

Motivation and perception underlying farmers to improve the implementation of Good Agricultural Practices - Pepper (GAP-Pepper)

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Motivation and Perception are psychological factors and essential capital that can influence farmers to improve the implementation of Good Agricultural Practices Pepper (GAP-Pepper). This study explores the underlying motivation and perception of farmers to be able to improve the implementation of pepper GAP, and its effects. This study uses a quantitative approach with a survey method, using a sample of pepper farmers in Bangka Belitung province, Indonesia, with a total of 270 farmers, sampling using the multistage random sampling method—data collection using observation, interview, and questionnaire techniques with the Likert scale. The data was analyzed using descriptive statistics, and the path equation model used SPSS AMOS 22. The results showed that farmers' motivation was in the category of doubt to apply GAP Pepper, farmers' perception of GAP pepper was in a good category, and pepper farmers sometimes applied according to GAP's recommendations. Motivation hinders the implementation of the Pepper GAP, while the positive influence of farmers' perception has not been able to increase the implementation of the Pepper GAP. The positive influence on each GAP variable is land selection and cultivation (PpL) on crop cultivation management (PbT) and PbT on harvest and postharvest (PcP). To change the motivation and perception of farmers, access to resources, information, knowledge, and supporting technology is needed, as well as improving extension services to increase productivity and the existence of white pepper muntok (MWP).

Keywords: Motivation, negative, perception, path analysis, sustainable, Muntok White Pepper (MWP), export products, Pepper Good Agricultural Practices (GAP-P).

INTRODUCTION

Indonesia is the world's best spice-producing country, has a distinctive aroma and taste known as "Muntok White Pepper (MWP)" (Novita *et al.*, 2021; Darwance *et al.*, 2023), contributing to world trade (Nanda *et al.*, 2020). Pepper consumption worldwide has been increasing every year, and pepper is used as a condiment, antioxidant, antimicrobial, carminative, and antiseptic (Semuroh and Sumin, 2021). Macro pepper exports contribute to the Indonesian economy (Directorate General of Plantations, 2022). Smallholder plantations dominate Indonesia's pepper production (Directorate General of Plantations, 2022), with the largest pepper production center being in the Bangka Belitung Islands Province (Purwasih *et al.*, 2020), Muntok white pepper (MWP) contributes to the regional economy and national pepper production (Pepper Development and Marketing Management Agency, 2022).

As an export product that has advantages and competitiveness in the international market (Azahari *et al.*, 2021), it has become a necessity to produce pepper according to cultivation standards, from production to post-harvest. This is in line with the world's pepper-producing countries that are members of the International Pepper Community (IPC) through the project "Smallholder Livelihood Enhancement and Income Generation via Improvement of Pepper Production, Processing, Value Adding and Marketing System and Enterprise Diversification" in Indonesia, Sri Lanka, and Vietnam, have recommended the implementation of good pepper cultivation (GAP for Pepper) (International Pepper Community, 2011). The implementation of pepper GAP, from the production process to post-harvest, can produce high-quality white pepper that is safe to make in an environmentally friendly way, product sustainability guarantees, and competitive selling prices by considering



economic, social, and environmental sustainability (International Pepper Community (IPC), 2011) (FAO, 2016). According to (Gellynck, 2002), GAP is a key approach developed to ensure the sustainability of agricultural production and trade, as well as to guarantee consumers the quality and safety of products and their origins. Therefore, GAP is a practiced, efficient, on-farm, and off-farm process aimed at sustainable production in farmers with a codification system (Oo and Usami, 2020; Pongvinyoo *et al.*, 2014). In addition, good agricultural practices (GAP) are food safety quality standards for cultivation and post-harvest activities to produce environmentally friendly and socially acceptable products (Krasachat, 2023). Several studies have shown the importance of GAP, such as (Tey *et al.*, 2014), which stated that adopting GAP is essential for improving agricultural sustainability. In addition, GAP can increase agricultural yield and income (Danquah *et al.*, 2015; Dorji *et al.*, 2016; Bairagi *et al.*, 2019). However, in many countries, the adoption rate of GAP is still low (Adhikari and Thapa, 2023). The findings show that the adoption of GAP is influenced by various factors such as socioeconomic, organizational, informational, agroecological, psychological, and the attributes used (Pannell *et al.*, 2006; Knowler and Bradshaw, 2007; Prokopy *et al.*, 2008; Baumgart-Getz *et al.*, 2012; Tey and Brindal, 2012). But in reality, farmers have not implemented pepper GAP optimally, such as cultivation, pest and disease control, and also the application of GAP for each component ranges from 67 to 95 percent on average (Setiawan *et al.*, 2015; Sitorus *et al.*, 2020); (Anjani *et al.*, 2023).

Research by Pranoto *et al.*, (2024), shows that farmers apply the GAP GI (Geographical Indication) component with an achievement rate of 52.07 percent. Therefore, the pepper GAP needs encouragement (motive) so that farmers can apply it. Motivation is the drive to act to achieve a specific goal. (James *et al.*, 2012) describe the power of acting on or within each individual that drives and directs Behaviour. In line with (Robbins Stephen and Timothy Judge, 2013) motivation is the process that describes the intensity, direction, and perseverance of an individual to achieve a goal. Tinning (2011) into (Ali *et al.*, 2019) state that motivation is an important personal factor; it can affect a person's overall behaviour. Even the need factor influences the motivation to start agricultural activities (Hamidi and Yaghoubi, 2017). Based on research (Astuti *et al.*, 2019), motivation is one of the important entrepreneurial characteristics of pepper farmers. Several studies show a link between motivation and agricultural sustainability; Intrinsic and extrinsic farmer motivation is influential in reducing the application of sustainable agricultural practices (SAP) on annual crops and organic grain production (Bopp *et al.*, 2019; Han *et al.*, 2021), the influence of motivation on the sustainability of the implementation of good agriculture practices (Yusifa and Sudarko, 2022) and sustainable agricultural systems,

appropriate agronomic properties and economic incentives are the Motivation for farmers to plant landraces cereals (Ortman *et al.*, 2023). Therefore, it is necessary to examine the motivation of farmers to increase the implementation of pepper GAP, and whether the motivational factor is the basis for farmers' decisions.

In addition to motives, information about GAP also causes low implementation of GAP. The information obtained from the environment will shape the perception of farmers towards pepper GAP. Theoretically, Perception is the process of filtering, organizing, and interpreting information about something (Umstot, 1988). Perception uses the brain's ability to translate or interpret stimuli that come in through the senses (Sam *et al.*, 2018). Perception influences the decision to adopt technologies related to agricultural technology (Asiedu-Darko, 2014) and (Sapbamrer and Thammachai, 2021). In addition, farmers' decisions are not only influenced by profitability factors but also by ethnographic-socioeconomic drivers that frame farmers' perceptions (Bravo-Monroy *et al.*, 2016). As is the case in organic farming, the perception of technological characteristics has a positive impact on attitudes and intentions to adopt agriculture organically, and organic rice farmers have a more positive perception than conventional farmers (Ashari *et al.*, 2018); (Sujianto *et al.*, 2022). Thus, farmers' perception of pepper GAP is farmers' understanding, which includes knowledge and stimuli obtained from the environment, so it is necessary to investigate and understand farmers' perception of pepper GAP. So, the perception factor is also the basis for farmers' decisions. Therefore, this study has implications for farmers' psychological factors consisting of motivation and perception, which are factors contained in individuals that underlie farmers' decisions to improve or even not apply Pepper's GAP. Based on the description above, this study is focused on exploring the underlying motivation and perception of farmers to improve the implementation of pepper GAP, as well as the influence of Motivation and Perception on the implementation of pepper GAP. The hypothesis of this study: 1). It is suspected that motivation affects the application of pepper GAP in a. land processing and selection, b) integrated cultivation management, and c) harvest and post-harvest. 2) It is suspected that perception affects the application of pepper GAP, such as a. land processing and selection, b) integrated cultivation management, and c) harvest and post-harvest. This study can identify the stages of Pepper GAP that have been implemented, especially closely related to the main motivation of farmers, and information obtained by farmers sourced from the environment, such as agricultural extension workers, local governments, and pepper stakeholders, can affect farmers' perception of GAP Pepper. The results of this study are useful for agricultural development planning to 1) increase farmers' access to a) white pepper support resources to increase motivation, b) information, knowledge, and technology to increase positive perceptions, 2) agricultural



extension workers in planning extension activities and 3) develop strategies to increase farmers' capacity building and extension to increase productivity and the existence of white pepper muntok (MWP).

MATERIALS AND METHODS

Research location: The research was conducted in South Bangka, Central Bangka, and West Bangka Regencies, Bangka Belitung Islands Province, in May-August 2023. The survey administration area includes Tukak Sadai District, Air Gegas District, Payung District, Sungai Selan District, Koba District, Simpang Katis District, Kelapa District, Simpang Teritip District, and Tempilang District. The geographical location of this study is 104°50' to 109°30' (E) East Longitude and 0°50' to 4°10' (L.S.) Fig.1.

Population and sample: The population in this study is all farmers who cultivate white pepper in Bangka Belitung Province. The determination of the research sample used the multistage random sampling method (Wulandari *et al.*, 2021). The number of samples in this study is 270 people. Sampling stage: First, the population of pepper farmers at the provincial level is broken down into sub-populations at the district level. Second, choose three sub-district clusters with the highest amount of pepper production. Third, three villages in each sub-district group, and finally, a sample of pepper farmers, as many as ten people at random.

Data collection: The motivational variables in this study refer to the ERG Motivation Theory (existence, association, growth) developed by Clayton Alderfer (James *et al.*, 2012). On the contrary, Perception refers to the theory of Perception developed by (Umstot, 1988). The explanation of each research variable can be seen in Table 1. Data was obtained through field collection with observation techniques, interviews, and questionnaires that had been prepared. Kuesioner penelitian It consists of 2 parts. The first part includes six questions regarding the demographic characteristics of the population, such as gender, age,

education level, pepper cultivation experience, pepper cultivation area, and pepper plant age. The second part consisted of 24 question items for the ERG motivation variable (existence needs, relatedness, growth), 16 question items for the farmer perception variable about Pepper's GAP, and 52 question items for the Pepper GAP variable (land selection and cultivation, crop cultivation management, and harvest and post-harvest). This phenomenon is explained by assessment, using measurements with the Likert Scale. Participants were asked to respond by checking the answers that had been given, such as motivation variables (very unwanted, unwanted, hesitant, wanted, and very wanted), perception variables (very unkind, bad, hesitant, good, and very good) while the GAP Pepper variable (never, rarely, sometimes, often and very often). The answer to the research variable is transformed to determine the value of the Likert Scale (Azwar, 2013).

Table 1. Description of research variables.

Variable	Description
Farmers' Motivation in the Application of GAP Pepper (X1)	The impulses that emerge in farmers to take specific actions in the application of the pepper gap include the need for self-existence, the need to interact with others, and the need for development with others, as measured by the Likert scale.
Farmers' perception of GAP Pepper (X2)	Farmers' views or assessments of Pepper GAP components are based on information that has been obtained from the environment: Pepper GAP is good or bad, Pepper GAP is beneficial or harmful, and Pepper GAP is easy or difficult to implement, measured by the Likert scale.
GAP-Pepper	
Land Selection and Processing (Y1)	The stages before pepper cultivation include topography, soil structure, and water availability, measured by the Likert scale.
Plant Cultivation Management (Y2)	The stages in the pepper cultivation process, consisting of plant material, seeding, bulking, seedling planting, maintenance, and fertilization, are measured by the Likert scale.
Harvest and post-harvest (Y3)	The production stage of pepper plants consists of harvest time, pepper seed peeling, and packaging, measured by the Likert scale.



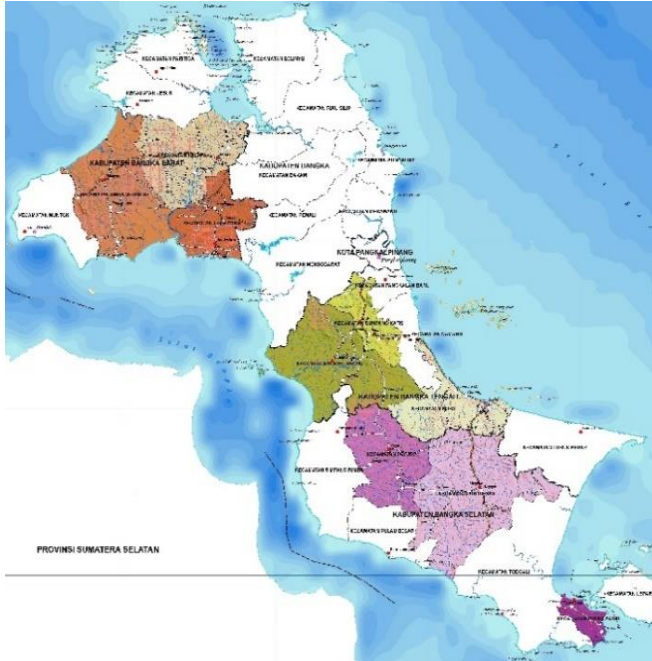


Figure 1. Research location in Bangka Belitung Province.

Data Analysis: Data was analyzed using descriptive statistics, tabulations, and the Likert Scale (Affandi *et al.*, 2022). The Likert Scale is a variable measurement based on a sequential response category (ordinal scale) (Gabel *et al.*, 2018; Prasetyo *et al.*, 2020). The determination of the level of achievement of the research variable category is intended so that the quantitative data of each research variable can be described more clearly and meaningfully. At the same time, inferential statistics were used to test the variables of motivation, perception, and implementation of GAP Pepper with a path equation model using SPSS AMOS 22. Path equations are used to identify relationships between variables (Liu *et al.*, 2023). The category criteria for the level of achievement of each variable can be seen in Table 2.



Table 2. Achievement level variables and categories.

Variable	Achievement Level Category Variable				
	0 - 20	> 20 - 40	>40-60	>60-80	>80-100
Farmers' motivation in the Implementation of GAP Pepper	I don't want to	Don't want to	Doubt	Want	Want to
Farmers' perception of Pepper GAP	Very bad	Bad	Doubt	Good	Excellent
Land selection and processing	Never	Infrequently	Sometimes	Often	Very often
Plant cultivation management	Never	Infrequently	Sometimes	Often	Very often
Harvest and postharvest	Never	Infrequently	Sometimes	Often	Very often

Meanwhile, to calculate the level of achievement of respondents (TCR) using the following formula:

$$TCR = \frac{\text{Average}}{\text{Score Max}} \times 100$$

RESULTS

Demographic characteristics of the study population sample:

Table 3 shows that most of the sample of pepper farmers are male (95.2%), productive age group 20-64 years (84.5%), primary school education level (53.3%), Pepper farming experience is 6 - 10 years (24.1%), land area 500 - 900 trees (42.9%), and crop productive age is 3 - 4 years (64%).

Achievement level of motivational variables, perceptions, and implementation of Pepper good agricultural practices (GAP-Pepper): To find out the level of achievement of motivational variables, farmers' perception of GAP pepper and indicators of GAP Pepper application consisting of land

selection and cultivation, integrated cultivation management, and harvesting and post-harvest can be seen in Table 4.

Table 4 shows that the motivation of farmers with the level of achievement of the variable in the category Doubtful means that farmers have doubts about implementing Pepper GAP even though there is a motive to meet the needs of existence, relevance, and growth. The perception of Pepper GAP with the achievement level of the variable category is Good, meaning that farmers have a good perception of Pepper's GAP.

Table 3. Sample demographic characteristics.

Variable	Percentage (%) N= 270	Variable	Percentage (%) N= 270
Gender (%)		Pepper Farming Experience (%)	
Male	95.2	>5 year	7.4
Female	4.8	6 - 10 year	24.1
Age Group (%)		11-15 year	13.7
Age 20-24	1.1	16- 20 year	16.3
Age 25-29	4.1	21- 25 year	8.5
Age 30-34	9.3	26 - 30 year	14.1
Age 35-39	15.9	31 - 35 year	4.1
Age 40-44	13.3	36 - 40 year	7.8
Age 45-49	17.8	> 40 years	4.1
Age 50-54	14.1	Pepper Crop Area (%)	
Age 55-59	8.9	400 trees	26.7
Age 60-64	9.3	500 - 900 tree	42.9
Age 65-69	3.7	1000 - 1500 tree	23.0
Age 70-74	1.5	1600 - 2000 tree	5.9
75+ Age	1.1	> 2000 tree	2.6
Education Level (%)		Productive Age of Pepper Plants (%)	
Primary school	53.3	1-2 year	26.3
Junior High School	10.0	3-4 year	64.4
Senior High School	28.2	5-6 year	21.0
Diploma/Graduate Universitas	8.5	7-8 year	1.5



Table 4. Variable and category achievement levels.

Indicator GAP-GI	Score		TCR (%)	Category
	Interval	Tengah		
ERG Motivation	0 - 163	75,10	46,07	Doubt
Perception of GAP Pepper	0 - 77	52,67	68,52	Good
Land selection and cultivation (PpL)	0 - 43	18,61	43,44	Sometimes
Plant cultivation management (PbT)	0 - 75	39,17	51,37	Sometimes
Harvest and post-harvest (PcP)	0 - 63	42,66	61,42	Often

Table 5. Path coefficients for structural models.

Path	Standard Estimated Coefficient	S.E.	C.R.	P	Hipotesis Testing
Motivation to Perception	-0.027	0.030	-0.928	0.353	NS
Motivation to PpL	-0.021	0.036	-0.575	0.565	NS
Motivation to PbT	-0.129	0.042	-3.095	0.002	S
Motivation to PcP	-0.090	0.027	-3.351	***	S
Perception to PpL	0.052	0.075	0.698	0.485	NS
Perception to PbT	0.369	0.086	4.300	***	S
Perception to PcP	-0.080	0.056	-1.413	0.158	NS
PpL to PbT	0.360	0.070	5.160	***	S
PbT to PcP	0.321	0.037	8.687	***	S

Note: *** and ** indicate a significance level of 1% and 5%, respectively. NS is non-significant

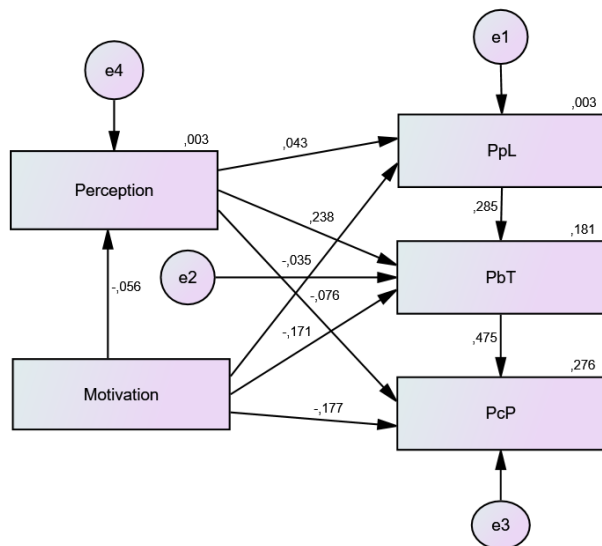


Figure 2. Path analysis model in research.

Meanwhile, the pepper GAP indicator consists of land selection and cultivation (PpL) and plant cultivation management with a variable level of achievement in categories sometimes, meaning that farmers sometimes apply pepper cultivation following GAP recommendations in line with farmers' abilities. While the harvest and post-harvest GAP indicators with the level of achievement of variable categories are frequent, meaning that farmers in pepper cultivation have followed the recommendations in the GAP,

Results of fit model and path equation analysis: Using measurable variables, a path equation model was carried out to test the influence of farmers' motivation and perception on the implementation of Good Agricultural Practices Pepper (GAP-Lada). Before looking at the results of the analysis of the path equation model, the model conformity results consist of GFI values of 0.999, NFI of 0.994, TLI of 1.013, and CFI of 1,000, and the four indicators exceed 0.9, indicating that the model and model conformity can be analyzed (Liu *et al.*, 2023). Next, the path equation model in Figure 2.

Figure 2 shows the relationship between the research variables, as well as the path equation coefficient, which can be seen in Table 5.

DISCUSSION

Table 5 shows the influence of each research variable. Motivation hurts plant cultivation management (PbT) and post-harvest (PcP). Perception affects the management of plant cultivation (PbT). Meanwhile, land selection and cultivation (PpL) affects crop cultivation management (PbT), and PbT affects harvest and post-harvest (PcP). While motivation does not affect perception, motivation does not affect land selection and cultivation (PpL). On the other hand, Perception does not affect land selection and cultivation (PpL), and Perception does not affect harvest and post-harvest (PcP).

Figure 1 shows that the influence of motivation on crop cultivation management (PbT), harvest, and post-harvest (PcP) is -0.171 and -0.177, respectively; these values show the



negative impact of motivation on Pepper GAP. Farmers are still hesitant about their motivation to manage or cultivate MWP (Table 4). Meanwhile, farmers sometimes still apply GAP according to farmers' capabilities. Negative influences indicate that if motivation increases, the application rate may decrease. This is related to the economic level of pepper which is less able to meet the needs of existing farmers. Farmers want pepper to be cultivated with minimal effort, so they do not heed the GAP principle, the tendency of farmers to cultivate pepper traditionally according to their ability. The implementation of this GAP has consequences on the costs that farmers must incur. The opinion of Hamidi and Yaghoubi (2017) states that the need factor affects the motivation to start agricultural activities. The low motivation of pepper farmers, caused by the impulse to meet the needs of pepper crops, has been replaced by other sources of income, and the existence of other more profitable commodities. In line with Research by Damsus and Effendi (2019), social and economic factors determine the motivation of farmers in pepper cultivation.

Based on Figure 1, the magnitude of the influence of perception on crop cultivation management (PbT) is 0.238 which shows the positive impact of farmers' perception of PbT on GAP Pepper—table 4 Farmers' Perception of GAP Pepper in the Good category. Farmers get information about GAP Pepper from various sources, such as agricultural extension workers, community leaders, and local governments through the agricultural office, thus giving a good perception to farmers. The positive influence shows that if the Perception of GAP is increased, it can increase the application. However, in practice, farmers' good perception of GAP is not in line with the implementation of Pepper GAP by farmers. Facts in the field, the application of Pepper GAP consisting of PpL, PbT, and PcP in the category of sometimes, pepper farmers do not heed the GAP principle. Based on the opinion (Umstot, 1988), perception is influenced by internal factors, which consist of feelings, experiences, thinking skills, motivation, and frame of reference. At the same time, external factors include the stimulus itself and the state of the environment in which Perception occurs. (Ali et al., 2019) states that severe past experiences and personal emotions influence perception and motivation to prevent harm. This means that past experiences and environmental circumstances reinforce perceptions. To increase motivation and implement a good perception of GAP Pepper, joint efforts from the government, extension agencies, and the farmer community are needed to provide better support such as intensive counselling, especially on pepper GAP, technical assistance such as seeds, fertilizers, and wider market access.

Figure 1 shows the magnitude of influence on the stages in Pepper GAP starting from land selection and cultivation (PpL) on crop cultivation management (PbT) by 0.285, and PbT on harvest and post-harvest (PcP) by 0.475. The positive influence shows that if PpL increases, PbT and PcP also increase in application. Table 4 shows the implementation of

GAP Pepper in PpL and PbT in the occasional category, while PcP is in the frequent category. Pepper farmers already know that the harvesting and post-harvest processes determine the quality standards of the pepper produced, so farmers have implemented harvest and post-harvest standards in GAP, such as harvest time, soaking and washing pepper with clean and running water, as well as dry places that are free from bacterial contamination. However, for PPL and Pbt, farmers still do not heed the GAP principle. The application of GAP Pepper can not only produce high-quality white pepper, as mentioned by (International Pepper Community (IPC), 2011) and (FAO, 2016), GAP Pepper can also increase the productivity of pepper plants (Siswanto et al., 2021) and (Adhikari and Thapa, 2023).

Conclusion: This study contributes to an important driving factor in farmers to improve the application of GAP Pepper. Farmers' motivation at the achievement level was 46.07 with the category of doubt towards the Pepper GAP, while the farmers' perception at the achievement level was 68.52 with the Good category towards the Pepper GAP. At the same time, the implementation of Pepper GAP includes land selection and cultivation (PpL) at an achievement level of 43.44 with the category of Sometimes, management of food crop cultivation (PbT) at an achievement level of 51.37 with the category of Occasional and harvest and post-harvest (PcP) at an achievement level of 61.42 with the category of Often. Motivation hurts the management of food crop cultivation (PbT), harvest, and post-harvest (PcP) in GAP pepper. Positive impact Perception of crop cultivation management (PbT) has a positive effect on each stage of Pepper GAP, namely land selection and cultivation, plant cultivation management, and harvesting and post-harvest.

The negative influence of motivation on Pepper GAP is because the motivation (motive) of farmers' needs (existence) has not been met with the implementation of Pepper GAP, so there is no incentive to increase the implementation of Pepper GAP. Meanwhile, the positive influence of farmers' perceptions has not increased the application of Pepper GAP because experience and the environment in which the perception occurred did not change Pepper farmers. Farmers' perception can only improve crop cultivation management in the application of Pepper GAP.

The findings of this study can help in agricultural development planning by increasing farmers' access to supporting resources such as seeds, fertilizers, and other agricultural tools. Access reliable information such as export markets and climate change. Access to counselling services such as increasing knowledge and pepper GAP technology is carried out intensively and continuously. For farmers, increasing knowledge and technology through extension services. For the government, it provides facilities and infrastructure in pepper cultivation and improves extension services through education and training as well as plot



demonstrations. Furthermore, this research can be expanded in addition to the main factors in farmers and can also examine factors outside farmers (external) such as government support, prices, changes in food and so on that can increase the implementation of Pepper GAP.

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SDGs addressed: No Poverty, Zero Hunger, Responsible Consumption and Production, Climate Action.

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