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THE ANALYSIS ON THE FORMULATION OF INTEGRATED PEST MANAGEMENT POLICY STRATEGY BY USING SWOT-AHP METHOD (A CASE STUDY ON VEGETABLE PLANT CULTIVATION IN LAMPUNG PROVINCE)

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Abstract. *The objective of this research was to formulate a policy strategy for integrated pest management by using SWOT AHP methods (case study on vegetable cultivation in Lampung Province). This method used A'WOT; the combination of AHP (Analytical Hierarchy Process) analysis and SWOT (Strength-Weakness-Opportunity-Threat) analysis. The analysis result showed the main strength factors becoming the base for sustainable agricultural business were the availability of good structures and infrastructures both in production and marketing, and the availability of sufficient production structure (seeds) with good quality and quantity. The weakness factors becoming concern were dominantly lack of institutional funding (capital) for vegetable business, many problems in the integrated pest management (IPM) technology implementation stage, many problems in good agriculture practices (GAP), and numbers of families making their life as farmers. The opportunity factors were the availability of IPM and GAP technologies, growing campaign for consuming domestic products reducing import, and high government commitment to improve vegetable farmers' welfare. The threats to concern were no protection operational base and farmer's empowerment, very few institutional funding (capital) for vegetable business, and many problems in the GAP and technology implementation. Six strategies becoming priority in order were drafting the regulation and standard of operation that regulate IPM and GAP implementations; strengthening farmer' institution, capital and agricultural insurance; drafting legality of operational protection and farmer's empowerment; agricultural intensification in order to improve quantity, quality, safety, and environmental insight for food security and independency; optimization of technology transfer by socialization or education of IPM and GAP for vegetable crops; and inexpensive IPM system based controlling technology development and effective and efficient of alternative production structures.*

Kata Kunci: *AHP, expert choice, internal factors, eksternal factors, A'WOT.*

1. Introduction

The complexity of a system requires special knowledge and analysis capability that are supported by a precise methodology. One of concepts that helps in the analysis of problem complexity is AHP (*Analytical Hierarchy Process*) process analysis. A model for decision making by using a system approach is able identify and understand various

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aspects of a problem and able to lead into a comprehensive solution (Marimin & Mafiroh 2010; Cabala, 2010).

Osuna & Aranda, (2007) explains that SWOT analysis is a powerful tool to help and analyze systematically the external and internal environment of an organization or a decision-making institution. The identification of strength, weakness, opportunity, and threat of an organization can develop a strategy based on the strength and weakness, to obtain maximum benefit by using opportunity and by neutralizing threat.

The combination of SWOT and AHP, that is known as A'WOT, is a hierarchic structure to process strategic planning based on the SWOT study. The steps in SWOT-AHP contain of: (a) SWOT analysis (internal: strength and weakness, external: strength and threat), (b) which arecombined with comparison between SWOT factors in the each of respective SWOT group, (c) by usingAHP to obtain relative priority of each factor in SWOT group. Then, all factors weight rankings are obtained by multiplying local factor weight with weight of a particular group, and (d) the strategy formulation is made from the policy formulation result (Osuna & Aranda, 2007; Gürbüz, 2010; Jeon & Kim, 2011; Görener et al., 2012). The SWOT analysis is the identifications of various factors systematically to formulate a corporate strategy (Rangkuti, 2013). This analysis is based on a logic that is able to maximize the *strength* and *opportunity*, but simultaneously is able to minimize *weakness* and *threat*. AHP is one of method to help composing a priority from some alternative by using some criteria (multi criteria). Because it is multi criteria in nature, AHP is pretty much used in composing priority.

The problem in the public policy formulation lies on the actor, mechanism, and process of public policy. To obtain an objective of creating a public policy that take sides with people and a public policy that ensures public participation, a strategy is required.The required strategy is the strengthening of public group organization. The policy shall design the rules in formulating a proportional and participative public strategy, and political communication by enhancing interactional spaces between parties related to the public policy.A methodology of policy analysis is a combination of elements from various sciences such as politic, sociology, psychology, economy, and other applied sciences including environment sciences. The policy analysis is descriptive and it can also be normative with objectives to create and criticize the claim of knowledge concerning a policy value for past, present, and future generation (Dunn, 2004). The objective of a strategy development is to be able to see objectively the internal and external conditions, to anticipate the external environment change, which are very

important in obtaining competitive superiority and in possessing outputs according to the public expectation with optimal existing resource support.

The concept of Integrated Pest Management (IPM) for plant protection is a part of plant cultivation system with an objective to limit the loss of outcome because of plant pest organism attack at minimum at possible, so that good quality and quantity production can be achieved by some implementations of IPM technologyincluding resistance variety, planting pattern, planting technique, mechanical or physical pest controlling, chemical substances that influence plant pest organism such as pheromone, biological and natural pest controlling such as preservation and use of natural enemy, natural predator, parasitoid of the pest and the use of pesticide.

The vegetable agribusiness problems in Lampung Province have a high complexity including limited land, numbers of farmer families, less good vegetable plant productivity because of less optimal management, limited production means, production obstacles because of plant pest and disease attacks, climate change, encroachment of protected forest for agriculture, etc. by a system approach, the problem complexity requires a policy strategy so that the objectives to achieve in the vegetable plant agribusiness objective in Lampung Province can be achieved.

The objective of this research was to formulate the policy strategy of integrated pest management by using SWOT-AHP method (a case study of vegetable plant cultivation in Lampung Province).

2. Materials and Methods

This was an explorative research with an orientation to an objective by with the following stages: literature study (desk study) that was followed by a field survey and interviews. Interviews were used to find out the problems to face, expectations, and opinions related to the agribusiness that was currently implemented and to extract information, expert opinions (academicians, agricultural educators, researchers, plant pest observations, non-government organizations, the heads of farmer groups, etc.) concerning the sustainable agriculture development, especially for vegetable plant, in Lampung Province.

The SWOT analysis as a tool for strategy formulation is based on the logic that is able to maximize *strengths* and *opportunities*, and at the same time, to minimize *weaknesses* and *threats*. The process of decision or strategy making is always related to the developments of mission, strategy, and policy. The SWOT analysis combined with

AHP analysis (or A'WOT) is used to predict possibilities that may occur in the future. A'WOT analysis is not similar to forecasting, because A'WOT analysis is able to predict alternatives that may occur in the future; both the positive (expected) and negative (unexpected) alternatives. This analysis is conducted to obtain information concerning factors and criteria having roles in the plant agribusiness and integrated pest management (IPM) according to the needs of actors who are involved in the system (Rangkuti, 2013).The primary data were collected with discussions, interviews, filling questionnaires, and direct observations to vegetable plant agribusiness in the research location. The selected experts represented regional government (agriculture office, food security office, forestry office), universities, forestry police, collector traders, association of farmer groups (*Gapoktan*), non-government organizations,formulators, farmers, and consumers.The types of primary data were data of social and economy, objectives of the system, identifications of strategic factors, interest levels of strategic factors, formulation of system scenario, and priority of activities.

Secondary data were collected from various sources including research results in the past, results of literature study, reports and documents from various institutions related to the field of research (Wibowo, 2008). The SWOT analysis is the identification of various factors systematically to formulate policy strategy formulation. The strategic planning (strategic planner) analyzes corporate strategic factors (strength, weakness, opportunity, and threat) in the current condition. SWOT matrix according to David (2006) consist of 9 (nine) cells; 4 (four) main factor cells, 4 (four) strategy cells, and 1 (one) cell is left to be empty (cell at left above). 4 (four) strategy cells are named with SO, WO, ST, and W, and developed after the 4 (four) main factor cells are completed and they are named S, W, O, and T. there are 8 (eight) steps in forming a matrix of SWOT; they are (1) making a list for external opportunities, (2) making a list for external threats, (3) making a list for internal strengths, (4) making a list for weaknesses, (5) matching external strengths and external opportunities and recording the results at the SO strategy cell, (6) matching internal weakness and external opportunities and recording the results at WO strategy cell, and (7) matching the internal weaknesses and external threats and recording the results at WT strategy cell.

The *Analytical Hierarchy Process* is an analysis method for hierarchic decision making that was developed by Dr. Thomas L. Saaty in 1970. The main instrument of AHP model is a functional hierarchy with human perceptions as the main input. The AHP model uses human perceptions of those who are considered to be experts as the main

input. According to Saaty in Marimin &Maghfiroh (2010), there are 3 (three) stages in problem solving by using AHP method:

- The composition of hierarchy and hierarchy level assessment

This composition is started from a complex problem and decomposed into main elements, and these main elements are decomposed furthermore into parts in a hierarchy.

- Determining priority

Pairwise comparison is conducted to determine priority. The pairwise comparison process is started from the top of the hierarchy (the goal) that is used to conduct the first comparison and then followed by the next level exactly below the to (criteria and sub-criteria), and alternative strategy.

- Consistency of logic

The consistency up to some extent in determining priority is required to obtain valid results in the real world. The ratio value of consistency of logic must be 10% or less, and if the result is more than 10%, the assessment must be improved.

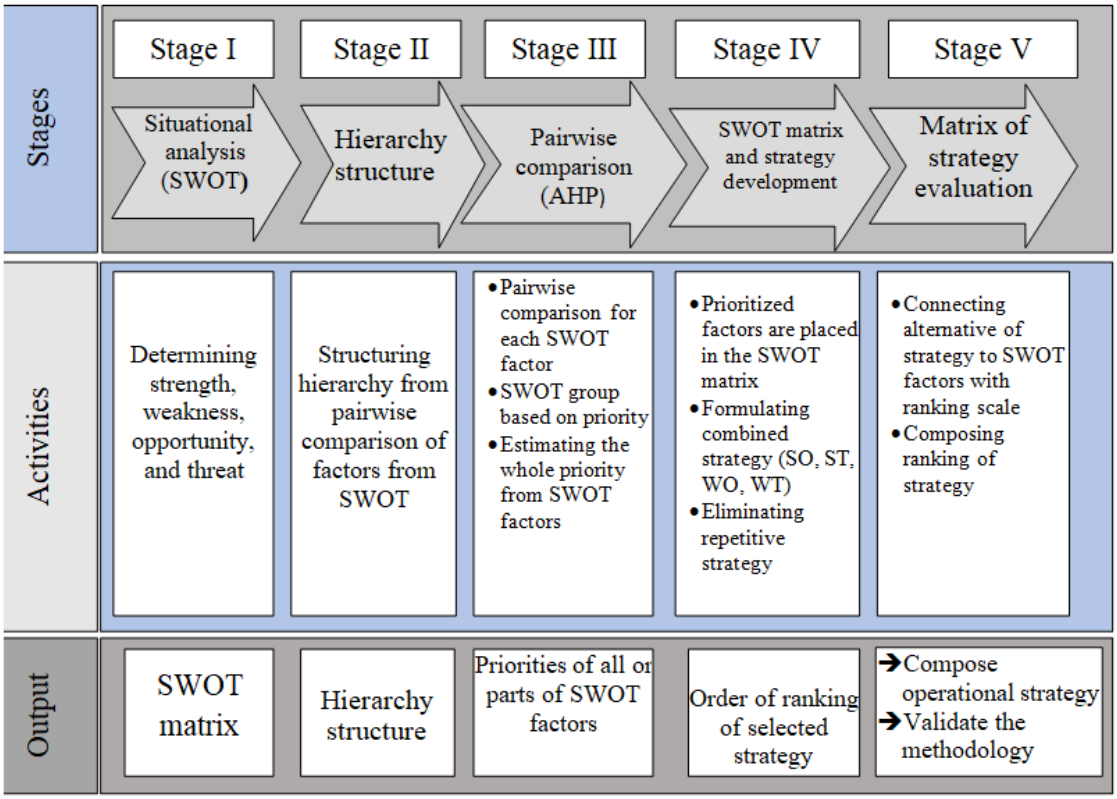

Figure 1. Flowchart of stages in the SWOT-AHP (A'WOT) hybrid analysis method(Wickramasinghe & Takano 2009)

The AHP (A'WOT) in formulating strategy and policy implementation (Figure 1) used the following stages:

Stage 1: Situational assessment (SWOT Analysis)

The main success of strategic marketing planning is depending on the accuracy of the effective SWOT situational analysis to provide a good base for a successful strategy formulation (Table 1).

Table 1. SWOT matrix for IPM-based vegetable plant agribusiness strategy

STRENGTHS What kind of strength that can be built?	*WEAKNESSES* What kind of weakness that needs to overcome?
S1:……....	W1:…….
S2:……....	W2:…….
S3:……....	W3:…….
OPPORTUNITIES What kind of opportunity that can be used?	*THREATS* What kind of threat that needs to identify?
O1:……....	T1:…….
O2:……....	T2:…….
O3:……....	T3:…….

Source: Wickramasinghe & Takano, 2010

Stage 2: Hierarchy structure

The highest level is the goal/objective to achieve. The goal to achieve in this research was the IPM (integrated pest management) based vegetable plant agribusiness. The second and third levels are criteria and sub-criteria in the A'WOT analysis which are factors of strength,opportunity, weakness, and threat. The lowest level is alternative for policy strategy that is planned and implemented (Osuna & Aranda, 2007) (Figure 2).

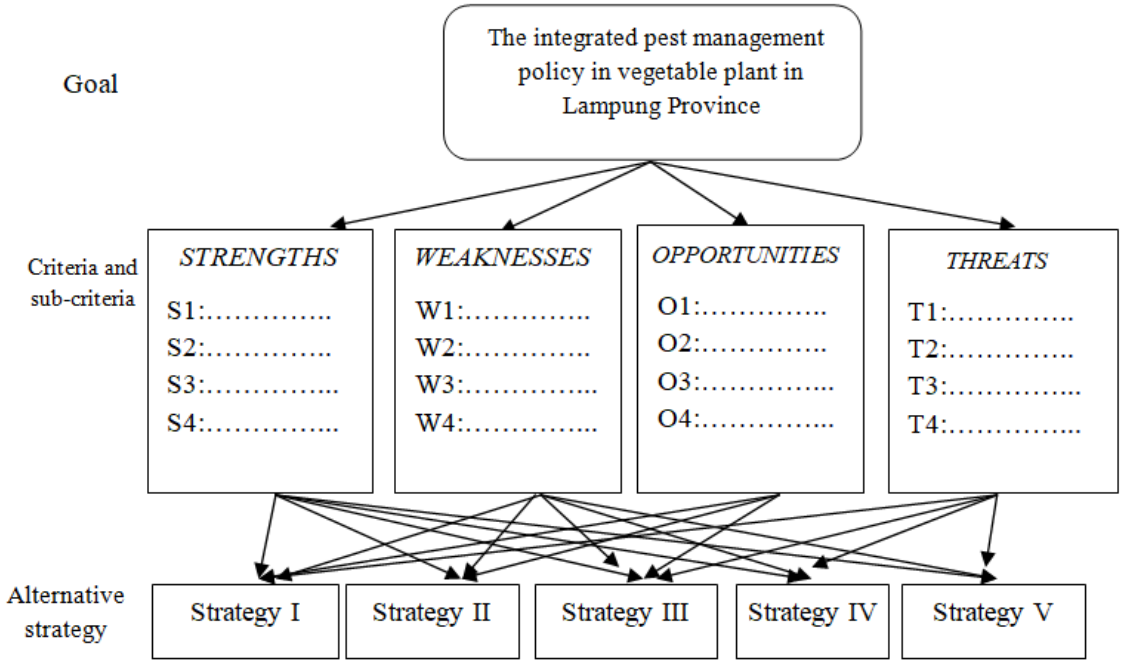

Figure 2.Hierarchy structure with SWOT priority(Osuna & Aranda, 2007)

Stage 3: Pairwise comparison (AHP)

In general, the AHP procedure includes the following stages: a)decomposing the problem; b) assessment/weighing to compare elements; c) composing matrix and consistence test; d) determining priority for each hierarchy; e) synthesis from priorities; and f) decision making. Each question would be rated with scales from 1 to 9 to weigh each relative factor. Finally, each SWOT factor is estimated as to be a local priority product and a scale for each of SWOT group.

Stage 4: SWOT matrix and strategy development

The main objective of the strategy formulation is to change current condition or to restore from bad condition into expected condition. In the practice, IPM in vegetable agribusiness proposes various policy strategy. The SWOT-AHP method formulates this process in the most transparent and simple ways to describe the SMART (*simple, measurable, applicable, reliable* and *time table*) strategy.Wickramasinghe & Takano (2009) states that SWOT table looks for logic combination and the alternative strategy formulation is started by finding combination of strategies. The TOWS matrix formulates four different strategies (or combination of logics). They are (1) SO, internal strength strategy can be used to realize external opportunity (ideal case), (2) WO strategy, is to reduce internal weakness or to develop the strength that is loss to realize external opportunity, (3) ST, the internal strength strategy is used to minimize external threat, and (4) WT, is to reduce internal weakness and to avoid external threat (only defensive strategy, in the worst case).The alternative strategies are developed together with experts' guidance. The benefit of this approach is the derivation of internal and external factor influences in the alternative strategy. The weakness is that certain combinations are not considered such as SW or PL. For each evolving strategy, the SWOT combinations in order to create output are understood rationally (for example, S1/O3 means that the strength is 1 and the opportunity number 3 has been mainly considered). To make this analysis simpler, only two strategies from the top of each strategy block to be selected and displayed in the TOWS matrix (Table 2).

Table 2. TOWS Matrix

	STRENGTHS	WEAKNESSES
OPRTUITIES	*SO Strategies: Maxi-Maxi*	*WO Strategies: Mini-Maxi*
	[Alt-1]……..	[Alt-3]……..
	[Alt-3]……..	[Alt-4]……..
THREATS	*ST Strategies: Maxi-Mini*	*WT Strategies: Mini-Mini*
	[Alt-5]……..	[Alt-7]……..
	[Alt-6]……..	[Alt-8]……..

Source: Wickramasinghe & Takano, 2010

Stage 5: Matrix of strategy evaluation

One of basic assumption in the AHP is the alternative strategy which is defined to check which one is the most effective concerning all SWOT factors. The rating scale mechanism developed by (Saaty, 2008) is used to assess the strategic relationship between SWOT factors and strategic planning. The strategic relationship is the contribution from factors (in the weakness and opportunity) to implement strategy and remedy, and the factors from certain strategies (in weakness and threat) are expected to be implemented.

3. Result and Discussion

Internal Factor Analysis

Data of internal factor analysis of IPM system-based vegetable plant agribusiness and matrix of result of analysis of Internal Factor Evaluation (IFE) of IPM system-based vegetable plant agribusiness can be seen in Table 3. The respondents' assessments on the internal key factors showed total score of IFE of 2.173. This result showed that the strategic position of vegetable plant in Lampung Province was above average in using the strength to face internal weakness.

The strategic formulation instrument by using IFE matrix can be used to summarize and evaluate the strength and weakness of vegetable plant agribusiness. The IFE matrix can also provide a base to identify and evaluate the correlation between the functional fields, so that a good understanding on internal strategy factors to be entered is more important than the numbers themselves (David, 2006).

Some vegetables could be cultivated properly in Lampung Province with total score of 0.235 as strength factor, while funding institution (capital) for vegetable agribusiness

was very few with total score of 0.283 as the weakness factor which provided the biggest contribution (see Table 3). The research result showed that Lampung Province also had good infrastructures and numbers of families with farmer profession was in accordance with agricultural census result in 2013, they were 102,566 families, and that increased 5.13% compared to 2003 with 97,567 farmer families (BPS, 2013).

The IFE matrix analysis result showed that the main weakness was very few funding institution or capital provider who were willing to fund horticulture sector. This was because vegetable price was susceptible to market price change, plant pest and disease, and climate change. There was no good agriculture insurance protecting agribusiness directly and the low interest of funding institution to provide credit for vegetable plant agribusiness.

Table 3.IFE matrix of IPM system-based vegetable plant agribusiness in Lampung Province

Determining Factor	Weight	Rating	Total of Score	Priority
Strength Factor				
A Numbers of families with farmer profession in Lampung province is still dominant	0,0897	1,50	0,135	5
B Climate condition and soil fertility that are suitable for vegetable cultivation	0,0998	1,40	0,140	4
C Availability of good infrastructure including roads and access for production and marketing	0,1042	2,00	0,208	2
D Some vegetables can be cultivated properly in Lampung	0,1066	2,20	0,235	1
E Availability of good production structure (seeds) both in quality and quantity	0,0943	1,50	0,141	3
Sub total	0,4946		0,8587	
Weakness Factor				
F numbers of families with farmer profession in Lampung province is still dominant	0,1058	2,50	0,264	3
G There are many problems in IPM and GAP technology implementtaion stage	0,1004	2,90	0,291	2
H Market penetration by pesticide formulator is very strong so that it ignores the IPM principles	0,0999	2,50	0,250	4
I Legality/legal standing of IPM is very weak	0,0982	2,30	0,226	5
J Funding institution (capital) for vegetable agribusiness is very few	0,1011	2,80	0,283	1
Sub total	0,5054		1,3143	

Analysis of External Factor

Matrix of analysis result of External Factor Evaluation (IFE) of IPM system-based vegetable plant agribusiness in Lampung Province (see Table 4). In the table, it can be

seen the high availability of IPM and GAP technologies and these are big opportunities for farmers to use them in the vegetable plant agribusiness in Lampung Province. However, there is a threat toward the implementation of IPM, because the legality of IPM that is currently the Law number 12 in 1992 concerning Plant Cultivation System is no longer relevant. In order to encourage the farmer protection and empowerment, the government issued the Law number 19 in 2013 concerning the Farmer Protection and Empowerment. However, the implementation in operational stage indicated that there is no government regulation and regional government regulation to regulate the implementation so that the operational stage cannot yet be done.

Table 4. EFE matrix in the IPM system-based vegetable plant agribusiness in Lampung Province

Determining Factor	Weight	Rating	Total of Score	Priority
Opportunity Factor				
A Vegetable demand as saple food is not yet satisfied and likely increasing	0,107	1,90	0,203	5
B The government commitment to improve vegetable farmers' welfare is very high	0,100	2,00	0,200	3
C Available IPM and GAP technologies	0,105	2,10	0,221	1
D Vegetable market opportunity starts to open in Bandar Lampung and in Jakarta and keep on increasing	0,103	1,50	0,154	4
E The campaign for consuming domestic product and reducing imported food consumption is increasing	0,103	1,90	0,195	2
Sub total	0,517		0,973	
Threat Factor				
F There are many problems in the implementation of IPM and GAP technologies	0,098	2,10	0,207	3
G Market penetration by pesticide formulator is very strong so that it ignores the IPM principles	0,105	1,80	0,189	4
H There is no operational legal standing for farmer protection and empowerment	0,100	2,50	0,250	1
I Funding Institution (capital) for vegetable plant agribusiness is very few	0,097	2,40	0,233	2
J Production costs especially fertilizer and pesticide keep on increasing	0,103	1,60	0,165	5
Sub total	0,504		1,044	
Total	1,021		2,017	

The vegetable plant agribusiness in Lampung faces opportunity and threat altogether in the implementation. The EFE matrix can explain the opportunity and threat faced by vegetable plant agribusiness. The EFE matrix analysis result shows the average score of external key factors is 2.017, and it means that the farmers' abilities to use existing opportunity and to overcome threat are in the middle position.

The IFE and EFE matrix estimation results show average total of score of 2.173 and 2.017 respectively. The combination of IFE and EFE values in *Internal-External* (IE) matrix will show that the position of IPM system-based vegetable plant agriculture in Lampung Province in the fifth cell (V) (see Figure 3). This IE matrix figure shows that the vegetable plant agribusiness in Lampung Province is located in fifth (V) cell, so that the best strategy should be *keeping* and *maintaining* the existing position.The general policy from this strategy is by penetrating market and developing new types of vegetable plants. It means that the farmers and government should keep their positions by keep on developing good vegetable plants both in quality and quantity.The strategies produced in IE matrix are only alternative strategies in general without more technical implementations on the farmers and the government. Therefore, IE matrix is also equipped by SWOT matrix in terms of concrete steps, by improving production through intensification and selection of vegetable plant types that have highest additional value.

Total average of weighed EFE	Total average of weighed IFE: Strong (3.0 - 4.0)	Average (2.0 - 2.9)	Weak (1.0 - 1.9)
High (3.0 - 4.0)	**I**	**II**	**III**
Middle (2.0 - 2.9)	**IV**	**V**	**VI**
Low (1.0 - 1.9)	**VII**	**VIII**	**IX**

Figure 3. IE (Internal-External) matrix of IPM system-based vegetable plant agribusiness in Lampung Province

The Analysis of *Strength, Weakness, Opportunity,* and *Threat* (SWOT)

After conducting analysis to internal and external factors, alternative strategies are formulated by using SWOT matrix, which are combined strategies of SO (*strength-opportunity*), ST (*strength-threat*), WO (*weakness-opportunity*), and WT (*weakness-threat*) (see figure 4).

The SWOT analysis result derived some types of strategies that can be explained as follows:

- Strategy of *Strength-Opportunity* (SO)

The SO strategy is a strategy that uses the strength to use the existing opportunity. Based on the strength and opportunity, strategies that should be done are: (a) drafting

regulation and standardization of operation (regional government regulation) that regulate the implementations of IPM and GAP, and (b) agriculture intensification in order to improve quantity, quality, safety, environment insight of food security and autonomy.

- Strategy of *Weakness-Opportunity* (WO)

The WO strategy is a strategy to minimize the weakness to use the opportunity. The followings areWO strategy that can be used: (a) strengthening farmer institution, capital, and agriculture insurance; and (b) optimization of technology transfer through socialization or education of IPM and GAP technologies for vegetable plants.

- Strategy of *Strength-Threat* (ST)

ST strategy is a strategy that use strength to avoid threat. The ST strategies that can be done are drafting operational legality for farmer protection and empowerment and strengthening agriculture funding institution.

- Strategy of *Weakness-Threat* (WT)

WT strategy is a strategy to reduce weakness and avoid threat. The strategy that can be formulated is developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficientproduction means.

The Analysis of IPM System-based Vegetable Plant Agribusiness in Lampung Province

The SWOT analysis results show that there are six strategies need to choose for IPM system-based vegetable plant agribusiness in Lampung Province. These strategies are as follows:

- Drafting regulation and standardization of operation (regional government regulation) that regulate the implementations of IPM and GAP.
- Agriculture intensification in order to improve quantity, quality, safety, environment insight of food security and autonomy.
- Strengthening farmer institution, capital, and agriculture insurance.
- Optimization of technology transfer through socialization or education of IPM and GAP technologies for vegetable plants.
- Drafting operational legality for farmer protection and empowerment.
- Developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficient production means.

The determination of strategy priority scale was done by using AHP method with informants coming from academicians, field agriculture educator (PPL), coordinator of plant pest organism observer (POPT), heads of farmer groups, and regional government.

Some benefits of AHP method include applicability to solve various measurable and unmeasurable problems, that require judgement, and it produces a single model that is easy to understand ((Saaty T.L., 2008); Wang & Chin, 2011). The hierarchic structure of strategies for sustainable vegetable plant agribusiness that is based on IPM system in Lampung Province can be seen in Figure 5.

The AHP assessment in determining alternative priority of first priority strategy is drafting regulation and standardization of operation (regional government regulation) that regulate the implementations of IPM and GAP (0.230). The second priority is strengthening farmer institution, capital, and agriculture insurance (0.201). The third priority is drafting operational legality for farmer protection and empowerment (0.181). Alternative strategy for agriculture intensification in order to improve quantity, quality, safety, and environment insight for food safety and autonomy (0.142).the fifth priority of alternative strategy is optimization of technology transfer through socialization or education of IPM and GAP technologies for vegetable plants (0.130). the next alternative strategy is developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficient production means (0.116). The recapitulation and priority based on AHP assessment by experts' choices can be seen in Table 5.

IFAS / EFAS	Strengths	Weakness
	1. Numbers of families with farmer profession in Lampung Province is still dominant (S1) 2. Climate condition and soil fertility that are suitable for vegetable cultivation (S2) 3. Availability of good infrastructure including roads and access for production and marketing (S3) 4. Some vegetables can be cultivated properly in Lampung (S4) 5. Availability of good production means (seeds) both in quality and quantity (S5)	1. There are many problems in IPM and GAP technology implementtaion stage(W1). 2. Market penetration by pesticide formulator is very strong so that it ignores the IPM principles(W2) 3. Legality/legal standing of IPM is very weak (W3) 4. Funding institution (capital) for vegetable agribusiness is very few (W4) 5. Production costs especially fertilizer and pesticide keep on increasing (W5)
Opportunities 1. Vegetable demand as staple food is not yet satisfied and likely increasing (01) 2. The government commitment to improve vegetable farmers' welfare is very high (02) 3. Available IPM and GAP technologies (03) 4. Vegetable market opportunity starts to open in Bandar Lampung and in Jakarta and keeps on increasing (04) 5. The campaign for consuming domestic product and reducing imported food consumption is increasing(05)	**SO Strategy** SO-1: drafting regulation and standardization of operation (regional government regulation) that regulate the implementations of IPM and GAP SO-2: agriculture intensification in order to improve quantity, quality, safety, environment insight of food security and autonomy	**WO strategy** WO-1: strengthening farmer institution, capital, and agriculture insurance WO-2: optimization of technology transfer through socialization or education of IPM and GAP technologies for vegetable plants
Threaths 1. Plant pest organism attack, climate change, and there are many problems in the implementation of IPM and GAP technologies (T1). 2. Market penetration by pesticide formulator is very strong so that it ignores the IPM principles (T2) 3. There is no operational legal standing for farmer protection and empowerment (T3) 4. Funding Institution (capital) for vegetable plant agribusiness is very few (T4) 5. Production costs especially fertilizer and pesticide keep on increasing (T5)	**ST Strategy** Drafting operational legality for farmer protection and empowerment and strengthening agriculture funding institution	**WT Strategy** Developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficient production means.

Note:*IFAS =Internal Strategic Factors Analysis Summary, EFAS =External Strategic Factors Analysis Summary*

Figure 4.SWOT matrix for IPM system-based vegetable plant agribusiness

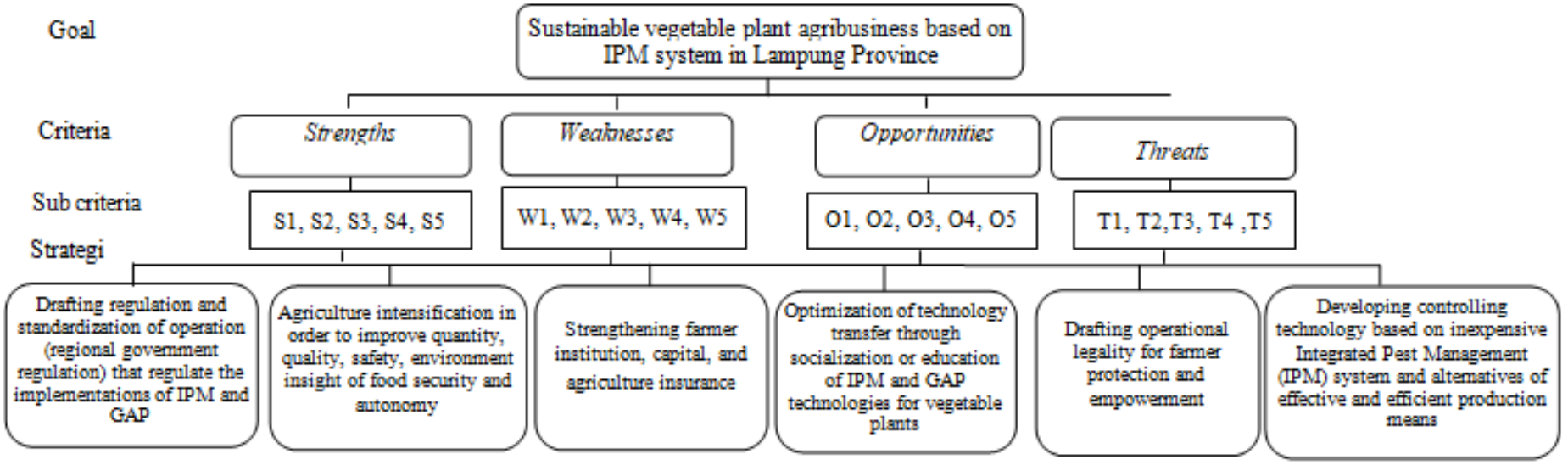
Goal
Sustainable vegetable plant agribusiness based on IPM system in Lampung Province
Criteria
Strengths
Weaknesses
Opportunities
Threats
Sub criteria
S1, S2, S3, S4, S5
W1, W2, W3, W4, W5
O1, O2, O3, O4, O5
T1, T2,T3, T4 ,T5
Strategi
Drafting regulation and standardization of operation (regional government regulation) that regulate the implementations of IPM and GAP
Agriculture intensification in order to improve quantity, quality, safety, environment insight of food security and autonomy
Strengthening farmer institution, capital, and agriculture insurance
Optimization of technology transfer through socialization or education of IPM and GAP technologies for vegetable plants
Drafting operational legality for farmer protection and empowerment
Developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficient production means

Figure 5. The hierarchic structure of strategies for sustainable vegetable plant agribusiness that is based on IPM system in Lampung Province

Strengths	***Weakness***	***Opportunities***	***Threaths***
1) Numbers of families with farmer profession in Lampung Province is still dominant (S1)	1) There are many problems in IPM and GAP technology implementtaion stage (W1).	1) Vegetable demand as staple food is not yet satisfied and likely (01)	1) Plant pest organism attack, climate change, and there are many problems in the implementation of IPM and GAP technologies(T1).
2) Climate condition and soil fertility that are suitable for vegetable cultivation (S2)	2) Market penetration by pesticide formulator is very strong so that it ignores the IPM principles(W2)	2) The government commitment to improve vegetable farmers' welfare is very high (02)	2) Market penetration by pesticide formulator is very strong so that it ignores the IPM principles (T2)
3) Availability of good infrastructure including roads and access for production and marketing (S3)	3) Legality/legal standing of IPM is very weak(W3)	3) Available IPM and GAP technologies (03)	3) There is no operational legal standing for farmer protection and empowerment (T3)
4) Some vegetables can be cultivated properly in Lampung (S4)	4) Funding institution (capital) for vegetable agribusiness is very few (W4)	4) Vegetable market opportunity starts to open in Bandar Lampung and in Jakarta and keeps on increasing(04)	4) Funding Institution (capital) for vegetable plant agribusiness is very few(T4)
5) Availability of good production means (seeds) both in quality and quantity (S5)	5) Production costs especially fertilizer and pesticide keep on increasing (W5)	5) Production costs especially fertilizer and pesticide keep on increasing (05)	5) Production costs especially fertilizer and pesticide keep on increasing (T5)

Table 5. The recapitulation of strategy priority scale determination result for IPM system-based vegetable plant agribusiness in Lampung Province

No.	Result of Strategy Weighing	*Inconsistency*	Weigh	Priority
1	Drafting regulation and standardization of operation (ministry regulation, regional government regulation) that regulate the implementations of IPM, GAP, and farmer protection		0,230	1
2	Agriculture intensification in order to improve quantity, quality, safety, environment insight of food security and autonomy through human resource improvement		0,142	4
3	Optimization of technology transfer through socialization or education of IPM and GAP technologies for	0,03	0,201	2
4	Strengthening farmer institution, capital, and agriculture insurance		0,130	5
5	Making instruction for implementation about vegetable plant management based on IPM and GAP		0,181	3
6	Developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficient production		0,116	6

4. Conclusion

The main strength factors of vegetable plant agribusiness in Lampung Province are that some vegetables can be cultivated properly in Lampung Province, the availability of good infrastructures, the production and marketing, available good production means (seeds) both in quality and quantity, and numbers of families with farmer profession in Lampung Province is still dominant. The weakness factors to considers are very few of funding institution (capital) for vegetable plant agribusiness and many problems in the IPM and GAP technology implementation stage.

Vegetable plant agribusiness needs to support with the existing opportunities such as availability of IPM and GAP technologies, increasing campaign for consuming domestic product and reducing imported food, and high commitment of government to improve vegetable farmers' welfare. The threats need to consider are no operational legal standing for farmer protection and empowerment, very few funding institution (capital for vegetable plant agribusiness, and many problems in IPM and GAP technology implementation stage.

The six strategies as main priority for IPM system-based vegetable plant agribusiness in Lampung are as follows.The first priority is drafting regulation and standardization of operation (regional government regulation) that regulate the implementations of IPM, GAP, and farmer protection; the second is strengthening the farmer's institution, capital, and farmer insurance; the third is drafting operational legality for farmer protection and empowerment; the fourth is agriculture intensification in order to improve quantity, quality, safety, and environment insight

in order to food safety and autonomy; the fifth priority is optimization of technology transfer through socialization and education of IPM and GAP technologies for vegetable plants, and the sixth alternative strategy is Developing controlling technology based on inexpensive Integrated Pest Management (IPM) system and alternatives of effective and efficient production means.

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