Pertanika J. Trop. Agric. Sci. 49 (S3): 109 - 130 (2026)

PERTANIKA JOURNALS

TROPICAL AGRICULTURAL SCIENCE

Journal homepage: http://www.pertanika.upm.edu.my/

Factors Affecting the Adoption of Climate-Smart Agriculture (CSA) Practices for Sustainable Food Production and Aligned with SDGs in Malaysia

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ABSTRACT

Ensuring sustainable food production has become a national priority in Malaysia as climate change and environmental pressures increasingly threaten agricultural productivity and resilience. In response, climate-smart agriculture (CSA) has emerged as a strategic approach to strengthening adaptive capacity, improving productivity, and enhancing sustainability in agricultural systems. This study investigates the determinants affecting the adoption of CSA practices among Malaysian agricultural producers and examines their associations for sustainable food production within the Sustainable Development Goals (SDGs) framework. Grounded in the theory of access, the study develops a conceptual framework integrating land availability, trialability and farmers' acceptability as key determinants of CSA adoption, with government support modelled as a moderating variable. A quantitative research methodology was employed, and data were collected from 409 agricultural producers across multiple Malaysian states. The proposed relationships were analysed using partial least squares structural equation modelling (PLS-SEM) through SmartPLS 4.1. The results reveal that land availability significantly influences CSA adoption, while trialability and farmers' acceptability insignificantly influence sustainable food production. Furthermore, CSA adoption positively supports sustainable food production, underscoring its role in enhancing agricultural resilience and food security. Government support for CSA practices for sustainable food production is negligible. Overall, the results provide empirical evidence that primarily encourages agricultural producers and agribusinesses to accelerate the adoption of CSA practices for sustainable food production in Malaysia, aligned specifically with SDG 2 (Zero Hunger) and SDG 13 (Climate Action).

Keywords: CSA practices, farmer's acceptability, government support, land availability, trialability, sustainable food production

ARTICLE INFO

Article history:
Received: 24 May 2026
Accepted: 27 August 2026
Published: 20 November 2026

DOI: https://doi.org/10.47836/pjtas.49.S3.06

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e-ISSN: 2231-8542

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INTRODUCTION

A global agricultural commodity is the production of food and other non-food items (Frey & Bruckner, 2021). Every country's agriculture sector plays a significant part in providing its people with economic opportunity and food security (Kumar, 2024). Climate-resilient agricultural diversification, climate-resilient crop varieties, conservation agriculture, water management strategies, integrated pest control and nutrient management are some of the CSA practices used in several Asian countries to enhance agricultural production (Nguyen et al., 2025). However, fruits, vegetables and grains are crucial for ensuring national food security (Dardak, 2021). Malaysia relies on imports of 30 40% from other countries to meet food demand (Tariq et al., 2026). One of Malaysia's biggest challenges in the agriculture area is how agricultural producers implement CSA practices for sustainable food production (SFP) (Aziz et al., 2024). Sustainable food production can be seriously threatened by land constraints, current land instability and limited access to available land. Land availability creates a long-term investment challenge for the implementation of CSA practices (Murken & Gornott, 2022). Access to resources is quite restricted; this study has stated the gap in how agricultural producers may face several problems in the execution of CSA practices to provide sustainable food production (Tariq et al., 2026). The acceptability approach of agriculture producers to adopt CSA practices is still beginning considered. Agriculture producers perceptions of risk and cost are linked together. Opportunities for producing sustainable food make it difficult to fully assess farmers' acceptability of executing CSA practices (Nyang'au et al., 2021). To ensure SFP, the Malaysian government supports the assumption that agricultural output would increase by 53.6%, from 1.51 M tonnes in 2019 to 2.32 M tonnes by 2030, which is quite a big challenge, at a compound annual growth rate (CAGR) of 4.89% (Dorairaj & Govender, 2023). Agriculture remains a fundamental support of Malaysia's socioeconomic development, contributing significantly to the country's livelihoods, national food resources, and economic stability (Mohd Yusoff et al., 2025).

However, the sector is increasingly confronted by difficult challenges arising from climate variability, land-use pressures, environmental degradation and rising food needs (Rahmat & Hamid, 2025). Further, access theory explains agricultural producers' ability to obtain agricultural resources, which can influence the adoption of CSA practices and ultimately meet sustainable food production. Land availability signifies agricultural producers' physical access to productive agricultural land, while trialability signifies their opportunity to experiment with CSA practices before making a larger commitment. Farmers' acceptability signifies their willingness to accept CSA practices within their existing farming systems. These access-related conditions can facilitate or constrain farmers' ability to convert available resources and opportunities into adoption of CSA practices (Tariq et al., 2026). Government support can increase this process by providing financial incentives and extension services that reduce agricultural producers' access constraints (Mutea et

al., 2020). Consequently, greater access to land, opportunities to trial CSA innovations, farmer acceptability and government support can encourage adoption of CSA practices, which can ultimately enhance sustainable food production. This study aims to examine the determinants of CSA adoption among Malaysian agricultural producers, with government support modelled as a moderating variable, and to assess the implications for sustainable food production in alignment with the SDGs.

Literature Review

Sustainable food production is the development of increasing, reaping and distributing food in a way that preserves and improves the environment, supports rural economies and farmer livelihoods and ensures food security (Wang, 2022). Sustainable food production is the progression of cultivating food using socially, economically and environmentally sound techniques so that agriculture can be sustainable and supply food and revenue for forthcoming generations (Çakmakçı et al., 2023). To achieve the Sustainable Development Goals (SDGs), such as SDG 2 (Zero Hunger) and SDG 13 (Climate Action), the food production system needs to be transformed to be more sustainable (Hoek et al., 2021). CSA practices represent a collection of agricultural practices that influence sustainable agricultural production. CSA practices consider the trade-offs and collaborations between productivity, mitigation and adaptation, with a specific focus on tackling climate change in the agricultural sector (Waaswa et al., 2022). Using contemporary agricultural technology and innovations, the primary objective of adopting CSA practices is to establish resilient structures and high agricultural productivity (Muriithi et al., 2023).

Agricultural producers, who fundamentally rely on their land and the right to utilise it, are particularly influenced by land availability (Singirankabo et al., 2022). In the context of climate change, land availability is thought to be crucial for the execution of CSA practices, which are necessary for sustainable food production (Tseng et al., 2021). Before a technology is adopted on a large scale, it must first be tested on a small scale (Valizadeh et al., 2023). Trialability offers an opportunity for experiential learning, allowing agricultural producers to understand how a new technology functions under specific conditions (Kirungi et al., 2023). Agriculture producers are striving toward sustainable food production by executing CSA practices through acceptability approach (Panyasit et al., 2024). Farmers' acceptability reflects their capacity, readiness and willingness to embrace CSA practices and respond favourably to climate change (Belay et al., 2022). CSA practices are more likely to be adopted by agricultural producers who get financial support (Damba et al., 2024). Adoption of CSA practices is also encouraged by peers, and agricultural producers are more open to long-term implementation (Kassa & Abdi, 2022). However, a lack of information, awareness, and training hinders the adoption of CSA practices, which has a detrimental influence on sustainable food production (Karimi & Ataei, 2024).

Theoretical Foundation

This study is grounded in theory which explains the connection between adoption of CSA practices and SFP outcomes. It draws on the theory of access, which posits that agricultural producers adopt CSA practices by accommodating land availability, trialability and farmers' acceptability of SFP (Mgomezulu et al., 2024; Usika et al., 2024). In the context of agricultural production, the three independent variables in this study land availability, trialability and farmers' acceptability function as specific forms of accessibility that can encourage agricultural producers to adopt CSA practices. The dependent variable, sustainable food production, represents the perceived return through CSA practices adoption, while the moderating variable, government support, reflects the idea that the benefits of capital may differ depending on how agricultural producers access facilities and at which level government can encourage the adoption of CSA practices for SFP.

To assess individual preparedness to adopt CSA practices, the study incorporates the access theory developed by Jesse Ribot and Nancy Peluso in 2003. This theory helps explain variation in accessibility of land availability, trialability and farmers' acceptability among agricultural producers. Within this theory, land availability is examined along trialability and farmers' acceptability, recognising that agricultural producers with access are more likely to acquire and effectively use relevant CSA practices, contributing positively to SFP. The moderating role of government support is also relevant here, as access to government support may affect agricultural producers differently due to differences in exposure or regional differences.

Finally, the study builds upon established sustainable food production models proposed by Francisco et al. (2023) and Zhu et al. (2018), which conceptualise SFP as a multi-dimensional construct that encompasses overall value in production. In this context, land availability, trialability and farmers' acceptability align with the adaptive competencies that are highlighted as critical for agricultural production. It has been observed that government support has a moderating effect in this study, which reflects that access to government support for agricultural producers would be helpful for sustainable food production.

Hypothesis and Conceptual Framework

According to land availability, agricultural producers believe they have the right to access, use, and govern all the land. Agricultural producers are inclined to embrace CSA practices because of these factors (Kehinde et al., 2022). H1: Land availability has a significant positive effect on the adoption of CSA practices. Agricultural producers communicate their CSA adoption experiences with their fellow farmers through trialability (Kwapong et al., 2024). H2: Trialability has a significant positive effect on the adoption of CSA practices. CSA practices are further expected to be adopted by agricultural producers who are more aware of the outcomes of climate change. Due to environmental changes,

agricultural producers tend to adopt CSA practices more (Antwi-Agyei et al., 2023). H3: Farmers' acceptability has a significant positive effect on the adoption of CSA practices. By encouraging long-term investments, facilitating access to institutional and financial assistance and creating a solid basis for robust, successful farming systems, land availability benefits SFP (Wang, 2022). H4: Land availability has a significant positive effect on SFP. Agriculture producers are enabled to test new CSA practices on a small scale, lowering risk, boosting confidence and promoting wider adoption, all of which support the shift to more resilient, effective and environmentally friendly agriculture structures in which trialability enhances SFP (Kirungi et al., 2023). H5: Trialability has a significant positive effect on SFP. Agriculture producers' approach toward acceptability is influenced by peer pressure and social learning, which enable them to fulfil SFP targets (Ramborun et al., 2020). H6: farmers' acceptability has a significant positive effect on SFP. To achieve SFP outcomes, CSA practices represent an approach that integrates multiple factors (Aziz et al., 2024). All these factors work together to adopt CSA practices and create SFP in an alternative way. H7: Adoption of CSA practices has a significant positive effect on SFP. Policy, financial, technical, and institutional assistance for sustainable agriculture are important ways the government encourages and facilitates agricultural producers' adoption of CSA techniques (Hussain et al., 2025). H8: Government support has a significant positive effect on SFP.

Mediating & Moderating role in Adoption of CSA Practices

According to recent studies, however, the influence of land availability on SFP is not always direct; rather, it frequently occurs through the implementation of successful CSA methods (Mizik, 2021). In the context of adoption of CSA practices, trialability plays an essential role because CSA practices often involve changes in crop management, soil practices and irrigation systems that agricultural producers may hesitate to adopt without prior testing (Senyange, 2022). A mediated relationship is theoretically supported in which farmers' acceptability increases the likelihood of CSA practices, and adoption of CSA practices enhances SFP (Wang et al., 2025). Agriculture producers are encouraged to adopt CSA methods for SFP by government support through policies, subsidies, technical aid and financial support, as well as ongoing training and development assistance and infrastructure development in general (Aerni & Zou, 2022).

H9a: The adoption of CSA practices mediates the relationship between land availability and SFP.

H9b: The adoption of CSA practices mediates the relationship between trialability and SFP.

H9c: The adoption of CSA practices mediates the relationship between farmers' acceptability and SFP.

H10: Government support moderates the relationship between the adoption of CSA practices and SFP.

Conceptual Framework

The conceptual framework of the current study is built around six key variables and is informed by the theory of access, as shown in Figure 1. To begin with, the capacity to optimise the factors, assess them, and use them effectively is required to be able to contribute to SFP (Movilla-Pateiro et al., 2021). Second, the connection of independent variables to sustainable agriculture production through CSA practices (Agyekum et al., 2024). Thirdly, government support reflects the confidence of agricultural producers in adopting CSA practices (Van Asseldonk et al., 2023). The outcome variable of the study, SFP, represents the perceived ability of agricultural producers to optimise CSA practices (Tay, 2024). In line with the access theory lens, the three factors are viewed as land availability, trialability and farmers' acceptability, which can enhance an agricultural producer's productivity. The theory of access reinforces the role of accessibility of resources in encouraging CSA practices and platform awareness. The model allows comparative analysis of factors between CSA practices and SFP by incorporating a moderating variable, government support. This study highlighted and focused on the adoption of CSA practices and its outcomes on SFP. This outcome is different because access theory indicates that the accessibility of resources different at different regions. This research also confirms this conclusion by stating that the levels of adoption of CSA practices differ among regional agricultural producers (Maspan & Halimoon, 2024; Ng et al., 2025).

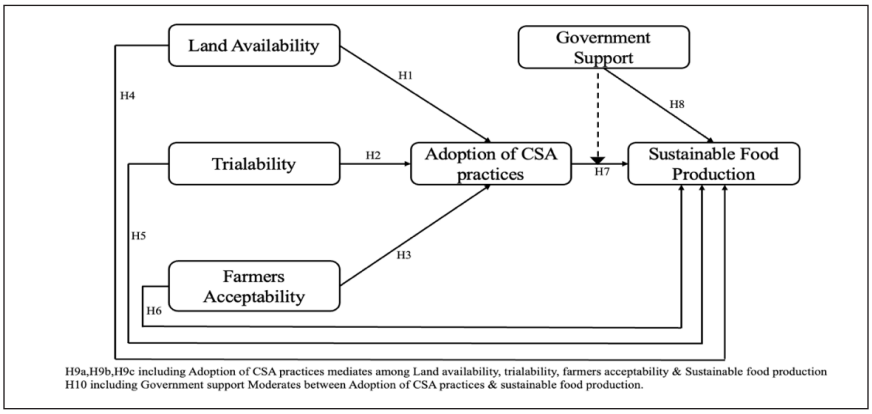


Figure 1. Conceptual framework with direct relationships

MATERIALS AND METHODOLOGY

This study employs a quantitative, cross-sectional study design within a positivist paradigm, which supports objective measurement and statistical analysis. The focus was to investigate the predictive factors of SFP in Malaysia's agriculture sector. Specifically, the study examined the perceptions of agricultural producers regarding the adoption of CSA practices. Approximately one million agricultural producers in Malaysia are involved in agricultural production (Ali et al., 2020). Additional official statistics were obtained from Jabatan Pertanian Malaysia. A non-probability purposive sampling method was used to reach agricultural producers who have been involved in agriculture across Malaysia. This technique was chosen because this study required respondents with specific characteristics; currently employed agricultural producers had an equal opportunity to be selected across Malaysia. Because all variables were self-reported by a single respondent group at a specific moment in time, common method bias (CMB) was assessed. This technique is broadly applied in social sciences when the aim is to gather insights from respondents who can provide the most relevant and informed perspectives on the research questions (Hair et al., 2017). The research has been approved by the relevant ethical committee at UTAR with reference number U/SERC/56(A)-635/2025. Participation was voluntary, and respondents were guaranteed confidentiality and anonymity. Digital knowledge consent was obtained prior to the start of the survey.

Around 650 questionnaires were distributed among agricultural producers, and a total of 409 valid responses were collected, with a 63% response rate, which meets the threshold value of 384 determined by the formula using Krejcie and Morgan's (1970). This sample exceeds the minimum threshold required for further analysis using PLS-SEM (Hair et al., 2017). Data were collected using a structured questionnaire developed based on validated scales adapted from prior studies, as the questionnaire items are presented in Appendix A. A total of four items for SFP have been adopted; four items for the adoption of CSA practices and four items for the trialability scale were adopted to analyse the extent to which agricultural producers are willing to adopt CSA, from Aziz et al., 2024 and Adnan et al., 2020. Four items for land availability were adopted from Hosaena Ghebru & Holden, 2013. Four items for farmers' acceptability were adopted from Masud et al., 2017 and Zulqarnain et al., 2020 and four items for government support were adopted from Bakar et al., 2020, respectively. All the items have been used on a 5-point Likert scale ranging from 1 Strongly Disagree to 5 Strongly Agree. Besides, initially, a pilot test with 30 participants was conducted to ensure the clarity, reliability and face validity of the items. The Cronbach's alpha values for all constructs exceeded the recommended threshold of 0.70, validating internal consistency.

Procedure of Data Analysis

Data have been analysed using SmartPLS 4.1, using a two-stage method, an established PLS-SEM procedure. In the first stage, the measurement model was assessed by investigating internal consistency reliability through Cronbach's alpha and composite reliability, convergent validity using average variance extracted (AVE) and discriminant validity using both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio. In the second stage, the structural model was assessed to test the hypothesised relationships among variables. This involved analysing path coefficients**,** coefficient of determination (R^2) and predictive relevance (Q^2) values, as well as effect sizes (f^2) to determine the strength of each predictor. Additionally, a moderating analysis was conducted to compare the structural relationships, thereby assessing the moderating effect. This has followed the suggestions of Hair et al. (2020) for strong SEM modelling in social science research and management studies.

RESULTS AND DISCUSSION

This section describes the measurement model validity and reliability while providing the researchers with knowledge on the demographic profile. The summary of respondents' demographic profile is given in Table 1.

Table 1
Summary of demographic profile

		No. of Respondents	Percentage %
Gender	Male	339	83%
	Female	70	17%
Marital Status	Single	218	53%
	Married	191	47%
Ethnic Group	Malay	214	52%
	Chinese	120	29%
	Indian	40	10%
	Others	35	9%
Monthly Income of Farmer	< RM 2000	173	42%
	RM 2001-3000	206	50%
	RM 3001-4000	12	3%
	RM 4001-5000	14	4%
	>RM 5000	4	1%
No. of years of experience	01-5 years	112	27%
	06-10 years	187	46%
	11-15 years	99	24%
	>15 years	11	3%

Table 1 (*continued*)

		No. of Respondents	Percentage %
Location (States) of agricultural producers	1) Kedah	54	13%
	2) Kelantan	49	12%
	3) Selangor	75	18%
	4) Perak	70	17%
	5) Pahang	55	13%
	6) Negeri Sembilan	39	10%
	7) Johor	31	8%
	8) Malacca	8	2%
	9) Perlis	5	1%
	10) Terengganu	7	2%
	11) Sabah	3	1%
	12) Sarawak	4	1%
	13) Penang	9	2%

Table 2
Reliability and convergent validity of constructs

Construct	Alpha	CR	AVE
Adoption of CSA Practices	0.86	0.90	0.70
Farmer's Acceptability	0.88	0.92	0.74
Govt. Support	0.81	0.87	0.63
Land Availability	0.87	0.91	0.72
Sustainable Food Production	0.79	0.86	0.61
Trialability	0.84	0.89	0.68

Table 2 shows that all constructs demonstrate acceptable internal consistency and convergent validity. Cronbach's alpha values exceed the recommended 0.70 threshold, while composite reliability (CR) values range from 0.86 to 0.92, indicating high reliability (Hair et al., 2017). Additionally, average variance extracted (AVE) values for all constructs are above 0.50, confirming convergent validity.

Table 3 shows that discriminant validity has been further assessed using the Heterotrait-Monotrait (HTMT) ratio. All HTMT values ranged below the conservative threshold of 0.90 (Henseler et al., 2015), thereby confirming discriminant validity among all latent constructs.

Further, Table 4 presents the Fornell-Larcker criteria used to evaluate discriminant validity as well. The square roots of the AVEs (diagonal values) meet the threshold value of 0.85, and each construct is greater than its corresponding inter-construct correlations, indicating adequate discriminant validity (Fornell & Larcker, 1981).

Table 5 shows the model's explanatory and predictive capability. The R^2 value for SFP is 0.40, indicating that the predictors explain a moderate amount of variance. The

Table 3
Discriminant validity-Heterotrait-monotrait ratio (HTMT)

	Adoption of CSA Practices	Farmer's Acceptability	Govt. Support	Land Availability	SFP	Trialability
Adoption of CSA Practices	0.33					
Farmer's Acceptability	0.17	0.40				
Govt. Support	0.26	0.32	0.19			
Land Availability	0.48	0.22	0.18	0.64		
SFP	0.51	0.22	0.25	0.20	0.16	
Trialability	0.16	0.03	0.03	0.05	0.14	0.08

Table 4
Discriminant Validity - Fornell-Larcker Criterion

	Adoption of CSA Practices	Farmer's Acceptability	Govt. Support	Land Availability	SFP	Trialability
Adoption of CSA Practices	0.84					
Farmer's Acceptability	0.29	0.86				
Govt. Support	0.15	0.34	0.80			
Land Availability	0.23	0.29	0.17	0.85		
SFP	0.40	0.19	0.16	0.55	0.78	
Trialability	0.44	0.18	0.21	0.17	0.14	0.83

Table 5
R^2, Q^2, and Effect Size (f^2) of the structural model

Construct/ Path	R^2	Q^2	f^2	Effect Size
SFP	0.40	0.28		
Land Availability → SFP			0.02	Small Effect
Trialability → SFP			0.19	Medium Effect
Farmer's acceptability → SFP			0.04	Small Effect

Q^2 value of 0.28 confirms medium predictive relevance. Effect size (f^2) analysis displays that trialability has the largest predictive effect ($f^2 = 0.19$, medium), followed by land availability ($f^2 = 0.02$, small) and farmers' acceptability ($f^2 = 0.04$, small), supporting the relative importance of these predictors within the model.

Table 6 presents the results; the significant result of H1 (β - value = 0.11 and p-value = 0.015). This result indicates that agricultural producers with greater access to suitable and secure agricultural land are more likely to adopt CSA practices. According

Table 6
Structural model assessment, direct effects

H	Relationships	β - value	t-value	p-value	Result
H1	Land Availability -> Adoption of CSA Practices	0.11	2.42	0.015	Supported
H2	Trialability -> Adoption of CSA Practices	0.39	8.36	0.000	Supported
H3	Farmer's Acceptability -> Adoption of CSA Practices	0.19	3.96	0.000	Supported
H4	Land Availability -> SFP	0.53	11.79	0.000	Supported
H5	Trialability -> SFP	0.03	0.57	0.569	Not Supported
H6	Farmer's Acceptability -> SFP	0.01	0.25	0.802	Not Supported
H7	Adoption of CSA Practices -> SFP	0.33	6.86	0.000	Supported
H8	Govt. Support -> SFP	0.07	1.81	0.070	Not Supported

to the theory of access, sufficient land access is generally better positioned to justify investments in improved irrigation systems, soil conservation measures, mechanisation, and digital agricultural technologies because of the expected greater outcome. Consequently, land availability increases both the opportunity and the capacity to implement CSA practices effectively (Myers & Hansen, 2020). The outcomes support a growing body of empirical literature indicating that land availability is a critical determinant of CSA adoption (Ngoma et al., 2021). Second, the results confirm the significance of H2 (β - value = 0.39 and p-value = 0.000). This result suggests that agricultural producers who retain more agricultural trialability opportunities and further acquire knowledge when applying it are more likely to adopt CSA practices. Trialability is a critical mechanism for equipping agricultural producers with the knowledge, technical skills and confidence required to implement CSA practices, ultimately contributing to more resilient and sustainable agricultural systems in Malaysia. The theory of access claims that trialability access mechanisms are interconnected. Trialability enhances agricultural producers' ability to benefit from other productive resources (Peluso & Ribot, 2020). This explains why agricultural producers with higher levels of trialability demonstrate greater adoption of CSA practices. Consequently, trialability supports agricultural producers' ability to benefit from CSA practices (Suresh et al., 2025).

Third, the results confirm the significance of H3 (β - value = 0.19 and p-value = 0.000). This shows that agriculture producers who recognise CSA practices as beneficial are more likely to adopt them. Acceptance behaviour is a critical determinant of CSA adoption and reinforces the importance of promoting favourable perceptions towards CSA practices among Malaysian agriculture producers (Antwi-Agyei et al., 2023). The theory of access also highlights that access mechanisms operate collectively. Consequently, agricultural producers' willingness behaviour is an important pathway which leads to the execution of CSA practices (Khatun et al., 2020). Fourth, the results confirm the significance of H4 (β

- value = 0.53 and p-value = 0.000). This result suggests that agricultural producers with greater access to secure land are more capable of achieving sustainable food production. Land availability remains one of the most fundamental agricultural resources. The theory of access further argues that access mechanisms interact with one another. Land availability enhances the effectiveness of other productive resources because farmers are more willing to invest when they have adequate land resources (Myers & Hansen, 2020). Therefore, the significant relationship observed in this study confirms that land availability serves as a foundational resource that enables agricultural producers to convert other forms of access into sustainable agricultural outcomes (Wang, 2022).

Fifth, the results confirm the insignificance of H5 (β - value = 0.03 and p-value = 0.569). The results show there is an insignificant association between trialability and SFP. As trialability has been widely recognised as an important determinant of innovation adoption, the present findings suggest that the opportunity to experiment with CSA practices is insufficient to improve sustainable food production among Malaysian agricultural producers. Access to providing agricultural producers with opportunities to trial CSA practices does not ensure meaningful expected outcomes (Autio et al., 2021). Agricultural producers may participate in demonstration pilot projects, yet still lack complementary resources such as financial capital, technical knowledge, technology, irrigation facilities, extension services and market access necessary to convert trial experiences into sustainable developments in agricultural productivity (Davis et al., 2021). Trialability provides only initial exposure to innovation rather than the actual capability to achieve sustainable food production.

Sixth, the results confirm the insignificance of H6 (β - value = 0.01 and p-value = 0.802). The results show there is an insignificant association between farmers' acceptability and SFP, indicating that farmers' acceptability is insufficient to produce sustainable production outcomes without actual implementation and access to complementary resources. According to the theory of access, agriculture producers must also possess other factors, including access to financial resources, agricultural inputs, extension services, technology, market opportunities and infrastructure, before acceptability attitudes can be converted into improved food production (Rust et al., 2022). Therefore, while agriculture producers may readily accept CSA innovations, they may still lack the practical means to implement these practices effectively and consistently. Consequently, agriculture producers are deficient in irrigation facilities, machinery, technical training, or affordable financing and may remain unable to achieve sustainable production (Thottadi & Singh, 2024). This explains why farmers' acceptability alone did not significantly predict sustainable food production.

Seventh, the results confirm the significance of H7 (β - value = 0.33 and p-value = 0.000). The results endorse that CSA practices ensure long-term food security while maintaining environmental sustainability, particularly in the Malaysian agricultural

sector. The theory of access further emphasises that multiple access mechanisms operate simultaneously (Peluso & Ribot, 2020). CSA practices serve as the operational pathway that enables agricultural producers to transform diverse forms of access into improved agricultural performance. This theoretical explanation supports that CSA practices contribute to sustainable food production (Ma & Rahut, 2024). Eighth, the results confirm the insignificance of H8 (β - value = 0.07 and p-value = 0.070). This result suggests that government support does not directly improve sustainable food production. The theory of access highlights that institutional mechanisms are insufficient to generate positive outcomes because agricultural producers' ability depends on different factors, including capital, land, technology, labour, knowledge, markets, and social networks (Mutea et al., 2020). In addition, governmental procedures, delays in subsidy distribution and differences in agricultural producers' participation levels may reduce the practical efficiency of government support (Gupta et al., 2023). Consequently, government support may create opportunities for agricultural improvement, but sustainable food production will increase only when agricultural producers have the capacity to combine government assistance with these complementary resources.

Table 7
Structural model results, mediation effects (VAF)

H	Relationships	Formula Outcome	Decision
H9a	Land availability -> Adoption of CSA Practices -> SFP	0.40	Partial mediation
H9b	Trialability -> Adoption of CSA Practices -> SFP	0.83	Full mediation
H9c	Farmer's acceptability -> Adoption of CSA Practices -> SFP	0.85	Full mediation

Further, Table 7 shows indirect mediation effects (VAF), in which H9a = 40% mediation result shows there is partial mediation observed, as land availability is not playing any major role directly in CSA adoption for SFP, can be considered (Bwalya et al., 2023). Further, land availability does not affect the relationship between CSA practices and SFP (Zerssa et al., 2021). In H9b, = 83 % result shows that trialability, as a full mediator between adoption of CSA practices and SFP, can be considered (Teklu et al., 2023). Without trialability, SFP cannot be attained as a mediator between adoption of CSA practices and SFP (Obabire & Adeleye, 2024). In H9c, = 85 % result shows that farmers' acceptability as a full mediator between adoption of CSA practices and SFP can be considered (Antwi-Agyei et al., 2023). Agricultural farmers do not show direct interest in adopting CSA practices at an advanced level for SFP (Gemtou et al., 2024).

Table 8 shows the analysis to assess the moderating role of government support. This result suggests that many Malaysian agricultural producers may not be receiving sufficient or effective support to meaningfully predict their adoption of CSA practices and

Table 8
Structural model results, moderation analysis

H	Relationships	β - value	t-value	p-value	Moderation
H10	Govt. Support x Adoption of CSA Practices -> Sustainable Food Production	0.06	1.639	0.101	Not Supported

subsequent food production outcomes (Sardar et al., 2021). In the Malaysian context, this insignificant relationship is explained by the limited accessibility and implementation gaps of agricultural support programs. While the government has hosted various agricultural modernisation plans through agencies such as the Ministry of Agriculture and Food Security, many agricultural producers continue to experience challenges in accessing subsidies, financial assistance, training and technical knowledge associated with CSA execution (Suffian & Suffian,2023). CSA practices that sustainably increase production resilience to climate change and reduce greenhouse gas emissions are significant to achieving SDG 2 (Zero Hunger) and SDG 13 (Climate Action). CSA practices and SDGs show links: CSA enhances SDG 2 targets on sustainable food production and smallholder productivity, while advancing SDG 13 targets on adaptation and mitigation (Naveen et al., 2024). Zero hunger and climate change are real challenges. SDG 2 encourages ending hunger, and SDG 13 encourages support for resilience to climate change (Naik et al., 2025). The finding may reflect regional differences in agricultural assistance across Malaysian states, where access to infrastructure, extension officers, agricultural programs and institutional resources differs significantly. Agriculture producers in developed agricultural regions may have relatively superior exposure to innovation programs, whereas those in less developed areas may encounter institutional barriers that reduce the efficiency of government support. Such differences may contribute to inconsistent results, an overall statistically insignificant moderating relationship.

CONCLUSION

This research examines variables such as land availability, trialability and farmers' acceptability that affect the application of CSA practices and their consequences for SFP in the context of Malaysia. However, the institutional obstacles small-scale agricultural producers face underscore the need for specialised training initiatives. These findings, which emphasise Malaysia-specific challenges while pointing to general drivers of CSA adoption, are in line with research from throughout the globe. As there are supported hypotheses of H1, H2, H3, H4, H7 and unsupported hypotheses of H5, H6, H8, which stated the significant and nonsignificant relationships among them, respectively. Nonetheless, an intriguing discovery showed that acceptability had a predictive effect on CSA practice adoption. This finding is encouraging because it has suggested that although agricultural producers are

aware of the benefits of using CSA practices for food security, the significant influence of CSA practices on SFP, which aligns with SDG objectives, demonstrates how CSA activities contribute to SFP, considering benefits as well. These results demonstrate that agricultural producers are aware of the potential of CSA practices to encourage sustainable productivity and food security at an advanced level.

THEORETICAL CONTRIBUTIONS

The theory of access provides insights into how access to information, resources and institutional support enables agricultural producers' readiness behaviour to adopt new CSA practices. The pattern of these perceptions conveys a complete understanding of sustainable agricultural adoption in the context of Malaysia. Practically, this study contributes valuable implications for agricultural stakeholders and policymakers by highlighting the necessity for critical interventions that advance agricultural producers' approach to land availability, trialability and farmers' acceptability. Supportive agricultural extension capabilities and increasing awareness of CSA advantages can additionally support adoption among agricultural producers. Moreover, policy frameworks would highlight comprehensive and sustainable agricultural development methodologies which support national food security plans and SDG goals, specifically SDG 2 (Zero Hunger) and SDG 13 (Climate Action).

IMPLICATION OF STUDY

Overall, this study demonstrates that resources alone do not ensure sustainable food production. Alongside theory, productive resources such as land availability, tractability, and government support create value only when agricultural producers have the capability to transform them into effective CSA practices. This study establishes that adoption of CSA practices serves as a critical instrument for sustainable food production by shaping resource efficiency, enhancing agricultural productivity, strengthening climate resilience and supporting food security in Malaysia. The results highlight that trialability, farmers' acceptability of sustainable food production and government support remain insufficient in easing CSA adoption and support its potential for sustainable food production. This emphasises the importance of collective efforts among policymakers, agricultural institutions, extension officers and agriculture producers to accelerate the transition toward CSA practices. The findings therefore suggested that Malaysia should move towards a more integrated approach that combines secure access to productive resources, technology transfer, digital agriculture, and collaboration. This will increase CSA adoption, strengthen climate resilience, improve sustainable food production, and enhance national food security.

LIMITATION AND RECOMMENDATION FOR FUTURE RESEARCH

Despite its contributions, current research recognises various limitations, including contextual and methodological limitations that may limit generalizability. Future research is encouraged to employ longitudinal plans, mixed-method methodologies, or comparative investigations across regions to improve the long-term effectiveness of climate-smart agriculture practices in improving SFP. This study included limited respondents from East Malaysia. Because a single respondent group self-reported at one moment in time, the connections may have been overstated because of CMB. Further research may also investigate mediating and moderating variables, such as climate risk perception, institutional trust and market convenience, to develop understanding of CSA adoption behaviour. In conclusion, climate-smart agriculture represents a sustainable and strategic path to help Malaysia's food production systems. By focusing on strategic adoption determinants and enhancing institutional support, CSA practices can significantly contribute to sustainable food security, resilient agriculture and the broader achievement of the SDG goals, specifically SDG 2 (Zero Hunger) and SDG 13 (Climate Action), in Malaysia.

ACKNOWLEDGEMENT

This study, under the grant Universiti Tunku Abdul Rahman Research Fund (UTARRF) 6552/0166, October 2025-September 2026, has been funded by Universiti Tunku Abdul Rahman with the title of the sponsored research project "Factors influencing adoption of climate smart agriculture (CSA) practices for SFP in Malaysia".

REFERENCES

Agyekum, T. P., Antwi-Agyei, P., Dougill, A. J., & Stringer, L. C. (2024). Benefits and barriers to the adoption of climate-smart agriculture practices in West Africa: A systematic review. *Climate Resilience and Sustainability, 3*(3), e279. https://doi.org/10.1002/cli2.79

Antwi-Agyei, P., Atta-Aidoo, J., Asare-Nuamah, P., Stringer, L. C., & Antwi, K. (2023). Trade-offs, synergies and acceptability of climate-smart agricultural practices by smallholder farmers in rural Ghana. *International Journal of Agricultural Sustainability, 21*(1), 2193439. https://doi.org/10.1080/14735903.2023.2193439

Autio, A., Johansson, T., Motaroki, L., Minoia, P., & Pellikka, P. (2021). Constraints for adopting climate-smart agricultural practices among smallholder farmers in Southeast Kenya. *Agricultural Systems, 194,* 103284. https://doi.org/10.1016/j.agsy.2021.103284

Aziz, M. A., Ayob, N. H., Ayob, N. A., Ahmad, Y., & Abdulsomad, K. (2024). Factors influencing farmer adoption of climate-smart agriculture technologies: Evidence from Malaysia. *Human Technology, 20*(1), 70-92. https://doi.org/10.14254/1795-6889.2024.20-1.4

Belay, A., Oludhe, C., Mirzabaev, A., Recha, J. W., Berhane, Z., Osano, P. M., Demissie, T., Olaka, L. A., & Solomon, D. (2022). Knowledge of climate change and adaptation by smallholder farmers: Evidence from southern Ethiopia. *Heliyon, 8*(12), Article e12089. https://doi.org/10.1016/j.heliyon.2022.e12089

Bwalya, B., Mutandwa, E., & Chiluba, B. C. (2023). Awareness and use of sustainable land management practices in smallholder farming systems. *Sustainability, 15*(20), Article 14660. https://doi.org/10.3390/su152014660

Çakmakçı, R., Salık, M. A., & Çakmakçı, S. (2023). Assessment and principles of environmentally sustainable food and agriculture systems. *Agriculture, 13*(5), Article 1073. https://doi.org/10.3390/agriculture13051073

Damba, O. T., Ageyo, C. O., Kizito, F., Mponela, P., Yeboah, S., Clottey, V. A., Oppong-Mensah, B. A., Bayala, J., Obeng Adomaa, F., Dalaa, M. A., Martey, F., Huyer, S., Zougmore, R., Tepa-Yotto, G., & Tamò, M. (2024). Constructing a climate-smart readiness index for smallholder farmers: The case of prioritized bundles of climate information services and climate-smart agriculture in Ghana. *Climate Services, 34*, Article 100453. https://doi.org/10.1016/j.cliser.2024.100453

Dardak, R. A. (2021). Overview of agricultural trade in Malaysia. FFTC Journal of Agricultural *Policy, 1*(1), 60-68. https://doi.org/10.56669/QQTR1622

Davis, K., Gammelgaard, J., Preissing, J., Gilbert, R., & Ngwenya, H. (2021). *Investing in farmers: Agriculture human capital investment strategies* (Vol. 4). Food and Agriculture Organization of the United Nations. https://doi.org/10.104060/cb7134en

Dorairaj, D., & Govender, N. T. (2023). Rice and paddy industry in Malaysia: Governance and policies, research trends, technology adoption and resilience. *Frontiers in Sustainable Food Systems, 7*, Article 1093605.

Francisco, É. C., de Arruda Ignácio, P. S., Piolli, A. L., & Dal Poz, M. E. S. (2023). Food-energy-water (FEW) nexus: Sustainable food production governance through system dynamics modeling. *Journal of Cleaner Production, 386*, Article 135825. https://doi.org/10.1016/j.jclepro.2022.135825

Frey, V., & Bruckner, M. (2021). *The global carbon footprint of Austria's consumption of agricultural (food and non-food) products*. https://doi.org/10.57938/7cd7ee70-111e-4784-80e9-84965bf2a371

Gemtou, M., Kakkavou, K., Anastasiou, E., Fountas, S., Pedersen, S. M., Isakhanyan, G., Erekalo, K. T., & Pazos-Vidal, S. (2024). Farmers' transition to climate-smart agriculture: A systematic review of the decision-making factors affecting adoption. *Sustainability, 16*(7), Article 2828. https://doi.org/10.3390/su16072828

Gupta, S., Rikhtehgar Berenji, H., Shukla, M., & Murthy, N. N. (2023). Opportunities in farming research from an operations management perspective. *Production and Operations Management, 32*(6), 1577-1596. https://doi.org/10.1111/poms.13967

Hair, J. F., Jr., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101-110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hair, J. F., Jr., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: Updated guidelines on which method to use. *International Journal of Multivariate Data Analysis, 1*(2), 107-123. https://doi.org/10.1504/IJMDA.2017.087624

Hoek, A. C., Malekpour, S., Raven, R., Court, E., & Byrne, E. (2021). Towards environmentally sustainable food systems: Decision-making factors in sustainable food production and consumption. *Sustainable Production and Consumption, 26*, 610-626. https://doi.org/10.1016/j.spc.2020.12.009

Karimi, H., & Ataei, P. (2024). An analysis of the perceived effectiveness and upscaling potential of climate-smart agriculture interventions in the Sistan Plain, Iran. *Journal of Cleaner Production, 460*, Article 142582. https://doi.org/10.1016/j.jclepro.2024.142582

Kassa, B. A., & Abdi, A. T. (2022). Factors influencing the adoption of climate-smart agricultural practice by small-scale farming households in Wondo Genet, Southern Ethiopia. *SAGE Open, 12*(3). https://doi.org/10.1177/21582440221121604

Khatun, K., Maguire-Rajpaul, V. A., Asante, E. A., & McDermott, C. L. (2020). From agroforestry to agroindustry: Smallholder access to benefits from oil palm in Ghana and the implications for sustainability certification. *Frontiers in Sustainable Food Systems, 4*, Article 29. https://doi.org/10.3389/fsufs.2020.00029

Kirungi, D., Senyange, B., Wesana, J., Sseguya, H., Gellynck, X., & De Steur, H. (2023). Entrepreneurial and attitudinal determinants for adoption of climate-smart agriculture technologies in Uganda. *Cogent Food & Agriculture, 9*(2), Article 2282236. https://doi.org/10.1080/23311932.2023.2282236

Kumar, L. (2024). The role of agriculture in economic development. *Journal of Environmental Agriculture and Agroecosystem Management, 1*(1), 62-68.

Rahmat, N., & Hamid, M. N. (2025). Emerging idle land issues and challenges in Malaysia: A review on the implications for national food security. *International Journal of Research and Innovation in Social Science, 9*(5), 24-31. https://doi.org/10.47772/IJRISS.2025.90500003

Maspan, R., & Halimoon, N. (2024). *Adoption of Malaysia Good Agricultural Practices (MyGAP) by crop producers in Peninsular Malaysia*. SSRN. https://doi.org/10.2139/ssrn.4743722

Mohd Yusoff, R., Syed Abdul Kader, S. Z., Arshad, A., Halim, A. H., Rosli, M. R., & Mohd Hafiz, S. M. (2025). A strategic proposal for enhancing Malaysia's economy through national food security initiatives. *Environment-Behaviour Proceedings Journal, 10*(SI28), 149-154. https://doi.org/10.21834/e-bpj.v10iSI28.6965

Muriithi, C., Mwongera, C., Abera, W., Chege, C. G. K., & Ouedraogo, I. (2023). A scalable approach to improve CSA targeting practices among smallholder farmers. *Heliyon, 9*(10), Article e20526. https://doi.org/10.1016/j.heliyon.2023.e20526

Murken, L., & Gornott, C. (2022). The importance of different land tenure systems for farmers' response to climate change: A systematic review. *Climate Risk Management, 35*, Article 100419. https://doi.org/10.1016/j.crm.2022.100419

Mutea, E., Rist, S., & Jacobi, J. (2020). Applying the theory of access to food security among smallholder family farmers around North-West Mount Kenya. *Sustainability, 12*(5), Article 1751. https://doi.org/10.3390/su12051751

Myers, R., & Hansen, C. P. (2020). Revisiting a theory of access: A review. *Society & Natural Resources, 33*(2), 146-166. https://doi.org/10.1080/08941920.2018.1560522

Naik, B. M., Singh, A. K., Venkatesan, P., Maji, S., Sunil, J., & Naik, M. R. (2025). Assessing the contribution of climate resilient agricultural technologies in advancing sustainable development goals in Telangana, India. *Discover Sustainability, 6*(1), Article 117. https://doi.org/10.1007/s43621-025-00870-1

Naveen, N., Datta, P., Behera, B., & Rahut, D. B. (2024). Climate-smart agriculture in South Asia: Exploring practices, determinants, and contribution to sustainable development goals. *Mitigation and Adaptation Strategies for Global Change, 29*(4), Article 31. https://doi.org/10.1007/s11027-024-10126-4

Ng, T. H., Lim, Y. S., Lye, C. T., Amran, A., & Tay, M. J. (2025). Understanding the challenges of community supported agriculture in Malaysia: Farmers' perspectives. *Applied Economics Letters, 32*(20), 3009-3013. https://doi.org/10.1080/13504851.2024.2360650

Ngoma, H., Angelsen, A., Jayne, T. S., & Chapoto, A. (2021). Understanding adoption and impacts of conservation agriculture in eastern and southern Africa: A review. *Frontiers in Agronomy, 3*, Article 671690. https://doi.org/10.3389/fagro.2021.671690

Nguyen, H. T. T., Le, T. Q. A., Tuyen, M. C., & Hung, P. X. (2025). A review of climate-smart agriculture in Asia: Critical achievements, key challenges, and potential prospects. *Journal of Agriculture and Rural Development in the Tropics and Subtropics, 126*(1), 25-42. https://doi.org/10.17170/kobra-2025011410816

Nyang'au, J. O., Mohamed, J. H., Mango, N., Makate, C., & Wangeci, A. N. (2021). Smallholder farmers' perception of climate change and adoption of climate-smart agriculture practices in Masaba South Sub-County, Kisii, Kenya. *Heliyon, 7*(4), Article e06789. https://doi.org/10.1016/j.heliyon.2021.e06789

Obabire, I. E., & Adeleye, I. A. (2024). Training needs of arable crop farmers on climate-smart agricultural practices in Ekiti State, Nigeria. *International Journal of Innovative Science and Research Technology, 9*(5), 1-10. https://doi.org/10.38124/ijisrt/IJISRT24MAY2326

Panyasit, K., Singhavara, M., Srihirun, J., Wangsathian, S., & Nonthapot, S. (2024). A study to assess the readiness of rice farmers to use agricultural technology for production in Nong Khai Province, Thailand. *International Journal of Innovative Research, 7*(2), 1607-1617. https://doi.org/10.53894/ijirss.v7i2.2703

Peluso, N. L., & Ribot, J. (2020). Postscript: A theory of access revisited. *Society & Natural Resources, 33*(2), 300-306. https://doi.org/10.1080/08941920.2019.1709929

Rust, N. A., Stankovics, P., Jarvis, R. M., Morris-Trainor, Z., de Vries, J. R., Ingram, J., Mills, J., Glikman, J. A., Parkinson, J., Toth, Z., Hansda, R., McMorran, R., Glass, J., & Reed, M. S. (2022). Have farmers had enough of experts? *Environmental Management, 69*(1), 31-44. https://doi.org/10.1007/s00267-021-01546-y

Singirankabo, U. A., Ertsen, M. W., & van de Giesen, N. (2022). The relations between farmers' land tenure security and agriculture production: An assessment in the perspective of smallholder farmers in Rwanda. *Land Use Policy, 118*, Article 106122. https://doi.org/10.1016/j.landusepol.2022.106122

Suresh, D., Shaw, R., & Masutomi, Y. (2025). Farmers' perspective on digitalization of climate-smart agricultural practices: A comparative study in Tamil Nadu, India. *Discover Agriculture, 3*(1), Article 28.

Tariq, Z., Nee, A. Y. H., & Senadjki, A. (2026). Factors affecting the adoption of climate-smart agriculture (CSA) practices for sustainable food production in Malaysia. *IOP Conference Series: Earth and Environmental Science, 1592*(1), Article 012016. https://doi.org/10.1088/1755-1315/1592/1/012016

Teklu, A., Simane, B., & Bezabih, M. (2023). Multiple adoption of climate-smart agriculture innovation for agricultural sustainability: Empirical evidence from the Upper Blue Nile Highlands of Ethiopia. *Climate Risk Management, 39*, Article 100477. https://doi.org/10.1016/j.crm.2023.100477

Thottadi, B. P., & Singh, S. P. (2024). Climate-smart agriculture (CSA) adaptation, adaptation determinants and extension services synergies: A systematic review. *Mitigation and Adaptation Strategies for Global Change, 29*(3), Article 22. https://doi.org/10.1007/s11027-024-10113-9

Tseng, T.-W. J., Robinson, B. E., Bellemare, M. F., BenYishay, A., Blackman, A., Boucher, T., Childress, M., Holland, M. B., Kroeger, T., Linkow, B., Diop, M., Naughton, L., Rudel, T., Sanjak, J., Shyamsundar, P., Veit, P., Sunderlin, W., Zhang, W., & Masuda, Y. J. (2021). Influence of land tenure interventions on human well-being and environmental outcomes. *Nature Sustainability, 4*(3), 242-251. https://doi.org/10.1038/s41893-020-00648-5

Valizadeh, N., Jalilian, S., Hallaj, Z., Esfandyari Bayat, S., Hayati, D., Bazrafkan, K., Kianmehr, N., & Akbari, M. (2023). Encouraging adoption of green manure technology to produce clean rice product. *Scientific Reports, 13*, Article 8690. https://doi.org/10.1038/s41598-023-35964-1

Waaswa, A., Oywaya Nkurumwa, A., Mwangi Kibe, A., & Ngeno Kipkemoi, J. (2022). Climate-smart agriculture and potato production in Kenya: Review of the determinants of practice. *Climate and Development, 14*(1), 75-90. https://doi.org/10.1080/17565529.2021.1885336

Wang, X. (2022). Managing land carrying capacity: Key to achieving sustainable production systems for food security. *Land, 11*(4), Article 484. https://doi.org/10.3390/land11040484

Zerssa, G., Feyssa, D., Kim, D. G., & Eichler-Löbermann, B. (2021). Challenges of smallholder farming in Ethiopia and opportunities by adopting climate-smart agriculture. *Agriculture, 11*(3), Article 192. https://doi.org/10.3390/agriculture11030192

Zhu, Z., Chu, F., Dolgui, A., Chu, C., Zhou, W., & Piramuthu, S. (2018). Recent advances and opportunities in sustainable food supply chain: A model-oriented review. *International Journal of Production Research, 56*(17), 5700-5722. https://doi.org/10.1080/00207543.2018.1425014

APPENDIX (A)

Questionnaire Items
Sustainable Food Production
I believe CSA practices will ensure sufficient sustainable food production.
I believe that CSA practices enhance sustainable food production by promoting resilience to climate change.
I believe CSA practices will reduce disease outbreaks agriculture production.
I believe CSA practices can produce high-quality food output.
Adoption of Climate Smart Agriculture (CSA) Practices
I believe that adopting CSA practices benefits agricultural production while preserving the environment.
I ensure that water resources are efficiently utilized when adopting CSA practices.
I am using CSA practices to protect the agriculture production from impact of climate change.
I am willing to promote the advantages of CSA adoption for agriculture growth to peers.
Land Availability
I believe land availability give me confidence to invest in CSA practices.
I believe having a land availability certificate increases chances of incentives from Government.
I believe a land certificate can reduces inheritance-related disputes.
I believe having a land availability certificate enhances the access to credit for investing CSA practices.
Trialability
There are agencies that allow farmers to try out CSA practices before adopting.
I would be more inclined to adopt CSA practices if I had the chance to test them first.
I will be more confident in adopting CSA practices if initial trial opportunities are provided.
I believe CSA practices are easy to test on small scale before full adoption.
Farmer's Acceptability
I feel acceptability is become necessary for all of us.
I believe the adoption of CSA practices can guarantee the quality and quantity of farm production.
I believe the adoption of technology can increase agriculture production.
To me, technology is needed.

Questionnaire Items
Government Support
I am aware of government support which promote CSA practices.
I believe Government subsidies can reduce the risk in adoption CSA practices.
I believe government policies providing helpful information about CSA practices.
I believe that government help agricultural producer in accessing input needed for CSA practices.