Open Access
J. Glob. Innov. Agric. Sci., 2024, 12(3):863-876
ISSN (Online): 2788-4546; ISSN (Print):2788-4538
DOI: https://doi.org/10.22194/JGIAS/24.1292
http://www.jgiass.com

Understanding Reasons Farmers to Adopt Mina Padi Farming on Rainfed Swamp Land: A Planned Behavior Theory Approach

Samsul Alam Fyka[1,*], Usman Rianse[2], Lukman Yunus[1] and Muhammad Aswar Limi[1]

[1]Department of Agribusiness, Halu Oleo University, Kendari, Indonesia; [2]Department of Agriculture Extension, Halu Oleo University, Kendari, Indonesia
*Corresponding author's e-mail: samsulalamfyka@uho.ac.id

This study uses the planned behavior theory to investigate why farmers practice Mina Padi farming (rice-fish integration) on rainfed swamp land. The research will focus on attitudes, subjective norms, perceived behavioral control, and intents. This research was conducted 2023 on 75 farmers who carried out Mina Padi farming (rice-fish integration) on rainfed swamp land in South Konawe Regency, Southeast Sulawesi Province, Indonesia. Descriptive analysis and structural equation modeling (SEM) analysis are the methods of data analysis used, and SmartPLS 3 software is utilized. The study's findings indicate that the intention variable for engaging in Mina Padi farming (rice-fish integration) positively and substantially affects attitudes, social norms, and perceived behavioral control. The most important factor influencing the formation of intentions is the attitude variable. A favorable and substantial influence was also identified for the intention variable on the behavioral variable of engaging in Mina Padi farming (rice-fish integration). Meanwhile, the behavioral control perception variable on the Mina Padi farming behavior variable (rice-fish integration) has a positive but insignificant influence.
Keywords: Mina Padi, rice–fish integration, rainfed swamps, SmartPLS, Theory of planned behavior.

INTRODUCTION

The global population is expected to rise by 15% between 2020 and 2050, from 7.8 billion to 9 billion people. Therefore, the availability and access to food must continue to be maintained so as not to cause problems (Ali *et al.*, 2020). The population growth rate in Indonesia in 2023 will be 1.13% of the total population, as many as 278.69 million people by mid-2023 (Muaya *et al.*, 2023). The increase in Indonesia's population will impact increased development and industrialization. This will affect decreasing agricultural land and climate change, threatening the population's food insecurity (Ziervogel and Ericksen, 2010; Wheeler and Von Braun, 2013). Land decline occurs because of functions of non-agricultural lands, such as housing development areas and tourist accommodation (Lanya *et al.*, 2017).

Demand for Indonesian food, especially rice, increases yearly due to population growth. The average rice consumption of the Indonesian population reaches 139.15 kilograms per capita per year, while the amount of rice consumed directly in households based on data is 100.76 kg/capita/year. The population of Indonesia in 2022 will be 273,879,750 people. If this figure is multiplied by the average Indonesian people's need for rice, namely 139.15 kg/capita/year or around 0.4 kg/person/day, then the need for rice will reach hundreds of millions of tonnes per day (Jiuhardi, 2023). Rice serves a crucial strategic purpose as the primary staple food for the majority of the Indonesian population. (Ambarwulan *et al.*, 2016; Wijaya, 2019; Resiani *et al.*, 2020; Sekaran, 2021; Tirtalistyani, 2022). Apart from rice, Indonesian people also need protein for their food. The primary source of protein consumed by the Indonesian population is fish. The total fish consumption of the Indonesian population in 2022 will be 56.48 kg/capita/year (Rahmawati *et al.*, 2023). To overcome the increase in rice and fish consumption, the condition of agricultural land continues to decline; a form of agriculture that can optimize existing land is integrated farming. The optimization of farm products through integrated agriculture takes into account sustainable principles from ecological, social, and economic viewpoints. (Freed, 2020; Peterson, 2020; Paramesh, 2022). Combining rice and fish, or Mina Padi, is one method to approach this strategically. Utilizing water resources to cultivate rice and fish concurrently on the same plot of land is one of the most viable approaches to ensuring sustainable food production. (Ahmed and Turchini, 2021; Sathoria and Roy, 2022).

Fyka, S.A., U. Rianse, L. Yunus and M.A. Limi. 2024. Understanding Reasons Farmers to Adopt Mina Padi Farming on Rainfed Swamp Land: A Planned Behavior Theory Approach. Journal of Global Innovations in Agricultural Sciences 12:863-876.
[Received 30 Jan 2024; Accepted 18May 2024; Published 13 Aug 2024]

Mina Padi (rice–fish integration) has a lengthy history in Indonesia, beginning in West Java in the ninth century. Fish are raised in mina padi between rice plants (Integrated Fish Farming) (Prasetyo, 2018; Artawan, 2021), spanning the period between two rice cultivation seasons or cultivating fish in rice fields instead of secondary commodities. (Fatimah, 2020; Yassi, 2023). The application of the Mina Padi system (rice-fish integration) experiences differences in each region, depending on the availability of irrigation, fish seeds, and social and economic conditions of the community (Nurhayati, 2016; Kinkela, 2017), including soil conditions (Lantarsih, 2016). Local knowledge is also incorporated into Mina Padi management (rice-fish integration) in a number of regions through the utilization of local resources that are accessible to the farmer. (Nurhayati *et al.,* 2016). Mina Padi (rice-fish integration) is applied in swamp land with a rain-fed irrigation system at this research location. The Mina Padi system model (rice-fish integration) on rain-fed swamp land has been implemented by farmers since 2009. However, the farmers did not know that the cultivation model they used by raising freshwater fish and planting rice on the same land was called Mina Padi (rice–fish integration) (Fyka *et al.,* 2023). The condition of wetland and rainfed land has limitations, as expressed by Darsani and Alwi (2022), namely drought and flooding in the rainy season; superior varieties must be available, pest and disease control must be intensive, and harvests are less than optimal, does not reduce the farmers' intentions. to continue carrying out Mina Padi farming (rice-fish integration) on that land. This can be seen in the number of farmers implementing Mina Padi farming, which continues to increase from 25 to 68 people (Akmal *et al.,* 2020).

The behavior of farmers to continue carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land is due to their firm intention to carry out this action. Intention describes the motivational factors that influence action (Ajzen, 1991). Motivation is a concept used to describe the impulses that arise within an individual to move and direct their behavior (Kusumayana, 2018). Farmers carry out planned actions or behavior when they choose to cultivate Mina Padi (rice-fish integration), maintain land area, increase land area, or not in the next planting season. As per the theory of planned behavior, the probability that an individual will execute a particular action increases with the intensity of their desire to do so (Ajzen, 1991; Rezaei *et al.,* 2018; Hall *et al.,* 2019; Hayati and Maisaroh, 2019; Peng *et al.,* 2022). The planned behavior theory approach has been widely applied and developed in empirical agribusiness studies. The empirical studies of Hall *et al.,* (2019) and Senger *et al.,* (2017) menggunakan kerangka teori perilaku terencana untuk menguji tindakan produsen. Meanwhile, Rezaei *et al.,* (2018), Cakirli Akyüz and Theuvsen (2020), Sok *et al.,* (2021), Peng *et al.,* (2022) The theory of planned behavior was embraced, and variables were constructed in accordance with empirical circumstances.

The decision of farmers to continue farming Mina Padi (rice–fish integration) on swampland with irrigation systems without irrigation or relying on rainfed with various risks faced during the rainy season or dry season, it becomes interesting to conduct a deeper study, the reason farmers continue to make these decisions in the future. In order to ascertain the long-term decision-making process of producers, it is imperative to acquire knowledge regarding non-economic factors that exert influence on said decision-making (Bonke and Musshoff, 2020). Lokhorst *et al.,* (2011) stated that specifically, it has been shown that psychological aspects of farmers' conduct matter when it comes to various agri-environmental policies since the adoption of these policies are not only driven by financial considerations. Until now, very few studies have examined farmers' decisions to carry out the Mina Padi agricultural system (rice-fish integration) through farmers' socio-psychological approaches. So, this research aims to discover why farmers carry out Mina Padi farming (rice-fish integration) on rainfed swamp land through the socio-psychological construction approach of the theory of planned behavior. This study is, as far as our knowledge goes, the first to employ the conceptual framework of the Theory of Planned Behavior (TPB) to investigate in depth the factors influencing farmers' intentions to implement Mina Padi farming (rice-fish integration) on rainfed swamp land.

MATERIALS METHODS

The study was carried out in Epeesi Village, which is located in the Basala District of South Konawe Regency, Southeast Sulawesi Province, Indonesia. The selection of this location was predicated on its appropriateness as a rainfed marshland for the cultivation of Mina Padi (Paddy-Fish). This village consists of four hamlets, of which three hamlets (hamlet 1, hamlet 2, and hamlet 3) have been farming Mina Padi (rice-fish integration) since 2009. The research period is from March to December 2023. The climate of Epeesi Village is still classified as a tropical climate, namely with two seasons per year where rainfall is 30 mm/year with an average temperature of 29ºC - 32ºC. The two seasons in question are the rainy and dry seasons, so these two seasons greatly influence the lives of the people in Epeesi Village, especially those who work as farmers. The topography of Epeesi Village is flat, so it is suitable for carrying out agricultural and plantation activities where 75% land, 10% swamps, and 15% potential for rice fields, with an altitude of 1,500 km above sea level. Agriculture-related activities provide the majority of residents with their primary source of income. The population's agricultural products include cocoa, lowland rice, patchouli, palm oil, and pepper (Selviana, 2022). The study's population comprised 75 persons who were cultivators and had adopted the Mina Padi agricultural system, which incorporated rice and fish integration. This population has

continued to increase since 2009, namely by only 25 people (Ningrum *et al.,* 2019). Determining the sample of respondents used the census method, namely, taking the entire population in this study (Etikan *et al.,* 2016). The characteristics of the sample used by taking into account aspects of farming experience of more than 5 years

Primary and secondary sources of information were utilized for this study. Data collected directly from samples/respondents via questionnaire-based interviews constitutes preliminary data. The survey instrument, the framework for theoretical analysis, and the practical circumstances of the research site were all determined by the research objectives. Formulation of a survey instrument (structured questionnaire) to gather data from a subset of respondents. The survey is divided into two sections. The initial section gathers data on socioeconomic variables, including age, education level, household size, farmland area, and farming experience in Mina Padi (rice-fish integration). It also inquires about planting patterns, production costs, rice and fish production, and other relevant aspects. The subsequent section addresses farmers' attitudes and behavioral intentions regarding Mina Padi farming (rice-fish integration), including attitudes, social status, and planting patterns. Survey questionnaires were completed through various methods, including literature evaluations, group discussions with agricultural specialists and researchers from prestigious institutions, and experimental studies. The questionnaires for this in-person survey were distributed to farmers. Meanwhile, secondary data supports data obtained from literature studies, statistical data, and previous research relevant to the research.

This study employs the theory of planned behavior, which comprises five latent variables, namely Mina Padi farming attitudes (rice - fish integration) (X_1), Mina Padi farming social norms (rice - fish integration) (X_2), Control of farming behavior of the farming system Mina Padi (rice - fish integration) (X_3), Mina Padi farming intentions (rice - fish integration) (Y_1), and Mina Padi farming decisions (rice - fish integration) (Y_2) and 16 manifest variables (indicators). Latent and manifest variables are explained conceptually in the research operational framework scheme (Figure 1). This research uses a Likert scale with closed questions and provides five alternative answers (1 = strongly disagree to agree = 5 strongly). The complete set of variables and measurements utilized in this study can be found in Table 1.

The results obtained from interviews with research variables were descriptive statistical analysis. According to Kaur *et al.,* (2018) descriptive statistics are used to describe or summarize the item under study using sample or population data without analyzing or making conclusions. This study uses descriptive statistical analysis to explain attitudes, social norms, behavioral control, farmers' intentions, and actions in Mina Padi cultivation (rice-fish integration). The basis for interpreting the average value used in this study refers to the

Table 1. Measurement of variables and indicators in research.

Variable	Indicator	Measurement
Mina Padi farming attitude (rice-fish integration) (X1)	Helping the family provide rice and fish (X1.1)	1. Strongly disagree
		2. Disagree
	Mina Padi proceeds can be used for family savings (X1.2)	3. Neutral
	Mina Padi provides additional family income (X1.3)	4. Agree
	Mina Padi is more profitable than monoculture (X1.4)	5. Strongly agree
Social Norms of Mina Padi Farming (rice - fish integration) (X2)	Family supports carrying out Mina Padi farming (X2.1)	1. Strongly disagree
		2. Disagree
	Doing Mina Padi because you see the success of other farmers (X2.2)	3. Neutral
	Mina Padi because of the encouragement of Bugis tribal traditions (X2.3)	4. Agree
		5. Strongly agree
	Mina Padi because of suggestions from friends or neighbors (X2.4)	
Control of Mina Padi farming behavior (rice – fish integration) (X3)	Water conditions that sometimes cannot be controlled (X3.1)	1. Strongly disagree
		2. Disagree
	Land conditions that support Mina Padi cultivation (X3.2)	3. Neutral
	The existence of farmer groups that support Mina Padi farming (X3.3)	4. Agree
		5. Strongly agree
Farmers' intentions to cultivate Mina Padi (rice-fish integration) (Y1)	Farmers will prefer Mina Padi to fish-only or rice-only monocultures (Y1.1)	1. Strongly disagree
		2. Disagree
	Farmers will invite other farmers to continue farming Mina Padi (Y1.2)	3. Neutral
		4. Agree
	Farmers will continue to cultivate Mina Rice in the future (Y1.3)	5. Strongly agree
Behavior of Mina Padi farmers (rice - fish integration) (Y2)	Farmers will not reduce the area of Mina Padi land (Y2.1)	1. Strongly disagree
		2. Disagree
	Farmers will develop Mina Padi farming in the form of freshwater fish fishing tourism (Y2.2)	3. Neutral
		4. Agree
		5. Strongly agree

interpretation of the scores used, namely the very harmful category (0.0 – 1.0), the negative category (1.1 – 2.0), the neutral category (2.1 – 3.0), positive category (3.1 – 4.0), and very positive category (4.1 – 5.0). Next, to determine why farmers carry out rice-fish integrated system farming (Mina Padi), Implement structural equation modeling with partial least squares (PLS-SEM) using SmartPLS 3.0. PLS-SEM is a variance-based non-parametric method for maximizing the explained variance of endogenous variables (Henseler *et al.,* 2009b; Simkin and McLeod, 2010; Hair *et al.,* 2011; Abas *et al.,* 2021). PLS-SEM is also applicable to data that deviates from the normal distribution and permits the use of constructs with only one or two indicators (Hair *et al.,* 2012; Henseler, 2014). PLS-SEM can also be applied to studies with limited sample sizes or absent data (Barroso *et al.,* 2009; Henseler *et al.,* 2009a; Sok *et al.,* 2021).

According to (Leguina, 2015), Two stages comprise the evaluation of PLS-SEM results: the outer and inner models. The external model is evaluated to determine the validity of the relationship between latent and indicator variables. Convergent validity, discriminant validity, and composite reliability are employed to ascertain the validity. As an indication of concurrent validity on PLS, the magnitude of the peripheral loading of each indicator on the latent variable is utilized. According to Chin *et al.,* (1997), an outer loading value of > 0.70 is strongly recommended. An AVE root or value in excess of 0.50 (Fornell, 1981) signifies the attainment of discriminant validity, which means that the indicators employed are capable of elucidating the variable constructed from other variables. Values of composite reliability and Cronbach alpha exceeding 0.60 are regarded as satisfactory (Hair Jr *et al.,* 2021), Thus, discriminant validity has been successfully attained. In the interim, the inner model evaluation assesses the appropriateness of latent variables, specifically endogenous and exogenous variables. According to (Hair *et al.,* 2012), several tests of a research model's efficacy can be conducted, including r-square (R2), q-square (Q2), and goodness of fit (GoF). According to (Hair *et al.,* 2011), The R-squared values are 0.67, which indicates strength, 0.33, which indicates moderation, and 0.19, which indicates weakness. According to (Hair *et al.,* 2011), Nilai GoF berkisar antara 0 hingga 1, dengan 0,1 (menunjukkan GoF kecil), 0,25 (menunjukkan GoF sedang), dan 0,36 (menunjukkan GoF besar) sebagai interpretasinya. Positive Q2 predictive relevance results are indicated by a value greater than zero. (Chin *et al.,* 1997), This demonstrates that the exogenous latent variable is suitable for predicting the endogenous variable as an explanatory variable (Stone, 1974). The final stage will be a hypothesis test to see the influence of all variables in the research. The following describes the study's hypothesis:

1. Hypothesis 1 (H_1): Attitudes influence farmers' intentions to carry out Mina (rice-fish integration) rice farming on rainfed swamp land
2. Hypothesis 2 (H_2): Social norms influence farmers carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land
3. Hypothesis 3 (H_3): Perceived behavioral control influences farmers' intentions to carry out Mina Padi farming (rice - fish integration) on rainfed swamp land
4. Hypothesis 4 (H_4): Intentions influence farmers' intentions to carry out Mina Padi farming (rice-fish integration) on rainfed swamp land
5. Hypothesis 5 (H_5): Perceived behavioral control influences farmers' intentions to carry out Mina Padi farming (rice-fish integration) on rainfed swamp land

RESULTS

The reasons why farmers carry out Mina Padi rice farming on rainfed swamp land in this research will be explained using the theory of planned behavior approach. This theory is based on Ajzen (1991) empirical study, which states that farmers' decisions in farming activities are influenced by complex motives and considerations, which are not only related to economic aspects but are more socio-psychological. Human behaviors are governed by three types of factors, according to Ajzen's Theory of Planned Behavior (TPB): (1) beliefs regarding the outcomes of behavior and evaluation of those outcomes (behavior beliefs); and (2) beliefs regarding the normative expectations of others. Furthermore, (3) motivation to conform to these expectations (normative beliefs) and (3) perceptions of the influence of factors that facilitate or impede behavior (control beliefs) are also significant (Ajzen, 1991). The planned behavior theory approach has been widely applied and developed in empirical agribusiness studies. The empirical studies of Senger *et al.,* (2017) and Hall *et al.,* (2019) use a planned behavior theory approach to study farmer actions. At the same time, Rezaei *et al.,* (2018), Cakirli Akyüz and Theuvsen (2020), Peng *et al.,* (2022), and Sok *et al.,* (2021) incorporate variables into the theory of planned behavior in accordance with empirical circumstances.

***Description of Research Variables*:** Descriptions of research variables are used to find out respondents' answers to each question for each research variable. The basis for interpreting the average value used in this study refers to the interpretation of the scores used, namely the Very Negative category (0.0 – 1.0), the Negative category (1.1 – 2.0), the Neutral category (2.1 – 3.0), Positive category (3.1 – 4.0), and Very Positive category (4.1 – 5.0). Farmers' reasons for carrying out Mina Padi farming (rice-fish integration) are explained through the planned behavior theory approach. This research employs a theory of planned behavior comprised of several variables, namely attitudes towards behavior (X_1), social norms (X_2), control over behavior (Y_1), farmer intentions, and farmer behavior (Y_2). The results of the statistical descriptive analysis will be detailed for each variable in Table 2.

Table 2. Description of variables from which farmers carry out Mina Padi farming on rainfed swamp land.

Variable	Average score	Category
Attitude towards Behavior (X1)	3.89	Positive
Social Norms (X2)	3.64	Positive
Control over behavior (X3)	3.86	Positive
Farmer Intention (Y1)	3.65	Positive
Farmer behavior (Y2)	3.68	Positive

The research results found that the mean value for the attitude variable indicator towards behavior (X_1) was 3.89 on a scale of 5. This shows that the respondent's attitude towards the behavior of carrying out Mina Padi farming (rice-fish integration) is positive for farmers in the form of helping farmer families maintain the availability of rice and fish; the results of Mina Padi production can be used as family savings, can provide additional family income and savings, and Mina Padi is more profitable than monoculture farming. In social norms (X_2), the mean value for each indicator is 3.64 on a scale of 5. The mean value falls within the positive range, indicating that there is influence from support from family, friends, or neighbors, the success of friends, and encouragement from Bugis tribal traditions, which influence respondents to be interested in farming—Mina Padi (rice–fish integration). In the perceived behavioral control variable, the mean value of the indicator is 3.86 on a scale of 5. This shows that the respondent has control or ability to carry out Mina Padi farming (rice-fish integration). The mean score for the farmer intention item is 3.65 on a scale of 5. This positive score indicates that the respondent intends to conduct Mina Padi farming (rice-fish integration). Meanwhile, in the farmer behavior variable, the mean value for each indicator is 3.68. This positive score indicates that the respondent farmers responded positively to the farmers' desire not to reduce the area of Mina Padi land and will carry out efforts to develop Mina Padi in the form of freshwater fishing tourism.

***SEM PLS analysis results*:** In the PLS-SEM analysis stage, two model evaluations are carried out: the outer and inner models.

1. Outer Model Evaluation
2. In order to assess the validity of this outer model, convergent validity, discriminant validity, and composite reliability are utilized. The subsequent findings present the results of the combined reliability, convergent validity, and discriminant validity analyses conducted for this study.

Convergent validity: In convergent validity, each indicator evaluates latent variable measurement models that use reflective indicators. For the convergent validity test on PLS, the value of the outer loading of each indicator on the latent variable is utilized. According to (Hair Jr *et al.*, 2021), The outer loading value should be greater than 0.70, accompanied by a t-statistic value greater than 1.96 or a p-value less than 0.05. The external loading values that were calculated for all latent variables in this investigation are as follows.

Table 3. Results of Outer Loading Calculation of Latent Variable Constructs in Research.

No.	Indicator	Outer Loading	t-statistics	P-value
1	X1.1 <- Attitude	0.776	18,166	0,000
2	X1.2 <- Attitude	0.784	14,204	0,000
3	X1.3 <- Attitude	0.833	27,538	0,000
4	X1.4 <- Attitude	0.893	40,467	0,000
5	X2.1 <- Social Norms	0.758	12,754	0,000
6	X2.2 <- Social Norms	0.806	21,188	0,000
7	X2.3 <- Social Norms	0.739	11,396	0,000
8	X2.4 <- Social Norms	0.815	18,610	0,000
9	X3.1 <- Behavior Control	0.896	41,302	0,000
10	X3.2 <- Behavior Control	0.933	65,757	0,000
11	X3.3 <- Behavior Control	0.900	42,053	0,000
12	Y1.1 <- Intention	0.775	15,597	0,000
13	Y1.2 <- Intention	0.783	12,330	0,000
14	Y1.3 <- Intention	0.821	20,890	0,000
15	Y2.1 <- Farmer Behavior	0.907	45,941	0,000
16	Y2.2 <- Farmer Behavior	0.917	52,882	0,000

Based on the table above, 16 indicator items were used in this research. From the 16 indicator items, A confidence level of 95% indicates that the outer loading value is greater than 0.7, and the p-value is less than (<0.05). These results indicate that all latent variables used in this research, namely attitudes, social norms, behavioral control, intentions, and farmer behavior, have been able to be formed and explained well by the indicators used in this research or can be convergently valid.

***Discriminant validity*:** Validitas diskriminan adalah ukuran sejauh mana suatu konstruk bersifat khas dan mampu menjelaskan fenomena yang diukur. Discriminant validity is indicated when an AVE value or AVE root exceeds 0.50. This indicates that the indicator employed is capable of defining the formed variable exclusively, as opposed to other variables. To certify a structure valid, the root value of AVE must be greater than the correlation value between latent variables. The AVE values and AVE roots obtained from this study are detailed in Table 4.

Table 4. AVE Value and AVE Root of Research Variables.

No.	Variable	AVE	AVE Root
1	Attitude	0.629	0.793
2	Social norms	0.831	0.912
3	Behavior control	0.828	0.910
4	Farmer Intentions	0.609	0.780
5	Farmer Behavior	0.677	0.823

Table 4 demonstrates that discriminant validity is attributed to each variable because the square root of the average variance extracted (AVE root) value for each variable is more

significant in significance than its AVE. In addition, the AVE root value for attitude, social norms, behavioral control, farmer intentions, and decisions is greater than the tolerance limit, 0.50. This shows that the constructs of attitudes, social norms, behavioral control, farmer intentions, and farmer behavior have good discriminant validity. By satisfying the criteria for discriminant validity, the instruments utilized in this study to assess all constructs or latent variables have been met.

Composite validity and Cronbach Alpha: Discriminant validity is considered to have been attained when composite reliability and Cronbach alpha values exceed 0.60. The subsequent findings present the test results for this study's Cronbach alpha and composite reliability measurement models.

Table 5. Cronbach Alpha and Composite Reliability Values for Research Variables.

No	Variable	Composite Reliability	Cronbach's Alpha
1	Attitude	0.836	0.705
2	Social norms	0.908	0.797
3	Behavior control	0.935	0.896
4	Farmer Intentions	0.862	0.786
5	Farmer Behavior	0.893	0.840

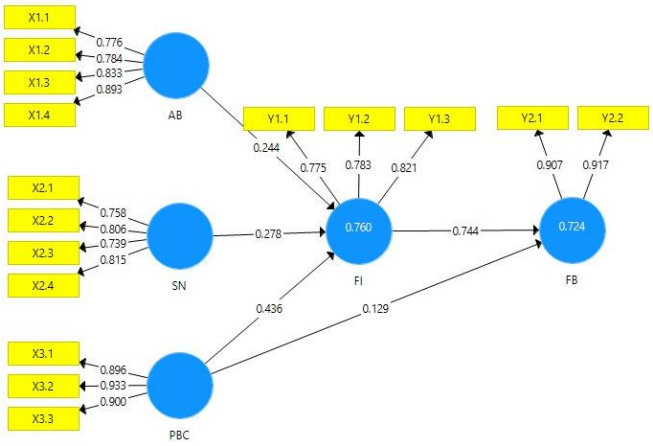

Figure 1. PLS Algorithm Results Reasons for Farmers Carrying out Mina Padi Farming (Paddy - Fish Integration) on Rainfed Swamp Land (AB = Attitude to behavior; SN = Social norms; PBC = Perceived Behavioral control; FI = farmer's intention; FB = farmer behavior)

The composite reliability values for the following variables are all greater than the limit value of 0.600, as shown in Table 5: 0.836 for the attitude variable, 0.908 for the social norm variable, 0.935 for the behavioral control variable, 0.862 for the farmer 'ssss intention variable, and 0.893 for the farmer's decision variable. This demonstrates that the latent variables employed exhibit favorable composite reliability, confirming discriminant validity. Also, all of the Cronbach alpha values exceed the predetermined threshold of 0.600. Specifically, the attitude variable has a value of 0.705, the social norm variable 0.797, the behavioral control variable 0.896, the farmer intention variable 0.786, and the farmer decision variable 0.840. This demonstrates that the employed latent variables are highly reliable.

Inner Model Evaluation: The structural model is assessed for Goodness of Fit throughout inner model testing. The path coefficient and measurement model for the equation model, which constitutes the Goodness of Fit or model determination coefficient, are shown in Figure 2:

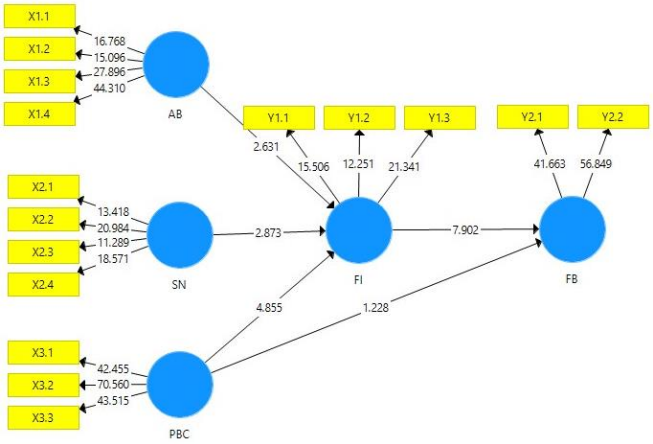

Figure 2. Results of PLS Bootstrapping (Reasons for Farmers Carrying out Mina Padi Farming (rice-fish integration) on Rainfed Swamp Land

The results of the inner model evaluation between endogenous and exogenous latent variables in this study are presented in Table 6.

Table 5. Results of Inner Model Evaluation

Indicator	Criteria	Results	Information
R^2	• >0.67 (good) • 0.33 -0.67 (Moderate) • < 0.33 (weak)	• Intention to carry out Mina Padi farming (0.750) • Decision to carry out Mina Padi farming (0.716)	• Good • Good
Q^2	$Q^2 > 0$ (good, the model has predictive relevance) $Q^2 < 0$ (not good, the model lacks predictive relevance)	$Q^2 = 0.929$	good, the model has predictive relevance

Table 6. Results of the Bootstrapping Process with a Significance Level of 0.05

Influence between variables	*Original sample (O)*	T Statistics (|O/STDEV|)	P- values	Significant Level	Hypothesis
Attitude→Intention	0.244	2,517	0.012	Significant	accepted
Social norms→Intention	0.278	2,759	0.006	Significant	accepted
Behavior control→Intention	0.436	4,989	0,000	Significant	accepted
Intention→Farmer Behavior	0.744	8,531	0,000	Significant	accepted
Behavior control→Farmer Behavior	0.129	1,340	0.181	Not significant	rejected

H1: The effect that farmers' attitudes have on their intentions to practice Mina Padi cultivation (rice-fish integration) on rainfed swamp land

As shown by Table 6, the inner model assessment findings indicate that the model is deemed appropriate for usage. Good R^2 values are found in all equations, including endogenous and exogenous latent variables, and Q^2 values are more significant than 0. The R^2 value of the intention variable to carry out Mina Padi farming is 0.750, meaning that the attitude variables (X_1), social norms (X_2), and behavioral control (X_3) can be explained by the intention variable (Y_1) of 75.0% and additional variables not included in the study account for the remaining 25%. Similarly, the R2 value for the Mina Padi farming behavior variable (Y_2) is 0.716, meaning that the behavioral control variable (X_3) and the intention variable (Y_1) can be explained by the farmer's decision variable (Y_2) amounting to 71.6% and the remaining 28.4 % determined by other variables outside the research.

Meanwhile, the results of calculating the Q^2 value above show that the predictive relevance value is 0.929. This means that the accuracy of this research model can explain 92.9% of the variables of attitudes, social norms, behavioral control, intentions, and farmers' decisions. The remaining 7.1% may be explained by components of the research model that were not accounted for in this study. Therefore, the model is considered good or has a good estimation value. The Q^2 value shows that the model has perfect accuracy because it produces a value of more than 80%. So, the model can be used to test direct and indirect impacts at a later stage.

***Hypothesis Testing and Discussion*:** Hypothesis testing is carried out to test the influence between constructs in the model. In hypothesis testing, we look at the values in the total effects output from the bootstrapping calculation process, which produces original sample values, t-statistics values, and p-values in the estimated path coefficients. The t-test, or t-statistic, is the statistical instrument utilized. The t-statistic value determines the acceptance or rejection of the hypothesis formulated in the initial research model. The t-test, or t-statistic, is the statistical instrument utilized. The t-statistic value determines the acceptance or rejection of the hypothesis formulated in the initial research model.

The statistical t value, as indicated by the results presented in Table 7, is 2.517 (>1.96). Hence, this value indicates that the attitude variable influences farmers' intentions in carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land, so H_1 can be accepted. The path coefficient value (original sample) is 0.278. It has a positive sign, meaning that the higher the level of farmers' attitudes towards farmer intentions, which is indicated by an indication that respondents consider that carrying out Mina Padi farming (rice-fish integration) provides advantages compared to monoculture, it is an additional saving and investment, provide extra income and help provide rice and fish for the family, the higher the farmer's intention to carry out Mina Padi farming (rice-fish integration) on rain-fed swamp land. According to the findings of research conducted by Bahrun (2022), Greiner (2015), Lemken (2017), and Bonke (2020), which stated that attitudes towards farmers' intentions to plant shallots were positive.

This relates to the theory of planned behavior, which posits that within the agricultural domain, the attitudes of farmers towards a specific farming practice or decision can significantly influence their intention to implement that practice. (Pratama, 2022). Farmers' attitudes can include an assessment of the advantages and disadvantages of a farming method. If farmers believe a new technique will increase crop yields, reduce costs, or provide other benefits, positive attitudes may increase intentions to adopt the technique. On the other hand, if farmers have a negative view of an innovation because they believe it could cause financial losses or reduce crop yields, negative attitudes may hinder their intention to adopt the innovation.

This attitude reflects farmers' subjective evaluation of the advantages, disadvantages, or value of actions to carry out Mina Padi farming (rice-fish integration) on rainfed swamp land in South Konawe Regency. Suppose a farmer has a positive attitude towards Mina Padi (rice-fish integration) farming on rainfed swamp land. This may be because they believe this method is more productive, environmentally sustainable, or economically profitable. This positive attitude can be the primary driver of farmers' intentions to adopt Mina Padi (rice-fish integration) farming practices. Based on the results of interviews with respondent farmers, they implemented Mina Padi farming (rice-fish integration) on rain-fed swamp land because they saw that Mina Padi farming (rice-fish integration) was more profitable than monoculture and was able to provide additional income and savings for the family. Because the results obtained from Mina Padi farming (rice-fish integration) in the form of fish and rice production

can be sold. Besides that, Mina Padi farming can provide additional food availability for the family, especially rice and fish. This is the biggest reason for the attitude factor that underlies farmers carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land. Similarly with previous research, these findings indicate that attitude is among the most significant determinants of the intention to engage in agri-environmental action. (Greiner, 2015). These are also the results of research thatnd Senger *et al.,* (2017), which stated that farmers' intentions to implement mixed cropping cultivation are influenced by their attitudes.

H2: The effect of societal norms on farmers' intentions to engage in Mina Padi farming, which involves the integration of rice and fish on rainfed swamp land.

The statistical t value, as indicated by the results presented in Table 7, is 2.517 (>1.96). Hence, this value indicates that the standard social variable influences farmers' intentions in carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land, consequently, hypothesis 1 is valid. In the original sample, the path coefficient value is 0.244. It has a positive sign, meaning that the higher the level of social norms that farmers believe in, it is indicated by support from the family, encouragement due to the success of other farmers, encouragement from Bugis ethnic motivation attached to farmers, and the presence of suggestions. From farmer groups, it will increase farmers' intentions to carry out Mina Padi farming (rice-fish integration) on rain-fed swamp land. This pertains to the theory of planned behavior, which posits that the degree to which farmers perceive social pressure from their peers to engage in particular behaviors or abstain from doing so is associated with social norms. Social norms include farmers' beliefs about whether people important to them (such as the farmer's family, neighbors, or friends) support or oppose the farming behavior. Suppose farmers feel the people around them support and appreciate specific farming methods. In that case, subjective norms can positively boost the intention to adopt farming activities or apply that technology. These results are consistent with studies carried out by Zhou (2016), Song (2017), Rezaei *et al.,* (2018) in the field of food safety behavior and Le Dang (2014), Arunrat (2017), and Senger *et al.,* (2017) in another field, where the behavior of farmers has been analyzed using the TPB model. In this case, Zhou (2016) it has been verified that social environment pressure heightens producers' awareness of product safety and thus encourages them to conduct self-inspections. Also, Burton (2004) The theory is put forth that intentions and behavior are impacted by subjective norms due to the fact that individuals are not immune to social and cultural influences.

It was determined, through interviews with respondent farmers, that social pressure affected their decision to intention in Mina Padi (rice-fish integration) farming. Support from the family in the form of a willingness to help in carrying out Mina Padi farming from the moment they started clearing land until now really encourages farmers to continue carrying out Mina Padi farming (rice-fish integration). This family significantly influences farmers' intentions; this is reinforced in the research results of Martínez-García (2013). Most workers in opening farming land come from their own families. Likewise, from the encouragement of influencing the success of other farmers who had previously carried out Mina Padi farming. This usually encourages the enthusiasm of the respondent's family to carry out Mina Padi farming (rice-fish integration), likewise with the cultural or tribal aspects attached to farmers, namely the Bugis tribe. Respondent farmers said they carried out Mina Padi farming (rice-fish integration) because they were motivated by their habit of living in the village to farm and utilize the existing land. So when they have the swamp land, they try to use it by cultivating rice and fish.

H3: The effect that farmers' attitudes have on their intentions to practice Mina Padi farming (rice-fish integration) on rainfed wetland land

Based on the output results of Table 7, the statistical t value is 4.989 (>1.96). Hence, this value indicates that the behavioral control variable influences farmers' intentions in carrying out Mina Padi farming (rice-fish integration) on cistern swamp land, thus accepting hypothesis 1. In the original sample, the path coefficient value is 0.436. It has a positive indication, indicating that farmers feel more in control of their actions, indicated by the existence of suitable land conditions, the existence of farmer groups, and water conditions that can sometimes be controlled, the greater the intention to farmers to carry out Mina Padi farming (rice-fish integration) on rainfed swamp land. The rationale for this is elucidated in the theory of planned behavior, which posits that an individual's actions will be congruent with his or her positive beliefs, which the individual will manifest (Pratama, 2022). Also, this suggests that the degree to which Mina Padi farming (rice-fish integration) is practiced is strongly impacted by how simple or complex an action is to execute. Additionally, even while farmers want to pursue Mina Padi farming (rice-fish integration), they often don't because they lack the resources or competencies or believe additional challenges would be involved. The results concur with studies conducted by Clayton (2008), Wong (2009), and Mullan (2013), according to the researcher, behavioral control is widely recognized as a significant predictor of intention regarding various food safety practices. Similarly, Zhou (2016) revealed that farmers' propensity to use cooperative self-inspection behavior to guarantee the safety of agricultural goods declined as their perceived difficulties with behavioral control increased. Based on Senger *et al.,* (2017), Farmers' intentions to diversify are influenced by how confident they are in their abilities to effectively diversify their agricultural output. An increase in behavioral control leads to heightened motivation and self-assurance among producers. (Herath, 2010; de Lauwere, 2022; Ma, 2023). As a result, they may show more

intention to engage in Mina Padi farming (rice–fish integration).

H4: The Impact of Farmers' Intentions on Their Behavior Regarding Mina Padi Farming (integration of rice and fish) on Rainfed Swamp Land

Based on the output results of Table 7, the statistical t value is 8.531 (>1.96). Hence, this value indicates that the behavioral intention variable influences farmers' intentions in carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land, so hypothesis 1 is acceptable. The value of the path coefficient in the original sample is 0.744. It has a positive sign, meaning that the higher the level of intention towards behavior felt by farmers, the farmer's behavior will increase in carrying out Mina Padi farming (rice-fish integration) which is characterized by the farmer's behavior to continue choosing Mina Padi farming (rice-fish integration) rather than monoculture, will continue to carry out Mina Padi farming (rice-fish integration) in the future and invite friends and family to carry out Mina Padi farming (rice-fish integration).

These results support the findings of Correia (2022), Valizadeh (2023b), and Fauzi (2022), which state that intention is the primary determinant of farmer behavior to do something. A person will have an intention to do something prior to exhibiting the behavior he desires. An individual will therefore intend to exhibit a behavior when he or she has a positive attitude and perception, considers the behavior to be acceptable in the environment, and accepts responsibility for the actions of others. (Handika, 2017). This means that the higher a farmer's intention to act, the more likely they are to carry out that action (Rezaei et *al.*, 2018; Perry, 2020; Ataei, 2021; Bakker, 2021;Mills, 2021; Sun, 2022). This shows that respondents have a high intention to carry out Mina Padi farming (rice - fish integration), and this intention leads to the behavior of wanting to carry out Mina Padi farming (rice - fish integration) again in the future. Of course, with high intentions, it will influence positive behavior in the future in Mina Padi farming (rice-fish integration). Respondents will consider the decision to carry out Mina Padi farming (rice-fish integration) as a farming activity that can provide results from rice and fish production and be developed as a future freshwater fishing tourist spot for the surrounding community. This decision is certainly in line with the number of farmers who continue to cultivate Mina Padi farming (rice-fish integration) and also has an impact on the increase in the area of Mina Padi land grown by respondent farmers. Since the beginning of 2009, the number of farmers growing Mina Padi has been 25 people. Currently, this has increased to 75 farmers. The area of swamp land used for Mina Padi is 60 ha for Hamlet 1, 35 ha for Hamlet 2, and 25 ha for Hamlet 3 (Ningrum *et al.*, 2019; Fyka *et al.*, 2023)

H5: The effect of behavioral control on farmers' behavior in carrying out Mina Padi farming (rice - fish integration) on rainfed swamp land

Perceived behavioral control has a direct impact on behavior as well in the notion of planned behavior. (Hardin-Fanning, 2017; Sholihah, 2018; Mahdavi, 2021; Chen, 2022; Valizadeh, 2023a). Based on the output results of Table 7, the statistical t value is 1.340 (>1.96). Hence, this value indicates that the behavioral control variable does not affect farmers' behavior in carrying out Mina Padi farming (rice-fish integration) on rainfed swamp land, so hypothesis 0 is acceptable. Positively signed path coefficient value (0.129, original sample); this explains that the greater the respondent's perception of the level of control over their behavior, the greater the possibility that the behavior of carrying out Mina Padi farming (rice-livestock integration) will be realized. This value serves as an illustration of the impact that the perceived behavioral control variable has on behavior, albeit without statistically significant significance. Therefore, it can be said that the perception of behavioral control has not been able to make respondents realize Mina Padi farming (rice-livestock integration) and only has the intention to do so. The results of this research are those conducted by Pratama (2022) on Jelantag Oil activities; Bahrun (2022) on shallot farming activities stated that behavioral control did not influence farmer behavior.

Theoretically, the better/positive control over the action of farming Mina Padi (rice-fish integration) felt by the farmer, the higher the farmer's intention to cultivate Mina Padi (rice-livestock integration). On the other hand, the more obstacles or inadequate resources and support there are for Mina Padi farming activities (rice-fish integration), the more farmers' behavior will be reduced. Control beliefs for assessing Mina Padi farming actions (rice-fish integration) are linked to endogenous and exogenous attributes, such as farmer characteristics (condition), availability of capital, irrigation feasibility, marketing access, availability of agricultural technology, access to agricultural information, agricultural, institutional support, and government policy support (Ajzen, 1991; Sok *et al.*, 2021; Peng *et al.*, 2022). The research results show that the most prominent obstacle respondent farmers always face in carrying out Mina Padi farming (rice-fish integration) is the lack of irrigation and technology for draining swamp water, which is sometimes excessive during the rainy season. This causes some respondent farmers to sometimes not carry out Mina Padi (rice-fish integration) farming during the planting season before the water conditions in the swamp land can be controlled.

To improve Mina Padi farming (rice-fish integration) on rainfed marsh land, this study has practical significance for scholars, practitioners, and policy makers. According to these results, farmers' intentions to cultivate Mina Padi (rice-fish integration) on rainfed marshland were positively and significantly correlated with attitudes, social norms, and control. However, regulating agricultural behaviour does not apply to how mina padi (rice-fish integration) is grown on marshland that receives rain; instead, it solely meets the needs

of the farmers. Farmers cannot resolve these issues on their own, which is why. Because everyone participating in attempts to advance Mina Padi farming in the future must work together, mainly to guarantee that farmers' needs for food are adequately addressed, cooperation is essential. To effectively address issues that farmers face, the government must be able to focus on finding solutions for problems relating to seeds, fertiliser, irrigation channels, water management systems on Mina Padi land (rice-fish integration), and pest control by actively involving relevant institutions like extension institutions and working with financial institutions, universities and research centers for agriculture and fishing. For farmers to become more knowledgeable and experienced in running their farms, frequent discussions, training sessions, and counselling must be provided. The farmer will continue to choose to plant Mina Padi (rice-fish integration) if his or her issues are overcome since it would sustain the family's access to food and boost revenue.

There are still several restrictions on the research's reach, even though it is one of the few that explicitly addresses the motivations behind farmers' use of planned behavior theory to plant Mina Padi (rice-fish integration) on rainfed swamp land. To enhance comprehension of the overall evolution of rice-fish integration, or Mina Padi farming, on rainfed swamp land, Future research should think about increasing the sample size. Second, neither the farmers who had never practised Mina Padi (rice-fish integration) farming on rainfed marsh land nor those who had quit after doing so were included in this study. Fourth, further analysis may be done using more advanced analytical techniques to determine how rainfed swamp land's Mina Padi agricultural practices—rice-fish integration—affect small-scale farmers' well-being and degree of food security.

***Conclusion*:** A number of significant findings from this study are succinctly outlined in this section. The intentions of farmers to engage in Mina Padi farming (rice-fish integration) are notably and positively impacted by behavioral control, social norms, and attitudes toward behavior; this explains that the more positive the respondent's attitude towards Mina Padi farming (rice-fish integration) and The stronger the encouragement from the people around them and the higher their perceived level of self-control in cultivating Mina Padi (rice-fish integration), the higher the respondent's intention to do so. Second, farmers' intentions positively and significantly influence farmers' behavior in carrying out Mina Padi farming (rice-fish integration) in the future. Third, behavioral control does not influence farmers' actions or behavior in future Mina Padi farming (rice-fish integration). The condition of swamp land with excessive water availability, which is sometimes difficult for farmers to control, is why farmers sometimes do not carry out Mina Padi farming (rice-fish integration) in the next planting season.

***Author contribution statement*:** Samsul Alam Fyka formulated the concept, devised the investigation, gathered and evaluated data, and composed the manuscript. Usman Rianse helped develop the research, reviewed the manuscript, and assisted in correcting the manuscript; Lukman Yunus allowed design the research, reviewed the manuscript, and assisted in restoring the manuscript; Muhammad Aswar Limi helped develop the research, reviewed the manuscript, and assisted in editing and proofreading the manuscript.

***Conflict of interest*:** The author declares no conflict of interest.

***Acknowledgment*:** The author would like to express his thanks and appreciation to all respondents for their cooperation during data collection.

REFERENCE

Abas, N.A.H., M.H. Lin, K. Otto, I. Idris and T. Ramayah. 2021. Academic incivility on job satisfaction and depressivity: can supervisory support be the antidote? Journal of Applied Research in Higher Education 13:1198-1212.

Ahmed, N. and G.M. Turchini. 2021. The evolution of the blue-green revolution of rice-fish cultivation for sustainable food production. Sustainability Science 16:1375-1390.

Ajzen I. 1991. The theory of planned behavior. Organizational behavior human decision processes. 50:179-211.

Akmal, H., M.A. Limi and S.A. Fyka. 2020. The Welfare Level of The Households of Minapadi Farmers in Epeesi Village, Basala Sub-District, South Konawe District. JIA : Jurnal Agribisnis dan Ilmu Sosial Ekonomi Pertanian 5:222.

Ali, M.P., M.M.M. Kabir, S.S. Haque, X. Qin, S. Nasrin, D. Landis, B. Holmquist and N. Ahmed. 2020. Farmer's behavior in pesticide use: Insights study from smallholder and intensive agricultural farms in Bangladesh. Science of the Total Environment 747:141160.

Ambarwulan, W., Y. Setiawan and C. Walter. 2016. Assessing the suitability and availability of land for agriculture in Tuban Regency, East Java, Indonesia. Applied Environmental Soil Science 2016:1-13

Artawan, I.P.R., I.M. Sukerta, N.P. Pandawani and I.P. Sujana. 2021. Strategy for improving minapadi system cultivation production in Gunung Salak village, Selemadeg Timur district, Tabanan regency (case study: Mina tirta pertiwi fish cultivator group). International Journal of Sustainability, Education, and Global Creative Economic (IJSEGCE) 4:174-182.

Arunrat, N., C. Wang, N. Pumijumnong, S. Sereenonchai and W. Cai. 2017. Farmers' intention and decision to adapt to climate change: A case study in the Yom and Nan basins,

Phichit province of Thailand. Journal of Cleaner Production 143:672-685.

Ataei, P., S. Gholamrezai, R. Movahedi and V. Aliabadi. 2021. An analysis of farmers' intention to use green pesticides: The application of the extended theory of planned behavior and health belief model. Journal of Rural Studies 81:374-384.

Bahrun, O.D., A.K. Adhi and B. Burhanuddin. 2022. Pengaruh intensi terhadap keputusan petani menanam bawang merah di kabupaten pesisir selatan. In Forum Agribisnis: Agribusiness Forum 12:98-112

Bakker, L., J. Sok, W. Van Der Werf and F.J.J.A. Bianchi. 2021. Kicking the habit: what makes and breaks farmers' intentions to reduce pesticide use? Ecological Economics 180:106868.

Barroso, C, G.C. Carrión, J.L. Roldán. 2009. Applying maximum likelihood and PLS on different sample sizes: studies on SERVQUAL model and employee behavior model. Handbook of partial least squares: Concepts, methods and applications. editor, Springer: 427-447.

Bonke, V. and O. Musshoff. 2020. Understanding German farmer's intention to adopt mixed cropping using the theory of planned behavior. Agronomy for Sustainable Development 40:4-14.

Burton, R.J. 2004. Reconceptualising the 'behavioural approach'in agricultural studies: a socio-psychological perspective. Journal of Rural studies 20:359-371.

Cakirli Akyüz, N. and L. Theuvsen. 2020. The impact of behavioral drivers on adoption of sustainable agricultural practices: the case of organic farming in Turkey. Sustainability 12:6875

Chen, Q. 2022. Analyzing Farmers' Cultivated-Land-Abandonment Behavior: Integrating the Theory of Planned Behavior and a Structural Equation Model. Land 11:1777.

Chin, W.W., A. Gopal and W.D. Salisbury. 1997. Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. Information systems research 8:342-367.

Clayton, D.A. and C.J. Griffith. 2008. Efficacy of an extended theory of planned behaviour model for predicting caterers' hand hygiene practices. International journal of environmental health research 18:83-98.

Correia, E., S. Sousa, C. Viseu and J. Leite. 2022. Using the theory of planned behavior to understand the students' pro-environmental behavior: a case-study in a Portuguese HEI. International Journal of Sustainability in Higher Education 23:1070-1089.

Darsani, Y.R. and M. Alwi. 2022. Inovasi Teknologi Budidaya Padi Unggul di Lahan Rawa Pasang Surut Tipe Luapan C. Jurnal Sosial Ekonomi Pertanian 18:40-54.

de Lauwere, C., M. Slegers, and M. Meeusen. 2022. The influence of behavioural factors and external conditions on Dutch farmers' decision making in the transition towards circular agriculture. Land Use Policy 120:106253.

Etikan, I., S.A. Musa and R.S. Alkassim. 2016. Comparison of convenience sampling and purposive sampling. American journal of theoretical applied statistics 5:1-4.

Fatimah, I.N., J. Iskandar and R. Partasasmita. 2020. Ethnoecology of paddy-fish integrative farming (minapadi) in Lampegan Village, West Java, Indonesia. Biodiversitas Journal of Biological Diversity 21:4419-4432.

Fauzi M.A., M.H. Hanafiah and V. Kunjuraman. 2022. Tourists' intention to visit green hotels: building on the theory of planned behaviour and the value-belief-norm theory. Journal of Tourism Futures ahead-of-print:1-22

Fornell, C. and D.F. Larcker. 1981. Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research 8:39-50.

Freed, S., B. Barman, M. Dubois, R.J. Flor, S. Funge-Smith, R. Gregory, B.A.R. Hadi, M. Halwart, M. Haque, S.V.K. Jagadish, O.M. Joffre, M. Karim, Y. Kura, M. McCartney, M. Mondal, V.K. Nguyen, F. Sinclair, A.M. Stuart, X. Tezzo, S. Yadav and P.J. Cohen. 2020. Maintaining diversity of integrated rice and fish production confers adaptability of food systems to global change. Frontiers in Sustainable Food Systems 4:576179.

Fyka, S.A., M.A. Limi, H. Batoa, W.O. Yusria, R. Rosmawati and H. Hidrawati. 2023. Feasibility analysis of Minapadi technology on rainfed land in South Konawe Regency, AIP Conference Proceedings 2583: 110001-1–110001-7, THE 5th international conference on agriculture and life science 2021 (icals 2021):3-4 November 2021. University of Jember, Indonesia.

Greiner, R. 2015. Motivations and attitudes influence farmers' willingness to participate in biodiversity conservation contracts. Agricultural Systems 137:154-165.

Hair, J.F., C.M. Ringle and M. Sarstedt. 2011. PLS-SEM: Indeed a silver bullet. Journal of Marketing theory Practice 19:139-152.

Hair, J.F., M. Sarstedt, C.M. Ringle, J.A. Mena. 2012. An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the academy of marketing science 40:414-433.

Hair, Jr.J., Jr.J.F. Hair, G.T.M. Hult, C.M. Ringle and M. Sarstedt. 2021. A primer on partial least squares structural equation modeling (PLS-SEM): Sage publications.

Hall, A., L. Turner, S. Kilpatrick. 2019. Using the theory of planned behaviour framework to understand Tasmanian dairy farmer engagement with extension activities to inform future delivery. The Journal of Agricultural Education Extension 25:195-210.

Handika, M.F.D. and D. Sudaryanti. 2017. Analisis Faktor-Faktor Yang Mempengaruhi Niat Mahasiswa Melakukan

Tindakan Whistleblowing. Jurnal Ilmiah Bisnis dan Ekonomi Asia 11:56-63.

Hardin-Fanning, F. and J.M. Ricks. 2017. Attitudes, social norms and perceived behavioral control factors influencing participation in a cooking skills program in rural Central Appalachia. Global health promotion 24:43-52.

Hayati M, Maisaroh S. 2019. Faktor-Faktor Yang Mempengaruhi Keputusan Petani dalam Pemilihan Komoditas (Studi Kasus Pada Tanaman Tembakau dan Padi Di Kabupaten Pamekasan). Jurnal Pamator: Jurnal Ilmiah Universitas Trunojoyo 12:84-92.

Henseler J, Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J., Hair, J. F., Hult, G. T. M., & Calantone, R. J. 2014. Common Beliefs and Reality About PLS: Comments on Rönkkö and Evermann (2013). Organizational Research Methods 17:182-209.

Henseler J, Ringle CM, Sinkovics RR. 2009a. The use of partial least squares path modeling in international marketing. New challenges to international marketing 20:277-319.

Henseler J, Ringle CM, Sinkovics RR. 2009b. The use of partial least squares path modeling in international marketing. New challenges to international marketing. editor, Emerald Group Publishing Limited 20: 277-319.

Herath, C.S. 2010. Motivation as a potential variable to explain farmers' behavioral change in agricultural technology adoption decisions. E+ M Ekonomie a Management 13:62-70.

Jiuhardi, J. 2023. Analisis kebijakan impor beras terhadap peningkatan kesejahteraan petani di Indonesia. INOVASI 19:98-110.

Kaur, P., J. Stoltzfus and V. Yellapu. 2018. Descriptive statistics. International Journal of Academic Medicine 4:60. https://doi.org/10.4103/IJAM.IJAM_7_18

Kinkela P.M., B.K. Mutiaka, T. Dogot, D. Dochain, X. Rollin, R.N. Mvubu, C. Kinkela, J. Mafwila and J. Bindelle. 2017. Diversity of farming systems integrating fish pond aquaculture in the province of Kinshasa in the Democratic Republic of the Congo. Journal of Agriculture and Rural Development in the Tropics and Subtropics 118:149-160.

Kusumayana, P. 2018. Pengaruh Motivasi Terhadap Perilaku Kerja Petani Bawang Merah di Desa Nalui Kecamatan Jaro Kabupaten Tabalong. Ziraa'ah Majalah Ilmiah Pertanian 43:96-103.

Lantarsih, R. 2016. Pengembangan "minapadi kolam dalam" di Kabupaten Sleman. GRARIS: Journal of Agribusiness Rural Development Research 2:17-27.

Lanya. I., I. Dibia, I. Diara, D. Suarjaya. 2017. Analysis of Subak landuse change due to tourism accomodation development in North Kuta Sub-district, Badung Regency, Indonesia. IOP Conference Series: Earth and Environmental Science 98: 012024, The 5th Geoinformation Science Symposium 2017 (GSS 2017) 27–28 September 2017, Yogyakarta, Indonesia.

Le Dang. H., E. Li, I. Nuberg, and J. Bruwer. 2014. Understanding farmers' adaptation intention to climate change: A structural equation modelling study in the Mekong Delta, Vietnam. Environmental science & policy 41:11-22.

Leguina, A. 2015. A primer on partial least squares structural equation modeling (PLS-SEM). International Journal of Research & Method in Education 38:220-221.

Lemken, D., A. Spiller and M. von Meyer-Höfer. 2017. The case of legume-cereal crop mixtures in modern agriculture and the transtheoretical model of gradual adoption. Ecological Economics 137:20-28.

Lokhorst, A.M., H. Staats, J. van Dijk, E. van Dijk and G. de Snoo. 2011. What's in it for Me? Motivational differences between farmers' subsidised and non-subsidised conservation practices. Appl Psychol 60:337– 353.

Ma, J., H. Gao, C. Cheng, Z. Fang, Q. Zhou and H. Zhou. 2023. What influences the behavior of farmers' participation in agricultural nonpoint source pollution control? — Evidence from a farmer survey in Huai'an, China. Agricultural Water Management 281:108248.

Mahdavi, T. 2021. Application of the 'theory of planned behavior'to understand farmers' intentions to accept water policy options using structural equation modeling. Water Supply 21:2720-2734.

Martínez-García, C.G., P. Dorward, and T. Rehman. 2013. Factors influencing adoption of improved grassland management by small-scale dairy farmers in central Mexico and the implications for future research on smallholder adoption in developing countries. Livestock Science 152:228-238.

Mills, J., H. Chiswell, P. Gaskell, P. Courtney, B. Brockett, G. Cusworth and M. Lobley. 2021. Developing farm-level social indicators for agri-environment schemes: A focus on the agents of change. Sustainability 13:7820.

Muaya, T.M., S. Sampe and N. Kumayas. 2023. Efektivitas Program Keluarga Berencana Dinas Pengendalian Penduduk Dan Keluarga Berencana Dalam Menekan Laju Pertumbuhan Penduduk Di Kabupaten Minahasa. GOVERNANCE 3:1-14.

Mullan, B.A, C. Wong and E.J. Kothe. 2013. Predicting adolescents' safe food handling using an extended theory of planned behavior. Food Control 31:454-460.

Ningrum, N.Z., M.A. Limi and S.A. Fyka 2019. Analisis Multiplier Effect Pengembangan Sistem Mina Padi Bagi Masyarakat Lokal di Desa Epeesi Kecamatan Basala Kabupaten Konawe Selatan. JIA : Jurnal Agribisnis dan Ilmu Sosial Ekonomi Pertanian 4:166-172.

Nurhayati, A., W. Lili, T. Herawati and I. Riyantini. 2016. Derivatif analysis of economic and social aspect of added value minapadi (paddy-fish integrative farming) a case

study in the village of Sagaracipta Ciparay sub district, Bandung West Java Province, Indonesia. Aquatic Procedia 7:12-18.

Paramesh, V., P. Kumar, M. Shamim, N. Ravisankar, V. Arunachalam, A.J. Nath, T. Mayekar, R. Singh, A.K. Prusty, R.S. Rajkumar, A.S. Panwar, V.K. Reddy, M. Paramanik, A. Das, K.K. Manohara, S. Babu and P. Kashyap. 2022. Integrated farming systems as an adaptation strategy to climate change: Case studies from diverse agro-climatic zones of India. Sustainability 14:11629.

Peng, L., X. Zhou, W. Tan, J. Liu and Y. Wang. 2022. Analysis of dispersed farmers' willingness to grow grain and main influential factors based on the structural equation model. Journal of Rural Studies 93:375-385

Perry, V. and M.A. Davenport. 2020. An inductive framework of self-efficacy to understand and support farmers in conservation agriculture. Journal of Soil and Water Conservation 75:198-208.

Peterson, C.A., L. Deiss, and A.C. Gaudin. 2020. Commercial integrated crop-livestock systems achieve comparable crop yields to specialized production systems: A meta-analysis. PLoS One 15:e0231840.

Prasetyo, M.N., S. Hartono and M. Masyhuri. 2018. The Analysis Of Business, Risk, And Development Strategy Of Minapadi (Paddy-Fish Integration Farming System) In Sleman District. Agro Ekonomi 29:64-82.

Pratama, D.A., I. Setiawati, B. Sumanto and D.D. Putri. 2022. Implementasi Teori Perilaku Terencana Dalam Pengelolaan Minyak Jelantah Berbasis Komunitas. Jurnal Ekonomi Pertanian dan Agribisnis 6:1530-1545.

Rahmawati, Y.A.S., S.A.S.L.C. Asih, A. Putri, R.E. Putri, D.T. Ayuningtyas, D. Mulyani, Y.A. Sanjaya, S.T. Pangan and P Nasional. 2023. Analisis Pola Konsumsi Ikan Masyarakat Kabupaten Jombang, Jawa Timur, pada Masa Pandemi dan Endemi Covid-19 Analysis of Fish Consumption Pattern of People in Jombang District, East Java, during Pandemic and Endemic Covid-19. Journal of Marine Coastal Science 12:51-57

Resiani, N.M.D. and I.W. Sunanjaya. 2020. The Efficiency of Water in Supporting Local Wisdom and Food Sustainability in Subak Sange, Bali Indonesia. Agromet 34:67-74.

Rezaei, R., S. Mianaji and A. Ganjloo. 2018. Factors affecting farmers' intention to engage in on-farm food safety practices in Iran: Extending the theory of planned behavior. Journal of Rural Studies 60:152-166

Sathoria, P. and B. Roy. 2022. Sustainable food production through integrated rice-fish farming in India: A brief review. Renewable Agriculture Food Systems 37:527-535.

Sekaran, U., L. Lai, D.A. Ussiri, S. Kumar and S. Clay. 2021. Role of integrated crop-livestock systems in improving agriculture production and addressing food security–A review. Journal of Agriculture and Food Research 5:100190.

Selviana, S., A. Abdi and W. Yusria. 2022. Analisis Kelayakan Teknis dan Finansial Usahatani Kelapa Sawit di Desa Epeesi Kecamatan Basala Kabupaten Konawe Selatan. JIA (Jurnal Ilmiah Agribisnis) : Jurnal Agribisnis dan Ilmu Sosial Ekonomi Pertanian 7:137 - 145.

Senger, I, J.A.R. Borges, J.A.D. Machado. 2017. Using the theory of planned behavior to understand the intention of small farmers in diversifying their agricultural production. Journal of rural studies 49:32-40

Sholihah, M.M.A. and M.D. Djamaludin. 2018. Analysis intention of farmer card utiliization using theory of planned behavior. Journal of Consumer Sciences 3:16-26.

Simkin, M.G. and A. McLeod. 2010. Why do college students cheat? Journal of business ethics 94:441-453.

Sok, J., J.R. Borges, P. Schmidt, I. Ajzen. 2021. Farmer behaviour as reasoned action: a critical review of research with the theory of planned behaviour. Journal of Agricultural Economics 72:388-412.

Song, H., R. Wang and Y. Hu. 2017. Consumers' purchase intentions toward traceable beef—Evidence from Beijing, China. American Journal of Industrial and Business Management 7:1128-1135.

Stone, M. 1974. Cross-Validatory Choice and Assessment of Statistical Predictions. Journal of the royal statistical society: Series B (Methodological) 36:111-133.

Sun, Q., H. Duan and D. Zhong. 2022. Influencing factors of farmers' participation in domestic waste classification: An empirical analysis based on the semi-nonparametric estimation extended model. Frontiers in Psychology 13:1000601

Tirtalistyani, R., M. Murtiningrum and R.S. Kanwar. 2022. Indonesia rice irrigation system: Time for innovation. Sustainability 14:12477.

Valizadeh, N., M. Bijani, N. Fallah Haghighi, D. Hayati, K. Bazrafkan and H. Azadi. 2023a. Conceptualization of Farmers' Water Conservation Intention and Behavior through the Lens of Economic Man Worldview: Application of Structural Equation Modeling. Water 15:3199.

Valizadeh, N., S. Jalilian, Z. Hallaj, S. Esfandyari Bayat, D. Hayati, K. Bazrafkan, N. Kianmehr and M, Akbari. 2023b. Encouraging adoption of green manure technology to produce clean rice product. Scientific Reports 13:8690

Wheeler, T. and J. Von Braun. 2013. Climate change impacts on global food security. Science 341:508-513.

Wijaya, S. 2019. Indonesian food culture mapping: a starter contribution to promote Indonesian culinary tourism. Journal of Ethnic Foods 6:1-10.

Wong, C.L. and B.A. Mullan. 2009. Predicting breakfast consumption: An application of the theory of planned behaviour and the investigation of past behaviour and executive function. British journal of health psychology 14:489-504.

Yassi, A., M. Farid, M.F. Anshori, H. Muchtar, R. Syamsuddin and A. Adnan. 2023. The Integrated Minapadi (Rice-Fish) Farming System: Compost and Local Liquid Organic Fertilizer Based on Multiple Evaluation Criteria. Agronomy for Sustainable Development 13:978.

Zhou, J., Z. Yan and K. Li. 2016. Understanding farmer cooperatives' self-inspection behavior to guarantee agri-product safety in China. Food Control 59:320-327.

Ziervogel, G. and P. Ericksen. 2010. Adapting to climate change to sustain food security. Wiley Interdisciplinary Reviews: Climate Change 1:525-540.