Spatial Pattern of Agrotourism Development Areas in Bandung Barat District

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Abstract. Bandung Barat District has an attraction for the development of agro-tourism areas because it is one of the largest horticulture producers in Indonesia, with fruit production is 583,539 Kw/year and vegetables is 677,480 Kw/year. This location not far from the Bandung city and provides benefits because it is often visited by tourists when visiting to around of Bandung area. The purpose of this study is to obtain a spatial picture of regional patterns that have the potential for developing agro tourism areas and evaluating significance relationships between indicators and variables each other. The analysis used is spatial analysis by evaluating physio geographic and socio geographic elements and used statistical analysis by SPSS tools. The results showed that the spatial pattern of the development of agro tourism areas in the study area, that is Lembang Sub-District, Cisarua Sub-District, and Cikalong Wetan Sub-District had 8 typologies. The most potential area with a high physio geographic and socio geographic typology is Mandalamukti Village, Cikalong Wetan Sub-District with an area of 6.049 km². Whereas, the locations which have no potential area with low physio geographic and socio geographic typologies are Ganjarsari and Puteran Villages, Cikalong Wetan Sub-District, covering an area of 14,086 km² and 10,325 km², Pasirlangu Village, Cisarua Village covering an area of 12,209 km², in Lembang Sub-District, Cibogo Village covering an area of 3.12 Km². Cikahuripan village covering an area of 7.31 km², Pagerwangi Village covering an area of 4.65 km², Suntenjaya Village with covering an area of 16.03 km², Wangunharja Village with covering an area of 7.85 km², Wangunsari Village with covering an area of 3.61 km². Statistical analysis shows that there is a significant relationship between accessibility indicators (socio geographic) and physio geographic elements, so it will be good to develop agro tourism areas in that locations which have these criteria.

1. Introduction

West Java Province in general has land that has the potential to produce food commodities, especially horticulture that is able to meet export market standards. One of its regions is Bandung Barat District as the largest agricultural producer in Indonesia. The total area of 46.68% of Bandung Barat District has a height of about 500-1000 meters above sea level so that it has an abundant agricultural production. Horticultural production results always increase compared to the previous year with fruit production of 583,539 quintal/year and vegetables of 677,480 quintals/year [2].
Bandung Barat District has a mission to make its region an environmentally friendly agro-industry and tourism-producing region. The natural conditions of the geophysical area of Bandung Barat District in the form of mountains, plains, and waters are suitable and supportive for the development of agribusiness, agro-industry, agro-tourism, and nature tourism. The cool mountain weather in the tropics is a tourist attraction for the development of agro-tourism in Bandung Barat District. The average annual rainfall in Bandung Barat District is around 1500 - 3500 mm/year which is classified as high.

Most of the area of Bandung Barat District is in the form of mountains so that it has fertile soil, therefore most of the people work in the agricultural sector. The highest livelihoods in the agricultural sector are in Lembang Village with 23,460 peoples, then Cisarua Village with 20,908 peoples and Cikalong Wetan Village with 13,825 peoples [2].

Regional Regulation of Bandung Barat District Numb. 4 of 2012 article 43 concerning the Tourism Development Master Plan of Bandung Barat District that the development of agro tourism areas is directed at the area of the North Bandung Barat District, namely Cisarua Sub-District, Cikalong Wetan Sub-District, and Lembang Sub-District.

The high number of farmers and the amount of agricultural production in Lembang Sub-District, Cisarua Sub-District, and Cikalong Wetan Sub-District, Bandung Barat District have not been optimally utilized to develop agro-tourism areas even though the existence of agro-tourism areas can be a potential for Bandung Barat District to add value in the agriculture and tourism sector. Thus, spatial assessment is needed regarding the potential in developing agro-tourism areas based on physio geographic and socio geographic elements.

2. Method

The spatial pattern of agro-tourism development analyses based on physio geographic and sociodemographic elements. The physio geographic element evaluates the actual physical condition that is suitable for the designation of the agro tourism area with variables in the form of distance, slope, and the amount of raw water sources. Socio geographic elements evaluate based on community perceptions with variables in the form of attractions, accessibility, accommodation, institutions, and community characteristics. Spatial analysis with map interpretation will show spatial distribution of potential areas of physio geographic and socio geographic elements for agro-tourism development in Bandung Barat District.

Data used for physio geographic elements are secondary data, including distance indicators obtained from Map Street Info 2019, slope data obtained from 1:25,000 RBI maps and SRTM imagery of 30 meters' resolution, and raw water sources obtained from PUPR documents of Bandung Barat District. Data on socio geographic elements in the form of primary data were obtained by conducting interviews with local communities who were familiar with the conditions of the study area.

2.1. Data Processing

The physio geographic element data processing has a distance indicator by measuring the distance from the centre of Bandung to each village using Map Street Info, then divided into 3 classes using the distance range of each village. The slope indicator is adjusted to the convenience of tourist visitors to reduce safety risks, then divided into 3 classes based on the theory of Guidelines for Land Rehabilitation and Soil Conservation (1986). Amount of raw water sources indicator is very important to maintain soil and plant fertility at potential agro-tourism locations and also as a clean water facility for tourists. Based on PUPR documents of Bandung Barat District, amount of raw water sources can be in the form of springs from mountains or wells, divided into 3 classes using a range. The weighting is obtained from the modification of the ADO-ODTWA Guidelines [3].
### Table 1. Agro Tourism Physio Geographic Scoring Elements

| Num. | Indicator                                                                 | Weight | High Score | Medium Score | Low Score |
|------|---------------------------------------------------------------------------|--------|------------|--------------|-----------|
| 1    | Distance to potential agro tourism locations from the city centre (Bandung) | 30     | 0 – 19 km  | 20 – 39 km   | > 40 km   |
| 2    | Slopes for tourists                                                        | 50     | 0-8%       | 8-15%       | > 15%     |
| 3    | Number of raw water source points per village Weight Amount                | 20     | 13-19 points | 7-12 points | 0-6 points |

Source: Researcher modification results (2019).

Data processing of socio geographic elements has indicators of attraction, accessibility, accommodation, institutional, and community characteristics. The sample that became respondents in this study were farmers and local communities as tourism actors. Determination of respondents using purposive sampling with several specific requirements, namely:

1. People who have lived in the study area for at least 3 years
2. Communities who understand the potential and problems in the research area
3. Communities residing in the study area
4. Communities involved in the development of agro-tourism areas both actively and passively in the study area.

Determining the number of samples to be used as respondents is calculated using the Slovin formula [4].

\[
n = \frac{N}{1 + N \cdot e^2}
\]

Information:

- \(n\): Sample size
- \(N\): Population size
- \(e\): Percentage (%), inaccuracy tolerance due to errors in sampling.

\[
n = \frac{1.710.088}{1 + 1.710.088 \cdot (0.1)^2}
\]

\[
= 99.99415
\]

Rounded to 100

The results of the Slovin formula calculation show the number of samples taken for this study were 100 people. To find out the number of samples in each Sub-District of the study area, the following formula is used:

\[
\text{Number of respondents} = \frac{\text{population of each sub-Village}}{\text{total population}} \times 100
\]

Data processing of socio geographic elements using a Likert scale questionnaire. Likert scale questionnaire is used to determine the level of agro-tourism potential from the socio geographical aspect, which is based on community perceptions. The following Likert scale scores are used for data socio geographic elements in table 2.
Table 2. Likert Scale in the Research Questionnaire.

| Scale          | Value |
|----------------|-------|
| Very Potential | 5     |
| Potency        | 4     |
| Potential enough | 3   |
| Less Potential | 2     |
| Very Potential | 1     |

Source: [6]

The questionnaire value for each village was obtained from the average value of each respondent. Furthermore, the classification with a range into three classes. Class divisions are based on the range of highest and lowest possible values. Weighting is obtained from the number of frequency results of the questionnaire using SPSS, the frequency that has a high value has a high weight.

\[
\text{value per village} = \frac{\text{average score}}{\text{total of respondents each village}} \times 100
\]  

Table 3. Classification of the Evaluation of Socio geographic Elements.

| Indicator                     | Weight | Classification Assessment |
|-------------------------------|--------|---------------------------|
|                               |        | Low (1) | Medium (2) | High (3) |
| Attractions                   | 25     | 113     | 165        | 218      | 219      | 269      |
| Accessibility                 | 25     | 106     | 146        | 186      | 187      | 225      |
| Accommodation                 | 15     | 70      | 108        | 147      | 148      | 184      |
| Institutional                 | 10     | 22      | 46         | 72       | 73       | 95       |
| Community Characteristics     | 25     | 100     | 158        | 218      | 219      | 275      |

Source: Research modification results (2019)

3. Results and Discussion

3.1. Physio geographic Elements

The physio geographic element of distance is measured by the range of the distance of each village in the study area to the city center. The city center chosen is the city of Bandung, where the city of Bandung is one of the leading tourist destinations in West Java Province so that tourists make the city of Bandung as the main recreational destination when visiting the Bandung area.

The physio geographic elements of the slope class in the study area were processed using SRTM imagery of 30 m spatial resolution. Some experts say that the slope of the land > 15% is less potential to be used as a tourist location, it would be more appropriate if the region with the height is used as a supporter of tourism namely natural panorama. Slopes in the study area are dominated by 0 - 8% land slope class of 180.2034 km² followed by land slope class > 15% at 116.5801 km², and land slope class (8-15%) at 93.54777 km².

The physio geographic element of the raw water source class in the study area is processed based on the range of springs per village. The amount of water in an agriculture is very important, especially if you want to hold the development of agro-tourism areas which incidentally is agriculture-based tourism. Besides the use of water for agricultural crops, water is also one of the crucial elements in a tourist location. The more number of raw water source points in a village, the more potential the village has for the development of agro-tourism areas of raw water source class.
3.2. Socio geographic Elements
According to the World Tourism Organization attraction is an attraction that must be possessed by a tourist attraction. Attractions are local attractions and are at a tourist destination to attract tourists. The value of attraction in this study was obtained by conducting interviews of 5 questions namely regarding natural scenery, cultural performances, types of activities for agro tourism, other types of activities supporting agro tourism, and supporting ODTW.

Accessibility is a series of systems that look at the pattern of geographical land use with the application of the transportation network system that connects it. Ease of accessibility is a benchmark of traveling comfort needed by tourists. Accessibility is also an easy benchmark or difficulty for tourists to get to a tourist location. Accessibility for the development of agro-tourism in this study through interviews with 5 questions namely road networks, distance, modes of transportation, travel time from other ODTWs, travel time from the centre of Bandung.

Another important aspect of tourism is accommodation. Accommodation in general is the provision of services for tourism activities both in the provision of resorts in tourist destinations, supporting facilities such as restaurants, entertainment and other facilities that are managed commercially. The accommodation for the development of agro-tourism in this study carried out interviews with 5 questions namely regarding the availability of souvenir sales, lodging, public facilities, clean water networks, and electricity networks.

In the context of tourism, some experts explain that institutions are an important component in supporting the success of tourism. Institutions play a role in managing the resources and distribution of benefits in an effort to increase tourism potential. The urgency of the existence of institutions in the field
of tourism is that institutions can play a role as a vehicle and an activator in facilitating and developing community participation in tourism. The existence of institutions in tourism will also make tourists more likely to visit and look for tourist attractions if in the area tourists can feel the security and protection (protection of tourism). The institution for developing agro-tourism areas in this study carried out interviews with 5 questions namely policies and regulations from the government, promotion of tourism in the research area, the role of tourism stakeholders in the research area, assistance from the government, and regular meetings held by local communities.

Cultural values and community characteristics that highly uphold fraternity, mutual respect and respect for others can give a positive impression for tourists, especially foreign tourists who usually travel not only to look for beauty but also want to see the original cultural character of a society, the management of cultural character in an area it should always innovate. Local people are one of the important actors in tourism because actually the community will provide most of the attractions while determining the quality of tourism products. In addition, local people are the direct owners of tourist attractions that are visited at the same time consumed by tourists. Community characteristics for the development of agro-tourism in this study through interviews with 5 questions namely livelihoods, tour guides, empowerment programs, organizations, and cooperative attitudes of local communities.

Figure 4. Attraction Class Map.
Source: Researcher results (2019).

Figure 5. Accessibility Class Map.
Source: Researcher results (2019).

Figure 6. Accommodation Class Map.
Source: Researcher results (2019).

Figure 7. Institutional Class Map.
Source: Researcher results (2019).
3.3. Spatial Pattern

The result of physiographic overlay between distance class, slope, and raw water source in the study area shows that the medium category dominates the most specifically in the Cikalong Wetan Sub-District while areas that have a low category dominate in the Lembang Sub-District. The high category is owned by Mandalamukti Village in Cikalong Wetan Sub-District and Padaasih Village in Cisarua Sub-District.

The results of the overlay of socio geographic elements in the development of agro-tourism areas between attraction classes, accessibility, accommodation, institutions, and community characteristics in the study area show that all villages in each Sub-District of the study area are dominated by low categories, especially in Lembang Sub-District with 13 villages. There are 8 villages which are categorized high by Cikalong Wetan Sub-District, namely Mekarjaya Village, Mandalamukti Village, West Cisomang Village, Wangunjaya Village, Ciptagumati Village, Cikalong Village, Rende Village, Kanangasari Village. Cisarua Sub-District has the most diverse categories with a high category of 3 villages namely Jambudipa Village, Pasirhalang Village, Sadangmekar Village, medium category of 3 villages and low category of 2 villages.

![Figure 8. Characteristics of Communities Class Map. Source: Researcher results (2019).](image)

![Figure 9. Physiographic Elements Map. Source: Researcher results (2019).](image)

![Figure 10. Socio geographic Elements Map. Source: Researcher results (2019).](image)
The spatial pattern of agro-tourism development is obtained from physio geographic and socio geographic elements through scoring and weighting, and overlaying to obtain potential areas. The processing results obtained 8 class typologies, including:

1. High physiogeographic and high sociogeographic covering 1 Village namely Mandalamukti Village, Cikalong Wetan Village with an area of 5.95 km²;
2. High physiogeographic and moderate sociogeographic covering 1 Village of Padaasih, Cisarua Village with an area of 4.94 km²;
3. Medium physiogeographic and high sociogeographic, covering 9 Villages namely Cikalong Village, Ciptagumati, West Cisomang, Kanangasari, Mekarjaya, Rende, Wangunjaya Cikalong Wetan Sub-District with a total area of 49.95 km², and Jambudipa Village, Pasirhalang Village, Cisarua Village with an area of 49 area of 8.12 km².
4. Medium physiogeographic and moderate sociogeographic, covering 2 Villages namely Cipada Village and Tugumuki Village, Cisarua Village with an area of 14.11 km².
5. Medium physiogeographic and low sociogeographic, covering 11 Villages namely Cipada Village, Mandalasari, and Tenjolaut Village of Cikalong Wetan Village with a total area of 35.37 Km², Kertawangi Village of Cisarua Village with an area of 5.82 km², Cibodas Village, Cikidang, Cikole, Kayuambon, Langensari, Lembang, and Mekarwangi Village, Lembang Village with a total area of 36, 20 km².
6. Low physiogeographic and high sociogeographic, 1 Village, which is intermediate village Cisarua Village with an area of 8.75 km².
7. Low physiogeographic and moderate sociogeographic, covering 3 Villages, namely Gudangkahirupan, Jayagiri and Sukajaya Villages, Lembang Village with an area of 18.52 km²; and
8. Low physiogeographic and low sociogeographic, covering 9 Villages, Ganjarsari Village, Puteran Village, Cikalong Wetan Village with a total area of 24.41 km², Pasirlangu Village, Cisarua Village with an area of 12.21 km², Cibogo Village, Cikahuripan, Pagerwangi, Suntenjaya, Suntenjaya, Wangunharja, and Wangunsari Village, Lembang Village, with a total area of 42.60 km².

Villages that have high physio geographic and socio geographic elements have the potential to be developed as plantation agro-tourism sites, but conversely if typology shows low categories, it means that the village has less potential to be developed as plantation agro-tourism sites.

![Figure 11. Spatial Patterns for Agro Tourism Development Map. Source: Researcher results (2019).](image)

The results showed that moderate physiological and low sociographic typologies had the highest number of villages, 11 villages, and high physiographic and high sociographic elements had the lowest potential, namely 1 village, Mandalamukti village.
Figure 12. Graph of Number of Villages and Typology.
Source: Researcher results (2019).

4. References
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