The Implementation of Web-GIS in Developing Tourism Object in Langkat Regency with Location Based Service Method

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Abstract

This research aims to help out the Culture and Tourism Office of Langkat Regency in presenting Langkat Regency tourism objects widely across the globe through the web. Therefore, it can be trusted to be able in increasing the number of both domestic and foreign tourists to visit Langkat Regency. This research shows a digital map on the web using the Google Maps API. With the belief that with there is an app that can clearly and completely displaying the name, photo, description and location of tourist objects which are taken from the database contained in the Google DBMS, it can increase the prospect of the number of tourists coming to Langkat Regency. Given that Langkat Regency has very good tourism potential. One of them is the Bukit Lawang area which has captivity for orangutans, then which are endangered and endangered by elephant captivity. With webGIS using the Location Based Service (LBS) method by utilizing Google Maps API technology and the CodeIgniter Framework. With LBS, the coordinates of tourist locations in the form of latitude and longitude derived from the Google Maps application can be easily entered in the webGIS code structure.

Keywords: Tourism Information, Web-GIS, Googlemaps Api, Langkat Regency

1. Introduction

In the current of pandemic of covid-19, there is a sector that feels the most negative impact, it is the tourism sector, where the implementation of the lockdown policy in every country over the world has resulted in closed tourist access. As a result of this condition, the 3 sectors that feel the most impact are the UMKM sector, the creative economy and the tourism sector [1]. Public places are prohibited from operating, this is exacerbated by the PSBB policy in several regions. The tourism sector is also experiencing a downturn. This is what is experienced by the government and the people of Langkat Regency. As a result of the Covid-19 pandemic, many tourist attractions have closed. In fact, this tourism sector is one of the sectors that plays an important role in regional income [2]. Langkat Regency is one of the regencies located in North Sumatra Province which is known for its very attractive tourism potential. This is because this regency is located along the foothills of the Bukit Barisan. The available tourist attractions include waterfalls, tree houses, orangutan captivity which is included in endangered animals and animals in protected categories and elephant breeding. Many foreign and domestic tourists are interested in visiting tourist objects in Langkat Regency.

According to the data from the Central Statistics Board of Langkat Regency, one of the sources of regional income for Langkat Regency comes from tourism sector. This is evidenced by the large amount of regional revenue in the tourism sector each year. In fact, this sector can be used as one of the leading sectors in the future of AEC (Asean Economic Community) [3]. However, on the other hand, efforts to promote tourist objects in Langkat Regency are still lacking. Especially for foreign tourists, they only know Lake Toba, Bali and West Nusa Tenggara, even though in North Sumatra, especially Langkat Regency, has no less good tourist objects. Because of lack of information, foreign tourists do not know the tourist objects in Langkat Regency.
Hence, we need a system to present tourist objects in Langkat Regency so that it is better known by the wider society. The tourism sector can be used as a leading sector in assisting a region in increasing income, opening jobs, creating creative economy businesses and improving infrastructure in an area. Therefore we need a system that is easy and efficient in introducing tourist objects to the wider community by utilizing appropriate technology in the form of webgis app which are products in the era of the Industrial Revolution 4.0 which use the Internet and big data in databases [4]. Where in this application is equipped with information about tourist objects in detail, where this application will be equipped with information on place recognition, location distance, conditions and location maps which are displayed digitally on the web page. The purpose of making this app is to increase the attractiveness of tourists in getting to know tourist objects in Langkat Regency. So that the number of tourists both foreign and domestic can continue to increase.

WebGIS is an app that combines design web and mapping web[5]. This webgis technology can show a map of a tourist attraction in a web page, which can be opened using a browser application. The GIS app is a solution in introducing and reviving the tourism sector during the current pandemic, considering that during the pandemic of covid 19 all activities were restricted to prevent the spread of the corona virus from spreading. By using internet technology, information can be conveyed to the wider society. By using the Location Based service method that utilizes the Google Maps API. With the method of determining tourist location points by inputting the coordinates of the latitude and longitude obtained from the google maps app. The results of this study will produce an app that contains a map of tourist attractions that can provide tourist map information to foreign and domestic tourists

2. Research Methodology

2.1. Place and Time research

The first process to conduct this research is collecting data. Data was collected directly from the location of the object, besides that the researcher also conducted a survey at the Langkat Regency Tourism Office. This is conducted so that the information obtained is more accurate. Research data were also obtained from the managers of tourist attractions and tourists who use this tourist application. The following is a flowchart description of the steps taken by researchers in collecting and processing existing data, can be seen in the following picture:

![Figure 1. The Stages of Research Work](image)
a) Collecting data on the location. The data were obtained from direct locations and the Langkat Regency Culture and Tourism office, official websites, as well as other relevant sources.
b) Data Analysis. Doing literacy in journals, books and other literature. Prepare tools and materials based on data to be used in analyzing data to support application development.
c) Problem Identification. Based on the data obtained, the researcher identifies existing problems to support the next stage of research.
d) Build a web-based application with the GIS method. This stage is the stage of creating an application system in accordance with the need to introduce tourist objects in Langkat Regency by using PHP programming language and MySQL Database Management System (DBMS).
e) System Testing. The stages in testing the system that has been built in order to get optimal conditions
f) Evaluation. Retrieving data from application trials.
g) Make a report and conclude the research results

2.2. Time and Place
Time the research was conducted from the beginning of April 2019 to the end of July 2019 at the Department of Culture and Tourism of Langkat Regency, North Sumatra, which is located at Jl. Imam Bonjol No.65 Stabat, North Sumatra.

2.3. Data Analysis
Data analysis is carried out based on supporting data obtained in the study. Data analysis here is as an effort or way to process data into useful information as a solution to problems. Especially problems that are directly related to research results. Researchers conducted a case analysis by comparing and looking for news, research literature that was in accordance with the theme of web-based location selection with the GIS (Geographic Information System) method. The method used is descriptive qualitative analysis method. The treatment in this research is to enter data on tourism objects in Langkat Regency. Which will then be saved in a database that was previously built. After that, environmental management will be carried out in building specific indicator monitoring facilities. This was followed by trying several times on the menu functions and items contained in the applications that have been built. After inputting the data, the next process is making maps in a GIS (Geographic Information System) which is more flexible than the manual method. The maps created can be printed at various scales and can show the information selected according to certain characteristics.

From the data of the Tourism and Culture Office of Langkat Regency, it can be seen that several tourist attractions are frequently visited by people who have contributed to Langkat Regency PAD, including: Namu Sira-sira, Simolap Hot Spring, Siluman Waterfall, Lau Kulap Baths, The Yo's Hill, Florida Beach Natural Bathing, Landak Bahorok River, Abadi Pond, Selfie Park, Tangkahan, Salak Beach Waterfall, Saringgana Waterfall, One Heart Hill, Bukit Lawang and Habitat Tree House [6]. Then an app is built based on the need for promotion of tourist objects in Langkat regency. With the display as follows:
Meanwhile, from the Central Statistics Board of Langkat Regency, a comparison of the number of tourists in 2020, namely: The number of foreign tourists during January-December 2019 amount to 246,198, or increase of 10.12% from 2018. Meanwhile, in 2020, since the Pandemic period, the number of foreign tourists could not be traced at BPS Langkat Regency and BPS North Sumatra Province [7].

![Figure 2. Web app view](image)

![Figure 3. Graph the Number of Tourist in Langkat District](image)

The research data which is the basis of this research are spatial and non-spatial data. The spatial data is in the form of a map of the location of the research area and the coordinate points of tourist locations in Langkat Regency which are taken from Google Maps. The search for coordinate data is done by entering certain travel keywords into the Google Maps application which is accessed online via the http://map.google.com page. Then the search results found the coordinates of the location and recorded coordinates in the form of latitude and longitude. Meanwhile, non-spatial data consists of primary data and secondary data. Primary data is in the form of tourism data in Langkat Regency which is obtained from Langkat district government sources and internet sources. The data taken is in the form of photos of tourist attractions and short profiles that contain their history, address, contact numbers and travel routes to these tourist locations.

2.4. Location Based service Method

Location Based Service (LBS) is a location-based service that can identify specific objects and display their location. LBS can be accessed on mobile devices with internet media [8]. LBS services to emphasize the user's position by utilizing the position of network cells or by using Global Positioning System (GPS) technology. LBS uses the coordinates of latitude and longitude in determining the user's location point [9]. This service contains a world map that we can use to view or display an area using a browser. Google Maps users can easily display a map on a web page or blog by using the Google Maps API. Google Maps API itself is a library in the form of JavaScript [10]. In the
Google Maps v3 library codeIgniter structure, there is an API key which can be obtained free of charge through the Google Maps app by visiting the https://code.google.com/apis/console page. This API key is needed to display a Google Maps map on a web page. The following is the API code in the CodeIgniter Google Maps v3 structure:

```php
class GoogleMaps

var $apiKey = 'AIzaSyC6-
3NeE2Sw0R1z8Tk20m4b6EMk_DnuGoHk';
```

3. Result and Discussion

The results of this research are a form of innovation in the use of web-based app that can assist in promoting the introduction of tourism objects. In this initial research, several problems that often arise in daily use will be tested. So that the application of the results of this research will provide assistance to the Langkat regency government in increasing regional income through tourism. To build a tourism information system based on Geographical Information System, it is necessary to design a map mapping using Google Maps. Where the geographic information system design can be seen in figure 4.

![Figure 4. Langkat Regency Geographical Information System Architecture](image)

While the interface design or admin activity diagram of the website to be built can be illustrated in picture 5 below:

![Figure 5. Diagram of Admin Activity](image)
And user activity that starts from user browsing to display the menu and dashboard display can be illustrated through the following diagram:

![Diagram of User Activity](image)

**Figure 6. Diagram of User Activity**

### 3.1 Interface Implementation

As it discussed in the sub-design above, the next step is to implement the results of the previously made designs. The Geographical Information System interface is designed to make it easier for users to understand and use this application. The display of the front page of the Geographic Information System for tourism in Langkat Regency can be seen in Figure 7.

![Front page display of Langkat Regency tourism information system](image)

**Figure 7. Front page display of Langkat Regency tourism information system**

And here is a display of map information on the position of tourist objects in Langkat district that will be promoted on the website

![Display Map of Tourist](image)

**Figure 8. Display Map of Tourist**
While the display of the options menu that can be conducted by users in searching for information can be seen figure 9.

![Figure 9. Filter Menu in Category Group](image)

3.2. Usability Test

In the usability test, questionnaires were distributed to determine the level of use of the webGIS. The questionnaire contains questions about the use of webGIS which are made in simple language so as not to make it difficult for respondents to fill them out. The questionnaire measurement uses the Likert’s method [11]. The questionnaire was distributed online using the help of Google Forms to 40 respondents who were randomly selected through online social media. There are 10 questions divided into 3 categories, namely app effectiveness, user ease of use and user satisfaction. The weight of the questionnaire used is a scale of 1-5:

- SS = Strongly Agree weight = 5
- S = Agree weights = 4
- CS = Agree Enough weight = 3
- TS = Disagree weight = 2
- STS = Strongly Disagree weight = 1

While the calculation of the questionnaire recapitulation uses the formula:

\[
\text{Total} = \frac{\text{Number of respondents} \times \text{weight}}{\text{Number of questions} \times \text{total number of respondents}}
\]

In table 1, 2 and 3 the following shows the results of the recapitulation of the three questionnaires from a number of 40 respondents:

<table>
<thead>
<tr>
<th>No</th>
<th>Marking</th>
<th>Grade</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>The appearance of Langkat Regency tourism object is interesting</td>
<td>10 19 9 3 0</td>
<td>0.97</td>
</tr>
<tr>
<td>2</td>
<td>Tourist locations displayed on the web are appropriate</td>
<td>9 6 18 5 2</td>
<td>0.84</td>
</tr>
<tr>
<td>3</td>
<td>The information presented on the web is very helpful in providing tourist information in Langkat Regency</td>
<td>13 19 6 2 0</td>
<td>1.02</td>
</tr>
<tr>
<td>4</td>
<td>The maps presented on Google Maps on the web are very helpful</td>
<td>16 15 4 2 0</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Total 3.81
4. Conclusion

Geographic Information System (GIS) technology is a technology that is very useful in introducing tourist objects at this time. It is cool that this system has been supported by a database found on Google Maps. This is what web programmers are currently using, to increase the prospect of the number of tourists in Langkat Regency. With this system the promotion will be more practical and effective. One of the effective ways of promoting an area is by designing a geographic information system-based website that can display digital maps on the web by utilizing the Google Maps API. With this system, it will be able to clearly and completely display the name, photo, description and location of the tourist attraction. So that it can attract more attention from potential tourists both domestic and foreign.

Testing of the webGIS app is carried out by means of system testing and reusability testing. In the system test, it can be concluded that webGIS can be accessed through several different internet browsers, both on computers and smartphones. Whereas in the usability test of a number of 40 respondents, the results of the app effectiveness test were 3.81 points, the user convenience test was 3.77 points and the user satisfaction test was 3.72 points. Referring to the rating on a scale of 1 to 5, it can be concluded that the West Jakarta tourism webGIS application is categorized as "quite effective", "fairly easy" and "quite satisfied".

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References


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