Characterization of ecotourism destinations in Toba Lake area with the Tourism Area Life Cycle (TALC) method and sustainability analysis

L Manalu and Y Manik*

Engineering Management Study Program, Institut Teknologi Del, Laguboti, Sumatera Utara, Indonesia

*yosef.manik@del.ac.id

Abstract. Lake Toba is one of national strategic tourism destinations which is projected to become one of the economic contributing sectors. To make the strategic programs for the sustainability of its development, detailed mapping of its characteristics is needed. This study aims to map the position of 4 destinations in Lake Toba namely Soda Water Natural Pool, Aek Nauli Forest, Tao Silalahi and Sampuran Efrata Waterfall which present the types of ecotourism and its geographical distribution. Mapping was made in the Tourism Area Life Cycle model. Criteria in mapping include attractions, facilities and services, accessibility, image of tourism object and costs or prices. Measurement of criteria is done by conducting a survey of 120 respondents representing four kinds of stakeholders are private owner, Department of Tourism, research institution and local community. The result of this study is presented that the destination of Soda Water Natural Pool is in the exploration stage, Aek Nauli Forest is in the involvement stage and Tao Silalahi and Sampuran Efrata Waterfall are in the stagnation stage. The position in tourism life cycle will be the basis in making development strategies of ecotourism in Lake Toba Area.

1. Introduction

In the current era of globalization, the tourism industry has become one of the biggest suppliers of income in the people's economy. This is proven in the Ministry of Tourism Book (2016), that part of the country's foreign exchange is given to the Gross Domestic Product (GDP) as a contribution from the tourism industry and the rest is used to develop the tourism sector and provide employment opportunities to 11 million people [1]. One of the tourism areas that is currently a priority of the government is the Lake Toba Area which is included in 88 National Tourism Strategic Areas based on Government Regulation Number 50 of 2011 concerning the Tourism Development Master Plan. The Lake Toba area is surrounded by 7 districts namely Simalungun, Toba Samosir, North Tapanuli, Humbang Hasundutan, Dairi, Karo, Samosir. One type of tourist attraction in the Lake Toba Region is an ecotourism object. The ecotourism object offers a beautiful environment, charming scenery, cool air, animal care, and other supporting facilities. Ecotourism is traveling to remote areas to enjoy, protect and bring awareness to endangered wildlife [2].

The research explains that the identification has been done for 17 ecotourism objects in the Lake Toba area, namely Tongging, Tao Silalahi, Faith Park, Lae Podom Forest, Haranggaol, Simarjarunjung, Aek Nauli Forest Taman Eden 100 Forest, Meranti Forest, Hutaginjang, Sipinsur, Bakkara, Pangururan Hot Spring, Sampuran Efrata Waterfall, Soda Water Natural Pool, Salib Kasih
Hill and Sipoholon Hot Spring. Most of the ecotourism objects in the Lake Toba area are owned and managed by local governments by empowering human resources who live around the ecotourism objects. Most of the data on visitors to the ecotourism object in the Lake Toba area was not recorded or recorded properly by the management. The ecotourism object in the Lake Toba region has a wide area that varies where there is a small land area, medium and large. To classify this land area, a classification is carried out, namely small land area is <2 Ha, medium land area is in the range of 2 - 100 Ha, and large land area is >100 Ha. [3].

In 2018, the number of foreign and domestic tourist to the Lake Toba Region fell by 14% from the previous year, so it can be seen that attractions in the Lake Toba Region still need development. Based on this, this study aims to determine the position of ecotourism objects in the Lake Toba Region in the tourism life cycle to see the extent of the development of the ecotourism destination. This has become the foundation in making development strategies to increase the number of visitors and be able to realize the Lake Toba Region as a national destination. To find out these characteristics, a study was conducted using the Tourism Area Life Cycle (TALC) method. This method was first stated by Richard Butler to predict the direction and trends of regional tourism development [4]. The tourism Area Life Cycle is a conceptual one that is widely used for tourism areas that currently provide long-standing tourism needs and have to start anew for renewed tourism [5]. The Tourism Area Life Cycle method is an interaction method which considers the carrying capacity of tourism which is very important in the tourism life cycle [6]. The method is used as a foundation in developing strategies to build a foundation and infrastructure, unique items and natural landscapes that are often not compatible with economic improvement. The life cycle of tourism follows the stages of exploration, involvement, development, consolidation, and stagnation (which consists of two namely, decline and rejuvenation). Each stage in the tourism life cycle has characteristics that are characteristic of each stage (Figure 1).

In various previous studies, determining the position of a tourist attraction in the tourism life cycle is determined by various approaches or ways. To get the desired results, the Tourism Area Life Cycle (TALC) method can be qualitatively, quantitatively or mixed (qualitatively and quantitatively). To determine the position of the Attack Village in the tourism life cycle in qualitatively, where the mapping of the position of the object of research is based on the characteristics or characteristics of tourist objects obtained through observation and interviews with informants who then adjusted to the characteristics of each stages in the tourism life cycle. Thus, it was found that Serangan Village was at

![Figure 1. Stage of tourism area life cycle](image-url)
the stage of involvement [8]. To determine the position of a tourist attraction in Lima Pulu Regency uses a quantitative approach which is based on secondary data analysis and scoring from the Gunn model (with a criteria system) to map the development of a tourist attraction. So, the results obtained are the Harau Valley at the stability stage, the Batang Tabik at the consolidation stage, the Padango at the Gadang House is at a decreased quality stage or decline stage, and the Kapalo Banda Tourism Object in the involvement stage [9]. To find out the position of Tuktuk Sidong, Muara, Sibandang, Parapat, Silintong Lumban, Bakkara, Sisingamangaraja Tombs, Paropo, and Tongging attractions in the tourism cycle. The study found the object of research in the tourism life cycle in a mixture (qualitative and quantitative), where mapping is obtained by calculating the value of a questionnaire that has been distributed to stakeholders and tourists for the characteristics of tourists who come to the tourist attraction. So, the results are Paropo, Muara, and Bakkara in exploration stage, Tongging and Silintong in the involvement stage while Parapat and Tuktuk are in stagnation stage [10].

In this study, researchers used quantitative and qualitative approaches. To determine the position of a tourist attraction in the tourism life cycle based on score total that get from a questionnaire that has been distributed to respondents are visitors and stakeholders. While the variables used are based on a summary of the characteristics of each stage in the life cycle of tourism, tourist attraction requirements [11] is attractions, facilities and services, accessibility, image of tourism object and cost or price which is also based on the characteristics of tourism development [11].

2. Research methodology

This research was conducted in the Lake Toba region which covers seven districts, such as Toba, North Tapanuli, Humbang Hasundutan, Dairi, Karo, Simalungun and Samosir. There are 4 types of ecotourism in the Lake Toba Area, consisting of waterfalls, forests (nature), baths and views [12]. The sample was chosen based on representatives of each type of ecotourism in the Lake Toba Region so that the sample size was 4 ecotourism objects. While the geographical distribution is represented by the west-north side (Samosir-Dairi-Karo), east-south district (Simalungun-Toba-North Tapanuli-Humbang Hasundutan), north-east district (Karo-Simalungun) and south-west side (Humbang Hasundutan-Samosir) in the Lake Toba Region. So, the samples in this study were Aek Nauli Forest, Tao Silalahi, Soda Water Natural Pool and Sampuran Efate Waterfall.

This research was conducted by combining quantitative and qualitative approaches. The quantitative approach was carried out by distributing questionnaires to 120 visitors and 4 stakeholders, namely the owners of the Soda Water Natural Pools, the Tourism Office of Samosir Regency, the community around Tao Silalahi and BP2LHK Aek Nauli. The questionnaire was filled out using a Likert scale. Each evaluation variable on a likert scale uses criteria so that the assessment is better and more directed. While the qualitative approach is carried out by surveys, interviews and literature studies. To explain how the development of the tourist attraction, a number of categories of variables were chosen as references such as attractions, facilities and services, accessibility, image of the tourist attraction as well as cost or price. Each variable category then has variables that will be assessed by each respondent, while the variable categories are determined by stakeholders. To determine the position of ecotourism objects in the tourism life cycle based on the total score. First, determine the weighting of variable categories carried out by stakeholders. This weighting will then be calculated using the pairwise comparison method. After the weight of the value is known, then what is processed is the assessment of visitors. Visitor ratings are then averaged for each variable and added up for each variable category. Furthermore, the sum of each category is then multiplied by the weight to get the value of each variable category. The values from the variable categories will then be added together to get the total score.

3. Results and discussion

Determination of the position of ecotourism objects in the tourism life cycle is based on the total score obtained through data processing of each variable so that the following results are obtained. By using the interval calculation formula mathematically, the interval used is 0.15. By using a scale width of
each of the above stages, the mapping of each ecotourism object in the tourism life cycle is based on the total score of the ecotourism object which is between the scores of each stage (Figure 2).

3.1. Soda water natural pool

Based on the tourism life cycle, Soda Water Natural Pool are in the exploration stage. Soda Water Natural Pool has a very original attraction which is added only in the form of a wall beside the pond while the base is still in the form of sand and rocks. However, the facilities offered are still low. Where there is only a toilet or dressing room that is not maintained and is not suitable for use because it is not clean, the door cannot be locked, there are no lights, and no air ventilation. Places to eat provided only provide food and soft drinks, the absence of lodging around attractions, and limited parking. In addition to low facilities, visitors also do not get good accessibility. The condition of the potholes and the narrow road so that it cannot load four-wheeled vehicles when passing each other, the distance of the transportation network with no fixed time and only one direction and does not provide clear information makes visitors reconsider this place because of the still low access. In addition, the community around the tourist attraction is still very friendly to visitors and free to interact with visitors. However, they do not utilize this attraction for economic purposes. This is very unfortunate considering this attraction has a very good attraction and can attract visitors so that it can improve the economy of the surrounding community. In introducing a tourist attraction, the owner of Soda Water Natural Pool has not done promotion directly by using social media and print media. This is a failure by the owner, given the ecotourism object, including a rare tourist attraction and the only one in Indonesia. This must be corrected immediately because promotion is very important in influencing the arrival of visitors to Toba Lake [12]. If the owner carries out a better promotion it will be able to introduce Soda Water Natural Pool to the world and increase the number of visitors who come. To increase the number of visitors, stakeholders must improve road conditions, add public transportation and add road directions to Soda Water Natural Pool because the transportation have a significantly influence the loyalty of the tourists visiting the Lake Toba [13]. This will make it easier for visitors to come to this attraction. In addition, the owner of a tourist attraction is also expected to make social media as a means of promotion, repair toilets, expand parking lots, improve maintenance and cleaning systems and provide photo facilities for visitors. These improvements are expected to increase the number of visitors.

| No | Variable Category       | Weight | Soda Water Natural Pool | Tao Silalahi | Aek Nauli Forest | Sampuran Efrata Waterfall |
|----|------------------------|--------|-------------------------|--------------|------------------|--------------------------|
| 1  | Attractions            | 0.2    | 2.20                    | 2.30         | 1.80             | 2.00                     |
| 2  | Facilities and Services| 0.18   | 1.98                    | 2.59         | 2.93             | 2.34                     |
| 3  | Accessibility          | 0.22   | 1.61                    | 2.07         | 2.63             | 2.35                     |
| 4  | Image of tourism object| 0.26  | 2.16                    | 2.00         | 1.19             | 2.52                     |
| 5  | Cost or Price          | 0.14   | 1.26                    | 1.04         | 0.91             | 0.92                     |
|    | Score Total            | 9.29   | 10.02                   | 9.46         | 10.06            |                          |
3.2. Aek Nauli forest
The position of Aek Nauli Forest is at the stage of involvement. This attraction is equipped with facilities provided by the manager and the community, although still limited. The manager has provided toilet facilities although it is still in a less clean condition but it is still suitable for use and ample parking space. While facilities such as places to eat have been provided by the surrounding community despite the limited circumstances and are outside the tourist attraction. This can prove that the surrounding community has begun to participate in attractions and use it as a source of economy. In addition, the condition of accessibility to attractions is also good with the condition of the paved road, easily traversed for four-wheeled vehicles. Directions to the tourist attraction are also available and are able to provide clear information about the location of the tourist attraction, although it is poorly maintained. Nevertheless, the location of a tourist attraction on the edge of a large road makes it easy for visitors to find this attraction. However, public transportation is still quite difficult to get from the location of the tourist attraction even though it is on the edge of a major road this is because of the far transportation network. To increase the number of visitors, the manager has made promotional efforts through print media in the form of newspapers, social media in the form of Instagram, Facebook, Twitter, and TV broadcasts such as TV One and TVRI. This can increase the number of visitors who come to this ecotourism object. Data on the number of visitors in 2017, 2018 to 2019 increased by 5000 visitors. Visitors usually come on holidays and weekends to enjoy this ecotourism object. To increase the number of visitors, the manager of Aek Nauli Forest is expected to improve the system of maintenance and cleanliness of tourist objects, improve service quality, add special transportation in the location of attractions, add photo facilities, maintain toilet cleanliness and create festivals at tourist attractions. This improvement is expected to increase the number of visitors.

3.3. Tao Silalahi
Tao Silalahi's position in the tourism life cycle is a stage of stagnation. Initially, the main purpose of tourists to visit to enjoy the scenery and play in nature. To complement this, a cultural attraction was developed in the form of tortor attractions and the attraction of making Ulos Silalahi as one of the distinctive features of this tourist attraction. However, these cultural attractions must be corrected immediately because visitors are not satisfied with these cultural attractions [14]. The decreasing quality of facilities and services provided by the surrounding community as a manager of this attraction is characterized by toilets, cleanliness, places to eat, lodging, and others that are neglected. This is evidenced by the tourist attraction environment is also not clean because there is still a lot of trash scattered about and the lack of adequate sanitation facilities. Lake Toba water has also begun to
get dirty because of the scattered garbage pollution from the floating net cages (KJA) and so much water hyacinth blocking the view of Lake Toba [15]. However, to increase the number of visitors, the surrounding community as the manager to add the function of a tourist attraction that is as a place for camping which is located at one point the location of the attraction. To increase the number of visitors, the manager of Tao Silalahi is expected to add, repair and maintain toilets, improve the cleanliness of tourist attractions, and make social media as a promotional tool.

3.4. Sampuran Efrata waterfall

Sampuran Efrata Waterfall is at a stage of stagnation in the tourism life cycle. Attractions offered by the Sampuran Efrata Waterfall are only views of the waterfall and its surroundings and tours like this also exist elsewhere. The number of visitors is declining due to the decreased quality of facilities and services. The facilities provided are toilets which are quite far from the waterfall with unsanitary and poorly maintained conditions. Likewise, the changing rooms were not clean, could not be closed because the door was broken, and there was no water so some visitors said that the changing rooms were not feasible. Other facilities provided are places to eat provided by the surrounding community and parking lots. To keep tourists coming to visit this attraction, the manager must be able to add to the function of this attraction. However, the condition of the tourist attraction that has not been added to the function resulted in the position of the Sampuran Efrata Waterfall is in a stage of decline. To increase the number of visitors, the manager of Sampuran Efrata Waterfall is expected to improve the condition of the road to the tourist attraction. The manage social media well, provide new attractions, make repairs and additions toilets and changing rooms, and add safer photo facilities.

4. Conclusion

The Soda Water Natural Pool is in the exploration stage, Aek Nauli Forest is in the involvement stage, Tao Silalahi and Sampuran Efrata Waterfall are in the stagnation stage. Based on the above analysis, it can be seen that the condition of ecotourism objects in the Lake Toba area is still in dire need of development and development. Some things that need to be considered are the lack of cleanliness of tourist objects and are always an obstacle in every sample of ecotourism object, the quality of toilets provided and public transport networks that are not routinely available and close to attractions. It also exist elsewhere. The number of visitors are not feasible. Other facilities provided are places to eat provided by the surrounding community and parking lots. To keep tourists coming to visit this attraction, the manager must be able to add to the function of this attraction. However, the condition of the tourist attraction that has not been added to the function resulted in the position of the Sampuran Efrata Waterfall is in a stage of decline. To increase the number of visitors, the manager of Sampuran Efrata Waterfall is expected to improve the condition of the road to the tourist attraction. The manage social media well, provide new attractions, make repairs and additions toilets and changing rooms, and add safer photo facilities.

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