups, and perceptions of actual benefits and constraints associated with Kalimuru development [48, 52]. These findings are consistent with those of Westaby et al. [9] and Cabeza-Ramírez et al. [18], who argue that values serve primarily as distal antecedents. At the same time, global motives are shaped through cognitive mediation processes involving contextual reasons. Because neither reasons for nor reasons against were formed significantly, values were also unable to exert a direct influence on global motives. This result has important implications for the study's novelty, particularly in explaining the intention-behaviour gap [11, 46]. The non-significant effect of values on global motives indicates that the gap between intention and behaviour is not caused by weak normative values among farmers, but rather by the failure of those values to be translated into actionable motivation [46, 80]. Therefore, in the context of community-based Kalimuru tree development, value-based interventions alone are insufficient and must be complemented by strategies that strengthen concrete reasons and structural support for global motives and intentions to materialize into actual behavior [3, 33, 37].

With the rejection of all three hypotheses, values cannot be positioned as an active factor that directly influences farmers'

decisions to accept, reject, or engage in Kalimuru tree development [56, 89]. Instead, values function as a relatively stable cultural background that is internalised in farmers' daily lives, rather than as a strategic determinant in individual decision-making [89]. The predominance of subsistence farmers among respondents further reinforces this condition, as their behavior is guided more by practical considerations, short-term economic risks, and structural pressures than by normative value orientations [14, 18, 90]. These findings confirm that, in community-based agricultural contexts, values play a passive role and become relevant only when mediated by operational, context-specific reasons [14, 18, 27].

H2a. Reasons have a positive effect on global motives.

H2b. Reason for has a positive effect on intentions.

H2c. Reason for has a positive effect on behavior.

Based on Table 17, the effect of Reason For (X2) varies across the tested hypotheses, specifically with respect to global motives (X4), intention (X5), and farmers' behavior (Y). Empirically, the reason for (X2) is found to have a positive and significant effect on both global motives (X4) and intention (X5) [17, 42]. This suggests that supporting reasons can shape general motivational orientations as well as farmers' commitment to act [13, 42]. However, the reason for does not exert a significant direct effect on farmers' actual behaviour (Y). This finding confirms that the role of reason for operates in a staged manner: it is strong at the stages of motivation and intention formation. However, it weakens when transitioning into behavioural implementation [11, 31]. Conceptually, this result is consistent with the interpretation of reason as a motivational factor that facilitates the formation of positive perceptions and orientations towards an action, rather than serving as a direct trigger of farmers' behavior [14, 31].

The results of hypothesis testing for H2a (X2 → X4) indicate that reason for has a positive and significant effect on global motives (β = 0.128; t = 3.156; p = 0.001). This finding suggests that the stronger the supporting reasons farmers hold for developing Kalimuru trees, such as perceived economic benefits, environmental potential, social support, institutional access, and opportunities to optimize the value of Kalimuru-derived products, the stronger the global motives that are formed [1, 5, 6]. In this study, global motives reflect an aggregation of attitudes, subjective norms, and perceived behavioral control, which constitute the primary psychological foundation of farmers' decision-making [8, 25]. From an empirical perspective, hypothesis H2a reflects the conditions of Kalimuru farmers around the Mount Rinjani area, where supporting reasons - such as contributions to long-term income, conservation of marginal land, and the strengthening of local wisdom encourage the formation of positive attitudes and social support for Kalimuru development [48, 52, 55]. When farmers can identify concrete benefits alongside supportive social environments, their global motives become stronger and more coherent. Theoretically, these results are consistent with BRT, which posits that reasons function as proximal cognitive mechanisms that shape global motives [13, 15]. Within the BRT framework, supporting reasons act as triggers for positive evaluations of an action, thereby strengthening attitudes, enhancing normative support, and improving perceived behavioural control [8, 15]. Accordingly, the findings for hypothesis H2a confirm that the reason for serves as a cognitive bridge between farmers' rational considerations and the formation of more comprehensive global motives. Previous studies also support this hypothesis. Westaby et al. [26] demonstrated that supporting reasons exert a significant direct influence on global motives across various behavioural contexts. Furthermore, studies by Dhir et al. [20] and Tandon et al. [17] found that the reasons for strengthened attitudes and subjective norms in the adoption of sustainable practices were. In the context of agriculture and forestry, research by Cabeza-Ramirez et al. [18] and Abimanyu and Kusumastuti [75] similarly reported that the reason for significantly enhancing farmers' motivation to adopt forestry crops or conservation practices was. Collectively, these findings reinforce the conclusion that reason for is a critical determinant in the formation of global motives [13, 17, 26, 42]. Moreover, this study contributes to the literature by demonstrating that reason for constitutes a key cognitive mechanism that effectively shapes global motives within the BRT framework [14, 27, 29]. Nevertheless, the strengthening of global motives represents an important initial stage, but it is not sufficient to guarantee the realisation of actual farmer behaviour. Consequently, this finding provides new insights into the early stages of the emergence of the intention behaviour gap in the context of Kalimuru tree development [11, 31, 46].

The results of hypothesis testing for H2b (X2 → X5) show that reason has a positive and highly significant effect on farmers' intention to develop Kalimuru trees (β = 0.230; t = 5.452; p < 0.001). This finding indicates that the stronger the perceived supporting reasons—such as the potential for income improvement and environmental benefits—the higher their intention to plant and develop Kalimuru [35, 70, 73]. Empirically, these results confirm that reason is a primary determinant in the formation of farmers' intentions. Theoretically, the H2b finding is highly consistent with BRT, which positions reasons as proximal cognitive mechanisms that directly shape intention before the occurrence of actual behaviour [15, 26]. Within the BRT framework, supporting reasons function to strengthen positive evaluations of an action, thereby fostering individuals' psychological readiness to act [27]. Accordingly, this finding confirms that the intentions of Kalimuru farmers are primarily constructed through rational and contextual justifications regarding the perceived benefits and feasibility of Kalimuru development. This hypothesis is also aligned with previous studies. Westaby [14] and Westaby et al. [9] demonstrated that, within the BRT framework, supporting reasons function to strengthen positive evaluations of an action, thereby fostering individuals' psychological readiness to act, which exerts a strong and direct influence on intention across various behavioral contexts. In the fields of agriculture and forestry, studies by Dhir et al. [20], Claudy et al [58], and Tandon et al. [17] similarly found that reasons grounded in economic and environmental benefits significantly increase farmers' intentions to adopt forestry crops or sustainable agricultural practices. Collectively, these studies underscore that when individuals possess clear and relevant reasons, their intention to act is formed more strongly. From a contextual perspective, hypothesis H2b reflects the conditions of farmers in the areas surrounding Mount Rinjani, who rationally assess Kalimuru as a forestry species well adapted to marginal land, offering long-term economic potential and contributing to environmental sustainability [1, 7, 67]. These supporting reasons build farmers' confidence and commitment, thereby strengthening their intention to develop Kalimuru despite various constraints [11, 15, 31, 46]. Importantly, H2b also carries significant implications for understanding the intention–behaviour gap. While the reason for effectively shaping farmers' intentions to develop Kalimuru trees is unclear, the successful formation of intention

does not necessarily guarantee the realization of actual behavior [11, 17, 31]. This suggests that the primary source of the intention–behaviour gap does not lie in intention formation itself, but rather in the transition from intention to concrete action [7, 11, 18]. Accordingly, H2b confirms that farmers' intentions are formed rationally and contextually through supporting reasons. Yet, their realisation remains constrained by structural, institutional, and situational factors [33, 37], thereby highlighting intention as a critical juncture before the emergence of the gap in Kalimuru tree development.

The results of hypothesis testing for H2c (X2 → Y) indicate that the reason does not have a significant effect on farmers' actual behaviour in the development of Kalimuru trees ($\beta =$ 0.049; $t = 1.018$; $p = 0.154$). This finding suggests that, although farmers possess strong supporting reasons, these reasons do not directly translate into concrete actions [7, 46]. In other words, the formation of supporting reasons alone is insufficient to ensure the realisation of farmers' actual behaviour [11, 31]. Theoretically, this result is consistent with BRT, which posits that the influence of reason on behaviour is indirect and is generally mediated by intention [8, 15]. Within the BRT framework, reasons primarily operate at the cognitive and intentional stages, whereas behavioural realisation is powerfully shaped by control factors and situational conditions [12, 15, 25]. Therefore, the non-significant direct path from reason for to behaviour does not contradict the theory; instead, it reinforces the notion of a staged decision-making process. This finding is also in line with previous empirical literature. Numerous studies have reported that positive reasons or attitudes frequently fail to be translated into actual behaviour due to structural constraints, such as limited resources, economic risks, and institutional barriers [31, 41, 44]. In the context of agriculture and smallholder forestry, studies by Meijer et al. [7] and Malila et al [73] demonstrate that, even when farmers hold strong reasons and intentions to adopt sustainable practices, actual implementation is often constrained by limited land availability, capital, and market access [3, 33, 37]. Similar findings have also been reported in studies on agricultural technology adoption in developing countries, where reasons and intentions do not automatically result in behavioral change [4, 10]. From the perspective of research novelty, the rejection of H2c makes an important contribution by clarifying the locus of the intention–behaviour gap within the BRT framework in the context of Kalimuru tree development [11, 26, 31]. This study demonstrates that the gap does not emerge at the stages of reason or intention formation (as evidenced by the acceptance of H2a and H2b), but rather at the transition from intention to actual behaviour [11, 26, 46].

Overall, the results of hypothesis testing for H2a and H2b support the BRT as articulated by Westaby [14], confirming that reason for strengthens individuals' fundamental motivation (global motives) in the decision-making process, including farmers' decisions to develop Kalimuru trees, and directly influences the formation of intention to cultivate and manage Kalimuru. However, when considered alongside the findings for H2c, this study demonstrates that strong intentions do not necessarily materialise into actual behaviour [9, 11, 31]. This condition reflects the phenomenon commonly referred to as the intention–behaviour gap, whereby rational intentions are not always realised in concrete actions due to situational and psychological barriers, such as limited market access, financial constraints, and entrenched farming practices [7, 11, 31]. These findings are consistent with previous studies indicating that resource limitations, restricted market access, and the dominance of subsistence farming practices often hinder farmers from converting intentions into actual behaviour [5, 60].

H3a. Reason against has a negative effect on farmers' global motives.

H3b. Reason against has a negative effect on farmers' intentions.

H3c. Reason against has a negative effect on farmers' behavior.

Based on Table 18, the effect of Reason Against (X3) exhibits different patterns across the tested hypotheses, with respect to global motives (X4), intention (X5), and farmers' behaviour (Y). Empirically, reason against (X3) has a positive and significant effect on global motives (X4) under H3a, as well as on farmers' behaviour (Y) under H3c [14, 20, 29]. These findings indicate that the presence of inhibiting reasons does not necessarily weaken farmers' motivation or actions; rather, in certain contexts, such reasons may strengthen farmers' awareness, attitudes, and adaptive responses in developing Kalimuru trees [38, 45]. In contrast, reason against does not have a significant effect on farmers' intention (X5) under H3b, suggesting that although farmers are aware of various constraints, these are not sufficient to reduce their intention to develop Kalimuru trees directly [18, 31].

The results of hypothesis testing for H3a (X3 → X4) show that reason against has a positive and highly significant effect on global motives ($\beta = 0.787$; $t = 26.152$; $p < 0.001$). This finding indicates that the stronger the inhibiting reasons perceived by farmers, such as limited market access, production failure risk, land conflicts, financial risk, and constraints in the adoption of technology and information, the stronger the global motives that are formed, as reflected in farmers' attitudes, subjective norms, and perceived behavioural control in Kalimuru development [4, 47, 63]. This finding is particularly noteworthy because, although farmers possess various reasons not to engage in Kalimuru development, they become increasingly aware of the importance of global motives such as environmental conservation, household welfare improvement, the reinforcement of local wisdom, and natural resource conservation [2, 77]. In other words, the presence of reason against may stimulate farmers to reflect on the fundamental values underlying their decision-making processes [10, 60]. This suggests that the greater the perceived constraints faced by farmers, the stronger their motivation to develop Kalimuru trees [60]. Field observations among Kalimuru farmers in areas surrounding Mount Rinjani further indicate that commonly encountered constraints, such as limited market access and economic risk, are not fully perceived as reasons to refrain from Kalimuru development. Instead, these constraints heighten farmers' awareness of the importance of cultivating Kalimuru trees, as such development contributes to environmental sustainability, livelihood diversification, and the strengthening of local institutions [18, 25]. These conditions collectively contribute to the formation of stronger global motives [25, 91]. From a theoretical perspective, this result does not fully align with the conventional proposition of Behavioural Reasoning Theory (BRT), which suggests that reasons against should exert a negative influence on global motives [16, 42, 57, 58]. However, this phenomenon can be explained empirically, as the constraints faced by farmers are not always perceived as barriers but may instead be interpreted as challenges that stimulate motivation to seek solutions, innovate, or build collaboration with other actors [69, 76, 92].

These findings are consistent with several previous studies demonstrating that constraints and risks do not necessarily reduce farmers' motivation. However, they may instead strengthen their attitudes and awareness in decision-making processes. Shepherd et al. [45] found that risk perception can increase cognitive engagement and reinforce motivation when individuals perceive opportunities for adaptation. Studies by Dhir et al [20] and Tandon et al. [17] similarly reported that, in the context of sustainable innovation adoption, challenges and constraints encourage actors to build stronger motivation through learning and collaboration. In the agricultural sector, Meijer et al. [7] showed that farmers who recognize production constraints tend to exhibit stronger attitudes towards conservation practices as an adaptive response to environmental risk. From the perspective of research novelty, H3a makes an important contribution by demonstrating that reason against can function as a trigger for strengthening global motives, rather than merely acting as an inhibiting factor [2, 91]. This enriches the BRT literature by providing empirical evidence that the dynamics of reason against are highly contextual and not always linear [27, 28]. Moreover, these findings help to explain the early mechanism underlying the emergence of the intention–behaviour gap, whereby constraints may increase awareness and global motivation, while the actual realization of behaviour remains dependent on farmers' capacity to overcome structural barriers.

The results of hypothesis testing for H3b (X3 → X5) indicate that reason against has a negative but statistically insignificant effect on farmers' intention to develop Kalimuru trees ($\beta = -0.073$; $t = 1.442$; $p = 0.075$). This finding suggests that the presence of negative reasons or perceived constraints is not sufficiently strong to reduce farmers' intention to engage in Kalimuru development substantially [7, 18]. Field observations among Kalimuru farmers in areas surrounding Mount Rinjani further indicate that existing constraints are not perceived as direct threats to intention. Farmers continue to regard Kalimuru as a forestry species that is well adapted to marginal land and offers long-term benefits, both economically and ecologically [1, 6, 55]. In addition, support from farmer groups and awareness of Kalimuru's conservation function help to sustain strong intentions, despite the presence of various constraints [48, 52]. From a theoretical perspective, this result is consistent with Behavioural Reasoning Theory (BRT), which posits that the influence of reason against intention is conditional and not consistently dominant, particularly when farmers simultaneously hold strong reasons for action [9, 14]. In this context, the reason against functions more as a reflective, evaluative input rather than as a factor that directly suppresses intention. BRT assumes that individuals weigh supportive and inhibiting reasons concurrently; therefore, the presence of constraints does not necessarily lead to a decline in intention when perceived benefits are considered to outweigh potential costs [15, 27, 56, 91]. This finding is also aligned with previous empirical studies. Shepherd et al. [45] and Abimanyu and Kusumastuti [72] found that perceptions of risk and constraints do not always reduce intention, especially when individuals recognize opportunities for adaptation or significant long-term benefits. In agricultural contexts, Meijer et al. [7] and Cabeza-Ramírez et al. [18] reported that farmers often maintain strong intentions to adopt sustainable practices despite facing structural constraints, due to expectations of economic and environmental benefits. Similarly, studies by Dhir et al. [20] and Tandon et al. [17] indicate that reason against frequently

has a non-significant effect on intention when social support and perceived benefits are more influential. Furthermore, from the perspective of research novelty, the rejection of H3b provides an important contribution by demonstrating that the intention–behaviour gap is not necessarily driven by a decline in intention resulting from perceived constraints. Instead, this study shows that farmers' intentions may remain resilient even in the presence of reasons against Kalimuru development, while the weakening of actual behaviour is more likely to occur at the implementation stage [11, 31, 66].

The results of hypothesis testing for H3c (X3 → Y) indicate that Reason Against has a positive and significant effect on farmers' behaviour in developing Kalimuru trees ($\beta = 0.214$; $t = 4.023$; $p = 0.000$). This finding suggests that the greater the perceived barriers or inhibiting reasons experienced by farmers, the stronger their tendency to remain actively engaged in Kalimuru development. In the context of Kalimuru farmers living around the Mount Rinjani area, indicators of reasons against - such as the risk of crop failure, land conflicts, financial risks, limited farmer capacity, and constrained access to technology and information—are not perceived solely as obstacles, but rather as challenges that must be confronted [4, 14, 47, 66]. This condition encourages farmers to continue cultivating Kalimuru as a strategy for diversifying farm income, conserving land, and protecting against environmental degradation [1, 6, 58]. In other words, farmers' behaviour is driven more by adaptive needs and empirical experience than by normative intention alone [46, 93]. Notably, this result is counterintuitive and deviates from the initial assumption that barriers should weaken behavioural engagement. Within the framework of BRT [14, 15, 28], this finding can be explained by the notion that reasons against do not always function as inhibitors of action. However, it may instead serve as triggers for cognitive reflection and behavioral adaptation [9, 14, 15, 26]. When individuals face tangible constraints, they do not necessarily withdraw from action; instead, they may develop adaptive strategies, innovations, or collaborations to overcome such challenges [13, 38, 75]. Accordingly, reasons against may stimulate more active behaviour, particularly in contexts that demand long-term resilience and adaptive capacity. This interpretation is consistent with previous studies. Shepherd et al. [45] found that perceived barriers in pro-environmental decision making can encourage individuals to act more cautiously and strategically, rather than avoiding action altogether. In agricultural contexts, Meijer et al. [7] and Van Noordwijk [93] reported that farmers who recognise production and market risks tend to be more proactive in adopting adaptive practices to reduce farm vulnerability. Similarly, Dhir et al. [19], Cabeza-Ramírez et al. [18], and Abimanyu and Kusumastuti [72] showed that structural constraints may trigger innovative behavior when farmers possess sufficient field experience and face intense economic pressures. From the perspective of research novelty, hypothesis H3c makes an important contribution by demonstrating that the intention–behaviour gap does not necessarily originate from a weakening of behaviour due to perceived barriers [14, 31, 58]. Instead, this study shows that at the stage of actual behaviour, reasons against may function as motivating factors that drive decision-making, even though their influence on intention (H3b) is not statistically significant. This finding enriches the development of BRT by highlighting that barriers play a dynamic and stage-specific role across the behavioural process [13, 17, 42], and by underscoring the importance of understanding farmers'

behaviour as the outcome of adaptive responses to structural pressures, rather than merely as a reflection of intention [2, 14, 27, 31, 65].

Overall, the hypothesis testing results indicate that Reason Against tends to encourage farmers to behave more proactively. Rather than inhibiting action, reasons against function as triggers for adaptive and innovative behaviour in Kalimuru tree development [18, 26, 42]. This study provides new insights by showing that reasons against can enhance both global motives and farmers' behaviour in developing Kalimuru trees. In other words, despite the presence of objections or constraints, farmers' intentions to cultivate Kalimuru remain intact because they perceive greater overall benefits [14, 27, 40]. For farmers, reasons against also serve as reminders to act more cautiously in Kalimuru development to minimise potential risks [44, 47, 63]. More generally, farmers perceive that maintaining the sustainability of Kalimuru development can reduce the likelihood of greater risks to their agricultural activities [5, 47]. Thus, reasons against do not invariably function as barriers; rather, they may serve as catalysts for awareness and adaptive responses, further clarifying the non-linear dynamics of the intention–behaviour gap, in which cognitive processes do not always translate directly into concrete action [11, 46, 87].

H4. Global motives have a positive effect on intentions.

Based on Table 17, the results of hypothesis testing for H4 show that global motives (X4) have a positive and significant effect on intention (X5), with a path coefficient of $\beta = 0.348$, a t-value of 7.759, and $p < 0.001$. This finding suggests that the stronger the global motives held by farmers, encompassing attitudes, subjective norms, and perceived behavioral control, the stronger their intention to develop Kalimuru trees [12, 14, 74]. Field observations further reveal that farmers' attitudes towards Kalimuru development tend to be positive, particularly due to their awareness of the various benefits offered by the species, including both economic and environmental advantages [35, 41, 78]. Social support from community leaders and farmer groups also strengthens subjective norms that encourage farmers' participation in Kalimuru cultivation [48, 52, 94]. In addition, perceived behavioural control is reflected in farmers' confidence in their basic ability to cultivate Kalimuru, despite ongoing constraints related to access to planting material, technology, and markets. [4, 63].

From a theoretical perspective, these results are consistent with Behavioural Reasoning Theory (BRT), which posits that global motives are a direct determinant of intention, following individuals' processing of supporting and inhibiting reasons within a broader cognitive framework [8, 14, 26]. In this context, global motives serve as a synthesis of rational and social evaluations, which are subsequently translated into an intentional commitment to act. These findings are also aligned with previous studies demonstrating that attitudes, social norms, and perceived behavioural control significantly influence intentions to adopt sustainable agricultural and forestry practices [7, 12, 94]. From the perspective of research novelty, H4 makes an important contribution by showing that global motives represent a critical transition point between reason-based cognitive processes (reasons for and reasons against) and intention formation, while not necessarily guaranteeing the enactment of farmers' behaviour. Accordingly, these results clarify that the intention–behaviour gap in Kalimuru development is not attributable to weak global motives, but rather to subsequent constraints that

emerge after intention has been formed [11, 31, 80]. This finding reinforces the explanatory power of BRT by highlighting that intention formation is a necessary, yet insufficient, condition for behavioral realization in the absence of structural and contextual support [14, 27, 42].

H5. Intention has a positive effect on farmers' behavior.

Based on Table 17, the result of hypothesis testing for H5 indicates that intention (X5) has a positive and highly significant effect on farmers' behaviour (Y) ($\beta = 0,635$; $t = 11.130$; $p < 0.001$), confirming that intention is the most proximal determinant driving the realisation of farmers' actual behaviour in the development of Kalimuru trees. In this study, intention is reflected through indicators of desire, willingness, expectations, and planning [12, 14, 26]. Field observation further confirms that the stronger the farmers' intention to develop Kalimuru trees, the greater their tendency to translate this intention into concrete action, such as planting and managing Kalimuru trees [9, 15]. Positive intentions encourage farmers to allocate land, seek planting material, and participate in training or extension activities facilitated by UPTD KPH Rinjani Barat. Although land ownership is relatively limited, social support from fellow farmers, farmer groups, and community leaders reinforces these intentions and helps convert them into actual behaviour [42, 52, 94]. Thus, a strong intention serves as a fundamental driver of behavior; however, the large-scale success of Kalimuru development still requires systemic support to ensure sustainability and tangible benefits for both farmers and the environment [5, 95].

These findings are consistent with BRT, which positions intention as a key predictor of behaviour [8, 14, 15, 26], and align with previous studies in the agricultural and forestry sectors that highlight the dominant role of intention in the adoption of sustainable practices [18, 39, 49, 72]. In the context of Kalimuru farmers around Mount Rinjani, strong intention is reflected in farmers' readiness to allocate land, access seedlings, and engage in extension activities, which is further strengthened by social support from farmer groups and local communities [49, 52]. From a novelty perspective, this finding demonstrates that the intention-behaviour gap in Kalimuru tree development is not caused by weak intention, but rather by structural and contextual barriers that emerge after intention formation [22, 28, 41]. This interpretation is reinforced by earlier hypotheses (H2c and H3b), which indicate that reasons for and reasons against do not directly influence actual behaviour. Accordingly, this study confirms that the intention-behaviour gap occurs at the post-intention stage, when farmers possess strong intentional commitment but continue to face constraints related to resource availability, market access, and institutional support [4, 5]. These results extend the BRT literature by emphasizing the critical role of structural factors in translating intention into actual behavior.

b. Indirect effect in the development of the Kalimuru tree

H6a. Environmental benefit has a positive effect on the relationship between reason and intention.

H6b. Environmental benefit has a negative effect on the relationship between reason against and intention.

Based on Table 18, the moderating role of Environmental Benefit (Z) exhibits distinct patterns in the relationships between reason and intention. Empirically, environmental benefits strengthen the effect of reason for (X2) on farmers' intention (X5) under hypothesis H6a, while under hypothesis H6b, they weaken the impact of reason against (X3) on

intention. These findings indicate that farmers' awareness of the environmental benefits of Kalimuru trees functions as a contextual factor that calibrates the intention formation process [20, 41, 42]. When ecological benefits are perceived as high, supporting reasons become more effective in promoting intention, as the influence of inhibiting reasons tends to be reduced. Accordingly, environmental benefits operate as a cognitive mechanism that enables farmers to reassess constraints and opportunities more adaptively in Kalimuru tree development [20, 36, 92, 93].

The result of hypothesis testing for H6a shows that the interaction between environmental Benefit (Z) and reason (X2) has a positive and significant effect on intention (X5) (β = 0,131; t = 3,385; p < 0.001), indicating a competitive partial moderation [17, 27, 51]. These findings suggest that environmental benefits do not replace the role of reason for in shaping intention; rather, they strengthen the effect through a moderating mechanism [13, 29]. In other words, the reason continues to exert a direct influence on intention, but this influence becomes stronger when farmers perceive a higher environmental benefit from Kalimuru development [22, 35]. Furthermore, the competitive partial moderation observed in H6a indicates that both the reason for and environmental benefit independently contribute to intention, while their interaction generates an additional and significant effect [14, 31]. This implies that the ecological benefit function not only serves as a normative background but also as a cognitive mechanism that enhances the effectiveness of supporting reasons. In the context of Kalimuru development, farmers who process economic or social reasons for cultivating Kalimuru demonstrate substantially stronger intentions when these reasons are combined with heightened awareness of long-term environmental benefits [16, 20, 42, 49].

From a theoretical perspective, these findings are consistent with BRT, which emphasizes that the relationship between reasons and intention is contextual and may be strengthened by relevant situational factors [14, 15]. Within the BRT framework, the reason serves as a cognitive justification for action. At the same time, the environmental benefit acts as an applied value context that increases the psychological salience of such justification [14, 20, 27]. When ecological benefits are perceived as substantial, supporting reasons such as land conservation, ecosystem sustainability, and environmental legacy for future generations become more meaningful and, consequently, more effective in promoting farmers' intention to develop Kalimuru trees [20, 41, 49]. These results are consistent with previous studies, which show that environmental awareness strengthens the relationship between positive beliefs and pro-environmental behavioural intentions [20, 72, 78], including in the context of community-based agroforestry adoption [7, 35].

From the perspective of theoretical contribution and research novelty, the findings of H6a enrich the BRT literature by demonstrating that the intention–behaviour gap is shaped not only by the strength of reasons or intentions, but also by value-based contexts that moderate the intention formation process [11, 27]. While environmental benefits are shown to strengthen the cognitive pathway from reason to intention, such reinforcement alone may be insufficient to ensure the realization of actual behavior without structural support [11, 46]. Accordingly, these findings underscore that policy strategies for Kalimuru development need to integrate environmental benefit narratives with economic and institutional support to enable strengthened intentions to be

converted into sustained, real-world action [4, 35, 41, 60].

The result of hypothesis testing for H6b, indicates that the interaction between environmental benefit (Z) and reason against (X3) has a negative and significant effect on intention (X5) (β = −0.167; t = 4.282; p < 0.001), characterised as competitive partial moderation [11, 14, 17, 31]. This finding suggests that the perceived environmental benefit moderates and weakens the influence of inhibiting reasons on farmers' intentions to develop Kalimuru trees [2, 10, 18, 35]. In other words, the higher the farmers' awareness of environmental benefits, the smaller the negative impact of reasons such as production risk, capital constraints, or market uncertainty on their intention to cultivate Kalimuru trees [6, 37, 59].

With the framework of BRT, this result can be explained through a context-dependent cognitive processing mechanism [14, 15]. Reasons against represent cognitive evaluations of constraints and risk that may hinder action [35, 56]. However, when individuals possess a strong awareness of environmental benefits, the psychological weight of these constraints is relatively reduced [22, 37, 59]. Environmental benefits function as a cognitive lens that shifts the focus of decision-making from short-term losses to long-term gains, thereby suppressing the negative influence of inhibiting reasons on intention formation [27, 31]. This finding is consistent with previous studies, such as Shepherd et al. [45], which demonstrates that environmental awareness and concern can reduce the impact of perceived risk on pro-environmental behavioural intentions. Similarly, Dhir et al. [20] show that perceptions of ecological benefits mitigate the influence of economic barriers on intentions to adopt sustainable behaviours. In addition, Boermans et al. [78] report that environmental benefits act as a significant moderator, weakening the influence of negative reasons on intention across diverse social groups in Europe.

In the context of Kalimuru farmers surrounding the Mount Rinjani area, these findings indicate that although farmers face tangible constraints such as land conflict, financial risk, and technological limitations, awareness of the ecological functions of Kalimuru trees as conservation and land rehabilitation species can offset the adverse effects of such barriers [55, 61, 78]. Farmers with higher levels of environmental awareness tend to perceive constraints as manageable challenges rather than as reasons to reduce their intentions [63, 96]. From a theoretical and novelty perspective, hypothesis H6b extends the BRT literature by demonstrating that the intention-behaviour gap is influenced not only by the strength of intention, but also by a moderating mechanism operating at the intention formation stage [11, 31, 57]. This study demonstrates that environmental benefits serve as a balancing mechanism that mitigates the influence of inhibiting factors, thereby helping to sustain a high intention level despite structural risks and constraints [78]. These findings underline that policy interventions emphasising environmental benefits can be an effective strategy for reducing perceptual barriers and strengthening farmers' intentions to develop Kalimuru trees [35, 41, 60].

5. CONCLUSION

This study concludes that farmers' behaviour in developing Kalimuru trees is not directly determined by values (X1), but rather by contextual and stage-specific cognitive mechanisms, as articulated within the framework of BRT. All hypotheses

testing the direct effects of values (X1) on reasons for (X2), reasons against (X3), and global motives (X4) (H1a–H1c) were rejected. These results indicate that values function as a relatively stable normative background, yet are not automatically translated into operational reasons or global motives that directly drive farmers' actual behaviour.

In contrast, reasons for (X2) play a significant role in shaping global motives (X4) (H2a) and intention (X5) (H2b), but do not exert a direct influence on actual behaviour (H2c). This finding confirms that supportive reasons are effective at the cognitive and intentional stages of decision-making, but tend to lose their driving force when farmers encounter the practical constraints associated with field-level implementation. The most striking result concerns the role of reasons against (X3), which unexpectedly exerts a positive and significant effect on both global motives (X4) (H3a) and farmers' actual behaviour (Y) (H3c). In contrast, their impact on intention remains insignificant (H3b). This suggests that perceived constraints and risks do not necessarily weaken farmers' engagement; rather, within the context of subsistence farming and resilience-based agroforestry systems, such challenges may trigger adaptive responses and proactive behaviour.

Furthermore, global motives (X4) have a positive and significant effect on intention (X5) (H4), while intention emerges as the strongest predictor of farmers' actual behaviour (Y) (H5). Accordingly, the intention–behaviour gap observed in Kalimuru development cannot be attributed to weak values, reasons, or intentions, but instead arises from structural and contextual constraints that emerge after intention formation. Finally, environmental benefits (Z) are shown to play an important moderating role. Environmental benefits strengthen the effect of reasons for on intention (H6a) and weaken the impact of reasons against on intention (H6b), thereby confirming that ecological awareness functions as a contextual cognitive mechanism that calibrates the intention formation process.

From a theoretical perspective, this study advances the development of Behavioral Reasoning Theory by demonstrating that relationships among its core constructs are neither linear nor uniform, but highly contextual and dependent on the stages of the decision-making process. Values do not operate as direct drivers of behaviour; instead, reasons play a dominant role in shaping global motives and intentions, while reasons against do not invariably function as inhibiting factors. Under certain conditions, they may instead stimulate adaptive behaviour. These findings challenge the conventional assumption that barriers necessarily weaken motivation and behavioral engagement, and suggest that, within subsistence farming contexts, risk and constraint may actually strengthen farmers' involvement in decision-making and concrete action.

Empirically, this study provides robust evidence that the intention–behaviour gap in Kalimuru development emerges at the post-intention stage, rather than during the formation of values, reasons, or motivation. In other words, farmers generally possess strong and rational intentions to develop Kalimuru; however, the translation of these intentions into actual behaviour is highly contingent upon their capacity to overcome constraints related to resource availability, market access, technology, and institutional support.

From a practical and policy perspective, these findings indicate that interventions relying solely on value-based approaches or normative campaigns are insufficient to promote sustained behavioural change. Accordingly, Kalimuru development strategies should prioritise the strengthening of concrete operational reasons across economic, technical, and institutional dimensions. Moreover, narratives emphasising environmental benefits must be accompanied by tangible, on-the-ground support, including improved access to quality planting materials, targeted technical assistance, inclusive financing schemes, and strengthened market access and institutional arrangements.

6. STUDY LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study has several limitations that should be acknowledged. First, the cross-sectional research design restricts the ability to capture long-term dynamics in changes in values, reasons, global motives, intentions, and farmers' behaviour over time. Second, the proposed model does not explicitly incorporate structural variables—such as market access, financial capital, policy support, and institutional arrangements—as latent constructs, despite substantial empirical evidence demonstrating their crucial role in translating intentions into actual behaviour. Third, the relatively homogeneous profile of respondents as subsistence farmers in the Mount Rinjani area may limit the generalisability of the findings to other socio-ecological and farming contexts.

In response to these limitations, future research is encouraged to adopt longitudinal research designs to better examine the temporal dynamics of the intention–behaviour gap. Further studies should also integrate structural and institutional factors as mediating or moderating variables within the BRT framework, while explicitly accounting for farmer heterogeneity, including variations in welfare status, farm scale, and farming experience. In addition, the use of mixed-method approaches that combine quantitative analysis with in-depth qualitative inquiry is recommended to capture farmers' adaptive processes and context-specific decision-making more comprehensively. Such approaches would not only strengthen the external validity of the BRT model in the context of smallholder forestry, but also provide a more robust empirical basis for the formulation of Kalimuru development policies that are sustainable, inclusive, and closely aligned with farmers' socio-economic realities.

REFERENCES

[1] Susanto, W. (2024). Analysis of forest-based economic, social, and environmental development in West Nusa Tenggara Province. Bappenas Work Paper, 7(2): 119-140. https://doi.org/10.47266/bwp.v7i2.321

[2] Rezaei, R., Safa, L., Ganjkhanloo, M.M. (2020).

Understanding farmers' ecological conservation behavior regarding the use of integrated pest management- an application of the technology acceptance model. Global Ecology and Conservation, 22: e00941. https://doi.org/10.1016/j.gecco.2020.e00941

[3] Hidayat, A., Safitri, P. (2021). The ecological politic of forestry: Industrial plantation forest policy in Sambelia, East Lombok. Jurnal Penelitian Sosial Dan Ekonomi Kehutanan, 18(3): 205-218. https://doi.org/10.20886/jpsek.2021.18.3.205-218

[4] Omulo, G., Daum, T., Köller, K., Birner, R. (2024). Unpacking the behavioral intentions of 'emergent farmers' towards mechanized conservation agriculture in Zambia. Land Use Policy, 136: 106979. https://doi.org/10.1016/j.landusepol.2023.106979

[5] Valentino, G.I.A.K.A., Juwita, A.H. (2023). Analysis of economic potential and its impact on the original regional income (PAD) of West Nusa Tenggara Province (NTB). Region: Jurnal Pembangunan Wilayah dan Perencanaan Partisipatif, 18(2): 568-579. https://doi.org/10.20961/region.v18i2.64555

[6] Sukmayana D. (2023). Global market potential analysis for forestry products: Opportunities and challenges for timber and non-timber forest product entrepreneurs. Komitmen Jurnal Ilmiah Manajemen, 4(2): 274-285. https://doi.org/10.15575/jim.v4i2.30422

[7] Meijer, S.S., Catacutan, D., Sileshi, G.W., Nieuwenhuis, M. (2015). Tree planting by smallholder farmers in Malawi: Using the theory of planned behaviour to examine the relationship between attitudes and behaviour. Journal of Environmental Psychology, 43: 1-12. https://doi.org/10.1016/j.jenvp.2015.05.008

[8] Wagner, M., Westaby, J.D. (2020). Changing pay systems in organizations: Using behavioral reasoning theory to understand employee support for pay-for-performance (or not). The Journal of Applied Behavioral Science, 56(3): 301-321. https://doi.org/10.1177/0021886319896411

[9] Westaby, J.D., Pfaff, D.L., Redding, N. (2014). Psychology and social networks: A dynamic network theory perspective. American Psychologist, 69(3): 269. https://doi.apa.org/doi/10.1037/a0036106

[10] Savari, M., Damaneh, H.E., Damaneh, H.E., Cotton, M. (2023). Integrating the norm activation model and theory of planned behaviour to investigate farmer pro-environmental behavioural intention. Scientific Reports, 13(1): 5584. https://doi.org/10.1038/s41598-023-32831-x

[11] Conner M, Norman, P. (2022). Understanding the intention-behavior gap: The role of intention strength. Front. Psychol, 13: 923464. https://doi.org/10.3389/fpsyg.2022.923464

[12] 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

[13] Westaby, J.D., Probst, T.M., Lee, B.C. (2010). Leadership decision-making: A behavioral reasoning theory analysis. The Leadership Quarterly, 21(3): 481-495. https://doi.org/10.1016/j.leaqua.2010.03.011

[14] Westaby, J.D. (2005). Behavioral reasoning theory: Identifying new linkages underlying intentions and behavior. Organizational Behavior and Human Decision Processes, 98(2): 97-120.

https://doi.org/10.1016/j.obhdp.2005.07.003

[15] Westaby, J.D., Rosemarino, N.M., Elliot, A.J. (2025). How behavioral reasoning may further explain the belief-to-behavior connection: Exploring the role of primary reasons, counter reasons, and comparative reasoning facets. Psychological Inquiry, 36(1): 67-74. https://doi.org/10.1080/1047840X.2025.2482353

[16] Sreen, N., Dhir, A., Talwar, S., Tan, T.M., Alharbi, F. (2021). Behavioral reasoning perspectives to brand love toward natural products: Moderating role of environmental concern and household size. Journal of Retailing and Consumer Services, 61: 102549. https://doi.org/10.1016/j.jretconser.2021.102549

[17] Tandon, A., Dhir, A., Kaur, P., Kushwah, S., Salo, J. (2020). Behavioral reasoning perspectives on organic food purchase. Appetite, 154: 104786. https://doi.org/10.1016/j.appet.2020.104786

[18] Cabeza-Ramírez, L.J., Guerrero-Baena, M.D., Luque-Vilchez, M., Sanchez-Canizares, S.M. (2024). Assessing farmers' intention to adopt drought insurance. A combined perspective from the extended theory of planned behavior and behavioral reasoning theory. International Journal of Disaster Risk Reduction, 113: 104818. https://doi.org/10.1016/j.ijdrr.2024.104818

[19] Dhir, A., Sadiq, M., Talwar, S., Sakashita, M., Kaur, P. (2021). Why do retail consumers buy green apparel? A knowledge-attitude-behaviour-context perspective. Journal of Retailing and Consumer Services, 59: 102398. https://doi.org/10.1016/j.jretconser.2020.102398

[20] Dhir, A., Koshta, N., Goyal, R.K., Sakashita, M., Almotairi, M. (2021). Behavioral reasoning theory (BRT) perspectives on E-waste recycling and management. Journal of Cleaner Production, 280: 124269. https://doi.org/10.1016/j.jclepro.2020.124269

[21] Varah, F., Mahongnao, M., Pani, B. Khamrang, S. (2021). Exploring young consumers' intention toward green products: Applying an extended theory of planned behavior. Environment, Development and Sustainability, 23: 9181-9195. https://doi.org/10.1007/s10668-020-01018-z

[22] Bagheri, A., Bondori, A., Allahyari, M.S., Damalas, C.A. (2019). Modeling farmers' intention to use pesticides: An expanded version of the theory of planned behavior. Journal of Environmental Management, 248: 109291. https://doi.org/10.1016/j.jenvman.2019.109291

[23] Wu, S., Xiao, Y., Pacala, A., Badulescu, A., Khan, S. (2024). Understanding Chinese farmers' behavioral intentions to use alternative fuel machinery: Insights from the Technology Acceptance Model and Theory of Planned Behavior. Sustainability, 16(24): 11059. https://doi.org/10.3390/su162411059

[24] Mahyarni, M. (2013). Theory of Reasoned Action and Theory of Planned Behaviour (sebuah kajian historis tentang perilaku). Jurnal El-Riyasah, 4(1): 13. http://doi.org/10.24014/jel.v4i1.17

[25] Sok, J., Borges, J.R., Schmidt, P., Ajzen, I. (2021). Farmer behaviour as reasoned action: A critical review of research with the theory of planned behaviour. Journal of Agricultural Economics, 72(2): 388412. https://doi.org/10.1111/1477-9552.12408

[26] Westaby, J.D., Woods, N., Pfaff, D.L. (2016). Extending dynamic network theory to group and social interaction analysis: Uncovering key behavioral elements, cycles,

and emergent states. Organizational Psychology Review, 6(1): 34-62. https://doi.org/10.1177/2041386614551319

[27] Sahu, A.K., Padhy, R.K., Dhir, A. (2020). Envisioning the future of behavioral decision-making: A systematic literature review of behavioral reasoning theory. Australasian Marketing Journal, 28(4): 145-159. https://doi.org/10.1016/j.ausmj.2020.05.001

[28] Westaby, J.D., Versenyi, A., Hausmann, R.C. (2005). Intentions to work during terminal illness: An exploratory study of antecedent conditions. Journal of Applied Psychology, 90(6): 1297-1305. https://doi.org/10.1037/0021-9010.90.6.1297

[29] Dwiyanti, I.G.K.A., Wirama, D.G. (2024). Behavioural Reasoning Theory perspectives: Hospitality accounting system adoption. Jurnal Akuntansi, 28(3): 438-456. https://doi.org/10.24912/ja.v28i3.2151

[30] Virmani, N., Sharma, S., Kumar, A., Luthra, S. (2023). Adoption of industry 4.0 evidence in emerging economy: Behavioral reasoning theory perspective. Technological Forecasting and Social Change, 188: 122317. https://doi.org/10.1016/j.techfore.2023.122317

[31] Wang, J., Shen, M., Chu, M. (2021). Why is green consumption easier said than done? Exploring the green consumption attitude-intention gap in China with behavioral reasoning theory. Cleaner and Responsible Consumption, 2: 100015. https://doi.org/10.1016/j.clrc.2021.100015

[32] Joshi, S., Bhattacharya, S., Pathak, P., Natraj, N.A., Saini, J., Goswami, S. (2025). Harnessing the potential of generative AI in digital marketing using the Behavioral Reasoning Theory approach. International Journal of Information Management Data Insights, 5(1): 100317. https://doi.org/10.1016/j.jjimei.2024.100317

[33] Istiasih, H. (2023). Organic food consumption behaviour: Sustainability, symbol of social class, luxury and price. International Journal of Humanities Education and Social Sciences (IJHESS), 3(3): 1597-1605. https://doi.org/10.55227/ijhess.v3i3.811

[34] Rahnama, H., Popkowski Leszczyc, P.T. (2022). The effect of fixed and growth mindsets on buying sustainable foods. British Food Journal, 124(12): 4533-4550. https://doi.org/10.1108/BFJ-04-2021-0441

[35] Nguyen-Phuoc, D.Q., Nguyen, N.A.N., Tran, P.T.K., Pham, H.G., Oviedo-Trespalacios, O. (2023). The influence of environmental concerns and psychosocial factors on electric motorbike switching intention in the global south. Journal of Transport Geography, 113: 103705. https://doi.org/10.1016/j.jtrangeo.2023.103705

[36] Sharma, R., Dhir, A., Talwar, S., Kaur, P. (2021). Over-ordering and food waste: The use of food delivery apps during a pandemic. International Journal of Hospitality Management, 96: 102977. https://doi.org/10.1016/j.ijhm.2021.102977

[37] Ramzan, S., Liu, C., Munir, H., Xu, Y. (2019). Assessing young consumers' awareness and participation in sustainable e-waste management practices: A survey study in Northwest China. Environmental Science and Pollution Research, 26(19): 20003-20013. https://doi.org/10.1007/s11356-019-05310-y

[38] Conke, L.S. (2018). Barriers to waste recycling development: Evidence from Brazil. Resources, Conservation and Recycling, 134: 129-135. https://doi.org/10.1016/j.resconrec.2018.03.007

[39] Tufail, H.S., Yaqub, R.M.S., Alsuhaibani, A.M., Ramzan, S., Shahid, A.U., S. Refat, M. (2022). Consumers' purchase intention of suboptimal food using Behavioral Reasoning Theory: A food waste reduction strategy. Sustainability, 14(14): 8905. https://doi.org/10.3390/su14148905

[40] Aschemann-Witzel, J., Niebuhr Aagaard, E.M. (2014). Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and in-store food choice. International Journal of Consumer Studies, 38(5): 550-558. https://doi.org/10.1111/ijcs.12115

[41] Nguyen, N., Drakou, E.G. (2021). Farmers' intention to adopt sustainable agriculture hinges on climate awareness: The case of Vietnamese coffee. Journal of Cleaner Production, 303: 126828. https://doi.org/10.1016/j.jclepro.2021.126828

[42] Kumar, S., Talwar, S., Murphy, M., Kaur, P., Dhir, A. (2021). A behavioural reasoning perspective on the consumption of local food: A study on REKO, a social media-based local food distribution system. Food Quality and Preference, 93: 104264. https://doi.org/10.1016/j.foodqual.2021.104264

[43] Nguyen, N.P.T., Dang, H.D. (2022). Organic food purchase decisions from a context-based behavioral reasoning approach. Appetite, 173: 105975. https://doi.org/10.1016/j.appet.2022.105975

[44] Schrieks, T., Botzen, W.J.W., Wens, M., Haer, T., Aerts, J.C.J.H. (2021). Integrating behavioral theories in agent-based models for agricultural drought risk assessments. Frontiers in Water, 3: 686329. https://doi.org/10.3389/frwa.2021.686329

[45] Shepherd, D.A., Williams, T.A., Patzelt, H. (2015). Thinking about entrepreneurial decision making: Review and research agenda. Journal of Management, 41(1): 11-46. https://doi.org/10.1177/0149206314541153

[46] Feil, K., Fritsch, J., Rhodes, R.E. (2023). The intention-behaviour gap in physical activity: A systematic review and meta-analysis of the action control framework. British Journal of Sports Medicine, 57(19): 1265-1271. https://doi.org/10.1136/bjsports-2022-106640

[47] Siswani, S.P., Rosada, I., Amran, F.D. (2022). Risk analysis and factors affecting corn farming production (Zea mays L.). Wiratani: Jurnal Ilmu Agribisnis, 5(2): 116. https://doi.org/10.33394/wiratani.v5i2.95

[48] Puspita, N.T., Qurniati, R., Febryano, I.G. (2020). Social capital in community forest management in the Batutegi forest management unit. Jurnal Sylva Lestari, 8(1): 54-64. https://doi.org/10.33394/jsl.v8i1.3245

[49] Burgos Espinoza, I.I., García Alcaraz, J.L., Gil López, A.J., Aryanfar, Y., Keçebaş, A. (2024). Achieving behavioral intention to renewable energy through perceived costs and benefits and environmental concern. Sustainable Futures, 8: 100319. https://doi.org/10.1016/j.sftr.2024.100319

[50] Fornell, C., Larcker, D.F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 18(3): 382-388. https://doi.org/10.2307/3150980

[51] Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M., Danks, N.P., Ray, S. (2021). Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook. Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7

[52] Puspita, I.J., Suharjito, D., Supriyanto, B. (2024). Social capital in collective action on water resources management in Buleleng, Bali, Indonesia. Jurnal Pengelolaan Sumber Alam dan Lingkungan, 14(1): 66-75. https://doi.org/10.29244/jpsl.v14i1.47404

[53] Hamrat, M.U., Rita, R.R.N.D. (2021). Plant species composition and agroforestry management systems in community forest areas of Praba Hamlet, Batu Mekar Village, Lingsar Subdistrict, West Lombok Regency, West Nusa Tenggara Province. Jurnal Silva Samalas, 4(2): 28. https://doi.org/10.33394/jss.v4i2.4857

[54] Zhang, Z.J., Li, N., Li, H.Z., Li, X.J., et al. (2018). Preparation and characterization of biocomposite chitosan film containing Perilla frutescens (L.) Britt. essential oil. Industrial Crops and Products, 112: 660-667. https://doi.org/10.1016/j.indcrop.2017.12.073

[55] Idris, M.H., Latifah, S., Lesmono Aji, I.M., Wahyuningsih, E., Indriyatno, I., Ningsih, R.V. (2015). Vegetation study and carbon stock in the Senaru special purpose forest area (KHDTK), Bayan, North Lombok. Jurnal Ilmu Kehutanan, 7(1): 25. https://doi.org/10.22146/jikfkt.6135

[56] Snedegar, J. (2018). Reasons for and reasons against. Philosophical Studies, 175(3): 725-743. https://doi.org/10.1007/s11098-017-0889-2

[57] Claudy, M.C., Peterson, M. (2014). Understanding the underutilization of urban bicycle commuting: A behavioral reasoning perspective. Journal of Public Policy & Marketing, 33(2): 173-187. https://doi.org/10.1509/jppm.13.087

[58] Claudy, M.C., Garcia, R., O'Driscoll, A. (2015). Consumer resistance to innovation—A behavioral reasoning perspective. Journal of the Academy of Marketing Science, 43(4): 528-544. https://doi.org/10.1007/s11747-014-0399-0

[59] Firmansyah, D., Dede. (2022). Techniques of common sampling in research methodology: A literature review. Journal Formosapublisher, 1(2): 85-114. https://doi.org/10.55927/jiph.v1i2.937

[60] Erekalo, K.T., Gemtou, M., Kornelis, M., Pedersen, S. M., Christensen, T., Denver, S. (2025). Understanding the behavioral factors influencing farmers' future adoption of climate-smart agriculture: A multi-group analysis. Journal of Cleaner Production, 510: 145632. https://doi.org/10.1016/j.jclepro.2025.145632

[61] Fahrunnisa, Soetarto, E., Pandjaitan, N.K. (2016). Contestations access to agrarian resources in forest area of Dodo Jaran Pusang, Sumbawa District, NTB. Sodality: Jurnal Sosiologi Pedesaan, 4(2): 145-151. https://doi.org/10.22500/sodality.v4i2.13381

[62] Joshi, A., Kale, S., Chandel, S., Pal, D. (2015). Likert scale: Explored and explained. British Journal of Applied Science & Technology, 7(4): 396-403. https://doi.org/10.9734/BJAST/2015/14400

[63] Kurniasih, D., Syaukat, Y., Nurmalina, R., Suharno. (2023). Farmers' perception of the criticality level of garlic farming risks and risk management strategies: A case study in Temanggung. Jurnal Penyuluhan, 19(2): 95-112. https://doi.org/10.29244/jupe.v19i2.46082

[64] Wasserman, J.D., Bracken, B.A. (2012). Fundamental psychometric considerations in assessment. In Handbook of Psychology (2nd Edition). https://doi.org/10.1002/9781118133880.hop210003

[65] Harisudin, M., Kusnandar, Riptanti, E.W., Setyowati, N., Khomah, I. (2023). Determinants of the Internet of Things adoption by millennial farmers. AIMS Agriculture and Food, 8(2): 329-342. https://doi.org/10.3934/agrfood.2023018

[66] Marlina, L., Rosanti, N., Sari, D.M., Rufaidah, E. (2025). Increasing the capacity of food farmers through farming management in East Ambarawa Village, Pringsewu Regency. Abdimas Galuh, 7(1): 454. https://jurnal.unigal.ac.id/abdimasgaluh/article/view/16980.

[67] 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.2008.09.002

[68] Arfadi, A.P., Amanah, S., Sulistiawati, A. (2018). Accessibility and utilisation of agricultural information by horticultural farmers in Cinangneng Village, Bogor. Jurnal Sains Komunikasi dan Pengembangan Masyarakat, 2(1): 123-132. https://doi.org/10.29244/jskpm.v2i1.123-132

[69] Eckerberg, K., Sandström, C. (2013). Forest conflicts: A growing research field. Forest Policy and Economics, 33: 3-7. https://doi.org/10.1016/j.forpol.2013.05.001

[70] Li, M., Wang, J., Zhao, P., Chen, K., Wu, L. (2020). Factors affecting the willingness of agricultural green production from the perspective of farmers' perceptions. Science of the Total Environment, 738: 140289. https://doi.org/10.1016/j.scitotenv.2020.140289

[71] Suprayitno, M.A.A., Fatchiya, A., Harijati, S. (2018). Capacity of agrotourism farmers in Malang Regency, East Java. Jurnal Penyuluhan, 14(2): 335-346. https://doi.org/10.29244/jupe.v14i2.18626

[72] Abimanyu, R., Kusumastuti, R.D. (2024). Enhancing electronic gadget waste recycling among Generation Z using a behavioral reasoning theory approach. Waste, Society, and Sustainability, 1(1): 23-40. https://doi.org/10.61511/wass.v1i1.2024.630

[73] Malila, B.P., Kaaya, O.E., Lusambo, L.P., Schaffner, U., Kilawe, C.J. (2023). Factors influencing smallholder farmers' willingness to adopt sustainable land management practices to control invasive plants in northern Tanzania. Environmental Sustainability Indicators, 19: 100284. https://doi.org/10.1016/j.esind.2023.100284

[74] Wicaksono, A., Steeneveld, W., Van Werven, T., Hogeveen, H., Van Den Borne, B.H.P. (2025). Knowledge, attitude, and behaviour of farmers towards the use of reproductive hormones in dairy cattle. Animal, 19(4): 101470. https://doi.org/10.1016/j.animal.2025.101470

[75] Khonitan, D., Utami, B.N. (2018). Motivating the younger generation to embrace the fourth industrial revolution (Industry 4.0) through agricultural education. Jurnal Sains Psikologi, 8(1): 162-170. https://doi.org/10.33394/jspsi.v8i1.6406

[76] Erfanian, S., Maleknia, R., Azizi, R. (2024). Environmental responsibility in urban forests: A cognitive analysis of visitors' behavior. Forests, 15(10): 1773. https://doi.org/10.3390/f15101773

[77] Ippolito, J.A., Laird, D.A., Busscher, W.J. (2012). Environmental benefits of biochar. Journal of Environmental Quality, 41(4): 967-972. https://doi.org/10.2134/jeq2012.0151

[78] Boermans, D.D., Jagoda, A., Lemiski, D., Wegener, J., Krzywonos, M. (2024). Environmental awareness and sustainable behavior of respondents in Germany, the Netherlands, and Poland: A qualitative focus group study. Journal of Environmental Management, 370: 122515. https://doi.org/10.1016/j.jenvman.2024.122515

[79] Vigués Jorba, J., Scherrer, D., Duchenne, F., Zellweger, F., Gossner, M.M., Bollmann, K. (2025). Differential responses of taxonomic, functional, and phylogenetic multi-taxa diversity to environmental factors in temperate forest ecosystems. Ecological Indicators, 178: 113855. https://doi.org/10.1016/j.ecolind.2025.113855

[80] Portus, R., Aarnio-Linnanvuori, E., Dillon, B., Fahy, F. (2024). Exploring the environmental value action gap in education research: A semi-systematic literature review. Environmental Education Research, 30(6): 833-863. https://doi.org/10.1080/13504622.2024.2314060

[81] Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1): 2-24. https://doi.org/10.1108/EBR-11-2018-0203

[82] Fong, L., Law, R. (2013). A primer on partial least squares structural equation modeling (PLS-SEM). European Journal of Tourism Research, 6(2): 211-213. https://doi.org/10.54055/ejtr.v6i2.134

[83] Lake, J., Sneddon, J., Bardi, A., Lee, J. (2025). How far into the future can values predict behavior? It depends on the value importance. Social Psychological and Personality Science, 16(5): 552-561. https://doi.org/10.1177/19485506241233646

[84] De Matos, C.A., Luppi, L., Veiga, R.T. (2025). Assessing the intention-behavior gap in the pro-environmental behavior context: A longitudinal study about water conservation. Journal of Cleaner Production, 524: 146499. https://doi.org/10.1016/j.jclepro.2025.146499

[85] Feisthauer, P., Hartmann, M., Börner, J. (2024). Behavioral factors driving farmers' intentions to adopt spot spraying for sustainable weed control. Journal of Environmental Management, 353: 120218. https://doi.org/10.1016/j.jenvman.2024.120218

[86] Karapanos, M., Borchert, T., Schneider, A. (2017). The adoption of educational technology from the perspective of behavioral reasoning theory. In 11th International Technology, Education and Development Conference, Valencia, Spain. https://doi.org/10.21125/inted.2017.0888

[87] Maio, G.R., Olson, J.M., Allen, L., Bernard, M.M. (2001). Addressing discrepancies between values and behavior: The motivating effect of reasons. Journal of Experimental Social Psychology, 37(2): 104-117. https://doi.org/10.1006/jesp.2000.1436

[88] Mitrofanova, E., Pummell, E.K.L., Mulrooney, H.M., Petróczi, A. (2021). Using behavioural reasoning theory to explore reasons for dietary restriction: A qualitative study of orthorexic behavioural tendencies in the UK. Frontiers in Psychology, 12: 685545. https://doi.org/10.3389/fpsyg.2021.685545

[89] Nakamura, H. (2019). Relationship among land price, entrepreneurship, the environment, economics, and social factors in the value assessment of Japanese cities. Journal of Cleaner Production, 217: 144-152. https://doi.org/10.1016/j.jclepro.2019.01.201

[90] Hamizar, A. (2023). The influence of social and ethical factors on investment decision-making behaviour: A case study of Sharia financial investments. Jurnal iainambon. 5(1): 59-69. https://doi.org/10.33477/eksy.v5i01.5478

[91] Masten, A.S. (2014). Global perspectives on resilience in children and youth. Child Development, 85(1): 6-20. https://doi.org/10.1111/cdev.12205

[92] Sharma, S. (2024). Benefits or concerns of AI: A multistakeholder responsibility. Futures, 157: 103328. https://doi.org/10.1016/j.futures.2024.103328

[93] Van Noordwijk, M. (2018). Agroforestry as part of climate change response. IOP Conference Series: Earth and Environmental Science, 200(1): 012002. https://doi.org/10.1088/1755-1315/200/1/012002

[94] Sakti, O., Sukartini, N.M. (2020). Individual characteristics and environmentally conscious behaviour: Electricity usage. Indonesian Journal of Environmental Education and Management, 5(1): 34-48. https://doi.org/10.21009/IJEEM.051.03

[95] Sniehotta, F.F., Scholz, U., Schwarzer, R. (2005). Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. Psychology & Health, 20(2): 143-160. https://doi.org/10.1080/08870440512331317670

[96] Jose, S. (2009). Agroforestry for ecosystem services and environmental benefits: An overview. Agroforestry Systems, 76(1): 1-10. https://doi.org/10.1007/s10457-009-9229-7