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Innovation to Improve the Village Economy Through the Development of Local Wisdom-Based Agro-Tourism, in North Kalimantan, Indonesia

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Abstract

Several villages in North Kalimantan Province have been potentially suitable to be developed through local wisdom-based agro-tourism. The development of agro-tourism is considered as research background because of the positive impact of agro-tourism on social, economic and environmental aspects of the villages. The objective of this research is to identify development potentials of villages in North Kalimantan Province and to select village to be developed through local wisdom-based agro-tourism. Research type is descriptive research using methods of scoring and Analytical Hierarchy Process. Data type is primary and secondary. Research sample is tourist villages in North Kalimantan Province. Several results of research were obtained. One result showed that three main criteria for developing villages through local wisdom-based agro-tourism are agricultural and plantation resources, facility and accessibility. Other result revealed that Panca Agung Village in Bulungan Regency of North Kalimantan Province is selected for the project of local wisdom-based agro-tourism. Agro-tourism development is expected to contribute the sustainable development at local, regional, national and international levels.

Keywords

Agro-tourism, tourist villages, local wisdom, innovation, north kalimantan, environmental economics.

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Introduction

Village development innovation is a catalyst to village economic growth. This innovation refers to tourism because tourism development has been proven as capable to contribute national economic growth (Shaffril et al., 2015). The contribution of tourism sector to Gross Domestic Income of Indonesia was reported as still one digit, which is, 5.25 percents (2018) but this percentage was still capable to go up (CNN-Indonesia, 2020). In 2018, tourism sector has given foreign exchange of IDR 229.5 trillions, which increases by 15.4 percents from previous year and absorbed workers for 12.7 millions individuals or 10 percents of total population (CNN-Indonesia, 2020). Agro-tourism is one of key contributors to tourism industry. Agro-tourism is a set of activities in which the tourists relate their tourism journey with the experience in agriculture area, agriculture product services and education concerning agriculture (Maetzold, 2002; Arroyo et al., 2013).

Tourism experts consider agro-tourism as an innovative way to develop village area (Marwanti, 2015). In line with this consideration, the Regulation of Indonesia Republic No.110 of 2015 on Agro-Horticulture Tourism was issued. By this regulation, the purpose of agro-horticulture tourism would be the diversification of agriculture works to increase farmer welfare, provide jobs, improve aesthetical and beauty values of the environment, and strengthen the emphasis on natural resource conservation. Agro-horticulture tourism is a variant of agro-tourism. Therefore, agro-tourism will be a proper and innovative solution to the matter of how to manage the development and economic growth of village.

Realizing the importance of this innovative solution, the government of North Kalimantan Province proposed to develop several villages into tourist villages. In 2021, five villages have been put on the project plan and ten villages wait on the list for the next year (Adpim, 2021). Villages

in North Kalimantan Province have potentials to be developed as tourist villages. One of those villages is Setulang Village in Malinau Regency. People in Setulang Village work at their farm land and plantation. Setulang Village is surrounded by 5,300 ha land comprising customary forest and protected forest. The majority dweller, which is Dayak Kenyah, has for a long time maintained the natural scenery of the village, conserved the village culture including language, daily habits, and customary law, and most importantly, taken care of village customary hall, or known as Balai Adat (Lamin Adat). All these constitute local wisdom in Setulang Village (Kabupaten-Malinau, 2019). Other village that resembles Setulang Village is Panca Agung Village in Bulungan Regency. This village is rich of tourism objects and wide agriculture land. However, so far, the stakeholders of both villages do not yet take initiatives to develop their villages toward agro-tourism.

In this research, several villages were reviewed to identify which village has potential to be developed as local wisdom-based agro-tourism. Village width was mapped to facilitate the initiation of agro-tourism development project but the map was used only if the village is selected for agro-tourism. North Kalimantan Province has been declared as suitable for the development of agro-tourism villages because the Province has two privileges, namely potential extensive area and agriculture excellency (Liputan6.com, 2021). Moreover, agriculture is the second biggest contributor to Gross Regional Domestic Income after the mine sector. In 2020, the contribution of agriculture reached IDR 10,922.84 millions (BPS-Kaltara, 2020).

Researches on village economic development through local wisdom-based agro-tourism are never conducted in North Kalimantan Province. Therefore, the current research on the development of agro-tourism based on local wisdom in North Kalimantan Province is academically a fresh novelty. Besides, this review will be in conformity with the national focus of the Main Plan of National Research from the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia. Meanwhile, the focus of this research is on sustainable development at local, regional, national and international levels. There is an expectation that this research contributes the development and management of local wisdom-based agro-tourism villages in North Kalimantan Province. Later, the establishment of agro-

tourism villages will contribute the sustainable development at local, regional, national and international levels.

This research needs two years to complete. First year is used for selecting one village for the development of local wisdom-based agro-tourism. Meanwhile, the second year is for constructing the model of development and management of local wisdom-based agro-tourism. This paper is written as a product of the first year research where one village with the highest potential to be developed as agro-tourism is selected. This village is Panca Agung Village which is located in Bulungan Regency, North Kalimantan Province. The paper is outlined into five sections, respectively introduction, literature review, methodology, result, and conclusion.

Literature review

Innovation on various products or services is an entrepreneurial strategy to increase the demand of those products or services. An innovation in economic activity is considered valuable if this innovation is able to solve social issue and the solution is regarded crucial by stakeholders (government, community association, individuals/companies) (Santos, 2012; Utomo et al., 2022). Sustainable tourist village will need a systemical integration between resources and stakeholders and this integration can be made happen through service innovation (Peng and Lin, 2016). Innovation for village development is related with a tourism sector that synergize with agriculture sector, and this synergy is known as agro-tourism.

Agro-tourism is a tourist destination that provides agriculture based scenery to the visitors. Worldwide tourists are already familiar with agro-tourism since the early of 20th century (Wicks and Merrett, 2003). Therefore, agro-tourism is a set of activities in which the tourists relate their tourism journey with the experience in agriculture area, agriculture product services and education concerning agriculture (Maetzold, 2002; Arroyo et al., 2013). Main characteristic of agro-tourism is that there is a direct contact between tourists and agriculture activities done by farmers in which later, the tourists get actual experience in or about agriculture (Flanigan et al., 2014). In agro-tourism, visitors not only get tourism journey but also sense new sensation and positive behavior from the environment, especially agriculture community and farmer culture (Wicks and Merrett, 2003). Agro-tourism can also be described

as a set of tourism activities that utilize agriculture potentials as tourist attraction, including agriculture landscape, various agriculture-based production activities, agriculture technology, and farmer culture (Gunarta and Hanggara, 2018).

New strategy has been conceptualized to be the base that underlies the development of agro-tourism and this strategy refers to local wisdom-based agro-tourism. The phrase "local wisdom" is associated with the conservation of local culture. Indeed, local wisdom represents a tradition performed by the conserver community throughout generations (Saeroji and Wijaya, 2022). Else, local wisdom can also be understood as a local idea or concept that emphasizes on norms and values which are respected and daily practiced by local community (Komariah et al., 2018). The development of local wisdom-based agro-tourism needs a precise planning and a proper master plan. Other requirements include optimization of village potentials, cooperation with stakeholders (private, government and community), education and training on tourism for the manager and the community, and comprehensive socialization to the community through community empowerment (Sriyadi and Istiyanti, 2020). By all these opinions, the development of agro-tourism must correspond to or support the local wisdom of the village.

Agro-tourism enables local economic to develop and grow (S. Karabati et al., 2009). Referring to the opinion given by Songkhla and Somboonsuke (2012), agro-tourism provides job opportunity to all ages and gives a quick response to unemployment issue. Agro-tourism can reduce urbanization and alleviate number of migration because the qualities of life and work in the village are improving. Pursuant to the opinion of Ohe and Kurihara (2013), agro-tourism helps village community to attain two main goals, respectively (1) to produce more jobs that can generate more income and (2) to provide space for the community members who want to diversify their farming works and produce more money from the works. Indeed, agro-tourism intrigues local businesses to emerge and develop because agro-tourism creates demand for local products, which later leads to regional marketing and also involves any efforts to build added-value and to avoid intermediary cost. Principally, agro-tourism allows the village community to get more income from diversification of their economic activity (Iario and Corsale, 2010).

In relation to the explanations above, agro-

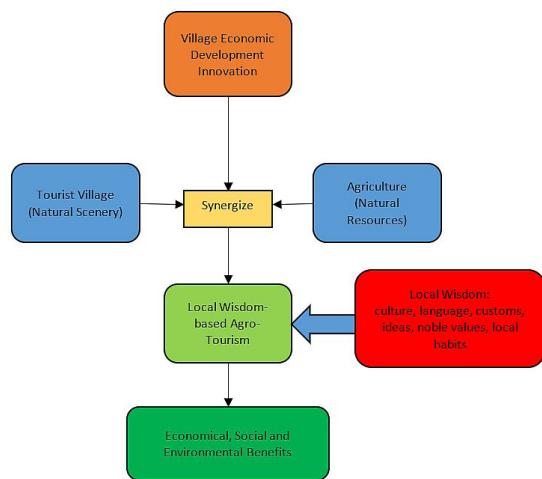
tourism is a catalyst to village economic growth that can be used to conserve natural, historical and cultural resources. The conservation is facilitated by income generated from presenting the resources to the tourists. Such presentation offers opportunity to the people to share their culture with tourists, build self-confidence about their culture, and increase their life quality through income raised from the presentation (Karabati et al., 2009). Else, agro-tourism becomes a path toward cultural transformation that make the tourists to become more appreciative, more understandings and more respectful to valuable local resources (Maruti, 2009). In addition, agro-tourism tightens social relationship across villagers because agro-tourism requires the cooperation among them to manage and promote the diversification of local legacies and cultural landscape (Aikaterini et al., 2001). Other benefit is that agro-tourism can reduce gender bias issue because agro-tourism gives equal opportunity to men and women in tourism activity (Chadda and Bhakare, 2012).

Furthermore, agro-tourism benefits local natural environment. Clearly, the main benefit is that agro-tourism changes the approach of village people to ecology, which at least makes the villagers more sensitive to and more care about their environment and thus leads them to be more protective to the environment (Ciervo, 2013; Utomo et al., 2019; Utomo et al., 2021). Village people begin to understand that the well conserved environment may affect regional attraction and this attraction can be used as income source (Rilla et al., 2011). Such perception on the nature will initiate the friendly posture to the environment and encourage people to invest themselves in natural protection and even to promote the use of environmentally friendly technology. Most importantly, the development of agro-tourism not only facilitates the protection and renovation of cultural and historical sites as well as other legacies but also creates positive climate in conservation of customs and traditions.

According to Marwanti (2015), agro-tourism development strategy consists of a lot of activities, such as: facilitating farmer community to develop businesses that utilize agriculture resources; creating business groups with farmers as the member; developing agriculture potential that attracts tourism; improving and increasing accessibility to village area; promoting agro-tourism by cooperating with related institutions; helping farmer groups to increase their knowledge and skill; giving extension, direction and explanation to farmer

community concerning the importance and benefit of tourism; strengthening the cooperation with the related institutions; disseminating information about agriculture resources that can be developed as tourist attraction; organizing exhibitions to promote agro-tourism; developing facilities that support agriculture-based tourism development; and directing farmer groups to develop creative economic by using agriculture resources to make agriculture become tourist attraction.

Taking into consideration of the elaborations above, the concept of local wisdom-based agro-tourism can be depicted as follows in Figure 1.



Source: Developed from several results of empirical

Figure 1: Concept of local wisdom-based agro-tourism research.

As shown in Figure 1, the concept of local wisdom-based agro-tourism is preceded by village development innovation to increase the added-value of the village and to solve social issues in the village. Natural resources of the village are used synergistically in two activities, namely tourism and agriculture, plus any potential capitals owned by the village. Synergistic village development will give birth to new activity called agro-tourism in which tourism entertainment and agriculture activity are connected one another. This agro-tourism still keeps and maintains local wisdom (culture, customs, ideas, noble values, and local habits). And therefore, the offered product is local wisdom-based agro-tourism. The activities in local wisdom-based agro-tourism can help improve village economic, strengthen social relationship and enforce environmental conservation. In the end, the concept of local wisdom-based agro-tourism is able to create sustainability in economical, social

and environmental aspects of the village.

Materials and methods

The type of this research is descriptive research because this research is intended to produce description, illustration, or drawing in systemic, factual and accurate manners about events, characteristics and relationships across the targeted phenomena (Sugiyono, 2012). Research population encompasses all villages at four regencies in North Kalimantan Province. The regencies are Malinau Regency, Tana Tidung Regency, Nunukan Regency and Bulungan Regency. Sampling technique is purposive sampling because the research sample is selected through certain condition or criterion. Two criteria are used, which respectively are: (1) the village has land resource that is available to be used for agriculture commodities and (2) the village has structure (infrastructure) that can support agro-tourism system, such as road, water system, standard water source, telecommunication network, production processing site and other facilities.

Data source is primary and secondary. Primary data were obtained through survey and interview which require respondents or key informants to fill the questionnaire. The informants are community members or stakeholders who have close involvement in agro-tourism development project. Secondary data were acquired from the institutions that publish agriculture and tourism data. These institutions are Central Bureau of Statistics for North Kalimantan Province and also the government offices in North Kalimantan Province that handle agriculture and tourism affairs.

Research phase begins with identification of villages that have agro-tourism development potentials and this identification uses sample criteria. Secondary data published by Central Bureau of Statistics for North Kalimantan Province, the Office for Agriculture and Food Tenacity Affairs, and the Office for Tourism Affairs were scrutinized. Several individuals from the relevant local office in each regency, which in this context is the office for tourism affairs, were invited into discussion. The phase of identification produced four village samples and each sample represented each regency. These villages are Panca Agung Village in Bulungan Regency, Setulang Village in Malinau Regency, Kujau Village in Tana Tidung Regency, and Selisun Village in Nunukan Regency.

The next phase is to determine the rank of the samples in order to know which village with the highest potential for agro-tourism development. Method for this determination is weight analysis (scoring) and *Analytical Hierarchy Process* (AHP), which the operation is supported by computer application of *Expert Choice*. The scoring was applied on the data collected from survey and questionnaire. Respondents are mostly community members who have close involvement in agro-tourism project, such as head of village, tourist village manager, and other related stakeholders. Scoring method comprises 10 (ten) variables which were already used in previous literatures (Jubaedah and Fajarianto, 2021; Muchlis and Santoso, 2017; Jafaruddin et al., 2020). These variables are: facility, accessibility, village attraction, village community involvement and empowerment, service and friendliness of the village community, agricultural and plantation resources, natural disaster resilience, other attractions, environmental conservation, and local wisdom values. Each variable has indicators which then were measured with five categories that are used as the anchor

to score the variables. These categories are 5 = very high, 4 = high, 3 = adequate, 2 = low and 1 = very low. Each indicator of the variables is presented in detail in the following Table 1.

In this research, respondents are individuals who have deep understandings about tourist village in North Kalimantan Province. Less surprisingly, the employees or staffs at the Office for Tourism Affairs are more dominant than other respondents. The answers of these informants in questionnaire were put on Analytical Hierarchy Process (AHP) for processing. This analytical method directs the respondents to compare two elements or to do *pairwise comparison* across criteria or alternatives. In this context, the criteria are the variables used in the scoring analysis, which include facility, accessibility, village attraction, village community involvement and empowerment, service and friendliness of the village community, agricultural and plantation resources, natural disaster resilience, other attractions, environmental conservation, and local wisdom values. The sample villages were also similar to the villages determined by scoring method, which involve Panca Agung

Variable	Number of Indicator	Indicator
Facility	13	security post, transportation, parking lot, road sign, information center office, trash bin, toilet, prayer house, lodging house, souvenir stalls, financial institutions, health post, restaurants
Accessibility	6	road, water source, health service, communication/internet, security service, and settlements
Village Attraction	18	mountain, natural forest, cool air, natural park, agro-tourism potential, wildlife, waterfall, physical recovery service, natural hot water source, culture and customs, sacred cemetery, religious ritual, historical sites, art culture, customary festival, customs during planting and harvest periods, and culinaries
Village Community Involvement and Empowerment	2	understandings about agro-tourism and consent for agro-tourism
Service and Friendliness of the Village Community	15	hotel staff friendliness, hotel comfort, transportation service, easy of information, community friendliness, community behavior and culture, mutual work, deliberation, culture of greeting, information about flora and fauna, information about sacred place, service of sellers/merchants
Agricultural and Plantation Resources	4	quality and quantity of agricultural and plantation commodities, fishery, processed products and human resources in agriculture
Natural Disaster Resilience	3	the ability to recognize disaster threat, to be adaptive, and to recover after the disaster
Other Attractions	10	mountain, camp ground, fishing pond, hunting ground, culinary, surfing, suspension bridge, waterfall, and culture that can be shown at the tourist destination
Environmental Conservation	3	trash management, waste management, and customs that conserve environment
Local Wisdom Values	4	art and culture, language, customs, noble values

Source: Jubaedah and Fajarianto (2021), Muchlis and Santoso (2017) and Jafaruddin et al. (2020)

Table 1: Variables and indicators of agro-tourism villages.

Village in Bulungan Regency, Setulang Village in Malinau Regency, Selisun Village in Nunukan Regency and Kujau Village in Tana Tidung Regency. The score for questionnaire is set on the scale between 1 and 9. More explanations about the rating of this scale and its definition are presented in the following Table 2.

The AHP method involve criteria in determining goal and in this context, the goal is tourist village in North Kalimantan Province with high potentials to be developed as local wisdom-based agro-tourism. As previously said, the criteria are ten variables, namely facility, accessibility, village attraction, village community involvement and empowerment, service and friendliness of the village community, agricultural and plantation resources, natural disaster resilience, other attractions, environmental conservation, and local wisdom values. The alternative villages are Panca Agung Village in Bulungan Regency,

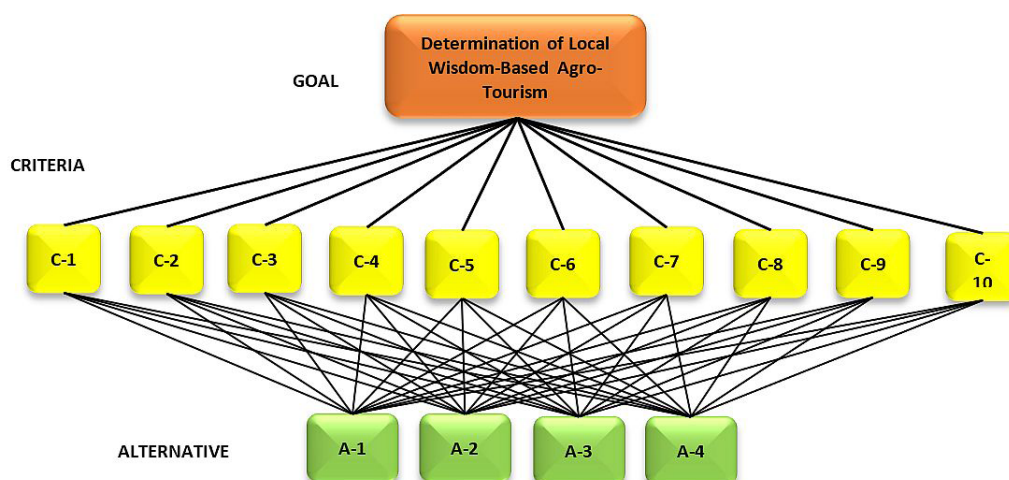
Setulang Village in Malinau Regency, Selisun Village in Nunukan Regency and Kujau Village in Tana Tidung Regency. In the AHP procedure, a hierarchy was then made consisting of 10 variables and 4 alternative villages. This hierarchy is depicted in Figure 2, where C-1 = Facility, C-2 = Accessibility, C-3 = Village Attraction, C-4 = Village Community Involvement and Empowerment, C-5 = Service and Friendliness of the Village Community, C-6 = Agricultural and Plantation Resources, C-7 = Natural Disaster Resilience, C-8 = Other Attractions, C-9 = Environmental Conservation, and C-10 = Local Wisdom Values.

A-1 = Panca Agung Village, A-2 = Setulang Village, A-3 = Kujau Village, and A-4 = Selisun Village.

Importance Intensity	Definition	Explanation
1	One element is as important as other element.	Both elements have same contribution level.
3	One element is a bit more important than other element.	One element is a bit dominant over other element.
5	One element is clearly more important than other element.	One element is quite dominant over other element.
7	One element is extremely more important than other element.	One element is surely dominant over other element.
9	One element is absolutely more important than other element.	One element is strongly dominant over other and always chosen.
2,4,6,8	There is a doubt in choosing one between two elements in proximity.	There is a room for negotiating the positions.

Source: Saaty (1993)

Table 2: Comparative matrix scale.



Source: Developed from several results of empirical

Figure 2: Hierarchy of research.

Results and discussion

General description

Several villages in North Kalimantan have the potential to be developed in agro-tourism. The data shows agricultural production as the second largest contributor to the Gross Regional Domestic Product, North Kalimantan. In addition, the tourism sector, although not yet a leading sector, with its natural beauty potential and high agricultural yields has the potential to be developed into an agro-tourism area. The following data shows some of the results of agricultural production in North Kalimantan in Table 3.

Based on the data in Table 3, these commodities have great potentials to be developed as agro-tourism products in North Kalimantan Province. For example, the production level of fruits and vegetables has increased from 89.874 tons in 2019 to 220.922 in 2021. On the other hand, the production level of seasonal fruits and vegetables is averagely around 35.8 thousands tons per year. Furthermore, data on foreign tourist

arrivals to North Kalimantan from 2019 to 2021 is presented, in Figure 3.

Figure 3, shows the number of foreign tourist visits, which in 2019 experienced an increase in visits from 358,684 in 2018 to 584,453 visits. In the following two years, visits decreased to 334,021 in 2021. This decrease in visits was due to visiting restrictions due to the outbreak of the Covid-19 pandemic. However, the data shows that the potential for foreign tourists is quite high and this has not been added to by local tourists. Thus from these data the tourism industry, especially agro-tourism has the potential to be developed.

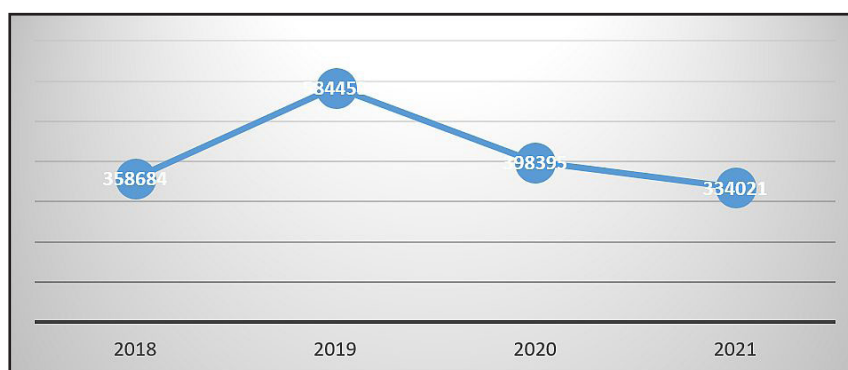
Weight analysis (scoring)

Secondary data from four tourist villages in four regencies have been mapped to determine their potentials for agro-tourism development. The four villages are Panca Agung Village in Bulungan Regency, Setulang Village in Malinau Regency, Kujau Village in Tana Tidung Regency and Selisun Village in Nunukan Regency. Scoring method was

No.	Commodity	2019	2020	2021
1	Annual Fruits and Vegetables	89.874	89.9	220.922
2	Mango	3.47	5.804	8.59
3	Durian	10.017	9.577	8.429
4	Siamese oranges	6.206	4.265	7.045
5	Banana	27.095	38.363	110.463
6	Pawpaw	12.078	6.698	34.577
7	Snakefruit	1.669	3.32	5.663
8	Jackfruit	8.204	8.255	21.75
9	rambutans	13.562	5.997	13.644
10	Paddy	33.357	33.574	38.165
11	Biopharmaceuticals (ginger, laos, noni etc.)	1.464	1.977	2.603
12	Vegetables (Chili, Onion, Potato, Tomato etc.)	18.686	16.395	22.082

Source: Central Bureau of Statistics, North Kalimantan (2022)

Table 3: Some of North Kalimantan's agricultural commodity production (tons).



Source: Central Bureau of Statistics, North Kalimantan (2022)

Figure 3: Number of arrivals of international tourists (visit).

applied on the results of survey and questionnaire by giving emphasis on 10 variables, respectively facility, accessibility, village attraction, village community involvement and empowerment, service and friendliness of the village community, agricultural and plantation resources, natural disaster resilience, other attractions, environmental conservation, and local wisdom values. The results of scoring method on ten variables are shown in the following Table 4.

In accordance with the contents of the Table 4, tourist village with the highest total score is Panca Agung Village, followed by Setulang Village, Selisun Village and finally Kujau Village. Total score of Panca Agung Village is 256 with mean score of 3.28, which signifies that the indicators for agro-tourism development in Panca Agung Village are in the category of above the adequate (> 3). Setulang Village has total score of 240 with mean score of 3.08, which informs

that the indicators for agro-tourism development in Setulang Village are also above the adequate (> 3). Meanwhile, Selisun Village and Kujau Village have mean score below 3, which make both villages are in low category. Based on the description above, Panca Agung Village in Bulungan Regency is selected as the priority village for agro-tourism development. The alternative is Setulang Village in Malinau Regency. Further confirmation for these results were done using Analytical Hierarchy Process (AHP).

Analytical Hierarchy Process (AHP)

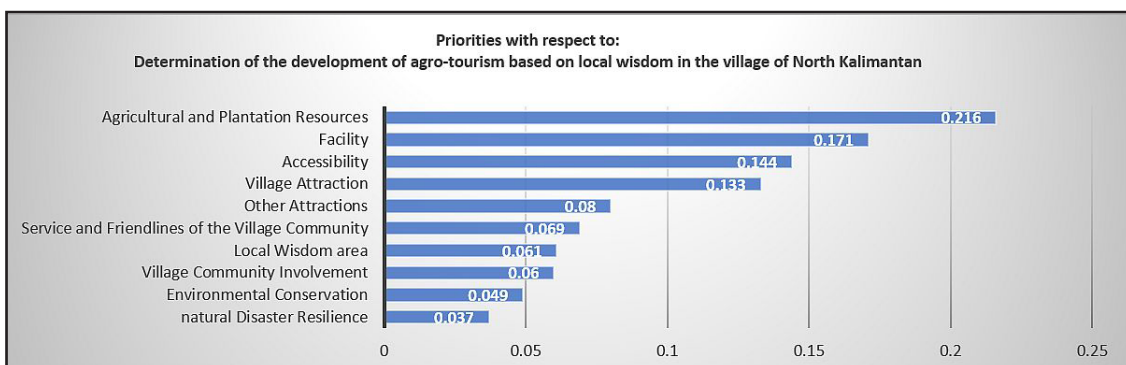
Pairwise comparison across criteria

In this section, the criteria used to select village for the development of local wisdom-based agro-tourism are compared to each other. There are 10 criteria to compare and the results of this comparison are displayed in Figure 4.

Variable	Panca Agung Village		Setulang Village		Selisun Village		Kujau Village	
	Mean	Total Score	Mean	Total Score	Mean	Total Score	Mean	Total Score
Facility	3.46	45	2.77	36	2.31	30	1.92	25
Accessibility	3.50	21	3.17	19	2.83	17	3.83	23
Village Attraction	2.78	50	2.78	50	2.72	49	1.33	24
Village Community Involvement and Empowermen	4.00	8	3.00	6	3.00	6	4.00	8
Service and Friendliness of the Village Community	3.60	54	3.40	51	3.33	50	3.00	45
Agricultural and Plantation Resource	3.50	14	2.75	11	2.75	11	2.50	10
Natural Disaster Resilience	3.00	9	3.00	9	3.00	9	2.00	6
Other Attractions	3.20	32	3.00	30	2.90	29	1.70	17
Environmental Conservation	3.00	9	4.00	12	2.00	6	2.33	7
Local Wisdom Values	3.50	14	4.00	16	2.75	11	3.25	13
TOTAL	3.28	256	3.08	240	2.79	218	2.12	165

Source: Primary data are processed (2022)

Table 4: Scoring assessment on variables of agro-tourism villages.



Note: Inconsistency = 0.06

Source: Primary data are processed (2022)

Figure 4: Pairwise comparison across criteria for importance intensity.

Correspond to Figure 4, the three most important criteria for selecting village for the development of local wisdom-based agro-tourism are that the village must have high potential of agricultural and plantation resources (0.216), the village must have supportive facility (0.171), and the village must have good accessibility (0.144). Other criteria are less important than these three and the lowest criterion is natural disaster resilience (0.037).

According to the statement above, the most important criterion for agro-tourism development is that the village must have high potential of agricultural and plantation resources. This result is in line with the definition of agro-tourism as a combination between natural scenery and agriculture potential. As stated by Sastrayuda (2010), agro-tourism is a tourism activity that take benefits from agriculture resources potentials, especially the natural scenery of agriculture land, the diversity of agriculture production and technology, and the culture of farmer community. Agro-tourism helps the tourists to enhance their knowledge about agriculture, to develop recreative experience on the field, and to build business contact in agriculture, which may include business on food crop, horticulture crop, plantation, fishery and animal husbandry. Interestingly, forestry can also be managed as the commodity for agro-tourism. Seemingly, high potential of agriculture resources is an absolute requirement for agro-tourism development. North Kalimantan Province has quite high potential of agriculture resources and therefore the Province has a privilege over other regions for agro-tourism development (Liputan6.com, 2021). Moreover, agriculture sector is the second biggest contributor to Gross Regional Domestic Product after mine sector in 2020 with contribution level reaching IDR 10,922.84 millions (BPS-Kaltara, 2020).

The next important criterion for agro-tourism development is facility. In this context, facility is defined as structure designated to make the tourists become easier, comfort and safe in visiting the destinations. Facility of tourist destinations is measured by the presence of indicators such as security post, transportation, parking lot, road sign, information center office, trash bin, toilet, prayer house, lodging house, souvenir stalls, financial institutions, health post, and restaurants. Facility is a factor that can make the visitors feel satisfied. Usually, the visitors also feel comfort after finding that the facility in the destinations is complete (Santoso and Nadapdap, 2019). Indeed, facility is a minimum

standard in any tourist destinations (Istiqomah and Priyatmono, 2019). Therefore, facility is absolutely needed in agro-tourism development.

Another important criterion for the development of local wisdom-based agro-tourism is accessibility. This criterion gets third rank after agricultural and plantation resources and facility. In this context, accessibility encompasses structure and infrastructure that enable the movement of tourists from their departure point to the destinations and also those that support the movement of tourists inside the destinations. The indicators of accessibility are road, water source, health service, communication/internet, security service, and settlements. More often, the quality of accessibility is measured from the quality of transportation mode that brings someone from one location to another (Aguila and Ragot, 2014). Accessibility in good quality will give satisfaction to the tourists and convince them to make repeated visit (Chin et al., 2018).

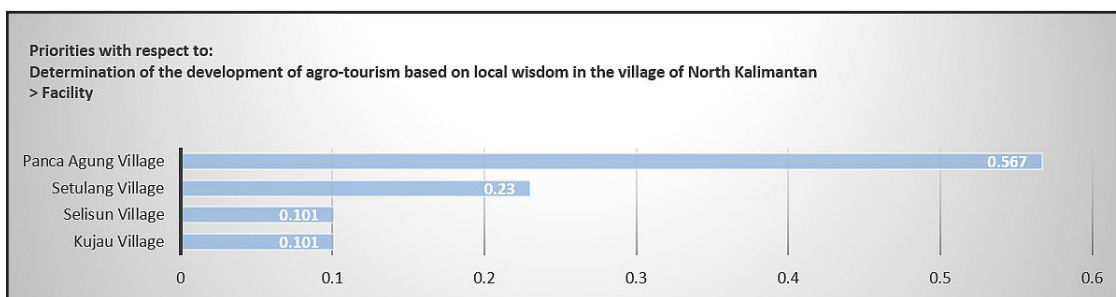
In addition, the results of AHP also revealed that village attraction and other attractions are two criteria, precisely fourth and fifth criteria, which are also important for the development of local wisdom-based agro-tourism. Every alternative village in this research has its own local wisdom. Each village has culture and customs that cannot be found in other place. Both culture and customs represent one indicator that explains the variable of village attraction. Surprisingly, local wisdom values that suppose to be the crucial element in the development of local wisdom-based agro-tourism are only getting seventh rank. The lowest rank is occupied by criterion of natural disaster resilience.

Pairwise comparison across alternatives (villages)

Each alternative village was compared to each other using the criteria. To begin with, the four alternative villages are compared by criterion of "facility". The results of this comparison are shown in Figure 5.

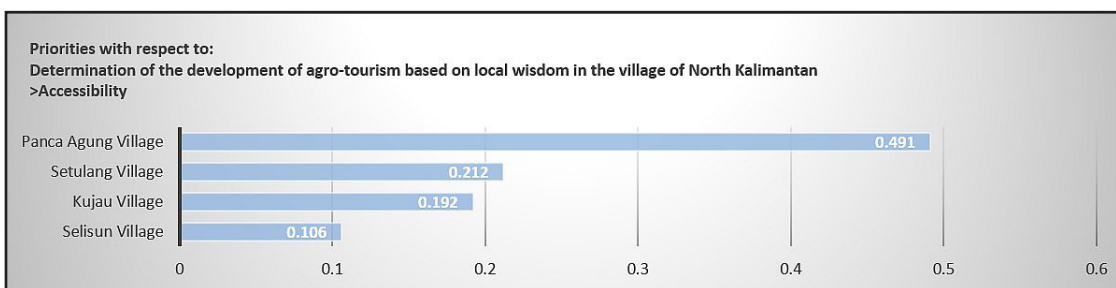
In conformity with Figure 5, the alternative village with the highest potential for agro-tourism development based on criterion of "facility" is Panca Agung Village (0.567), followed by Setulang Village (0.230), Selisun Village (0.101), and finally Kujau Village (0.101).

The results of pairwise comparison across alternative villages by criterion of "accessibility" are given in Figure 6.



Note: Inconsistency = 0.07
Source: Primary data are processed (2022)

Figure 5: Pairwise comparison across alternatives by criterion of “facility”.



Note: Inconsistency = 0.04
Source: Primary data are processed (2022)

Figure 6: Pairwise comparison across alternatives by criterion of “accessibility”.

Based on the contents of Figure 6, the alternative village with the highest potential for agro-tourism development based on criterion of “accessibility” is Panca Agung Village (0.491), followed by Setulang Village (0.212), Selisun Village (0.192), and finally Kujau Village (0.106).

Furthermore, the results of pairwise comparison across alternative villages by criterion of “village attraction” are depicted in Figure 7.

Referring to the contents of Figure 7, the alternative village with the highest potential for agro-tourism development based on criterion of “village attraction” is Panca Agung Village (0.417), followed by Setulang Village (0.316), Selisun Village (0.140), and finally Kujau Village (0.126).

Criterion of “village community involvement and empowerment” is used in pairwise comparison across alternative villages and the results are put on Figure 8.

In regard to the contents in Figure 8, the alternative village with the highest potential for agro-tourism development based on criterion of “village community involvement and empowerment” is Panca Agung Village (0.435), followed by Setulang

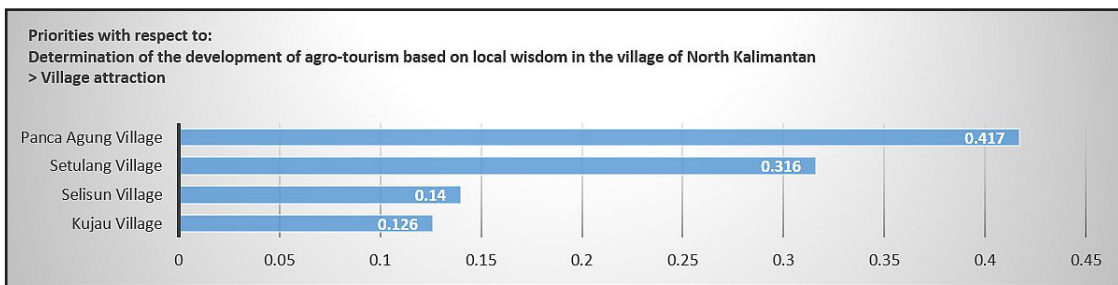
Village (0.233), Selisun Village (0.228), and finally Kujau Village (0.103).

Criterion of “service and friendliness of the village community” is used in pairwise comparison across alternative villages and the results are set on Figure 9.

Pursuant to the contents of Figure 9, the alternative village with the highest potential for agro-tourism development based on criterion of “service and friendliness of the village community” is Panca Agung Village (0.489), followed by Setulang Village (0.265), Selisun Village (0.131), and finally Kujau Village (0.115).

The results of pairwise comparison across alternative villages by criterion of “agricultural and plantation resources” are displayed in Figure 10.

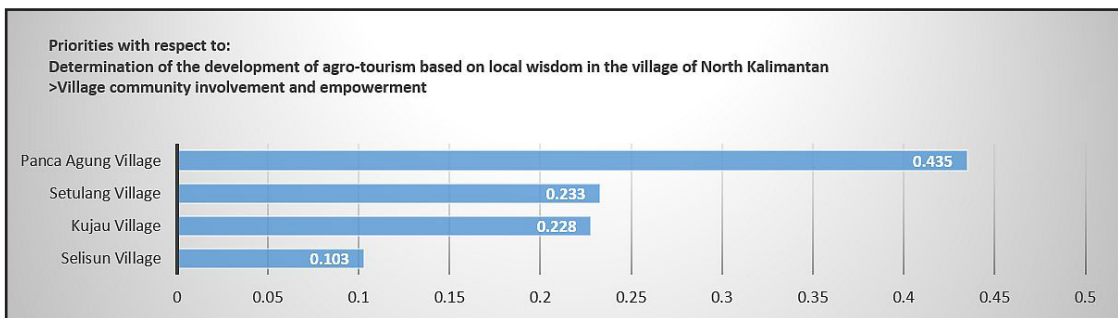
Following the contents of Figure 10, the alternative village with the highest potential for agro-tourism development based on criterion of “agricultural and plantation resources” is Panca Agung Village (0.568), followed by Setulang Village (0.195), Selisun Village (0.128), and finally Kujau Village (0.109).



Note: Inconsistency = 0.07

Source: Primary data are processed (2022)

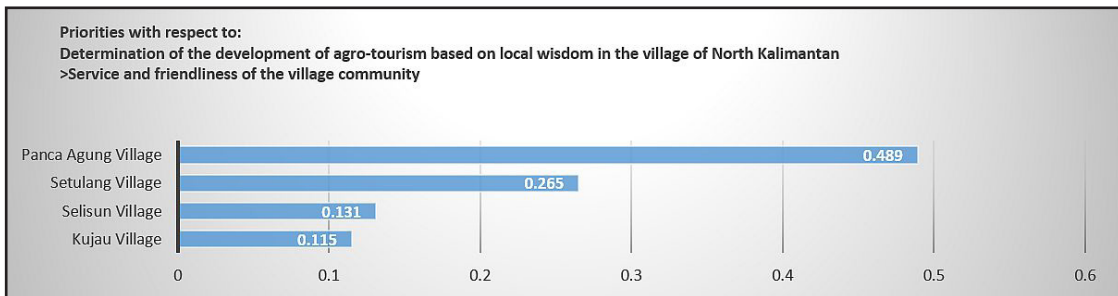
Figure 7: Pairwise comparison across alternatives by criterion of “village attraction”.



Note: Inconsistency = 0.02

Source: Primary data are processed (2022)

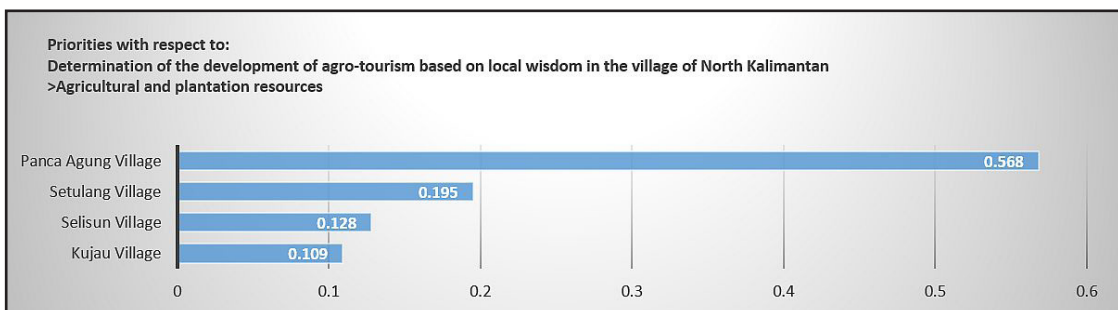
Figure 8: Pairwise comparison across alternatives by criterion of “village community involvement and empowerment”.



Note: Inconsistency = 0.05

Source: Primary data are processed (2022)

Figure 9: Pairwise comparison across alternatives by criterion of “service and friendliness of the village community”.



Note: Inconsistency = 0.02

Source: Primary data are processed (2022)

Figure 10: Pairwise comparison across alternatives by criterion of “agricultural and plantation resources”.

Criterion of “natural disaster resilience” is used in pairwise comparison across alternative villages and the results are shown in Figure 11.

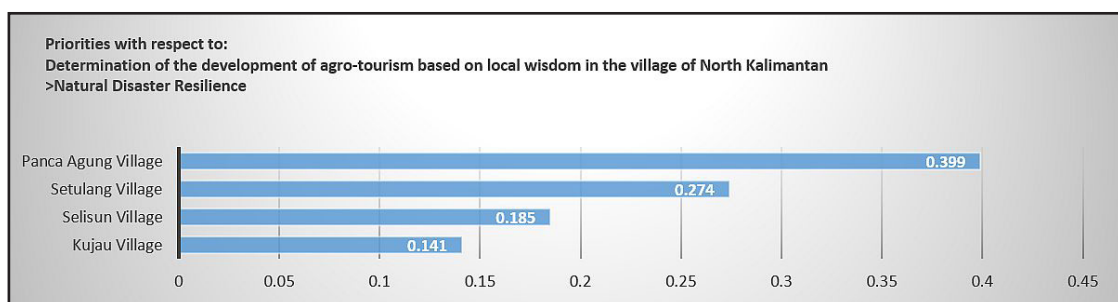
In association with the contents of Figure 11, the alternative village with the highest potential for agro-tourism development based on criterion of “natural disaster resilience” is Panca Agung Village (0.399), followed by Setulang Village (0.274), Selisun Village (0.185), and finally Kujau Village (0.141).

The results of pairwise comparison across alternative villages by criterion of “other attractions” are given in Figure 12.

By the contents of Figure 12, the alternative village with the highest potential for agro-tourism development based on criterion of “other attractions” is Panca Agung Village (0.472), followed by Setulang Village (0.289), Selisun Village (0.138), and finally Kujau Village (0.102).

Criterion of “environmental conservation” is used in pairwise comparison across alternative villages and the results are depicted in Figure 13.

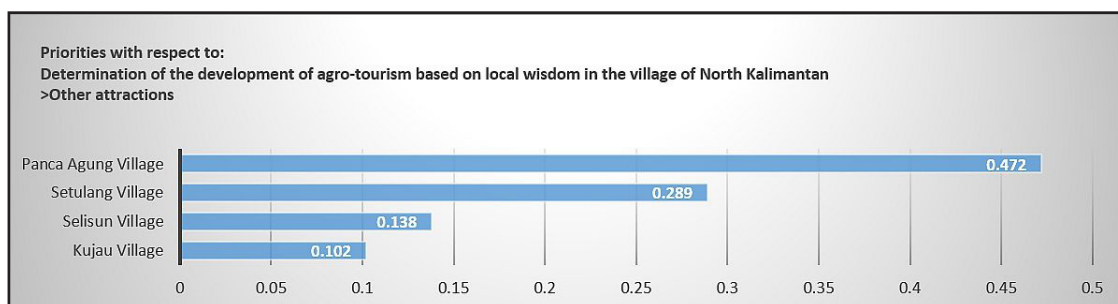
The results of pairwise comparison across alternative villages by criterion of “local wisdom values” are presented in Figure 14.



Note: Inconsistency = 0.02

Source: Primary data are processed (2022)

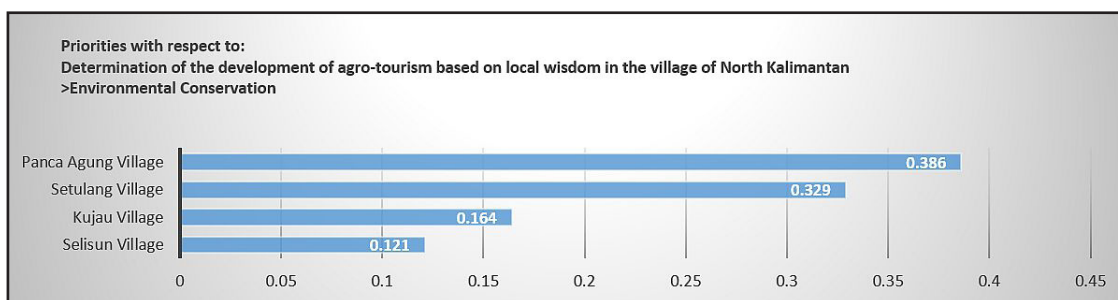
Figure 11: Pairwise comparison across alternatives by criterion of “natural disaster resilience”.



Note: Inconsistency = 0.02

Source: Primary data are processed (2022)

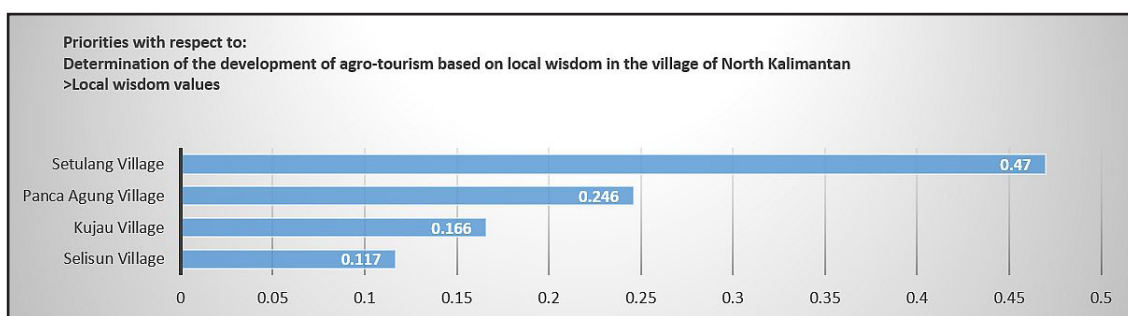
Figure 12: Pairwise comparison across alternatives by criterion of “other attractions”.



Note: Inconsistency = 0.02

Source: Primary data are processed (2022)

Figure 13: Pairwise comparison across alternatives by criterion of “environmental conservation”.



Note: Inconsistency = 0.03

Source: Primary data are processed (2022)

Figure 14: Pairwise comparison across alternatives by criterion of “local wisdom values”.

According to the contents of Figure 14, the alternative village with the highest potential for agro-tourism development based on criterion of “local wisdom values” is Setulang Village (0.470), followed by Panca Agung Village (0.246), Kujau Village (0.166) and finally Selisun Village (0.117).

Priority village for local wisdom-based agro-tourism

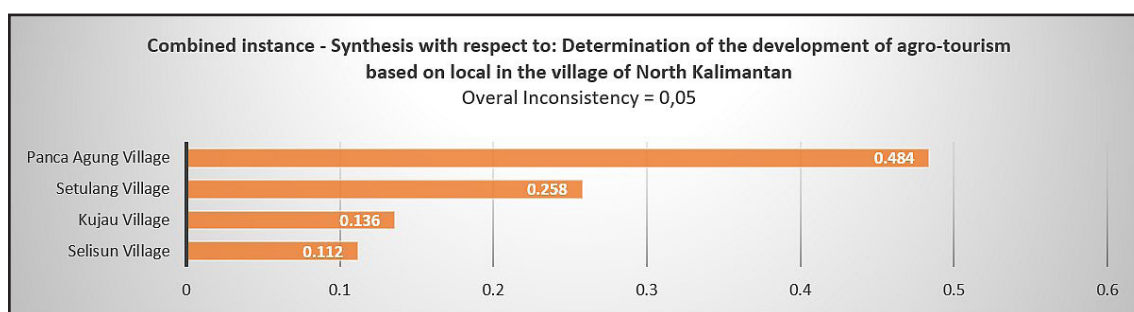
Villages that become alternative for agro-tourism development have been compared one to another. This comparison is expected to be helpful in selecting village to be the priority of agro-tourism development. Comprehensive assessment needs to be done at least to confirm the best alternative in compliance with opinions of informants. The results of comparison for the priority village is put on Figure 15.

The pairwise comparison was conducted over alternative villages for determining the priority village for the development of local wisdom-based agro-tourism. The highest point is gotten by Panca Agung Village in Bulungan Regency which makes this village become the priority. Second alternative is Setulang Village in Malinau Regency. Third and fourth positions are occupied by Kujau Village in Tana Tidung Regency and Selisun Village in Nunukan Regency. The results from both scoring method and AHP method have been taken into account. Seemingly, the results of both methods similarly show that the priority village for the development of local wisdom-based agro-tourism is Panca Agung Village.

Selecting one village to become priority for the development of local wisdom-based agro-tourism is indeed the goal of the current research. The priority is fallen to Panca Agung Village. As one of villages that make up the District of Tanjung Palas Utara, Bulungan Regency, North Kalimantan

Province, the land width of Panca Agung Village is 2500 ha. Historically, Panca Agung Village was established in 1983 through transmigration program. The 2021 data reported that the population of Panca Agung Village is 2300 individuals with 766 family heads. Javanese tribe is quite dominant among the village dwellers. Therefore, most of the dwellers are the wanderer or the participants of transmigration program who leave their life in Java and move to Kalimantan. The leading potency of Panca Agung Village is agriculture and so far, the management of agriculture land in this village is handled by Village Enterprise (BUMDES). For the topography, the altitude of Panca Agung Village is 34 meters with 65 % mountain valleys and 35% low land. The dominant land use is for agriculture. To farm out this wide agriculture land, farmers, and also plantation workers, have use advanced and modern farm equipments and technology. Special land in the village is managed and developed to be millennial agriculture land. So far, the agriculture commodity in Panca Agung Village is emphasized on rice, fruits and vegetables, whereas the plantation commodity is dominated by coconut.

In general, Panca Agung Village has complete facility either in village or regency levels. This facility includes air port, sea port, bus station, electric network, water network, security post, transportation, parking lot, road sign, information center office, trash bin, toilet (bath room), prayer house (mosque), lodging house, souvenir stalls, financial institutions (banks), health post (community health center), and restaurants. Accessibility to the village has been relatively good including the access for water source, health service, security service and settlements. Meanwhile, accessibility to tourist destination needs to be improved to ease the visitor in reaching



Source: Primary data are processed (2022)

Figure 15: Pairwise comparison across alternative villages for determination of priority village.

their desired spots. The government can make this happen by launching a supportive program such as the construction or the improvement of the access road to tourist destination.

Village attraction of Panca Agung Village is quite promising. The combination between mountain valleys and agriculture land provides beautiful scenery for the visitors. Beside this scenery, other elements that make up the attraction in Panca Agung Village are natural forest, cool air, extensive width of agriculture and plantation lands, traditional medicine, art culture, and culinaries. Interestingly, several tourist destinations have been integrated in one area, which is Panca Agung Village, and this makes the village become the popular destination. The integrated destinations include natural tourism (*Batu Tumpuk*), rafting tourism, public square tourism, fishing pond tourism, religious tourism, motor vehicle (ATV) arena tourism, cultural tourism and culinary tourism.

Panca Agung Village has extensive agricultural land supported by modern equipment and the dominant community profession as farmers and garden workers. Villages have special land as village assets that can be developed as millennial agricultural land. Agricultural products are in the form of rice, fruits, vegetables while plantation products are in the form of oil palm.

People in Panca Agung Village are respecting the noble values of mutual work, tolerance, altruism and religiosity. All these values are considered as the constituent values of local wisdom. Villagers and also village officers have determined to enforce the behavior that conserve the environment. Possibly, because the dominant occupation in the village is being farmer and plantation worker, then most of village dwellers already know about the importance of environmental conservation and also agro-tourism. Taking this situation into consideration, therefore, Panca Agung Village

is highly potential to be developed as local wisdom-based agro-tourism. The reason behind this is that Panca Agung Village not only has beautiful natural scenery and high potential of agriculture resources but also has human resources which are already familiar with agriculture due to their profession as farmer and plantation worker.

Conclusion

The objective of this research is to identify the potentials of villages in North Kalimantan Province for the development of local wisdom-based agro-tourism and also to construct resource map in order to find the proper village to be developed as local wisdom-based agro-tourism. Several results of research were obtained. One result showed that the nominee village for the development of local wisdom-based agro-tourism must fulfill three main criteria (more important over other criteria), respectively agricultural and plantation resources, complete facility and good accessibility. In addition, village attraction and other attractions are other criteria that are considered supportive to agro-tourism development.

Other result revealed that Panca Agung Village in Bulungan Regency of North Kalimantan Province has defeated other villages (Setulang Village, Selisun Village, Kinjau Village) because this village has been selected for the development of local wisdom-based agro-tourism. Panca Agung Village not only has beautiful natural scenery and high potential of agriculture resources but also has human resources which dominantly work as farmer and plantation worker who definitely understand the importance and benefit of agro-tourism. The people in Panca Agung Village respect the noble values of mutual work, tolerance, altruism and religiosity. All these values are the constituent values of local wisdom. The government can support and facilitate

the development of agro-tourism by launching programs that construct and improve the access road to tourist destination which in turn will make the tourist feel comfort and satisfied in their journey to the destination.

More specifically, the current research is the material for the next research that will construct the model of development and management of agro-tourism village. There is an expectation that the current research will contribute the development and management of local wisdom-based agro-tourism villages in North Kalimantan

Province. Also, for the future, the development of agro-tourism villages is expected to contribute the sustainable development at local, regional, national and international levels.

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