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Research Article

Empowering Peatland Farmers: Exploring the Role of Farmer Participation in Enhancing the Quality of Honey Pineapple Commodities

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ABSTRACT

The participation of farmers in agricultural development has been identified as a crucial component for the transfer of knowledge and technology. Access to information on innovative agricultural practices is essential for farmers to implement procedures that support farming. Although active participation can take various forms, physical involvement is not the sole determinant of successful participation. Peatland honey pineapple cultivation has been a long-standing practice, and its production has experienced fluctuations over the years. The decline in honey pineapple production from 2017 onwards poses a challenge for both farmers and the district government, given the crop's potential for development in Galang Village, Mempawah Regency. This research study utilized a sample of 73 individuals and collected data through interviews, observations, and available references. Both quantitative and qualitative analyses were conducted to examine the level of farmers' participation in the development of honey pineapple commodities across three stages: participation, implementation, and evaluation. The study revealed that farmers' participation in the development of honey pineapple commodities at the participation stage fell into the independent category (1.43 >1.96), while at the implementation and evaluation stages, it entered the independent category, with values of 5.29 (>1.96) and 2.96 (>1.96), respectively. Age, education level, and length of farming experience were identified as factors that influenced farmers' participation in the development of honey pineapple commodities.

INTRODUCTION

The agricultural sector is a cornerstone of the Indonesian economy, given the country's reliance on agriculture as a primary source of livelihood for a majority of its population. The agrarian horticultural sector, which encompasses a range of commodities such as vegetables, fruits, ornamental plants, and biopharma plants, is a vital component of this sector and presents significant investment opportunities. Fruits, in particular, play a crucial role in ensuring a balanced diet for individuals, as they constitute an essential component of the food pyramid.

Pineapple (*Ananas comosus (L.) Merr*) is a high-priority horticultural commodity for development due to its potential profitability and capacity to genelevel income for farmers. It is one of the tropical fruits with a significant economic value, ranking as the third-largest producer worldwide after bananas and oranges (Bartholomew et al., 2003). In West Kalimantan Province, pineapple is the second-most produced fruit commodity after *siamese tangerine*, with a total output of 126,502 tons. Pineapple alone has a production of 72,504 tons, followed by banana with a production of 59,776 tons.

Agricultural development participation serves as a bridge between farmers' practices and the knowledge and technology required to meet their evolving needs (Kartasapoetra, 2002). In order to implement effective farming practices, farmers must be informed about innovations in agriculture (Shodiq, 2022). Participation is not limited to physical involvement alone, as it encompasses a person's mental engagement, thoughts, and emotions in a group setting that motivates them to contribute to achieving common goals and take responsibility for the group's efforts.

Honey pineapple cultivation has been a longstanding practice in peatlands. Its production had been steadily increasing in the past five years, from 2013 to 2016, before declining in 2017. This decline poses a significant challenge for honey pineapple farmers and the district government, as honey pineapple has the potential to be a major commodity in Galang Village, Mempawah Regency. Encouraging community involvement in honey pineapple farming is one way to tackle this issue and further develop the commodity. Given these circumstances, the present study aims to investigate Farmer Participation in the Development of Leading Commodities in Peatlands.

METHOD

This study aims at assessing the extent of participation among honey pineapple farmers in Mempawah Regency. The primary research approach used in this study is the descriptive analysis method, which involves gathering, organizing, and analyzing data to provide a comprehensive depiction of the population. The descriptive method entails identifying factual evidence and interpreting it acculevelly. Descriptive research is utilized to investigate societal issues, practices employed in society, and various scenarios, including the interrelationships, activities, attitudes, perspectives, ongoing processes, and influences related to a given phenomenon.

The study was conducted in Galang Village, Sui Pinyuh Subdistrict, Mempawah Regency, which is the primary area for honey pineapple production and where the majority of the population depends on pineapple farming as a source of livelihood. The selection of this location was purposeful and based on its significance in the pineapple industry. The data collection for this research took place in 2019.

The present study focuses on honey pineapple farmers who are members of the farmer group in Galang Village, Sui Pinyuh District, Mempawah Regency, and consists of a population of 275 farmers belonging to 10 different farmer groups. The sample size comprised 73 respondents who were selected to participate in the study.

The data collection for this study involved interviews, questionnaires, observations, literature study, and recordings. The research variables were measured by assessing the level of farmer participation. The analysis method employed for this study was Structural Equation Modeling (SEM) analysis.

Operational Definition and Measurement of Research Variables

Participation Level

To determine the participation level of pineapple farmers in the honey pineapple development program, a qualitative approach was employed. The extent of their involvement in the program was measured as it relates to honey pineapple being a leading commodity in Mempawah Regency. The formula used for measurement was:

$$Interval\ Scale = \frac{Maximum\ Score - Minimum\ Score}{3}$$

Where:
Maximum Score = 24
Minimum Score = 8

Determination of Intervals:
Low Participation Level : 8 - 13 = score 1
Medium Participation Level : 14 - 19 = score 2
High Participation Level : 20 - 24 = score 3

Factors Affecting Participation

This study employs a hypothesis-driven approach where the independent variable (X) is believed to have an effect on the dependent variable (Y), which is the level of participation measured on a Likert scale. The independent variables (X) used in this research are internal and external factors.

Data Analysis Technique

Structural Equation Modeling (SEM) Analysis

Structural Equation Modeling (SEM) analysis is a statistical technique that allows for the examination of the relationships between latent variables and their indicators, as well as the relationships between latent variables themselves, while taking into account measurement errors. The SEM procedure typically involves several stages, including model specification, identification, estimation, fit test, and respecification, as outlined in Wijanto's book on Structural Equation Modeling with Lisrel 8.8 (2008).

The Relationship between Variables of Structural Equation Modeling (SEM)

In the present study, the significance level of the construct coefficient (γ) or gamma, representing the effect of the independent latent variable on the latent dependent variable, was determined by the t value. A higher t value indicates a more significant impact of the independent latent variable on the dependent latent variable. The critical value of the t-test at the 5% absolute level is 1.97, which was used to test the hypothesis proposed in this study. The structural equation model equation used in this study is presented below:

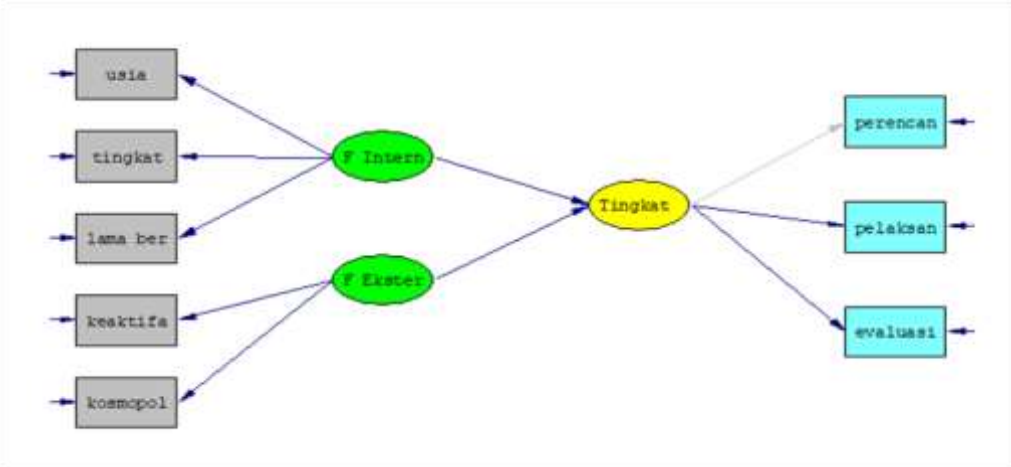

Figure 1. Structural Equation Model

Analysis of Farmers' Participation

The research employed a quantitative method to measure the level of farmer participation by aggregating scores from various variables. The analysis was conducted using Frequency Distribution to depict the respondents' characteristics and farmer participation. The measurement of the level of participation was determined by examining the indicators of participation such as the degree and authority in decision-making. It was categorized into three types: non-participation, tokenism, and citizen power based on the classification proposed by Arnstein (1969).

RESULTS AND DISCUSSION

Condition of the Research Site

Mempawah is one of the regencies located in West Kalimantan. Administratively, Mempawah Regency consists of nine districts, seven urban villages, and sixty villages. This research was located in Galang Village, Mempawah Regency, one of the largest pineapple producers in West Kalimantan. The production of honey

pineapple is not only for the needs of the people in West Kalimantan but also traded in other regions (other provinces). Some are even exported abroad and have received certificates from the local government.

Characteristics of Respondents

The present study consisted of seventy-three pineapple farmers who cultivate peatland without burning in Galang Village, which was the research location. The respondents' essential characteristics, such as gender, age, education, and number of family members, were recorded and presented in Table 1.

Table 1. Characteristics of Respondents

Characteristics of Farmers	Total of Farmers (person)	Percentage (%)
Gender		
Male	57	78
Female	16	22
Age of Farmers		
17-40 (Early Adulthood)	36	49,3
41-60 (Middle Adulthood)	32	43,8
>60 (Late Adulthood)	5	6,9
Education		
Less than elementary school education	31	42,5
Elementary school education	21	28,8
Junior high school education	6	8,2
High school education	13	17,7
Bachelor's degree	1	1,4
Master's degree	1	1,4
Length of Farming Experience		
≤5	12	16,4
6-20	40	54,7
≥21	21	28,7
Participation of Group		
- Sales objectives		
Active	32	43,8
Inactive	41	56,1
- Post-harvest		
Active	73	100
Inactive	0	0
- Group activities		
Active	61	83,5
Inactive	12	16,4
Cosmopolitan		
- Connections outside the village		
Active	73	100
Inactive	0	0

Source: Primary Data, 2019

The majority of pineapple farmers in this study were men, comprising 78 percent of the sample, while women accounted for 22 percent. The gender disparity can be attributed to traditional gender roles in which men are expected to be the primary breadwinners and heads of household, while women are primarily responsible for domestic duties. Furthermore, pineapple farming often involves physically demanding tasks, such as land cultivation, for which male labor is typically preferred. However, it was observed that some women involved in pineapple cultivation were widowed single parents or had husbands employed in non-farming occupations such as village officials or business owners.

Age can significantly affect an individual's work performance. According to Soekartawi (2013), as long as a person is still productive, their ability to work efficiently and effectively is not impacted by age. Furthermore, farmers in the early adult stage are more likely to be curious and eager to adopt new science and technology innovations. The majority of respondents in this study, 36 farmers or 49.3 percent, were between the ages of 20-40 years. This suggests that honey pineapple farmers in the early adult stage are more actively engaged in meeting their families' needs through their work.

Education is the process of acquiring knowledge, skills, and attitudes that are transferred from one generation to the next through teaching, training, or research. The level of education attained by farmers can influence their capacity to adopt technological and scientific innovations. Higher education levels can enhance farmers' opportunities to adopt and apply innovative technologies to improve the quality of their agricultural

production. However, the education level of many farmers remains low. In this study, the majority of respondents (42.5 percent) had not completed elementary school, which may be attributed to economic constraints and limited awareness of the benefits of education among farmers.

In the research site, the majority of farmers (54.7%) have farming experience ranging from 6 to 20 years. This indicates that farming experience significantly contributes to farmer participation, as those with more experience are more receptive to external input (Soekartawi, 2013). In fact, most farmers in the research location have been engaged in farming since a young age and have accumulated over ten years of experience. Consequently, farmers with more than ten years of experience are deemed suitable for decision-making regarding the allocation of compensation funds due to their mature and informed perspectives.

The level of participation of farmers can be affected by the activeness of the group they belong to. This is due to the spontaneous involvement and sense of responsibility that group membership entails towards achieving common goals (Sastroepoetra, 2004). Meanwhile, Mikkelsen (2005) defines participation as a voluntary process by the community in determining and implementing changes that affect them.

In the context of honey pineapple production, group activity plays a crucial role in determining potential sales directions and achieving transparency in market prices. The extent to which farmers actively participate in finding effective sales destinations is an important indicator of their engagement in the sales process. This information is presented in Table 1. The results indicate that 43.8 percent of the respondents (32 individuals) are actively seeking more efficient pineapple sales destinations, while 56.1 percent of the respondents (41 individuals) do not participate in such activities. Rather, they engage in private sales or sell to intermediaries who come directly to their yard.

In this study, post-harvest activities refer to the frequency of members' involvement in harvesting activities for pineapple plants that are sold directly to the market after post-harvest processing. The post-harvest frequency in this study was measured as 3 to 6 times of harvesting per year. The findings indicated that all respondents (73) were active members who aimed to improve their income and facilitate group activities.

In this study, group activity is defined as the frequency of attendance of group meetings by its members within a year. The meetings serve as a platform to discuss various aspects of honey pineapple cultivation and implementation of cooperative farming. The level of activity is classified as either "very active" or "less active." The former denotes members who actively participate in the meetings, contributing to the development of the group, while the latter indicates members who attend meetings less frequently due to other commitments. The findings of the study reveal that 83.5 percent of respondents (61 people) were very active in attending meetings, indicating that they recognized their role as group administrators and were committed to promoting cohesiveness among members in agricultural activities. In contrast, 16.4 percent of respondents (12 people) were less active in attending meetings due to personal and professional obligations.

According to the findings presented in Table 2, the majority of respondents from Galang Village, Mempawah Regency exhibit a high level of cosmopolitanism. This study shows that the relationship between cosmopolitanism and level of participation is highly correlated, with all 73 respondents (100%) exhibiting a high level of participation. Cosmopolitanism is defined as the frequency of travel outside of one's residential area to engage in activities beyond the immediate vicinity, as well as the frequency of contact with individuals outside of one's community. A low level of cosmopolitanism is indicated by infrequent travel outside the immediate area to attend agricultural events or extension services and lack of interaction with innovators. In contrast, respondents with a high level of cosmopolitanism obtain diverse information from various sources and are more likely to interact with individuals outside their community, which facilitates the acquisition of new information and ideas. Consequently, farmers with higher levels of cosmopolitanism are more innovative and creative, as they are exposed to a wide range of ideas and information about honey pineapple cultivation.

Participation Level of Honey Pineapple Farmers in Galang Village

Table 2. Values of Participation Level

Participation Level	Planning		Implementation		Evaluation	
	Total of Farmers (person)	Percentage (%)	Total of Farmers (person)	Percentage (%)	Total of Farmers (person)	Percentage (%)
Manipulation (skor1)	0	0	0	0	0	0
Therapy (skor2)	0	0	0	0	3	4,1
Information delivery (skor3)	0	0	0	0	1	1,3

Participation Level	Planning		Implementation		Evaluation	
	Total of Farmers (person)	Percentage (%)	Total of Farmers (person)	Percentage (%)	Total of Farmers (person)	Percentage (%)
Consultation (skor4)	0	0	0	0	1	1,3
Placation (skor5)	3	4,1	3	4,1	4	5,4
Partnership (skor6)	6	8,2	2	2,8	3	4,1
Delegated Power (skor7)	20	27,3	19	26,0	12	16,4
Citizen Control (skor8)	44	60,2	49	67,1	49	67,1
Total	**73**	**100**	**73**	**100**	**73**	**100**

Source: Primary Data, 2019

Participation of Farmers at the Planning Stage

The participation of farmers in the planning stage refers to their involvement in the planning process, wherein they contribute ideas to design various activities to be carried out in honey pineapple farming. Such planning necessitates the engagement of relevant stakeholders, including PPL, farmer group administrators, farmer group members, and certain village officials.

Based on the SEM analysis presented in Figure 4, the score for the number of farmers participating in the Planning Stage was calculated by estimating the average values of respondents. The resulting score of 1.43 (>1.96) indicates that participation of honey pineapple farmers is independent or citizen-controlled, and is not affected by the calculated value. This finding is consistent with the dominant value of respondent decision-making observed during fieldwork, where 60.2% (44 respondents) made independent decisions about planning their honey pineapple farming. The decision-making process is primarily driven by individual farmers and their families, with agricultural extension activities mainly limited to meetings with the chairman of the farmer group and management, and rarely conducted with all members of the group. The low level of education among farmers, particularly the majority who did not complete elementary school, poses a challenge for the diffusion of information and technology.

The cosmopolitan indicator showed the highest value of 100% (73 respondents), indicating that all participants engage in cosmopolitan activities, primarily traveling outside their domiciles for personal reasons instead of seeking agricultural extension services outside Galang Village. Despite their cosmopolitan tendencies, farmers still desire the presence of extension services to engage in discussions and seek assistance regarding problems commonly encountered in honey pineapple farming. Unfortunately, extension services are sparsely attended, as each village only has one extension worker, and agricultural activities lack specific programs. Consequently, in the planning stage, farmers make independent decisions without any intervention from extension services.

The study findings reveal a significant correlation between education level and farmer participation, with the highest proportion of participants (31 individuals or 42.5%) having not completed elementary school. To foster greater participation, it is essential to involve farmers through non-formal education programs, such as counseling sessions offered through state-sponsored extension programs. These initiatives can enhance the skills and knowledge of farmers, particularly regarding the cultivation of superior commodities such as honey pineapple.

Several initiatives have been undertaken to advance the development of honey pineapple cultivation. These include organizing discussion meetings with the farmer group's chairman and management, outlining strategies to expand farming areas, developing plans for creating ditches and boundaries between farmer groups, introducing organic pineapple certification programs, and exploring avenues for processing honey pineapple into value-added products like *dodol nanas* (sweet toffee-like sugar made from pineapple), pineapple syrup, and pineapple chips. Extension workers have also enlisted the expertise of researchers to investigate diseases and pests that commonly afflict honey pineapple crops. Additionally, marketing efforts have been expanded by utilizing social media platforms such as WhatsApp and Facebook.

Several factors have been identified as affecting farmer participation in the planning stage, including the inadequate communication between extension workers and farmers, insufficient communication skills on the part of extension workers in publicizing socialization meetings, and limited access to agricultural extension tools such as whiteboards, stationery, and projectors. In addition, extension aids such as printed materials (e.g., pamphlets, posters, and photos), projected images (e.g., slide films and video films), and graphic symbols (e.g., graphs, diagrams, and maps) conveyed during farmer socialization meetings also influence participation levels.

Participation of Farmers at the Implementation Stage

The successful implementation of the honey pineapple farming program requires the involvement of both farmers and extension workers. The cultivation process involves monitoring the growth and development of the pineapple plants in the field, paying particular attention to factors such as plant height, pest infestation, and weed growth. Subsequently, farmers receive guidance on how to address any identified issues. Furthermore, during the extension forum, farmers and extension workers exchange insights and observations, which can inform subsequent farming practices.

The study's findings reveal the impact of agricultural extension on honey pineapple farming participation levels. Specifically, the calculated t-value of 5.29 (>1.96) indicates a statistically significant relationship between the implementation stage of honey pineapple development and the number of participating farmers. Furthermore, based on the most dominant decision of the respondents during fieldwork, it falls into the category of independent or citizen control, with 67.1% (49 respondents) determining this decision. This suggests that farmers may perceive the agricultural extension program to be insufficiently active in engaging with them, leading to a reliance on independent decision-making. Consequently, farmers may struggle to voice their aspirations based on factual information and adopt technological innovations effectively. In interviews, farmers expressed a desire for counseling during the implementation stage, as well as improved access to information from the agricultural extension. Currently, farmers rely mainly on their own experiences and inherited knowledge to carry out farming activities.

In the context of pineapple farming, agricultural extension activities extend beyond crop cultivation and encompass post-harvest practices such as fruit collection and sorting. This sorting process involves segregating pineapples into different grades based on size. Notably, Grade A pineapples weighing between 900 gr, and 1 kg fetch a higher selling price of IDR 8000, while smaller-sized pineapples (<900 gr) command a price of IDR 5000. Any damaged fruit or those falling under Grade Care repurposed as raw materials for producing processed pineapple products. This approach to post-harvest management highlights the importance of maximizing profits and reducing waste in the pineapple industry.

Several factors can influence farmers' participation in the implementation stage of honey pineapple farming. The timing of implementation is a crucial factor, as it can coincide with farmers' working hours and affect their availability. Additionally, the duration of time farmers has resided in Galang Village and their domicile status can also impact participation levels. Notably, some farmers who are not domiciled in the area may engage in honey pineapple farming due to land lease agreements. These factors underscore the complexities of engaging farmers in agricultural extension programs and highlight the need for tailored strategies that consider the unique circumstances of individual farmers.

Participation of Farmers at the Evaluation Stage

Evaluation is the final indicator of the effectiveness of honey pineapple farming extension programs. This stage is characterized by farmers' and extension workers' assessments of the program's impact on crop yields, changes in planting methods, and overall satisfaction with the farming program. Typically, the evaluation process is conducted in two stages. The first stage involves analyzing the problems faced in the field, based on observations made jointly by extension workers and farmers. In the second stage, the evaluation is conducted before the closure of extension activities. This evaluation is carried out through a meeting attended by all farmer group participants, village officials, and extension workers. Key aspects assessed during this stage include farmers' involvement in the evaluation process, their level of awareness about the importance of evaluation, and their assessment of the quality of agricultural extension programs. These findings highlight the need for continuous monitoring and evaluation to ensure that the extension program's goals are achieved effectively.

Based on the calculation results, the number of respondents participating in the evaluation stage of honey pineapple development through agricultural extension has a t-value of 2.96 (>1.96), indicating a positive effect on the level of farmer participation. This falls into the category of independent or citizen control, based on the most dominant decision of respondents during field activities. Specifically, 49 respondents, accounting for 67.1%, fell into this category. However, the extension workers' work program is perceived as less active in terms of interaction and work visits, particularly in providing advice or input for evaluating honey pineapple farming activities in Galang Village. These findings emphasize the importance of increasing the extension program's level of interaction with farmers to promote effective monitoring and evaluation.

The preceding issues are identified as contributors to the low level of farmer involvement in honey pineapple extension activities. The insufficient visits by extension workers and the absence of a particular program for honey pineapple farming are factors that influence farmers to work independently and to make decisions and solve problems without guidance from extension personnel. The low educational attainment of farmers, with most not completing elementary school, also hinders their participation in extension activities. Inadequate numbers of extension personnel and their lack of capacity constrain the provision of guidance and counseling to farmers. Overcoming low participation in the education stage requires involving farmers with increased educational backgrounds in non-formal education programs that focus on the development of superior honey pineapple commodities.

Models Fit before Respecification

In the current study, the model fit test stage was conducted to assess the Goodness of Fit (GOF) measure and determine the level of compatibility between the model and the data. To establish the overall adequacy of the model, various approaches can be employed alone or in conjunction. Table 3 presents the GOF measures and measurement errors for each instrument in the measurement model of the initial model before respecification.

Table 3. Models Fit Test before Respecification

No	GOF	Target Fit	Estimation	Conclusion
1	*Chi Square/X²*	The smaller, the better	36.41 (P=0.0)	Good
2	X^2/DF	1.0 ≥ x ≤ 5.0	2.99	Good
3	NCP	Small value, narrow interval	15.89 (3.40; 36.17)	Good
4	SNCP (NCP/n)	Small value	0.16	Good
5	RMSEA	≤ 0.08	0.097	Good
6	ECVI	Small value, and close to ECVI with *Satuleveld* Model	M=0.75 S=0.73 I=3.50	Good
7	AIC	Small value, and close to AIC with *Satuleveld* Model	M=70.89 S=72.00 I=346.60	Good
8	CAIC	Small value, and close to CAIC with *Satuleveld* Model	M=139.39 S=201.79 I=375.44	Good
9	NFI	≥ 0.90	0.89	Less Good
10	NNFI	≥ 0.90	0.89	Less Good
11	PNFI	High value, better fit	0.54	Less Good
12	CFI	≥ 0.90	0.94	Good
13	IFI	≥ 0.90	0.94	Good
14	RFI	≥ 0.90	0.82	Less Good
15	GFI	≥ 0.90	0.92	Good
16	AGFI	≥ 0.90	0.84	Less Good
17	PGFI	0-1	0.44	Good
18	RMR	≤ 0.05	0.034	Good
19	CN	≥ 200	91.84	Less Good

Source: Primary Data Analysis, 2021

Table 3 displays the results of the Goodness of Fit (GOF) measure analysis of the initial model before respecification, revealing that only 13 measures meet the good criteria, whereas the remaining 6 measures do not. Despite this, the initial model can still be considered good since more GOF measures have not met the standard or target fit value criteria. To improve the GOF measure, the model is modified or respecified by utilizing the information on modification indices available in the printed output. The modification indices suggest two ways to improve the model: the first is by adding paths, and the second is by adding covariances. In this study, the second method is employed by adding covariances. Researchers can obtain the complete list of modification indices by adding the MI option to the statement options in the SIMPLIS program.

In the modification process, each indicator can be tested for adding covariance. If a warning occurs during the modification process, the recently added covariance can be removed, indicating that the indicator has no correlation with other indicators, and adding it will not affect the t-value or GOF. If error covariances have been added to all indicators, the chi-square value will decrease, followed by a reduction in the degrees of freedom, p-value, and RMSEA. As adding a covariance reduces the degrees of freedom by 1, theoretically, adding more covariances will result in a decrease of the df value towards zero. When the df value is zero, the model is

considered just-identified, with a unique solution, and the overall fit of the model in the just-identified model is referred to as a perfect fit and a one-level model (Wijanto S. H., Structural Equation Modeling dengan LISREL 8.8, 2008).

In pursuit of achieving the most minimal chi-square probability (P≥0.05), excessive addition of error covariance could lead to over-fitting and render the model implausible. Thus, it is crucial to stop the model modification when several GOF measures display a good model fit since chi-square is not the sole measure of GOF.

Model Fit Test after Respecification

The revised model obtained from modification or respecification is subject to further testing using Goodness of Fit (GOF) criteria to match the standard or target value of the fit with the statistical GOF value estimated from the final model. Table 4 presents the GOF and measurement error measures for the measurement model of each instrument in the final model.

Table 4. Model Fit Test after Respecification

No	GOF	Target Fit	Estimation	Conclusion
1	*Chi Square/X²*	The smaller, the better	16.08 (P=0.097)	Good
2	X^2/DF	1.0 ≥ x ≤ 5.0	1.39	Good
3	NCP	Small value, narrow interval	6.08 (0.0; 21.16)	Good
4	SNCP (NCP/n)	Small value	0.05	Good
5	RMSEA	≤ 0.08	0.078	Good
6	ECVI	Small value, and close to ECVI with *Satuleveld* Model	M=0.69 S=0.73 I=3.50	Good
7	AIC	Small value, and close to AIC with *Satuleveld* Model	M=68.08 S=72.00 I=346.60	Good
8	CAIC	Small value, and close to CAIC with *Satuleveld* Model	M=161.82 S=201.79 I=375.44	Good
9	NFI	≥ 0.90	0.95	Good
10	NNFI	≥ 0.90	0.93	Good
11	PNFI	High value, better fit	0.34	Less Good
12	CFI	≥ 0.90	0.98	Good
13	IFI	≥ 0.90	0.98	Good
14	RFI	≥ 0.90	0.900	Good
15	GFI	≥ 0.90	0.96	Good
16	AGFI	≥ 0.90	0.89	Less Good
17	PGFI	0-1	0.27	Good
18	RMR	≤ 0.05	0.026	Good
19	CN	≥ 200	135.44	Less Good

Source: Primary Data Analysis, 2021

Table 4 presents the results of the model fit evaluation after modification or respecification. The analysis indicates an improvement in the model fit, as evidenced by an increase in the number of GOF measures meeting the good criteria from 13 to 16, while only 3 GOF measures remain below the recommended thresholds. These measures include X2/DF, NCP, SNCP, RMSEA, ECVI, AIC, CAIC, NFI, NNFI, CFI, IFI, GFI, IFI, RFI, GFI PGFI, and RMR. However, despite the overall improvement, certain criteria still do not meet the desired thresholds.

Wijanto (2008) stated that several measures of model fit in SEM and model fit assessment are assessed based on how many model measures can be met by the research model. The more GOF values that are good or fulfilled by the model, the better the research model. Then there is another opinion also saying that if two or more of the overall GOFs used have shown a good model fit, then the research model can be said to be good (Ghozali, 2008). When viewed from the underlying theory, the model in this study can be considered pretty good, with 16 out of 19 GOF measures falling into good criteria.

The final model estimation resulted in a chi-square (X^2) value of 16.08 with a significance level of P=0.097, accompanied by a degrees of freedom (df) value of 10, indicating that the model is still good. The chi-square value assesses the degree of similarity between the sample covariance matrix and the model covariance matrix. If the obtained chi-square value is lower, it indicates a better fit. Conversely, a high chi-square value indicates a significant difference between the estimated model and the covariance matrix. According to Wijanto

(2008), researchers aim to achieve a low X^2 value with a significance level greater than or equal to 0.05 (P≥0.05), indicating that H0 is accepted, and the predicted and actual input matrices are not statistically different. However, other researchers suggest that an ideal chi-square value should be less than three, and a value closer to zero or X^2=0 would indicate no difference (H0 is accepted). Nonetheless, since there is no minimum size, chi-square cannot be used as the only measure of the model's overall fit.

The normed chi-square (X^2/df) is a measure of how well the model fits the data, and it is calculated by dividing the chi-square value by the degrees of freedom. In the final model, the X^2/df ratio is 1.39, which is lower than Wheaton's upper limit of 5.0 but falls within the range suggested by Carmines and Zeller (2.0) (Ghozali, 2008). Wijanto (2008) suggests that the normed chi-square value should be between 1.0 and 5.0, indicating a pretty good fit while controlling for the complexity of the model. Therefore, based on the X^2/df value, the final model can be considered to have a relatively good fit.

The Non-Centrality Parameter (NCP) of the final model is 6.08, and its 90% confidence interval is (0.0; 21.16), which is relatively narrow, indicating a good model fit. NCP is a fixed parameter associated with the degrees of freedom that quantifies the difference between the population and observed covariance matrices. A small NCP value implies a negligible difference between the population and observed covariance matrices. Hence, it is essential to obtain a small or low NCP value in the model.

The scaled non-centrality parameter (SNCP) is a refinement of NCP, and it is calculated to be 0.05. A lower SNCP value indicates a better fit, and the obtained value suggests a good fit for the model.

In the final model, the RMSEA value was 0.078, which is less than the recommended threshold of 0.08, indicating a good model fit. Moreover, the RMSEA value falls within the 90% confidence interval of (0.0; 0.15). RMSEA is a measure used in covariance structure modeling that takes into account the discrepancies between the observed covariance matrix and the population covariance matrix.

In the final model, the ECVI or Expected Cross-Validation Index was calculated to be 0.69. The ECVI value for the *Satuleveld* Model was found to be 0.73, while the ECVI for the Independence Model was 3.50. These values fall within the 90% confidence interval of 0.63 to 0.84. The ECVI is used to compare the suitability of models with samples of the same size and population. A model with an ECVI value that is close to the ECVI value of the *Satuleveld* Model is considered a good fit, and in this case, the final model is deemed to show good fit.

In this study, the AIC or Akaike Information Criterion for the model was calculated as 68.08, while *Satuleveld* AIC was 72.00 and Independence AIC was 3.50. AIC is commonly used to compare models with different numbers of constructs. Based on the findings presented, models with AIC values similar to Satuleveld Model suggest good model fit.

CAIC, or Consistent Akaike Criterion Information, is a statistical criterion similar to AIC that is used to compare models with different numbers of constructs. In the final model, the CAIC value was determined to be 161.82, while the CAIC with *Satuleveld* model and Independence CAIC were 201.79 and 375.44, respectively. A small CAIC value and proximity to the CAIC value for the *Satuleveld* Model suggest that the final model has a good fit.

The NFI (Normed Fit Index) and NNFI (Non-Normed Fit Index) are measures used to compare the proposed and null models. Both indices range from 0 to 1 and are derived by comparing the hypothesized model with a particular independent model. The NFI and NNFI values of the final model were 0.95 and 0.96, respectively, indicating a good fit (with a criterion of ≥0.90 for both indices).

The Parsimonious Normed Fit Index (PNFI) is a variant of NFI and is employed for comparing models with varying degrees of freedom. A difference of 0.06 to 0.09 between PNFI values of two or more models indicates a significant difference between the models. Nevertheless, according to the presented table, the final model's PNFI value is 0.34, indicating a poor fit. Consequently, the PNFI value for the present model is inadequate, and further modifications to the model are required to enhance its fit.

The Comparative Fit Index (CFI) in the final model is 0.98, indicating a good fit as it exceeds the acceptable threshold of 0.90. CFI is an incremental fit index that is relatively insensitive to sample size and model complexity. As a modified version of NFI, it addresses the issue of low model fit in small samples. Therefore, the CFI provides an effective measure for assessing model fit.

The IFI (Incremental Fit Index) and RFI (Relative Fit Index) are fit indices that address the parsimony and sample size issues associated with NFI. Their values range from 0 to 1, and if they are greater than or equal to 0.90, the model is considered to have a good fit. In the final model, following the respecification process, the IFI value is 0.98, and the RFI value is 0.90, both of which meet the standard of ≥0.90 for a good fit. Therefore, it can be concluded that the model has a good fit value.

The Goodness of Fit Index (GFI) value in the final model is 0.96 (≥ 0.90), indicating a good fit value. On the other hand, the Adjusted Goodness of Fit Index (AGFI) has a value of 0.89 (≥ 0.90), indicating a poor fit value. Both GFI and AGFI serve as measures of absolute fit and describe the overall level of model fit by comparing the squared residuals of the predicted model to the actual data.

Moreover, Parsimony Based Indexes of Fit, also known as PGFI, take into account the complexity of the hypothesized model in relation to the overall model fit. PGFI is a tool for comparing the fit of alternative models, and values range from 0-1, with an ideal fit of 0.9. In the final model, the PGFI value of 0.27, although not ideal, indicates a good parsimony model.

The model's fit value can be assessed using the Root Mean Square Residual (RMR), which is calculated by obtaining the average value of all residuals and standardizing them with the variance-covariance matrix of the sample data. A value of 0.026 obtained in the model indicates a good fit (≤ 0.05). The standardized RMR represents the mean value of all standardized residuals and has a range between 0-1.

In this study, an additional measure of goodness-of-fit (GOF) is CN or Critical N, which indicates the adequacy of the sample size used. It represents the largest sample size that can be used to accept the hypothesis that the model is accurate. A sufficient sample size is indicated by a CN value > 200. However, in the final model, the CN value is 135.44, which is lower than the acceptable limit. This suggests that the sample size used in this study may be insufficient and needs to be increased to achieve a good fit model.

Factors Affecting Participation of Honey Pineapple Farmers in Galang Village

The estimated relationship between exogenous variables and the participation of honey pineapple farmers can be discerned through the results of the modified or improved indices. The strength of these relationships in the Structural Equation Modeling (SEM) model is illustrated by the path diagram model's t-value and parameter estimation coefficients, as depicted in Figures 1 and 2 below.

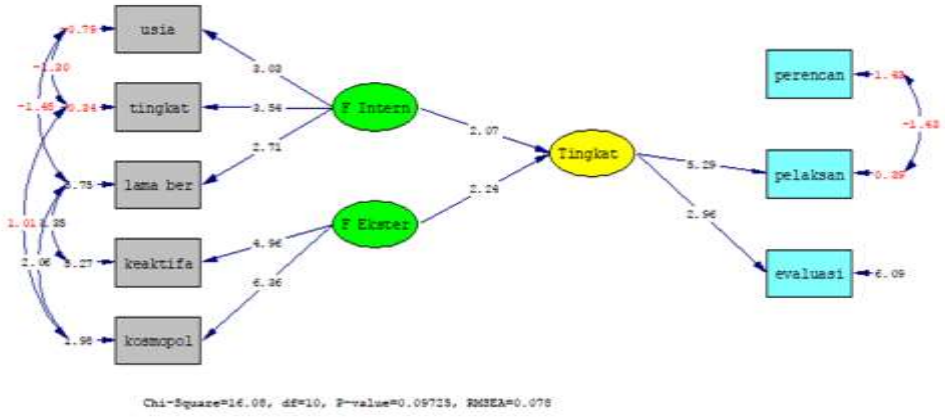

Figure 2. T-value of Structural Model of Factors Affecting Participation of Honey Pineapple Farmers

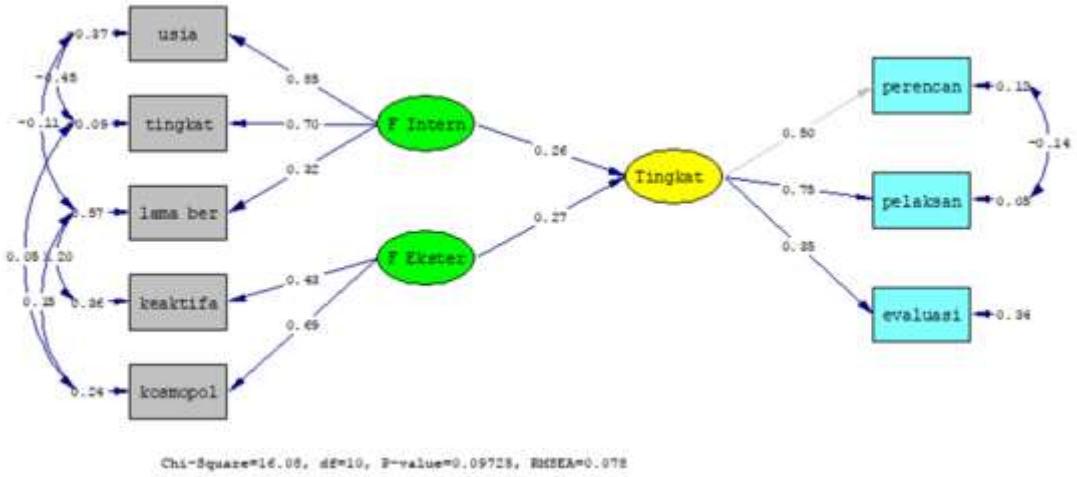

Figure 3. Coefficient of Estimation of Structural Model of Factors of Participation of Honey Pineapple Farmers

The R^2 value calculated from the structural model equation is 0.19, indicating that the variables included in this study account for 19% of the variation in the farmer participation rate. Other factors outside the research variables may contribute to the remaining 81% of the variance. During the questionnaire discussions, most respondents agreed with the estimated results obtained from the data analysis as presented in the t-values reported in Figure 3.

This study measures the participation factor of honey pineapple farmers using various indicators such as age, education level, length of farming experience, group activity, cosmopolitanism, and the level of participation in planning, implementation, and evaluation. The findings suggest that high levels of participation among farmers have the potential to positively influence the learning process. These results support the argument made by Hébert and Mincyte (2014).

The impact of age on the participation factor of honey pineapple farmers was examined in this study. The results indicated that age is a significant variable, with a t value of 3.03 < 1.96, indicating that age affects the participation factor of honey pineapple farmers. Specifically, respondents between the ages of 17-40 had the highest average age value of 49.3%, indicating a very low to medium age scale. Physical and stamina that is healthy and stronger at this age positively influenced farmer participation. Respondents within this age range were also more receptive to the information and directions provided. In contrast, farmers over 60 years old had the lowest age value of 6.9%, indicating a very high scale of age. This group was less likely to participate in activities organized by extension agents due to factors associated with advanced age. Productive age was found to be between 15-55 years old, indicating that individuals within this range have relatively greater potential to increase their farm production due to their healthy physical condition and ability to accept innovations and information provided. These findings contribute to the understanding of the role of age in farmer participation and can inform the development of strategies to enhance farmer participation in agricultural activities (Marphy and Priminingtyas, 2019).

The impact of education level on farmer participation was investigated in this study. The results showed that education level is a significant factor, with a t value of 3.54 (>1.96), indicating a real effect on accelerating farmer regeneration. Respondents who had not graduated from elementary school had the highest average value of 42.5%, indicating a very low scale with a score of 1. Farmers with this level of education were less likely to participate or attend farmer group activities or activities organized by extension workers. In contrast, respondents with a bachelor's degree had the lowest value of 1.4%, indicating a very high scale with a score of 5. Farmers with higher education levels, especially the head of the farmer group, were more likely to participate in group activities and activities organized by extension workers. Formal and non-formal education levels were found to have a positive influence on farmer regeneration. The higher the level of education, the higher the level of knowledge in agriculture, particularly in the development of honey pineapple commodities. Previous studies have reported a similar positive relationship between education level and knowledge in the field (Mohamad, 2018; Farry et al., 2018). These findings contribute to the understanding of the role of education level in farmer participation and can inform the development of educational programs aimed at enhancing farmer knowledge and participation in agricultural activities.

This study also investigated the length of farming as a factor influencing farmer participation. The results showed that farming experience has a real effect on farmer participation, with a t value of 2.71 (>1.96). Respondents who had been farming for 6-20 years had the highest average value of 54.7, indicating a low to high scale. The length of farming is crucial for participation because honey pineapple farming is often carried out from generation to generation or inherited from parents. Farmers with more experience in honey pineapple farming are more skilled in overcoming challenges that may occur during farming. This finding is consistent with previous research conducted by Marphy and Priminingtyas (2019), Farry Primandita, Suwarto (2018), Rumiati Khasanah, Suwarto (2020), and Sri Mulyati, Rochdiani, Dini Yusuf (2016). These findings suggest that efforts to enhance farmer participation should consider the role of farming experience and the importance of passing down farming knowledge and skills from generation to generation.

The fourth indicator examined in this study is the level of group activity as an external factor affecting the participation of honey pineapple farmers. The study found that farmers' level of involvement in group activities significantly influences their participation, as evidenced by a t value of 4.96 (>1.96). Participating in farmer groups and attending meetings provides farmers with practical knowledge, such as exchanging ideas with other farmers, which is highly valued by most respondents. The results indicate that 43.8% of respondents were categorized as having active sales objectives, with 32 farmers being highly involved in group activities. In contrast, 56.1% of respondents were categorized as having less or inactive sales objectives, with 41 farmers showing a lack of participation in farmer group activities and counseling on honey pineapple sales techniques in Galang Village.

In Galang Village, all 73 respondents achieved a perfect score of 100% in the post-harvest category, indicating that all farmers participated in post-harvest activities. In terms of active farmer group activities, 83.5% or 61 respondents were active participants, while 16.4% or 12 respondents were not. This suggests that the majority of farmers in Galang Village are engaged in farmer group activities that are organized by the head of the farmer group and extension workers. These activities provide valuable knowledge and skills to the honey pineapple farmers, allowing them to improve their commodity and become more competitive in the Mempawah Regency area.

The fifth indicator examined in this study is the level of cosmopolitanism among honey pineapple farmers. Results indicate that this indicator has the highest value, and its contribution to the farmer participation factor is statistically significant with a t value of 6.36 (>1.96). Findings reveal that all 73 respondents (100%) possess a high level of cosmopolitanism, indicating that they frequently engage in meetings with community leaders from other villages. Additionally, most respondents reported using electronic media as a means of communication.

Farmers are crucial stakeholders in the development of superior commodities, particularly in the implementation and evaluation stages, while their participation in the planning stage has been relatively low. Therefore, to enhance farmers' participation in the planning stage, this study suggests improving the education level of farmers, as the level of education has a significant impact on their participation, according to the research results. The majority of respondents have not completed elementary school, and only a few have graduated. Hence, non-formal education, such as extension programs that offer training, could enhance farmers' skills, knowledge, and capabilities to participate in planning, implementation, and evaluation processes.

This study shows that each indicator measuring the farmer participation factor is representative and strongly correlates with varying values. Notably, the cosmopolitan indicator has the highest load of 6.36, indicating that an increase in farmer participation ability in this area will have a significant impact on the development of honey pineapple in Galang Village. Thus, enhancing farmers' participation in cosmopolitan activities could be a key strategy for improving the development of honey pineapple in the region.

Community participation is essential in development, as it places the community as a subject rather than an object of development programs. This approach ensures that the community actively participates in the planning, implementation, and evaluation of development programs, preventing the feeling of indifference and a lack of ownership of existing programs. Without community participation, development programs may face criticism and be ineffective.

Active participation of the community in development involves more than just passive involvement. It requires active and creative participation, where the community plays a role in every stage of the program, from decision-making in planning, implementation, and evaluation. This fosters the community's creative power, which enhances its ability to shape and influence the direction and performance of a program. To recognize farmers' participation as an actual activity, three main factors must support it, namely external and internal factors.

CONCLUSION

Based on the results of research on participation in the development of superior pineapple honey commodities, it can be concluded that: The level of participation of farmers in the development of superior honey pineapple commodities in Galang Village is found to be lacking in the planning stage. The category of independent or Citizen Control is the most frequent response with a value of 1.43 (>1.96), indicating that farmers' participation is not influential enough with the highest value of 60.2 or 44 respondents. This can be attributed to the lack of non-formal knowledge through extension programs facilitated by extension workers. However, at the implementation and evaluation stages, farmers who are categorized as Independent or Citizen Control show a positive impact with values of 5.29 (>1.96) and 2.96 (>1.96), respectively, with the highest response rate of 67.1 or 49 respondents.Various factors significantly influence the participation of honey pineapple farmers in Galang Village, including age, level of education, length of farming, group activeness, and cosmopolitan. External factors such as cosmopolitan indicators have a high influence, as all respondents engage in activities related to this indicator. The second highest factor is the level of education, with 31 respondents (42.5%) reporting its influence. The planning stage of farmer participation is categorized as independent or Citizen Control, which has a negative impact and a value of 1.43 (>1.96), indicating inadequate farmer involvement. Insufficient non-formal knowledge through extension programs provided by facilitators or extension workers may be the root cause. However, at the implementation and evaluation stages, farmers categorized under independent or Citizen Control have a positive impact, with values of 5.29 (>1.96) and 2.96 (>1.96), respectively. The highest value of 67.1 or 49 respondents reported a positive impact at these stages.

Based on the conclusions obtained, several things can be suggested including: The farmers in the village of Galang are categorized as independent or citizen control at the planning stage, which has a negative impact. It is recommended that the farmers be directed towards a state of manipulation, as in this state, they can exchange ideas with fellow farmers. The level of education has a significant influence on the participation of farmers, particularly due to the lack of formal education among them. In this regard, facilitating non-formal education through extensive training programs can be a viable solution to address this challenge. Facilitators and instructors can employ various techniques, such as providing practical demonstrations, presenting innovative methods for growing honey pineapples, and employing visual aids like slides and videos to enhance the farmers' knowledge and understanding of agriculture, particularly in the development of superior honey pineapple commodities.

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