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# Sustainable Tourism Development Strategy with AHP (Analytical Hierarchy Process) Method in Pagilaran Tea Plantation Agrotourism, Indonesia

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**ABSTRACT**

Tourism requires a strategy for development. The steps taken in developing tourism are quite complex. The tourism potential in the Pagilaran Tea Plantation can find a sustainable tourism model in an agro-tourism. Of course there are still many shortcomings from various aspects regarding the development of sustainable tourism in Pagilaran Tea Plantation Agrotourism, especially related to management. This study measures and examines the agro-tourism development strategy of Pagilaran Tea Plantation which has the advantage of being a sustainable tourism model with its social, economic, environmental and educational aspects. The right method used for this research is AHP (Analytical Hierarchy Process) because this method solves a complex unstructured situation into several components in a hierarchical arrangement, by assigning a subjective value to the relative importance of each variable, and determining which variable has the highest priority in order to influence the outcome of the situation. The results of the AHP analysis (Analytical Hierarchy Process) in obtaining priority from the criteria of factors in the sustainable tourism development strategy of Pagilaran Agrotourism, namely: Economic, Socio-Cultural, Ecological and Educational factors (0.351). The highest priority is education which gets a vector weight value (0.351). This result is in accordance with the vision and mission of the Pagilaran tea plantation company and the history of the Pagilaran tea plantation that the existence of this plantation is intended for education and research. Agrotourism is actually intended for educational tourism that provides insight and knowledge about agricultural commodities. Based on the results of the AHP analysis (Analytical Hierarchy Process) as a whole shows that the priority of alternative choices for sustainable tourism development strategies in Pagilaran Tea Plantation Agrotourism are as follows: 1st priority: Human Resources Development, 2nd priority: Tourism Infrastructure, 3rd priority: Tourism Marketing and 3rd priority: 4: Giving Capital.An alternative strategy that becomes a priority to be developed is human resource development (0.297). This is relevant to the development strategy of the Pagilaran tea plantation Agrotourism where the education aspect is a top priority.

## 1. INTRODUCTION

International tourism has almost quadrupled in the last 30 years, and domestic tourism has also increased in most developed and newly industrialized countries [1]. Tourism is considered as a strategic tool to achieve Sustainable Development goals [2]. Awareness of sustainability issues which originally referred to the natural environment but now also includes social, economic, and cultural fields as well as the built environment has also grown significantly over the past 30 years [1]. Tourism has a central role in nation-building.

The economic benefits of the tourism sector in fact cause problems in the reduction of natural resources, socio-cultural and environmental problems, as a result of the tourism concept that leads to mass tourism. The increasingly severe environmental damage has received a lot of criticism so tourism development nowadays is directed at alternative tourism that is more concerned with environmental sustainability, by implementing sustainable tourism such as agrotourism development [3]. Sustainable tourism scenarios for the region and to meet the economic, socio-cultural, and environmental needs of stakeholders [4, 5].

Tourism has a positive trend in terms of quantity in Indonesia. Based on the data from the Ministry of Tourism 2020, it was stated that the number of foreign tourist arrivals to Indonesia through all entrances in October 2019 was 1,354,396 visits or an increase of 4.86% compared to the same period in October 2018 which amounted to 1,291,605 [6, 7]. This provides an opportunity to develop tourism in Indonesia to be of higher value with the principles of sustainability. Nature-based tourism becomes a reference for developing tourism with high social values. The symptom of a shift in

tourism pattern that appears in Indonesia shows that tourists (58%) want tourism activities in natural objects [8].

One of the specialties of the leading tourist attraction in Indonesia is Agrotourism. This is due to Indonesia having the potential for fertile soil with abundant natural resources and superior agricultural products. Based on the results of the study, it is stated that Agrotourism is a tool that has been widely used throughout the world for the purpose of intensifying the socio-economic aspects of local communities [9]. The qualitative study concludes that agrotourism can be a driver for sustainable community development. The benefits are improving their social empowerment system, strengthening their social ties and developing their social skills and relationships, increasing local people's income, diversifying products and intensifying economic activity, as well as providing job opportunities and poverty alleviation [10]. The development of agrotourism has a positive and significant impact on the welfare of the community [3].
Agrotourism is expected to be able to provide social and conservation benefits, namely Agrotourism. This supports the global agenda, which is the Millennium Development Goals, which have eight goals, one of which is to ensure environmental sustainability [11]. Agrotourism has the potential to increase public awareness regarding implementing sustainable development [10]. Tourism experts have seen one side of development by empowering agricultural potential in rural areas to become alternative tourist attractions [12]. Agricultural commodities with their diversity and uniqueness become a strong attraction as agrotourism [13].

If the management of agrotourism is carried out with sustainable principles, then tourism, apart from being a catalyst for development, can also be a conservation investment for future generations. Agrotourism that is presented with sustainable tourism management can bring a change in the paradigm of society in traveling. Sustainable tourism can reconcile tensions and balance various aspects of heritage conservation, tourism management, social pressures, and economic development [4].

Pagilaran tea plantation is the object of this research. The Pagilaran tea plantation is managed by a company called PT Pagilaran. PT Pagilaran has business fields namely Plantation, Industry, Trade, Consulting and Agrotourism. The tea plantations are class 1 plantations and are RA (Rainforest Alliance) certified. Agrotourism in Pagilaran, takes advantage of the beautiful nature of the tea plantations, which are wide green, clean air rich in oxygen and clean rivers. Even though it was hit by COVID 19 and restrictions on tourist visitors and other policies that were quite tight on the entry of visiting tourists, the Pagilaran Tea Plantation Agrotourism immediately got up and cleaned up. July 2020, Pagilaran Tea Plantation Agrotourism has tested the opening of post-pandemic tourist destinations and received approval from the government for tourism affairs to be opened with strict health protocols. This is because the Pagilaran tea plantation agro-tourism has a wide area coverage so it minimizes crowding. At present, Pagilaran tea plantation agrotourism is increasingly rising with tourist visits to stay and not stay overnight.

Pagilaran Tea Plantation is currently still a good destination for visitors who want to take nature tours and educational tours. In addition, Pagilaran Tea Plantation is a place for education and research for students, lecturers, and researchers (Figure 1). The Pagilaran tea plantation does not forget the history of the Pagilaran Tea Plantation which is managed by Gajah Mada University to be used as a source of knowledge, research and application of knowledge from the University. Pagilaran Tea Plantation Agrotourism is positively affected so that the nuances of Pagilara tea plantations are Education. Therefore, the advantages of Pagilaran Tea Plantation Agrotourism are for educational facilities and scientific development, especially regarding tea commodities.

This research really needs to be done to analyze that the existence of Pagilaran Agrotourism provides a multiplier effect on socio-economic conditions in the form of job creation, business opportunities, and increasing income as well as having a positive impact on the environment and education. A priority strategy is needed that needs to be developed to be able to turn Pagilaran Tea Plantation Agrotourism into sustainable tourism and become a policy recommendation and role model for tourism in Indonesia and the world. This research will be able to produce an agro-tourism development strategy in the Pagilaran Tea Plantation with the AHP method (Analytical Hierarchy Process).

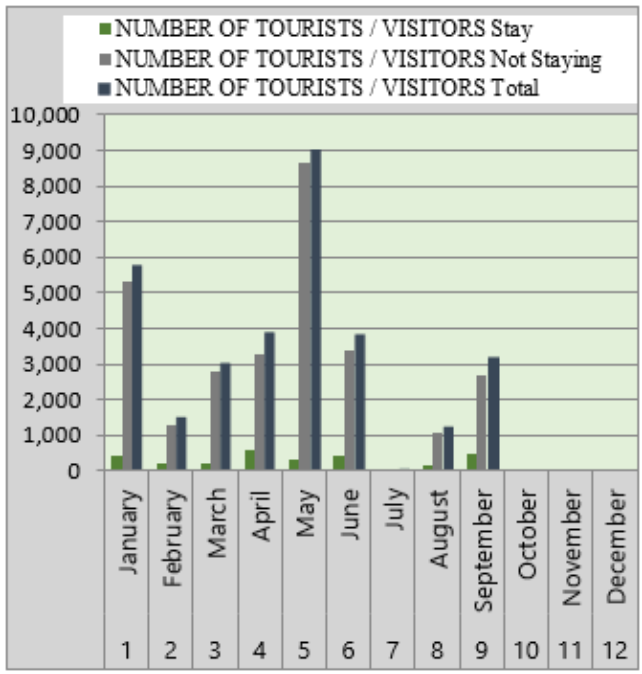



**Figure 1.** The number of visits of Pagilaran agrotourism tourists in January-September 2021

## 2. LITERATURE REVIEW

### 2.1 Tourism

Tourism is a multidisciplinary study [2] and the implementation process as a catalyst for development [14]. The perspective of social sciences related to the dynamics of people's lives and their environment is the theoretical frame of tourism. Tourism is a complex activity, which can be viewed as a large system and has various components such as economic, ecological, political, social, cultural, and so on [15]. Tourism is a strategy to bring progress and national development based on local potential. In this theory, tourism has a big role to be able to change aspects of human life with all its activities and problems. Scientific studies on tourism refer to research on tourism, giving rise to four tourism approaches, namely Advocacy, Adaptancy, Developmental, and Knowledge-Based. The Knowledge-Based approach

states that tourism is a multidisciplinary research field and tends to apply theories and methods from various fields related to tourism [16].

Tourism activities are carried out by people of various ages and social strata. All are entitled to tourism activities because they have various purposes. This statement is supported by "Public perceptions of tourism destinations have been shown to play an important role in tourist decision making, as perceptions and images of preferred destinations positively influence tourist destination choices [17-20]". People will choose a tourist destination to go to according to their perception, definitely, that perception is supported by the experience and image of the tourist destination. Therefore, maintaining the image of a tourist destination has an important role. Tourism is one of the largest sources of income in Indonesia. Tourism development is experiencing rapid dynamics and adaptation [21].

Tourism is an activity that can be done by everyone in an effort to enjoy new destinations with new knowledge and insights to be gained. Tourism is not just a temporary visit, but the hope is that it is sustainable. Considering that tourism has many goals, which are relaxation, adding insight, developing knowledge, and exploring certain values according to the culture of the tourist attraction. Tourism that needs to prioritize educational values and provide comfort and satisfaction to tourists so that they will come back to these tourist destinations or the term "Repeater". In this case, tourism is expected to continuously develop strategies to develop tourist attraction innovations. One of them is Agrotourism which is conceptualized as educational tourism regarding the use of agricultural land, plantations that produce superior commodities. Agrotourism is very relevant to be a priority in countries that produce agricultural and plantation commodities.

### 2.2 Sustainable tourism

Theoretically, the concept of Sustainability emerged as a critique of the economic and non-economic paradigms which only have one benchmark, namely growth which usually uses "Gross National Product" (GNP) as a parameter [22]. According to the United Nations Burndtland Commission Report in 1987, sustainable development was defined as: "development that meets the needs of the present without compromising the right of future generations to meet their own needs." [23]. In the application of the system approach to tourism, what is meant is that tourism with the principle of sustainability requires a holistic approach by integrating social, ecological, economic, cultural aspects as well as institutional roles related to tourism development to become a unified whole, namely the Pentahelix collaboration.

Tourism development must pay attention to sustainable development which aims at increasing tourist satisfaction sustainably [24]. The definition of sustainable development includes proper management of resources. It has brought ecotourism to the forefront of sustainable tourism following its impact of conservation and development [25]. Sustainable tourism and ecotourism should not be considered synonymous concepts in such a way that many forms of ecotourism may not be sustainable. For ecotourism to support sustainable development, which brings economic benefits while promoting nature conservation, it must go through careful planning and management [26]. Careful and thorough planning can be done with collaboration and cooperation between institutions related to tourism development, namely: Academic, Business, Community, Government, Media. Sustainable development can be realized with tourism sector instruments that apply the principles of sustainability. Agrotourism is a part of tourism that optimizes the natural and social environment to be used to increase knowledge and insight about ecology, culture, education, and aims for the welfare of the community [7].

## 3. METHOD

This study uses quantitative data based on the AHP (Analytic Hierarchy Process) analysis technique. Research informants consist of the Board of Directors of PT. Pagilaran Tea Plantation and at the same time a lecturer at Gajah Mada University, representatives of the local government, namely the Tourism Office, administrators of the Tourism Awareness Group (Pokdarwis), Pagilaran Agrotourism Management and Media Journalists. This research uses 10 respondents. The purpose of this research is to analyze and find updates using the analytical technique AHP (Analytic Hierarchy Process) is used as a tool to determine the priority scale in making policies for the development of Pagilaran Tea Plantation Agrotourism through a Sustainable Tourism Model. The initial process of AHP, problems are arranged in the form of a hierarchical structure in which there are goals, criteria, sub-criteria, and alternatives.

This research begins with the researcher doing Pre-Field Observation and initial interview with the President Director of Pagilaran Company is Rachmad Gunadi who is also a lecturer in Agriculture at Gadjah Mada University. Researchers conducted interviews to identify and explore the current condition of the Pagilaran tea plantation from the management aspect. Researchers get problems that have not been completed and that must be addressed, especially for the field of agro-tourism business which still needs to be improved from the side of supervision. In addition, researchers also made observations to tea plantations and conducted interviews. Researchers conducted pre-research to Pagilaran Tea Plantation Agrotourism to get an initial picture of the conditions at the research site. Researchers conducted interviews with the Head of Pagilaran Unit, Head of the Agrotourism Section, Head of Tourism Awareness Group, Traders at Agrotourism locations, and tourism actors. Besides that, the researcher met with the part of the government that was involved in the management of the Pagilaran Tea Plantation Agrotourism, namely the Tourism Office of Batang Regency, Central Java, Indonesia. So the researchers conducted interviews with key informants as Figure 2.

After conducting pre-research and observation, the researcher wants to study the development strategy of Pagilaran tea plantation agro-tourism by using priorities that need to be done immediately or the most important and followed by priorities for further development strategies with a hierarchical type. The aim is that this research can be a strategic recommendation for Pagilaran Companies that manage the Agrotourism business of Pagilaran Tea Plantation to make Agrotourism a sustainable tourism destination. Although there are still many problems and aspects that need special attention, the results of this study will show that the priorities for developing agro-tourism will form systematic sequences and the goals of sustainable tourism development will be achieved.

The data collection technique in this study used a

questionnaire instrument filled out by ten key informants. In addition to informants filling out questionnaires, this study also used interview, observation and documentation techniques. Interviews were used to explore and check the results of observations made by researchers by observing in depth the conditions and situations of the Pagilaran tea plantation. Documentation is used to explore secondary data obtained from company and government documents, in this case the Regional Research and Development Agency of Batang Regency, Central Java, Indonesia.

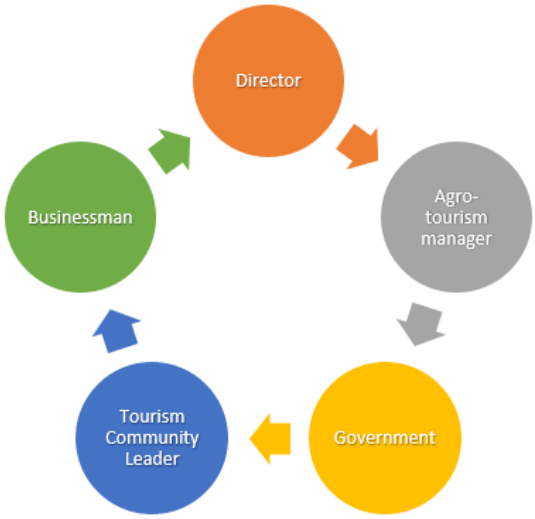



**Figure 2.** Stages of data collection with key informants

Subjective evaluation is converted into numerical value and then processed in the form of alternative rankings on a numerical scale. Hierarchy involves the relationship between elements from one level to the level below it, that is, each element is related to one another. This means that the root of the problem in the hierarchical structure is the goal or object to be studied and analyzed. While the leaf nodes in the hierarchical structure are alternatives to be compared. Between the two levels, there are various criteria and sub-criteria. Data that has been collected by experts or decision makers related to problems in the hierarchical structure, is described in quantitative form through the Comparative Judgment process. Experts can assign levels to the pairwise comparison matrix, namely as important, slightly more important, important, very important, and absolutely important in Table 1.

In the pairwise comparison method, the criteria and alternatives are presented in pairs, based on one or more observers or raters (e.g. experts or decision makers). It is necessary to evaluate each alternative based on the overall weight of the criteria. The eigenvalues are obtained from the sum of the number of criteria with the weight of the assessment in the pairwise comparison matrix. Then each weight entered in the pariwise comparison matrix is normalized or synthesized in order to obtain a Priority Vector. To test the consistency value, the following formula can be used: Calculating Lambda max (λmax), Calculating Consistency Index (CI) and Calculating Consistency Ratio (CR) in Table 2.

Table Consistency Ratio (Ratio Consistency) is a value that comes from a random table, the value is adjusted to the number of criteria, and added up to obtain the consistency ratio value. This stage is an evaluation of the consistency value, if the consistency ratio value is < 10%, then the value of the pairwise comparison matrix on the given criteria is consistent and if the value of the consistency ratio > 10% then the value of the paired comparison matrix on the given criteria is inconsistent. The Overall Composite Weight (OCW) stage is the end of the synthesis of the Analytical Hierarchy Process method. The results of this Overall Composite Weight can be drawn conclusions for decision making. The OCW value shows the level of need. The greater the OCW value, the higher the level of need, and vice versa. The OCW value is obtained from the results of the Priority Vector multiplication for each criterion with Priority Vector (weight) and main Pairwise Comparison.

The research process is divided into four stages, namely: (1) the preparation and data collection stage, (2) the hierarchical structure design stage, (3) the calculation or computational stage of AHP, (4) the stage of making research reports. The stages of the research can be seen in Figure 3.

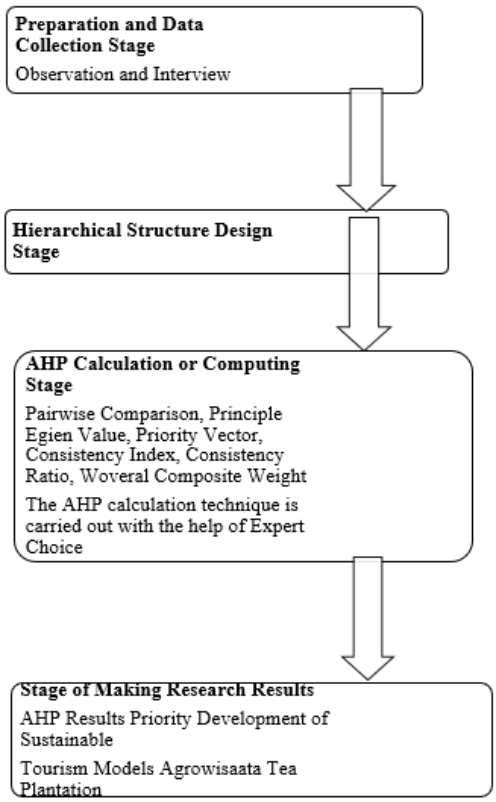



**Figure 3.** Stages of AHP (Analytic Hierarchy Process)

**Table 1.** Scale of pairwise comparison

| Importance | Definition | Explanation |
|---|---|---|
| 1 | Equal Important | Both activities contribute equally to the goal |
| 3 | Moderately Important | Decisions indicate liking for one activity slightly more than others |
| 5 | Important | Decisions Show preference for one activity over another |
| 7 | Very Important | Decisions show a strong preference for one activity over another |
| 9 | Absolute Important | Decisions show a very strong preference for one activity over another |
| 2,4,6,8, | Middle value | Between two adjacent decision values When compromise is needed |

**Table 2.** Random Inconsistency Index (RI) for n = 1,2,..15

| N | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RC | 0.00 | 0.00 | 0.58 | 0.9 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 | 1.51 | 1.48 | 1.56 | 1.57 | 1.59 |

## 4. RESULT AND DISCUSSION

### 4.1 Determination of alternatives for sustainable tourism development in Pagilaran agrotourism with AHP (analytical hierarchy process) analysis

The determination of alternative sustainable tourism development in Pagilaran Tea Plantation Agrotourism Batang in this study uses the AHP (Analytical Hierarchy Process) method. The AHP method helps solve complex problems by determining the criteria that are arranged in a hierarchy and then assigning a numerical weight value as a substitute for the views or perceptions of experts. By giving a synthesis, the priority scale will be known.

The AHP model in this study is formulated in two levels as follows:

(1) Level 1, is the criteria of the factors considered which consist of 4 criteria (Economic, Socio-Cultural, Ecological, and Educational)

(2) Level 2, is alternative strategies which consist of 4 alternatives (Tourism Infrastructure, Human Resource Development, Tourism Marketing, and Capital Provision)

The hierarchical model of the factors and alternatives can be described as follows (Figure 4):

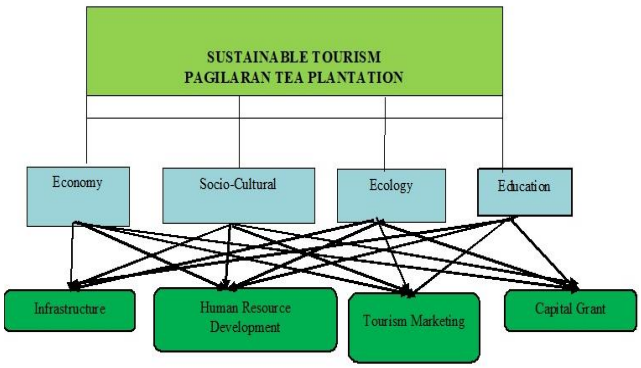



**Figure 4.** AHP model selection of alternative strategies

The data of criteria comparison are taken from the results of questionnaires given to 5 stakeholders consisting of experts and specialists as well as parties who are directly related to the Development of Agrotourism Sustainable Tourism. Pairwise comparison matrices are used to form relationships within the structure. In the pairwise comparison matrix, the weight of each criterion will be searched by normalizing the geometric mean of the respondent's opinion.

The first stage of analysis is to compare the priority scales in the criteria for selecting alternative strategies for Sustainable Tourism Development for Agrotourism as the main goal. The results of processing the Process Hierarchy Analysis using the Expert Choice 11 analysis tool are as follows:

4.1.1 The determination of priority criteria

The results of the questionnaires given to the respondents are then arranged in a criterion comparison matrix. The mean value is calculated using the geometric mean formula as shown in Table 3. The calculation result can be seen in Table 3.

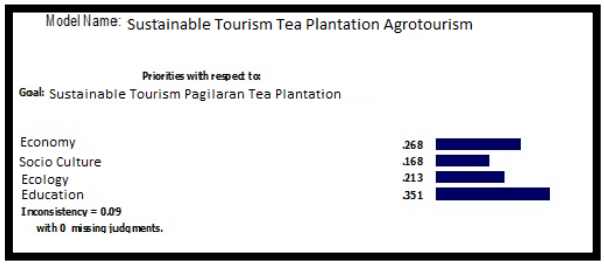
**Table 3.** Average assessment of criteria comparison matrix

| Criteria | Economy | Socio-Culture | Ecology | Education |
|---|---|---|---|---|
| Economy | **1.00** | 2.29 | 0.78 | 0.89 |
| Socio-Culture | 0.44 | **1.00** | 1.45 | 0.33 |
| Ecology | 1.29 | 0.69 | **1.00** | 0.64 |
| Education | 1.12 | 3.00 | 1.55 | **1.00** |

Source: The results of research data processing

Table 3 shows the results of pairwise comparisons between criteria given by five experts (informants). Based on the results of calculations with geometric show that the value of 2.29 means that the economic factor is 2.29 times more important than the socio-cultural factor, on the contrary, the socio-cultural factor is 0.44 times more important than the economic factor. The economic factor is 0.78 times more important than ecology or the ecological factor is 1.29 times more important than economics. The education factor is 1.12 times more important than the economy and the economy is 0.89 times more important than Education. The socio-cultural factor is 1.45 times more important than the ecology. On the other hand, the ecological factor is 0.69 times more important than the socio-cultural factor. The socio-cultural factor is 0.33 times more important than education. On the other hand, education is 3.00 times more important than the socio-cultural factor. The ecological factor is 0.64 times more important than Education. On the contrary, Education is 1.55 times more important than ecology. It can be concluded that the average assessment of the comparison matrix obtained that the Education aspect has the highest level of importance of 3.00. Based on the results of observations and interviews, Education is a policy priority at the Pagilaran Tea Plantation and cannot be separated from the Agrotourism business sector. Education includes research and scientific development activities as well as learning practices carried out by students and lecturers. Every month, PT. Pagilaran has students arrive in the context of PKL (Field Work Practice) and Internships as well as Collaborative Research.

After determining the average comparison of the main criteria variables, the next step is to determine the weights using the Expert Choice program which results can be seen in Figure 5.




Source: AHP Processing Results (Expert Choice)

**Figure 5.** Criteria level priority value

The results of the AHP analysis at the first level obtained the priority vector weights from the factor criteria in the development strategy of Pagilaran Agrotourism sustainable tourism (Figure 1), namely: factors

(1) Economy (0.268)
(2) Socio-Culture (0.168)
(3) Ecology (0.213)
(4) Education (0.351).

Based on the results, the highest priority value is the education factor. The inconsistency ratio value in the above criteria is 0.09, which indicates that the result of the Analytical Hierarchy Process (AHP) is acceptable since the inconsistency ratio value is less than 0.10 (10 percent).

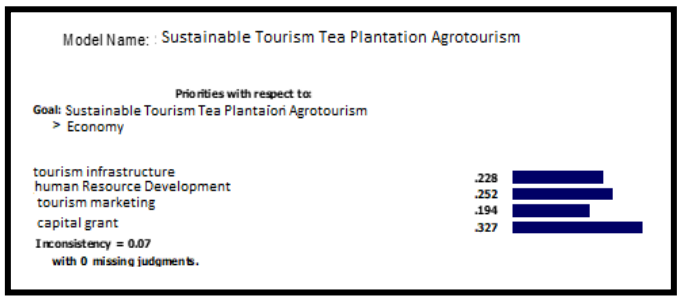
The factor criteria for the AHP processing result show that the highest priority is the Education factor. This is in accordance with the historical journey, Vision, and Mission of the Pagilaran Tea Plantation that Pagilaran is used for scientific development and research.

4.1.2 The priority determination of alternatives in criteria

Alternative priority on economic criteria. The results of the questionnaires given to the respondents are then compiled in an alternative comparison matrix in the Economic criteria. The mean value is calculated using the geometric mean formula as shown in Table 3. The calculation results can be seen in Table 4.

Table 4 shows the results of pairwise comparisons between alternatives on the economic criteria given by five experts (informants). For example, a value of 1.45 means that the Tourism Infrastructure aspect is 1.45 times more important than the Human Resource Development aspect, whereas the human resource development aspect is 0.69 times more important than infrastructure. Infrastructure has an importance level of 1.17 times compared to tourism marketing, whereas tourism marketing has an importance level of 0.86 times compared to tourism infrastructure. Infrastructure has an importance level of 0.41 times compared to capital grant. Otherwise, capital provision is 2.45 times more important than tourism infrastructure. Human resource development has an importance level of 1.55 times compared to tourism marketing. On the other hand, tourism marketing has an importance level of 0.64 times compared to human resource development. Human resources development is 1.05 times more important than capital provision. Otherwise, capital provision is 0.95 times more important than the development of human resources. Tourism marketing has an importance level of 0.8 times compared to capital provision. On the other hand, capital provision has an importance level of 1.25 times compared to tourism marketing.

After determining the average comparison of alternative variables on the Economic criteria, the next step is to determine the weights using the Expert Choice program, the results of which can be seen Figure 6 below:




Source: AHP Processing Results (*Expert Choice*)

**Figure 6.** Alternative priority on economic criteria

The results of the AHP analysis at the alternative level based on economic criteria obtained the priority vectors in the sustainable social edutourism strategy of Agrotourism, namely: Tourism Infrastructure (0.228), Human Resource Development (0.252), Tourism Marketing (0.194), and Capital Provision (0.327). Based on the results, the highest priority value on the Economic criteria is the alternative of Capital Provision. The inconsistency ratio value in the comparison of the alternative levels above is 0.07, which indicates that the result of the Analytical Hierarchy Process (AHP) is acceptable because the inconsistency ratio value is less than 0.10 (10 percent).

Capital provision on economic criteria is intended to support the welfare of tourism actors so that they are active in developing Pagilaran Tea Plantation Agrotourism. The provision of capital intended is capital support in the form of business place facilities, institutions such as BUMDes (Village Owned Enterprises), or revolving loans.

Alternative priority on socio-cultural criteria. The results of the questionnaires given to the respondents are then compiled in an alternative comparison matrix in the socio-cultural criteria. The mean value is calculated using the geometric mean formula as shown in Table 3. The calculation results can be seen in Table 5.

**Table 4.** Average assessment of alternative comparison matrix based on economic criteria

| Alternatives | Tourism Infrastructure | Human Resource Development | Tourism Marketing | Capital Grant |
|---|---|---|---|---|
| Tourism Infrastructure | **1.00** | 1.45 | 1.17 | 0.41 |
| Human Resource Development | 0.69 | **1.00** | 1.55 | 1.05 |
| Tourism Marketing | 0.86 | 0.64 | **1.00** | 0.80 |
| Capital Grant | 2.45 | 0.95 | 1.25 | **1.00** |

Source: The results of research data processing

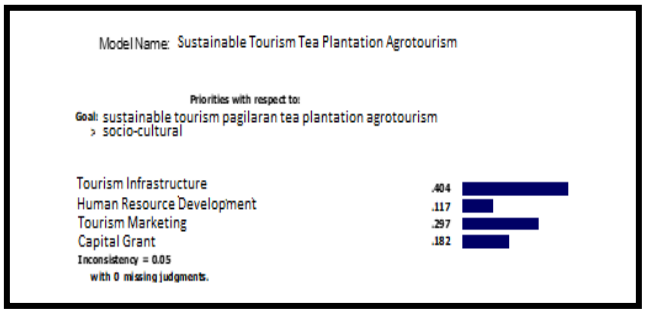
**Table 5.** Average assessment of alternative comparison matrix based on socio-cultural criteria

| Alternatives | Tourism Infrastructure | Human Resource Development | Tourism Marketing | Capital Grant |
|---|---|---|---|---|
| Tourism Infrastructure | **1.00** | 2.14 | 1.58 | 3.00 |
| Human Resource Development | 0.47 | **1.00** | 0.32 | 0.46 |
| Tourism Marketing | 0.63 | 3.16 | **1.00** | 1.66 |
| Capital Provision | 0.33 | 2.18 | 0.60 | **1.00** |

Source: The results of research data processing

In Table 5, it is known the results of pairwise comparisons between alternatives on the Socio-Cultural criteria given by five experts (informants). The value of 2.14 means that the Tourism Infrastructure aspect is 2.14 times more important than the aspect of Human Resource Development. On the other hand, human resource development has an importance level of 0.47 compared to tourism infrastructure. Tourism infrastructure has an importance level of 1.58 than Tourism marketing. On the contrary, marketing has an importance level of 0.63 compared to tourism infrastructure. Tourism infrastructure has an importance level of 3.00 compared to capital provision. On the contrary, capital provision has an importance level of 0.33 compared to tourism infrastructure. Resource development has an importance level of 0.32 compared to tourism marketing. On the other hand, tourism marketing has an importance level of 3.16 compared to human resource development. Human resource development has an importance level of 0.46 compared to capital provision. On the contrary, capital provision has an importance level of 2.18 compared to human resource development. Tourism marketing has an importance level of 1.66 compared to capital provision. On the contrary, the provision of capital has a value of 0.60 than tourism marketing.

After determining the average comparison of alternative variables on the Socio-Cultural criteria, the next step is to determine the weights using the Expert Choice program, the result of which can be seen in the Figure 7.




Source: AHP Processing Results (Expert Choice)

**Figure 7.** Alternative priority on socio-cultural criteria

The results of the AHP analysis at the alternative level based on Socio-Cultural criteria obtained the priority vectors in sustainable tourism development strategies in Pagilaran Tea Plantation Agrotourism, namely: Tourism Infrastructure (0.404), Human Resource Development (0.117), Tourism Marketing (0.297), and Capital Provision (0.182). Based on the result, the highest priority value on the Socio-Cultural criteria is Tourism Infrastructure. The inconsistency ratio value in the comparison of the alternative levels above is 0.05, which indicates that the result of the Analytical Hierarchy Process (AHP) is acceptable as the inconsistency ratio value is less than 0.10 (10 percent). Based on the calculation results of Alternative Priority on the Socio-Cultural Criteria, it was found that the highest criteria for developing the Socio-Cultural aspect of the Pagilaran Tea Plantation Agrotourism is the tourism infrastructure. The socio-cultural aspect has become part of the agrotourism development plan, which is the plan to build an amphitheater that can be used for socio-cultural activities related to arts and other entertainment activities to attract tourists. In Pagilaran Hamlet itself has several arts such as Tea Picking Dance, Lengger, Campursari. Picking tea dance itself is original art from Pagilaran and was created by an art teacher who teaches at SD Negeri Keteleng, Blado, Batang. The picking tea dance becomes a tourist attraction, especially when the tourists are from work and are grouped in a large enough mass. However, the construction of the amphitheater has stopped since the outbreak of the pandemic in mid-2020 since the third party stopped its construction and PT. Pagilaran has not yet resumed continuing the construction of the amphitheater.

Alternative priority on ecological criteria. The results of the questionnaires given to the respondents are then compiled in an alternative comparison matrix in Ecological criteria. The mean value is calculated using the geometric mean formula as shown in Table 3. The calculation result can be seen in Table 6.

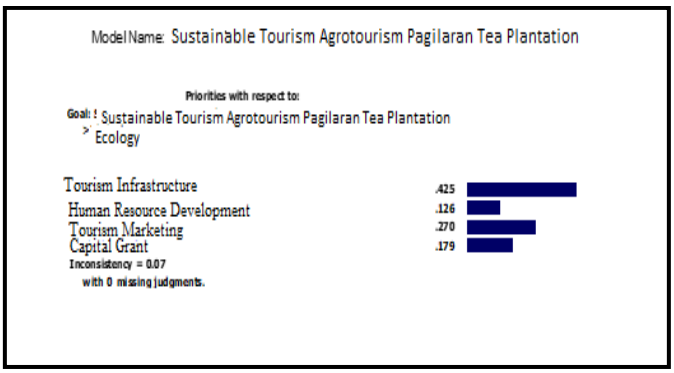
Table 6 shows the results of pairwise comparisons between alternatives on the Ecological criteria given by five experts (informants). For example, a value of 3.16 means that the Tourism Infrastructure aspect is 3.16 times more important than the Human Resource Development aspect, on the other hand, the human resource development aspect has an importance level of 0.32 compared to tourism infrastructure. Tourism infrastructure has an importance value of 1.05 compared to tourism marketing. On the contrary, tourism marketing has a value of 0.95 compared to tourism infrastructure. Tourism infrastructure has an importance level of 3.74 compared to capital provision. Otherwise, capital provision has an importance level of 0.27 times compared to tourism infrastructure. Human resource development has an importance level of 0.68 compared to tourism marketing. Otherwise, tourism marketing has a value of 1.48 compared to human resource development. Human resource development has an importance level of 0.46 compared to capital provision. On the contrary, capital provision has an importance level of 2.18 compared to human resource development. Tourism marketing has an importance level of 1.48 compared to capital provision. On the contrary, capital provision has an importance level of 0.68 compared to tourism marketing.

After determining the average comparison of alternative variables on Ecological criteria, the next step is to determine the weights using the Expert Choice program. The result can be seen in the Figure 8.

**Table 6.** Average assessment of alternative comparison matrix based on ecological criteria

| Alternatives | Tourism Infrastructure | Human Resource Development | Tourism Marketing | Capital Grant |
|---|---|---|---|---|
| Tourism Infrastructure | 1.00 | 3.16 | 1.05 | 3.74 |
| Human Resource Development | 0.32 | 1.00 | 0.68 | 0.46 |
| Tourism Marketing | 0.95 | 1.48 | 1.00 | 1.48 |
| Capital Grant | 0.27 | 2.18 | 0.68 | 1.00 |

Source: The results of research data processing




Source: AHP Processing Results (*Expert Choice*)

**Figure 8.** Alternative priority on ecological criteria

The result of the AHP analysis at the alternative level based on ecological criteria obtained the priority vectors in the sustainable social edutourism strategy of Agrotourism, namely: Tourism Infrastructure (0.425), Human Resource Development (0.126), Tourism Marketing (0.270), and Capital Provision (0.179). Based on the result, the highest priority value on the Ecological criteria is the Tourism Infrastructure alternative. The inconsistency ratio value in the comparison of the alternative level above is 0.07, which indicates that the result of the Analytical Hierarchy Process (AHP) is acceptable since the inconsistency ratio value is less than 0.10 (10 percent).

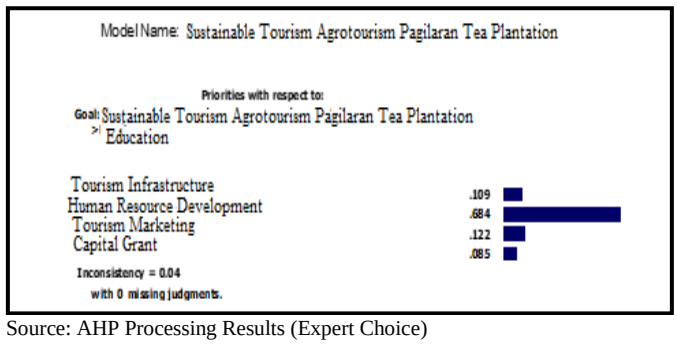
The ecological aspects in the development of sustainable tourism of Agrotourism Pagilaran tea plantations are related to environmental management for cleanliness, beauty, and comfort in traveling. In the Pagilaran Agrotourism area, written education regarding *Sapta Pesona Wisata* in the Agrotourism area has not been carried out even though it is a national tourism implementation guideline from the Ministry of Tourism, which has long had to be implemented. The following values of *Sapta Pesona Wisata* are Security, Order, Cleanliness, Coolness, Beauty, Hospitality, and Memories. The implementation of the application of *Sapta Pesona* on tourism activities in Indonesia has a legal umbrella, namely based on the Decree of the Minister of Tourism, Post, and Telecommunication Number 5/UM.209/MPPT-89 concerning Guidelines for Organizing *Sapta Pesona*. Sapta Pesona is defined as a condition that must be realized in order to attract tourists to visit an area or region in Indonesia.

On the Ecological criteria, based on the result of the AHP calculation, the highest value is on infrastructure, so it is appropriate because the tourism that is presented in infrastructure to develop ecological aspects is still lacking. Like the existence of tourist cars in the form of open cars that take tourists to visit tea plantations to the top. Based on the result of the interview, it was stated that the existence of tourist cars to the top needed to be reviewed because the pollution produced could damage the tea plants and visitors brought trash to the top of the tea plantation area. Until now, this has been in the spotlight so that solutions can be found by presenting more eco-friendly tour packages. The researcher conducted interviews with the Board of Directors regarding agrotourism development innovations in the future and the Board of Directors already has a design regarding tourist attractions that they want to implement by prioritizing eco-friendly principles. The agrotourism development plan is Hot Air Balloons that fly up to see the view of the Pagilaran Tea Plantation.

Alternative priority on education criteria. The results of the questionnaires given to the respondents are then compiled in an alternative comparison matrix in the Education criteria. The mean value is calculated using the geometric mean formula as shown in Table 3. The calculation result can be seen in Table 7.

Table 7 shows the results of pairwise comparisons between alternatives on the education criteria given by five experts (informants). For example, a value of 0.12 means that tourism infrastructure has a value of 0.12 times compared to human resource development, on the other hand, the Human Resource Development aspect is 8.56 times more important than the Tourism Infrastructure aspect. The value of 1.05 means that the tourism infrastructure aspect is more important than tourism marketing. The value of 1.55 indicates that tourism infrastructure has an importance level of 1.55 compared to capital provision, while capital provision has an importance level of 0.64 compared to tourism infrastructure. Human resource development has an importance level of 6.11 compared to tourism marketing. On the other hand, tourism marketing has an importance level of 0.16 compared to human resource development. Human resource development has an importance level of 5.24 compared to capital provision. On the contrary, capital provision has an importance level of 0.19 compared to human resource development. Tourism marketing has an importance level of 1.93 compared to capital provision. On the contrary, capital provision has a level of 0.52 compared to tourism marketing.

After determining the average comparison of alternative variables on the Education criteria, the next step is to determine the weights using the Expert Choice program. The result can be seen in the Figure 9.




Source: AHP Processing Results (Expert Choice)

**Figure 9.** Alternative priority on education criteria

**Table 7.** Average assessment of alternative comparison matrix based on education criteria

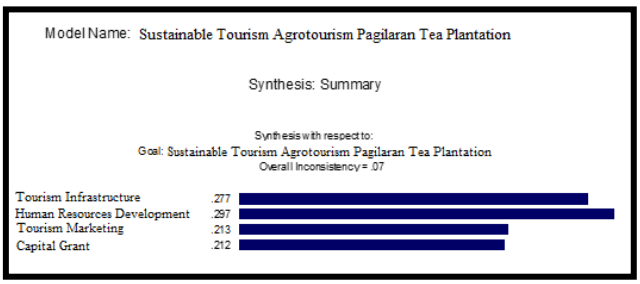
| Alternatives | Tourism Infrastructure | Human Resource Development | Tourism Marketing | Capital Grant |
|---|---|---|---|---|
| Tourism Infrastructure | 1.00 | 0.12 | 1.05 | 1.55 |
| Human Resource Development | 8.56 | 1.00 | 6.11 | 5.24 |
| Tourism Marketing | 0.95 | 0.16 | 1.00 | 1.93 |
| Capital Grant | 0.64 | 0.19 | 0.52 | 1.00 |

Source: The results of research data processing

The results of the AHP analysis at the alternative level based on the education criteria obtained the priority vectors in the sustainable social edutourism strategy of Agrotourism, namely: Tourism Infrastructure (0.109), Human Resource Development (0.684), Tourism Marketing (0.122), and Capital Provision (0.085). Based on the result, the highest priority value on the Education criteria is Human Resource Development. The inconsistency ratio value in the comparison of the alternative levels above is 0.04, which indicates that the result of the Analytical Hierarchy Process (AHP) is acceptable because the inconsistency ratio value is less than 0.10 (10 percent).

### 4.2 Priority determination of strategic alternatives

Based on the results of the AHP analysis as a whole, it shows that the priority of alternative choices for sustainable tourism development strategies in Pagilaran Tea Plantation Agrotourism is as Figure 10.




Source: AHP Processing Results (*Expert Choice*)

**Figure 10.** Alternative priorities

The figure above shows the alternative priorities are as follows:

1. 1st Priority: Human Resources Development (0.297)
2. 2nd priority: Tourism Infrastructure (0.277)
3. 3rd priority: Tourism Marketing (0.213)
4. 4th priority: Capital Grant (0.212)

In the first order, the alternative that can be used is Human Resource Development with a weight of 29.7%. Furthermore, the second priority alternative is Tourism Infrastructure with a weight of 27.7%, the third place is Tourism Marketing at 21.3%, and the last is Capital Grant at 21.2%. For the priority order of the criteria used, it can be presented in Figure 11.

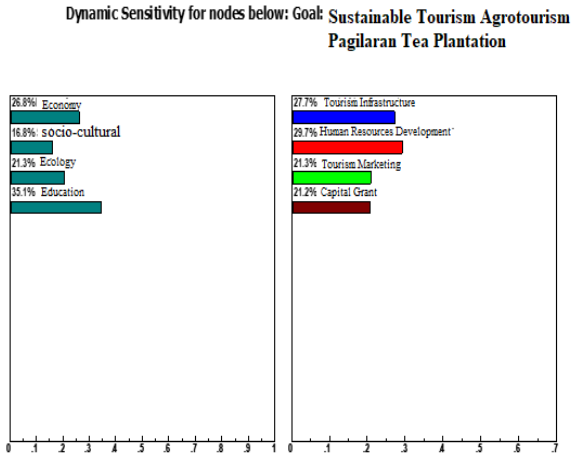



**Figure 11.** Summary of criteria and alternative priority

Based on the graph above, the criterion that becomes the main priority is Education (35.1%), then Economy (26.8%), Ecology (21.3%), and the lowest is socio-cultural (16.8%). Tourism is a human-to-human activity that requires reliable people; professional; and proficient in the realm of skills, personality, and knowledge. The development of tourism people is the key to advancing Indonesian tourism [2]. Regional development plans as part of agro-tourism development can provide ecological, economic, social and management benefits. The strategy that can be applied in developing agro-tourism is a progressive strategy [27].

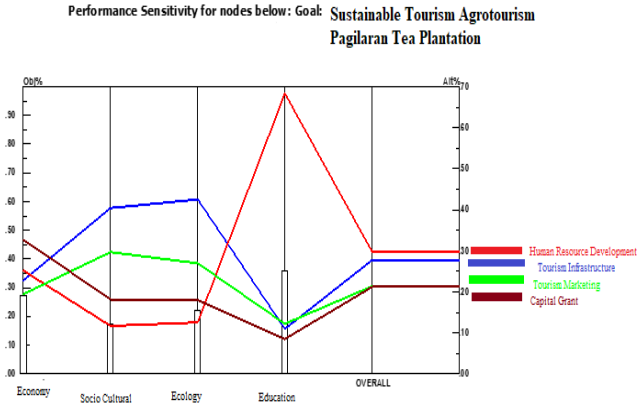



**Figure 12.** Diagram of *performance sensitivity*

In the Performance Sensitivity Diagram above (Figure 12), it can be seen that the alternative which becomes the main priority is Human Resource Development, which is indicated by the red line, excels in the Education criteria. However, Human Resource Development is lower than other alternatives on Socio-cultural and Ecological criteria. One of the ways to develop human resources is to improve excellent service [28]. Another development strategy is strengthening the characteristics of agro-tourism and adding varieties to attract tourists [28].

## 5. CONCLUSION

The results of the research on Sustainable Tourism Development Strategies with the AHP Method (Analytical Hierarchy Process) in Pagilaran Tea Plantation Agrotourism, Indonesia showed that the priority strategy that must be developed is education, then the second is economic, the third is ecological and the fourth is socio-cultural. Based on the dimensions of sustainable tourism in the Pagilaran Tea Plantation Agrotourism, they are Economic, Socio-Cultural, Environmental and Educational. The novelty of the research results in this article is that the education aspect is one of the dimensions that build sustainable tourism. The Education dimension is a priority for the Agrotourism development strategy, this is in accordance with the vision, mission and goals of the Pagilaran Company by prioritizing tea plantations for education and research. There is no exception in the business sector that is managed, namely Agrotourism which conceptually prioritizes elements of education regarding agricultural commodities that exist in Agrotourism locations. The Pagilaran tea plantation is a source of learning for researchers, students and lecturers because it is a place to visit regularly for study and research purposes.

Pagilaran Tea Plantation Agrotourism has the potential for educational tourism that can be seeded so that sustainable tourism can be applied there. Tea plantation agrotourism has an attraction with group tourism which is regularly visited by tourists from private institutions, organizations and government agencies with an agenda related to human resource development. Not only that, educational institutions, schools and universities also utilize tea plantations for outdoor study activities, gardening, teaching factories and tea walking.

Based on the results of research with AHP (Analytical Hierarchy Process) analysis as a whole, it shows that the priority of alternative choices for sustainable tourism development strategies in Pagilaran Tea Plantation Agrotourism are as follows: Priority 1st: Human Resources Development, Priority 2nd: Infrastructure Tourism, Priority 3rd: Tourism Marketing and Priority 4th: Capital Grant. Tea plantation agrotourism still has obstacles regarding supervision in terms of the management of villas, guesthouses, and guest houses. The innovation of tour packages has not yet been developed and there are very few tour guides who understand the history and culture of tea plantations.

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