Agro-tourism Development Planning to Support Vertical Garden System Tourism Destination Using Hirarchy Process Analysis Method in Tonjong Village Serang Banten

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Abstract

The tourism sector in this era is a mainstay sector that cannot be used as a foundation that is able to provide multiplier effects on other development sectors. One sector that can be integrated is the agricultural sector, agricultural sector has more value compared to other sectors because each subsystem can be used as a tourist destination and tourist spots that have attraction. The method used in this activity is a descriptive analysis method with sampling techniques used purposively in two farmer groups namely the mekar jaya farmer group and the tomato farmer group. The informants were set at 20 members of the farmer group consisting of 10 people from the Tani Mekar Jaya group and 10 members of the farmer group from the tomato farmer group. Data analysis techniques use the Process hierarchy tabulation and analysis (AHP). Based on the results of hierarchy level 1 analysis, it shows that the factors from within for agro tourism development are important priority scales AW6. Hierarchy level 2 is the most important priority scale in BAW 6, but there are important programs because the weight is higher than AW6 even though it is lower than BAW 1. CAW 3 Scale is the most important priority on level 3 hierarchy, and the program specified in the hierarchy of three levels is very low in abnormal with the level of interest of the other three hierarchical programs. At the level three hierarchy planning level the importance is not yet visible because this hierarchy consists mostly of programs that are macro elements. Hierarchy level 4 is the highest level of importance in DAW4, this level of importance is the highest level of importance of all programs and of the whole hierarchy

Keywords: Development; Agro tourism; Process hierarchy analysis

Introduction

The tourism sector in this era is a mainstay sector that cannot be used as a foundation that is able to provide multiplier effects on other development sectors. The leverage of the tourism sector needs to be supported by other sectors. One sector that can be integrated is the agricultural sector, the agricultural sector has more value compared to other sectors because each subsystem can be used as a tourist destination and tourist spots that have attraction [1,2]. In accordance with Yoeti's opinion the tourism industry towards the 21st century is referred to as one of the mainstays to obtain the country's foreign exchange and its development can spur the growth of the Indonesian economy. Tourism will be the Globalization of the World Large Industry in the 21st century. In this decade developing countries pay special attention to tourism development. Tourism development in every tourism program is always promoted. This is one of the strategies to face the competition of attracting tourists to visit [3].

Tonjong village is a village that has unique characteristics, namely the surjan farming system that has been developing for a long time. The attractiveness of the surjan farming system, this model of farming system in addition to planting rice in one stretch of land this system can be diversified with other crops, namely ornamental plants and other horticultural crops. To package the agricultural system, the development and arrangement of the Tonjong Village area that is directed for the development of agro tourism is needed [4].

Based on the problems mentioned above, it is necessary to formulate a priority scale to develop the potential in Tonjong Village. Any plants, vegetable plants and fruit crops that can be developed in the Tonjong Village, in addition to arranging and building strategic planning is needed by making priority scale alternatives [5,6].

Method

The method used in this activity is a descriptive analysis method with sampling techniques used purposively in two farmer groups namely the mekar jaya farmer group and the tomato farmer group. The informants were set at 20 members of the farmer group consisting of 10 people from the Tani Mekar Jaya group and 10 members of the farmer group from the tomato farmer group. Data analysis techniques use the Process hierarchy tabulation and analysis (AHP) [7].

AHP analysis focuses on a complex unstructured situation, into its component parts, arranges the parts or variables into a hierarchical arrangement, gives numerical values to subjective considerations about the relative importance of each variable, and synthesizes those considerations to determine which variables who has the highest priority and acts to influence the outcome of the situation. Correspondingly, in solving problems with AHP (decomposition) , the principle of comparative judgment, the principle of priority synthesis (synthesis of priority) and the principle of logical consistency (logical consistency).

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- Decomposition, which is a complete solution into its elements. If you want to get more accurate results, the solution is also done to the elements until it is impossible to do further solutions, so that there are several levels (hierarchy) of the problem.

- Comparative Judgment. This principle means making judgments about the relative importance of two elements at a certain level in relation to the level above them. The assessment is the core of AHP, because it will affect the priority of the elements. The results of the assessment are presented in a matrix called matrix pairwise comparison.

- Synthesis of Priority. In each pairwise comparison matrix there is local priority. Because "pairwise comparison" is found at each level, then to get the global priority must be synthesized between the local priority. Sorting these elements according to relative importance through a synthesis procedure called priority setting.

- Logical consistency. Consistency in this case has two meanings. First, that similar objects can be grouped according to the uniformity of their relevance. Secondly, that the level of relationship between objects based on certain criteria, for example, is equally important, a little more important, obviously more important, absolutely more important.

The most important thing in AHP is assessment with paired comparison techniques for actors at a hierarchical level. Assessment is done by giving a numerical weight and comparing between one element with another element. The next step is to synthesize the results of the assessment to determine which element has the highest priority from the lowest. The comparative scale used is 1 to 9 is the best. This has been proven by Saaty based on the consideration of the high accuracy shown by the value of Root Means Square (RMS) and Median Absolute Deviation (MAD) at various problems [6].

The intended comparative scale value is presented in Table 1.

Individual opinion matrix

If C1, C2, ... Cn is the set of elements for a level of decision in the hierarchy, then the quantification of opinions from the results of the comparison with each element against the other elements will form an matrix of size n x n. if the Cj element is compared to the Cj element, then aij is the value of the comparative opinion matrix which reflects the value of the importance of Ci towards Cj. The matrix value aij = 1 / aij is the inverse value of the matrix aij. If i = j, then the matrix value aij = aji = 1, because the comparison of the elements to the element itself is 1. Formulation of an nxn-sized matrix A with elements C1, C2, ... Cn for ij = 1, 2, 3, ... n and ij are the values of the comparative opinion matrix that reflect the importance level of Ci, Cj for ij = 1, 2, 3 ...... n are as follows:

Importance	Definition
1	Equally important
3	A little more important
5	Clearly more important
7	Very clearly more important
9	Definitely / absolutely more important
2,4,6,8	When in doubt between two adjacent values
1 / (1-9)	The goodness of the level of importance on a scale of 1-9

Table 1: Value of Paired Comparative Scale.

Combined opinion matrix

A combined opinion matrix (G) is a new matrix arrangement whose matrix elements (gij) are derived from geometric averages or geometric means of individual opinion matrix elements (aij) whose consistency ratio (CR) meets the requirements. Equation formulations to obtain geometric mean values are as follows:

$$= \sqrt[m]{\dfrac{\overset{m}{aij}}{\underset{k=1}{}}}$$

$G_{ij} = G_{ij(k)}$

Information:

Gij = combined opinion matrix element in line i and column i

aij (k) = individual opinion matrix elements in row i and column j for individual opinion matrix with Consistency Ratio (CR) that meets the requirements kk.

Ij = 1, 2, ... n

K = 1,2, ... m

m = number of individual opinion matrix

with CR that meets the requirements.

Horizontal processing is used to prioritize decision elements at the level of the decision hierarchy. The calculation stages performed in horizontal processing are shown in the following equations:

- Line multiplication (Z) with formula

$$Z_i = Gij = \sqrt[n]{\overset{m}{\underset{k=1}{\mu}} \; aij(k)}$$

- Calculation of priority vectors or eigenvectors (VP) with formulas:

$$VP1 = \dfrac{\sqrt[n]{\overset{m}{\underset{k=1}{\pi}} \; aij(k)}}{\sqrt[n]{\overset{m}{\underset{k=1}{ij(k)}}}}$$

- Calculation of Maximum Eigenvalues (λ mak) with a formula:

VA = (aij) x VP, dengan VA = (va)

$VB = VA/VP_{1...n}$

with VB = (vbi λ mak = $\overset{\circ}{a}Vb1$, for i = 1, 2, 3, ... n

i=1

- Calculation of Consistency index (C1) by formula:

CI = λmak/n-1

- Calculation of Consistency Ratios (CR) with formulas:

CR = CI/RI

Description: RI is a Random Index: Random index values vary according to the matrix order. For more details, the random index values for a particular order can be seen in Table 2. The value of consistency ratio (CR) which is smaller or equal to 0.1 is a value that has a good level of consistency and can be accounted for. Thus the CR

Orde (n)	1	2	3	4	5	6	7	8
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41
Orde (n)	9	10	11	12	13	14	15	
RI	1.45	1.49	1.51	1.54	1.56	1.57	1.59	

Source: Fewidarto (2000)

Table 2: Random index value matrix (RI).

value is a benchmark for the consistency of the comparison line in a single opinion matrix.

Vertical processing: Vertical processing is used to prioritize the influence of each element at the level of a particular decision hierarchy on the ultimate goal. If CVij is defined as the priority value of the influence of the jth element on the i level of the main target, then

$CV_{ij} = CH_{ij}\ (i, j\text{-}1)\ X$

t -1

VWt (i-1

For : i = 1, 2, 3, ...p

J = 1, 2, 3, ... r

t = 1, 2, 3, ... s

information:

CHij (t, i-1) = the priority value of the influence of the jth element on the i level on the t-element at the upper level (i-j), which is obtained from the results of horizontal processing.

VWt (i-1) = priority value of the effect of the t-element at the level of (j-1) on the main target, which is obtained from the results of vertical processing.

P = number of levels of decision hierarchy

r = number of elements that exist at level i

s = number of elements at level (i-1).

If there are two unrelated factors in the decision hierarchy (both do not influence each other), then the priority value is zero. The priority vector for level i (CV) is defined as follows:

CV = (CVij), for j = 1, 2, 3, ... s

According to Saaty (1993), paired comparison techniques used in AHP were carried out by direct interviews with respondents. Respondents can be experts or not, but are involved and know the problem well. if the respondent is a group, all members are endeavored to give opinion (judgment).

Analysis Results and Discussion

General description of the region

Factors in the construction of a tourist spot or destination

Factors in the development that are sourced from within (Level One hierarchy) are built by 11 elements with AW1 to AW 11 codes. The first level 1 hierarchy is the arrangement of vertical garden tourist spots. Vertical garden tourist spot arrangement is included in the priority because the vertical garden tourist spot development in Tonjong village is a development of the existing agricultural potential, namely Surjan system farming. The second level 1 hierarchy building the development of tropical flower garden tourist spots. The construction of a tropical flower garden tourist spot is needed because this tourist spot is

important and will be able to attract the number of tourists. Marketing of this tourist spot does not require much cost because its development is the development of the existing agricultural system.

The third level 1 hierarchy building Taman Anggrek Tourism, marketing development is an absolute prerequisite to ensure the certainty of the distribution of local food commodities produced, so that the distribution chain can run sustainably.

The fourth level hierarchy is the development of Taman Anggrek tourism, the construction of orchid garden tourism will be able to increase the number of tourists and orchid garden tourism has the power if integrated with other types of agro tourism such as tropical flower gardens. The fifth level 1 hierarchy is increasing the knowledge of Pokdarwis in each tourist spot, increasing knowledge including important because of this effort because the Pokdarwis is part of the community that is involved in tourism management. The sixth level 1 hierarchy is the improvement of facilities (irrigation, water reservoirs, farm roads or tourist trails, information networks, wi-fi networks). This element of hierarchy is an important consideration in the development of agro tourism because the supporting factors greatly facilitate and become a support for the sustainability of agro tourism. The seventh level 1 hierarchy is healthy production standards, regarding healthy production standards are needed for the trust and comfort of tourists. The 8th level hierarchy is the arrangement of guest houses. This element of hierarchy is in addition to accelerating the implementation of agro tourism development as well as efforts to empower the community (Table 3).

The 9th level hierarchy is the construction of integrated chocolate garden spots. This chocolate garden spot supports the growth of agro tourism in Serang City because besides being able to be packed with its own characteristics it also has its own charm when it is integrated into the spot starting from upstream to downstream. The tenth level 1 hierarchy is the development and empowerment of the community in order to build the readiness of the local community. This hierarchy is needed in connection with the mental preparation of the community as an agrarian tourism man. Village communities in the tourist spot that will be built are part of important inputs that need to be prepared. Mental, behavioral and mindfulness must be prepared so they can be involved and get a positive impact from agro tourism development (Table 4).

The first level 2 hierarchical analysis is the Agro Tourism Development Policy; the policy of developing agro tourism is needed for

Code	Information
AW1	Arrangement of tourist spots of rice valleys
AW2	Construction of a Tropical Flower garden tourist spot
AW3	Taman Aggrek tourism development
AW4	Arrangement of Fruit Garden Tourism (Durian)
AW5	Increased knowledge of Pokdarwis in each spot
AW6	Repair of facilities (irrigation, water reservoirs, farm roads or tourist trails, information networks, wi-fi networks)
AW7	Healthy production standards
AW8	Arrangement of guest houses
AW9	Construction of an integrated chocolate garden spot
AW10	Community development and empowerment in order to build local community preparedness
A.W11	Development of supporting facilities (communal toilets, temporary disposal and waste management, roads to tourist spots, and agrotourism roads)

Table 3: Level 1 Hierarchy Analysis Results (Factors in Development A).

strengthening and supporting both technical and non-technical nature for the implementation and development of agro tourism. The second level hierarchical analysis results are Youth Participation or tourism pioneer communities. Pioneer youth are needed for community development and support and to motivate the community around the tourist spot environment. Pioneer youth have strong emotional ties to tourist spots. Youth pelopr can help community independence to deal with environmental and social changes. The result of hierarchical analysis level 3, the third Development of Tourism Marketing Networking, this hierarchy is important for media promotion of agro tourism, either partially or integrated with other provinces or regions. The third level 3 hierarchy is increasing the capacity and role of the local government committee. Increasing the capacity and role of Pokdarwis is a strategic step to increase tourism growth. Increasing the role and capacity of Pokdarwis makes tourist spots quickly grounded and the community feels ownership so that tourism sustainability can be guaranteed.

The fifth level 2 hierarchical analysis results is Improving cross-sectoral collaboration this solution is important for the development of agro tourism is not a task of one related OPD but more than that tourism development will be realized if each sector is involved in accordance with their duties and responsibilities (Table 5).

The first level 3 hierarchical analysis results Increased PAD in the agricultural sector. PAD is an impact that can be obtained from the development of agro tourism in Serang city. Agro tourism development will be able to provide direct impacts in the form of taxes and levies. Agro tourism development will also have an indirect impact on PAD because the development of agro tourism will increase the attractiveness of other sectors.

The second level 3 hierarchy, namely Increasing Community Welfare, improving community welfare is one of the hierarchies of the development of agro tourism as a macro impact obtained for the people of Serang city. Community welfare as an impact of agro tourism is built by itself as a result of changes in demand patterns and supply of goods and services in the Serang City area. This change in demand and supply patterns will change the pattern of the macro economy in Serang City. The third level 3 hierarchy is Growing Investor Interest, with an agro tourism destination in Serang City, by itself will open business opportunities related to the growth of the sector. The business opportunity itself is an attraction for investors.

Code	Information
AW1	Agro Tourism Development Policy
AW2	Youth participation or tourism pioneer community
AW3	Development of Tourism Marketing Networking
AW4	Increase the capacity and role of Pokdarwis
AW5	Improve cross-sectoral cooperation

Table 4: Results of Level 2 Hierarchy Analysis (Stakeholders) with Important Roles Development of Agro Tourism.

C1	Increased PAD in the agricultural sector
C2	Increasing Community Welfare
CA3	Grow Investor Interest
C4	Increase the carrying capacity of the environment on an ongoing basis
C5	Regional economic growth

Table 5: Results of Level 3 Hierarchy Analysis (Stakeholder Objectives in Serang City related with Agro Tourism Development).

The fourth level 3 hierarchy is increasing the carrying capacity of the environment on an ongoing basis. Agro tourism development has minimal environmental impact compared to the development of other sectors. Agro tourism development based on ecosystem balance will be able to increase the carrying capacity of the environment in a sustainable manner. The fourth level hierarchy, namely regional economic growth, part of the fruits of agro-tourism will have an impact on regional growth, besides its economic growth will also have an impact on the spread and even distribution of growth centers. Agro tourism development in addition to increasing economic growth also minimizes economic disparities between urban areas in attack cities and rural areas (Table 6).

The results of the first level 4 hierarchical analysis Strengthening and developing the packaging technology for pariwisata commodities. As a new tourism destination, agro tourism requires packaging technology for tourism commodities, packaging of tourism commodities intended to make agro tourism have added value and more commercial

The second level 4 hierarchical analysis results, namely technology development and tourism promotion, tourism promotion technology development, to support the growth of the tourism sector needed contemporary promotion technology, tourism promotion technology not only through print media but also tourism technology through the internet which is integrated with other regions. The third level 4 hierarchy is the formation of organizations and institutions supporting the development of agro tourism. The formation of this organization is mainly an organization that grows from the community so that this organization has a higher responsibility for the sustainability of the agro tourism that is formed.

Hierarchical level 4 integration of agro-tourism development between sectors, integration of agro-tourism development between sectors is needed because the development of agro tourism actually has broad links with other sectors in the region. The development of agro tourism has strong links both upstream and downstream, so that if the development of agro tourism is not supported by the growth of other sectors, the development of agro tourism will experience obstacles and obstacles (Table 7).

	D1	Strengthening and developing technology for tourism commodity packaging
Hierarchy level 4	D2	Technology Development and Tourism Promotion
	D3	Establishment of organizations and institutions supporting the development of agro tourism
	D4	Integration of development between sectors

Table 6: Level 4 Hierarchy Analysis Results (Technological Development Scenario Tourism).

Program Code	Total	Average	Percentage	Ranking
AWI	0.99	0.03	3.96	13
AW2	0.89	0.03	3.48	15
AW3	0.75	0.03	2.98	19
AW4	1.24	0.05	4.96	7
AW5	0.99	0.04	3.95	14
AW6	1.38	0.06	5.52	5
AW7	0.86	0.03	3.43	17
AW8	0.86	0.03	3.43	16
AW9	1.07	0.04	4.28	11
AW10	1.14	0.05	4.57	8
AW11	1.12	0.04	4.49	9

Table 7: Level 1 Hierarchy Analysis Results (Factors in Agro Tourism Development).

Based on the results of weighting the AW1 hierarchical code (arrangement of tourist spots in the rice valley), the weight obtained was 0.99 or 5, 67 percent. Construction of the Tropical Flower Park (AW2) b tourist spot was ranked 15. Construction of tourist spots for tropical flower gardens was directed to support other tourist spots and built in an integrated manner. The construction of the Tropical Flower Garden Spot was 0.89 or 3.48 percent in total. Furthermore, the development of orchid park tourism (AW3) weighs 0.75 or 2.98 percent. The development of orchid garden tourism (AW4) was ranked 19. The Fruit Garden Tourism Arrangement (Durian) (AW4) was ranked 7th with a weight of 1.24 or 4.96 percent. Increasing knowledge of Pokdarwis in each spot (AW5) occupied 14th position with a weight of 0.99 or 3.95 percent. Improvement of facilities (irrigation, water reservoirs, farm roads or tourist paths, information networks, wi-fi networks) (AW 6) 5th rank with a weight of 1.38 or 5.52 percent. Healthy production standards (AW7) 17th priority scale with a weight of 0.86 or 3.43 percent. The arrangement of guest houses was ranked 18th with a weight of 0.86 or 3.43 percent. Construction of a spot of integrated cocoa gardens (AW 9) was ranked 11th with a weight of 4.28. Community development and empowerment in order to build local community preparedness (AW10) gets the 8th priority scale with a weight of 1.14 or 8 percent. Development of supporting facilities (communal latrines, disposal and temporary waste management, roads to tourist spots, and agro tourism roads) (AW11). Ranked 9th with a weight of 1.12 or 4.49 percent (Table 8).

Level 2 hierarchy is built by 5 priority programs, the first program is the policy of developing agro tourism (BAW1) which is ranked second with a weight of 1.74 or 6.95 percent. The second program, Youth Participation or tourism pioneer community (BAW 3) was ranked 10th with a bobit of 1.07 or 4.29 percent. The Development of Tourism Marketing Networking (B AW3) is ranked as a priority 10 scal with a weight of 1.07 or 4.29 percent. Increasing the capacity and role of Pokdarwis (BAW4) occupies a priority scale of 20 with a 0.55 or 2.21 percent weight. Increasing cross-sectoral cooperation is ranked 3rd with a weight of 1.59 or 6.36 percent (Table 9).

Level 3 hierarchical analysis results show that the Serang City PAD improvement program occupies a priority scale 24 with a weight of 0.44 or 1.78 percent. Improve community welfare (CAW2) included in the priority scale 23 with a weight of 0.46 or 1.85. The Growing Investor Interest (CAW3) program is ranked 25th with a weight of 0.36 or 1.46 percent. Regional economic growth weighs 0.48 or 1.91 percent ranked 22nd (Table 10).

Strengthening and developing tourism commodity packaging technology (DAW1) ranks 4th with a weight of 1.59 or 6.35 percent. Technology development and Tourism Promotion (DAW2) ranked

| Program Code	Total	Average	Percentage	Ranking
BAW1	1.74	0.07	6.95	2
BAW2	0.99	0.04	3.97	12
BAW3	1.07	0.04	4.29	10
BAW4	0.55	0.02	2.21	20
BAW5	1.59	0.06	6.36	3

Table 8: Stakeholder Level 2 Level 2 Hierarchical Priority and Scale plays an important role related to the factors in the development of agro tourism.

Program Code	Total	Average	Percentage	Ranking
CAW1	0.444	0.018	1.777	24.00
CAW2	0.463	0.019	1.853	23.00
CAW3	0.498	0.020	1.993	21.00
CAW4	0.364	0.015	1.457	25.00
CAW5	0.477	0.019	1.907	22.00

Table 9: Level 3 Hierarchy and Priority Priority Scale (Development Pattern Scenario Agro Tourism in Serang City).

Program Code	Total	Average	Percentage	Ranking
DAW1	1.59	0.06	6.35	4.00
DAW2	0.83	0.03	3.31	18.00
DAW3	1.31	0.05	5.22	6.00
DAW4	1.82	0.07	7.29	4.00

Table 10: Weight and Hierarchical Priority Scale Level 4 (Scenario of Agro Tourism Development Pattern).

Figure 1: Agro tourism development strategy.
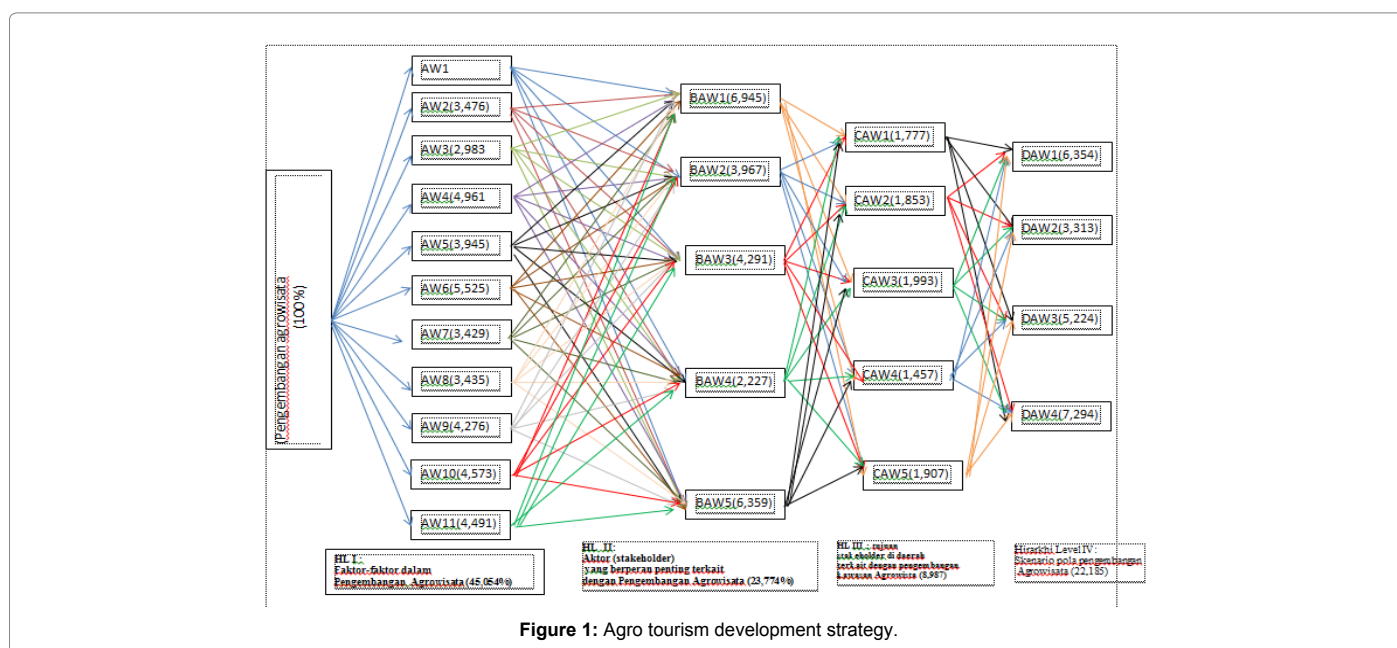
18th weighing 0.83 or 3.31. Organizational formation and institutional support for agro tourism development (DAW3) ranked 6th with a weight of 1.31 or 5.22 percent. Integration of development between sectors is ranked 1 with 1.82 or 7.29 percent.

Agro tourism development strategy

The development of agro tourism such as those on the surface before having to be two choices: the first choice makes tourism commodities as the main while agriculture as the supporting sector. The second option defines tourism commodities as the main sector as if the tourism sector is a supporting sector. Based on the characteristics of the area, it shows that the sub-district is not more efficient when choosing the first alternative. The underlying reason for the development of agro tourism in Serang City aims to utilize local resources to be developed into agro tourism, these natural resources cover all aspects of humans as (man capital) and natural resources (agroecosystem) as (resource capital), these two resources will produce an agrarian destination commercial. The link between these factors can be seen in the Figure 1 below.

Based on the results of hierarchical analysis level 1 shows that the factors from within for agro-tourism development are important priority scales AW6, while the programs in this hierarchy are important to support the development of agro tourism. Level 2 hierarchy is the most important priority for BAW 6, but there are important programs because the weight is higher than AW6 even though it is lower than BAW1. CAW 3 is the most important priority scale on level 3 hierarchy, and the program specified in the hierarchy of three levels of interest is very low compared to the level of importance of other three hierarchical programs. At the level three hierarchy planning level the importance is not yet apparent because this hierarchy consists mostly of programs that are macro elements. Hierarchical level 4 has the highest level of importance in DAW4, this level of importance is the highest level of importance of all programs and of all hierarchies.

Conclusion

Based on the analysis, it can be concluded: Level 1 hierarchy is the most important with AW1 code (agro tourism development program, wi-fi network). The most important level 3 hierarchy is the program with the CAW3 code (Growing Investor Interest). The fourth most important hierarchy is the program with the DAW4 code (Integration of development between sectors).

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