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Geographic information system for boyolali tourist object mapping android based

Maria Atik Sunarti Ekowati[1], Kristyana Dananti[2], Darsini[3] Sri Wening[4]
[1]Informatics Engineering Study Program, Faculty of Engineering, Solo Christian Technology University, Surakarta, Indonesia
[2]Management Economics Program, Faculty of Economics, Solo Christian Technology University, Surakarta, Indonesia
[3]Industrial Engineering Program, Faculty of Engineering, Veteran Bangun Nusantara University, Sukoharjo, Indonesia
[4]Christian Religious Education Study Program, Faculty of Theology, Solo Christian University of Technology, Surakarta, Indonesia

A R T I C L E I N F O

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ABSTRACT

Boyolali is part of Indonesia which is rich in tourism potential and regional specialties. Boyolali is a city that has tourist attractions and typical regional souvenirs. Boyolali tourist attractions are New Selo, Gancik Hill, Kedung Kayang Waterfall, Omah Bammbu Merapi, Cengklik Reservoir, Gunung Madu Valley, Dairy Cow Agro Tourism, Brown Canyon, Tlatar Water Park, Mount Merbabu Trekking, Kedung Goro, Umbul Tirto, Gardens Raya Indrokilo, Bade Reservoir, Restu Wijaya Waterboom. However, there are problems for tourists outside the region due to the lack of information obtained or tourists' knowledge about where the tourist attractions they can visit are located. Apart from that, tourists are also confused about where to go. The aim of this research is to provide a solution to the problems faced by tourists by developing a geographic information system for mapping tourist attractions by utilizing the global positioning system (GPS) feature available on Android smartphones. Through the design of the application being developed, it is hoped that tourists and visitors to Boyolali tourist attractions will be able to obtain convenience in mapping tourist locations in the Boyolali area as well as help provide comments and ratings about the quality of the products produced by sellers.

Corresponding Author:

Maria Atik Sunarti Ekowati,
Informatics Engineering Study Program;
Solo Christian Technology University;
Jln. Robert Wolter Monginsidi No. 36-38, Gilingan Banjarsari Surakarta 57134, Indonesia
Email : maria.atik@gmail.com

1. INTRODUCTION

Boyolali is a district in Central Java Province. Geographical location of Boyolali Boyolali Regency is one of 35 regencies/cities in Central Java Province, located between 110° 22' - 110° 50' East Longitude and 7° 7' - 7° 36' South Latitude, with an altitude of between 75 - 1500 meters above sea level. According to legend, the name Boyolali is related to the story of Ki Ageng Pandan Arang (Regent of Semarang in the 16th century). Once upon a time, Ki Ageng Pandan Arang, better known as Tumenggung Notoprojo, was predicted by Sunan Kalijogo as the final guardian to replace Sheikh Siti Jenar. By Sunan Kalijogo, Ki Ageng Pandan Arang was sent to Mount Jabalakat in Tembayat (Klaten) to spread the Islamic religion (Arjasakusuma et al., 2022; Taryono et al., 2016).

On his journey from Semarang to Tembayat, Ki Ageng encountered many obstacles and stumbling blocks as a test (Noorduyn, 2006). Ki Ageng walked quite a distance leaving his wife and

children when he was in the wilderness when he was robbed by three people who thought he was carrying property. It turned out that this assumption was wrong, so this place is now known as Salatiga. The journey continued until we arrived at a place with lots of yellow bamboo trees or Ampel bamboo and this place is now known as Ampel, which is one of the sub-districts in Boyolali. In taking this long journey, Ki Ageng Pandan Arang increasingly left behind his wife and children. While waiting for them, Ki Ageng rested on a large rock in the middle of the river .

During his break, Ki Ageng said "Bâyå wis lali wong iki" which in Indonesian means "Have you forgotten this person". From the words "Bâyå Wis Lali" the name Boyolali came to be. According to the local community, this large stone is located on Kali Pepe which divides the city of Boyolali, Pasar Sunggingan Boyolali. According to local people, this stone was once a resting place for Nyi Ageng Pandan Arang. While resting, Nyi Ageng tapped her stick on this stone and the stone became curved like a dakon (an old children's toy). Because this stone looks like a dakon, the people around Sunggingan Market call it mBah Dakon and to this day this stone is sacred to the residents and no one dares to disturb it. which is now a legend in the tourism sector in Boyolali district (Aman & Asbari, 2020; Sakti & Agustian, 2021; Sari & Riyansah, 2021; Winata & Setiawan, 2013).

The tourism sector is the mainstay potential of the city of Boyolali, which is now building new tourist attractions to support the plans and vision of "Creating a Superior Tourist Destination Area that is Sustainable Competitive and Capable of Encouraging Regional Development towards an Environmentally Based Modern City". As one of the cities in Central Java Province, Boyolali has various tourism potentials, namely New Selo, Gancik Hill, Kedung Kayang Waterfall, Omah Bammbu Merapi, Cengklik Reservoir, Gunung Madu Valley, Dairy Cow Agro Tourism, Brown Canyon, Water Park Tlatar, Trekking Mount Merbabu, Kedung Goro, Umbul Tirto, Indrokilo Botanical Garden, Bade Reservoir, Restu Wijaya Waterboom. It is difficult to determine travel planning because a description of the tourist area is not available, such as a visualization of the place, the distance between tourist areas and the roads that must be taken. Therefore, through designing and creating a tourism Geographic Information System (GIS), it is hoped that it can display a tourist map of the city of Boyolali so that it is more attractive and can be enjoyed by the wider community. Presenting information in web form makes it easier for people to access it. Geographic Information Systems (GIS) technology has developed rapidly. GIS is created using information originating from the processing of a number of data, namely geographic data or data related to the position of objects on the earth's surface. GIS technology integrates database-based data processing operations that are commonly used today, such as capturing typical visualizations as well as the various advantages that geographic analysis can offer through map images. GIS can be presented in the form of desktop applications or web-based applications. GIS can also provide an explanation of an event, and other strategic planning and can help analyze general problems such as economic problems. In accordance with the description above, there is a need for an ANDROID-BASED GEOGRAPHIC INFORMATION SYSTEM FOR MAPPING BOYOLALI TOURISM OBJECTS, which requires information facilities in the form of desktop applications and web-based applications (Abdulghani & Ubaedilah, 2018; Nugraha, 2012; Pradana & Assegaff, 2019; Sukron & Sarjono, 2021).

2. RESEARCH METHOD

In developing this system, we first explain the tools and materials, system development methods, system output, evaluation and documentation of the Geographic Information System for the Fastest Route Search for Boyolali tourist locations using the WayPoint function and the Web-based Greedy Heuritic method in the city of Boyolali, Tools and materials (Susianto et al., 2022; Zaliluddin & Rully, 2020)

Making a geographic information system for finding the fastest route to tourist locations in Boyolali district using the waypoint function and greedy heuristic method in Boyolali city based on web requires several tools and materials, namely hardware and software. Laptop hardware required as a means of building applications, tested by admin. The software needed as a tool to build applications is (Budiyanto, 2002; Leman & Akbar, 2018; Ritonga et al., 2021; Susanto, 2021):

1. OS (operating system), when creating the application, Windows 11, 64-bit is used as a medium for running other software that will be used to create the system.
2. Sublime Text is a text editor that will be used to create program code for the application that will be created in this final assignment.
3. Using PHP as the programming language

4. CodeIgniter is used as a framework for creating applications in the form of websites which will make it easier to develop applications.
5. XAMPP is Apache web server software which contains a MySQL server which will be used as a server in creating applications and is used to manage the database required by the application.
6. Microsoft Office 2011 was used for report preparation.

The data and information needed, the method used in the data collection process is :

1. Literature Study
   The research method used is a literature study method with references from books including Basics of Dynamic WEB Programming using PHP, Basic Concepts of Geographic Information Systems and a GIS journal entitled Geographic Information System Applications for tourism mapping in Boyolali Regency.
2. Interview
   The interview technique is a method of collecting data by conducting one-sided questions and answers which is carried out systematically and based on the research objectives, namely by conducting interviews with the managers of Boyolali district tourist attractions.
3. Observation
   Direct observations were carried out in Boyolali district to collect the required data such as coordinates and location of tourist locations.

3. RESULTS AND DISCUSSIONS

In this research, database design aims to meet information needs according to what users need for certain applications. This database design aims to obtain a database scheme that minimizes data redundancy and duplication and maintains data integrity. The database design produces 3 designs, namely conceptual design, logical design and physical design (Pribadi & Istiqomah, 2021).

The Database Logical Design Stage aims to prepare a conceptual design in accordance with the selected SMBD. Transform the conceptual model produced in the previous stage into a data model that is appropriate to the SMBD used, and using MySQL as the SMBD. SMBD MySQL uses a relational data model. The development of the logical model is carried out by creating a relationship table that connects between entities. Logical modeling is also confirmed by identifying the key elements (identity) of each entity. Can be seen in Figure 1. Boyolali Tourist Map Database Logic (Rahman & Ali, 2019).

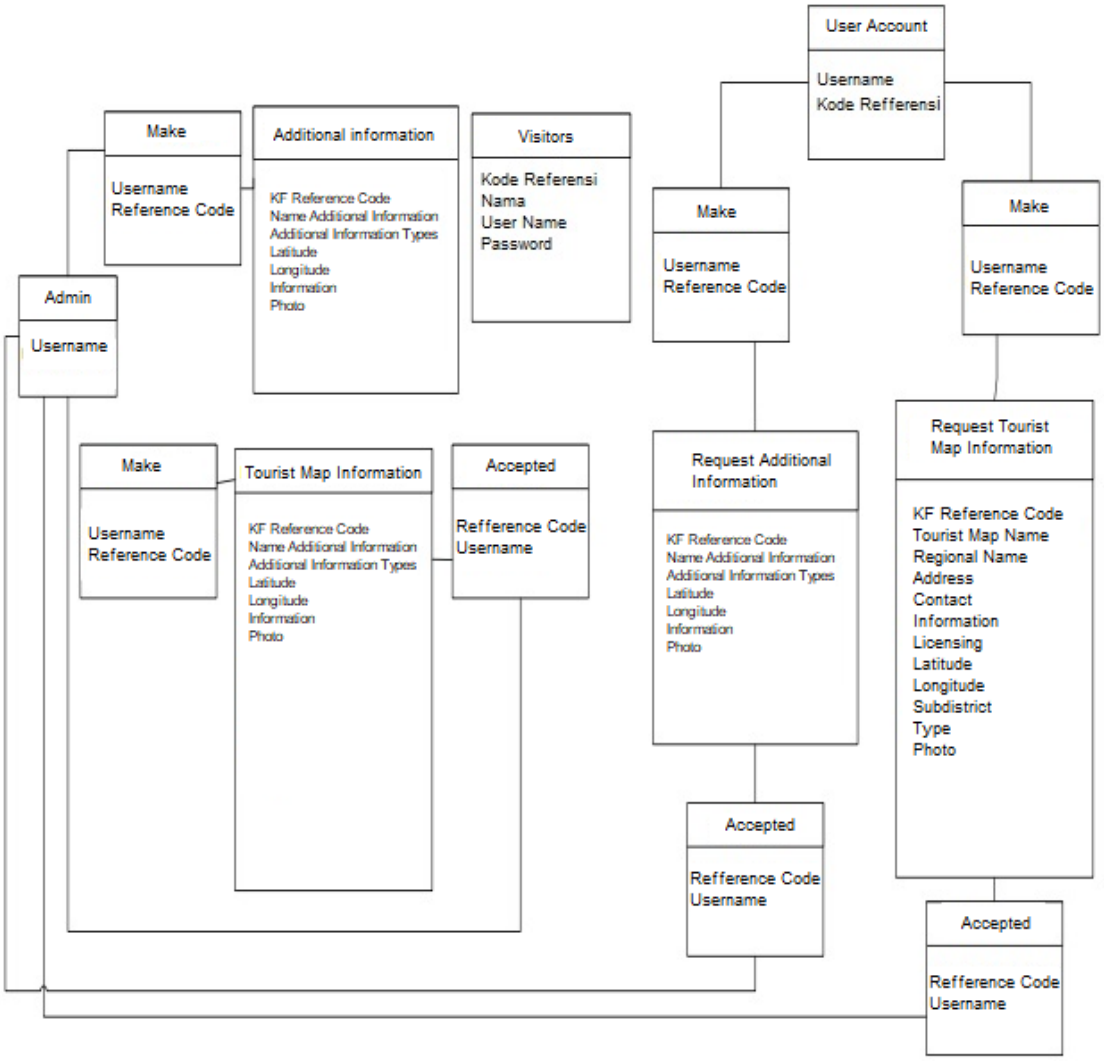

Figure 1. Boyolali tourist map database logic

The next design is a Physical Database Design created with the aim of creating storage structure specifications and data access paths so that good system capabilities are obtained for various applications. In physical design, a transformation of the data structure that will be stored is also carried out by specifying the structure of each data file (Mega Ningsih et al., 2022; Ningsih et al., 2022).

And the last thing carried out in this research is Database Implementation. The database that has been designed is then built with PHPMyAdmin software. With software PHPMyAdmin, one can create databases, create tables, filling in data, etc. easily, without having to memorize the command line. Figure 2 Implementation of the Boyolali Regency tourist map database (Rahman & Ali, 2019).

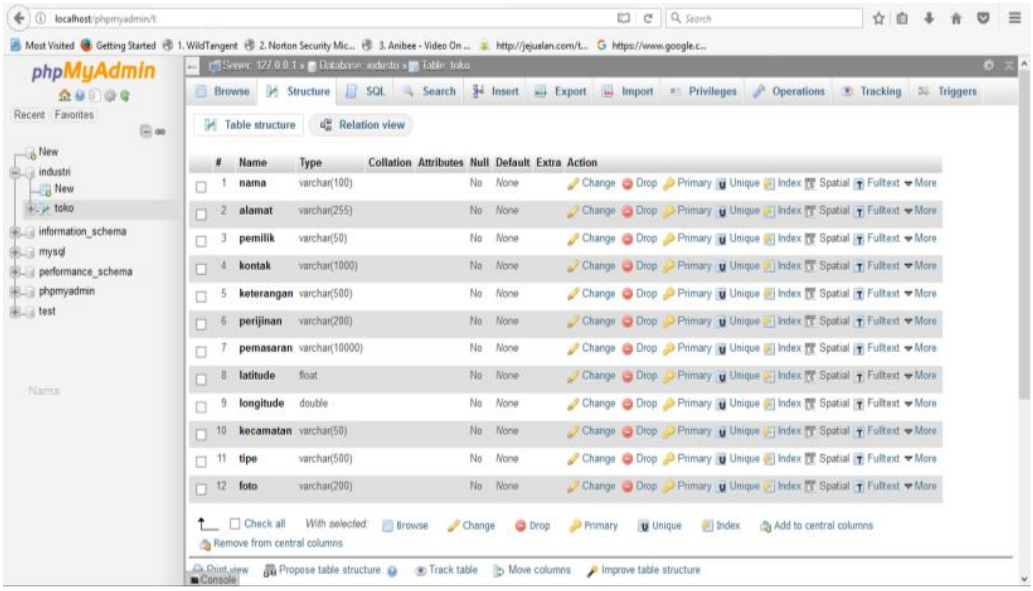

Figure 2 Implementation of the Boyolali Regency tourist map database

The next system development tool is a Use Case which describes what activities are carried out by a system from an observation point of view at the Boyolali Regency tourist attraction. Figure 3. Shows Use Case Diagram for GIS Development of Boyolali Regency Tourism Map.

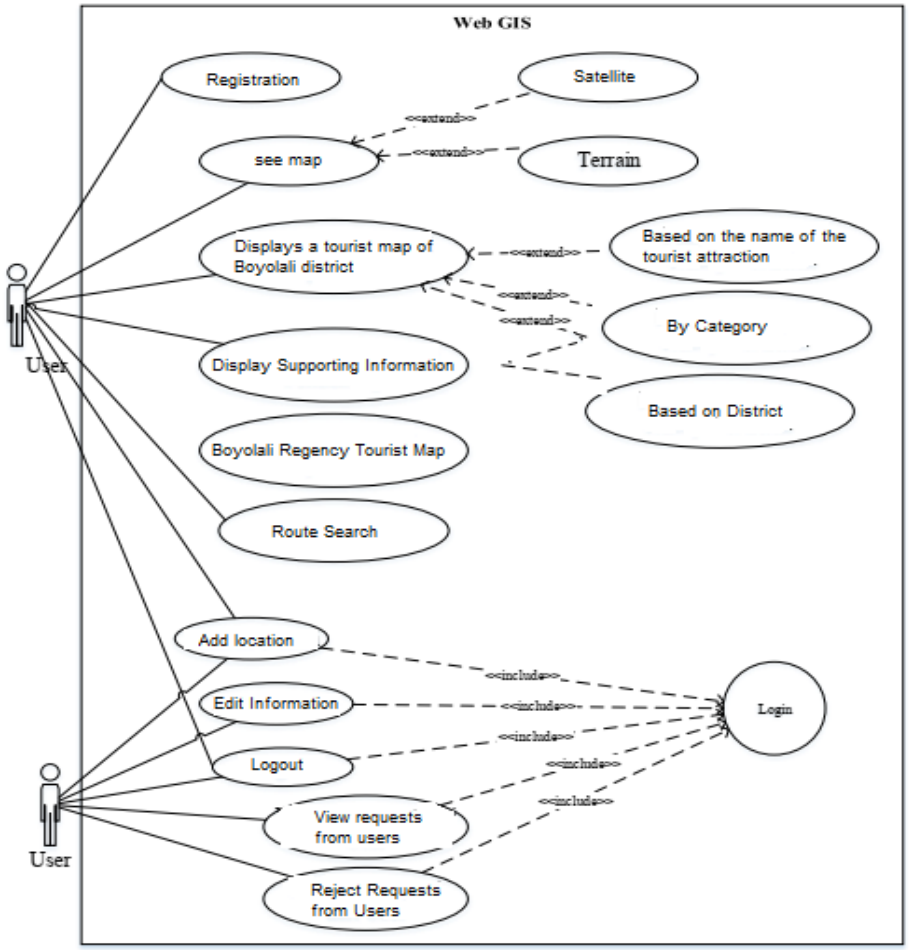

Figure 3. Shows Use Case Diagram for GIS Development of Boyolali Regency Tourism Map.

Creating a Google Maps API Template is code (javascript plus html) initial provided by Google to make it easier for users develop maps according to user wishes (Saian et al., 2021)

```
!DOCTYPE html>
<html>
    <head>
        <title>Simple Map</title>
        <meta name="viewport" content="initialscale=1.0">
        <meta charset="utf-8">
        <style>
            /* Always set the map height explicitly to define the size of the div * element that contains the map. */
            #map {
                height: 100%;
            }
            /* Optional: Makes the sample page fill the window. */
            html, body {
                height: 100%;
                margin: 0;
                padding: 0;
            }
        </style>
    </head>
    <body>
        <div id="map"></div>
        <script>
            var map;
            function initMap() {
                map = new
google.maps.Map(document.getElementById('map '), {
                    center: {lat: -8.098414, lng: 112.164375},
                    zoom: 13
                });
</script>
        <script async defer
src="https://maps.googleapis.com/maps/api/js
?key=AIzaSyBW_zw0UYc86ByAEM3qG5DWlarMC_LaZKs &callback=initMap">
            </script>
        </body>
    </html>
```

In the script that shows the center coordinate point: {lat: -8.098414, lng: 112.164375} and the var function is used to make it easier for the coordinate data entered by the user so that the coordinates are dynamic. Center value function (-8.098414, 112.164375) to display Boyolali Regency on the map.

The non-spatial or tabular data used in the research is tourist attraction data in Boyolali district, as well as coordinate data obtained directly from the field and combined with searches on Google Maps. Then the data obtained is combined as a database: (1). Coordinate data, addresses and information on tourism objects in Boyolali district; (2). Coordinate data and supporting information on tourist attraction routes in Boyolali Regency; (3). Address data, supporting information and coordinates of tourism objects that have not been registered with the Boyolali Regency Tourism Office.

The main menu for the implementation of spatial data processing results, Geographic Information System For Boyolali Tourist Android Based Object Mapping, can be seen in Figure 4.

Figure 4. Geographic Information System For Android Based Boyolali Tourism Object Mapping

Next, the menu for implementing the system development results on the distribution of the Boyolali Regency Tourism Object Map, can be seen in Figure 5.

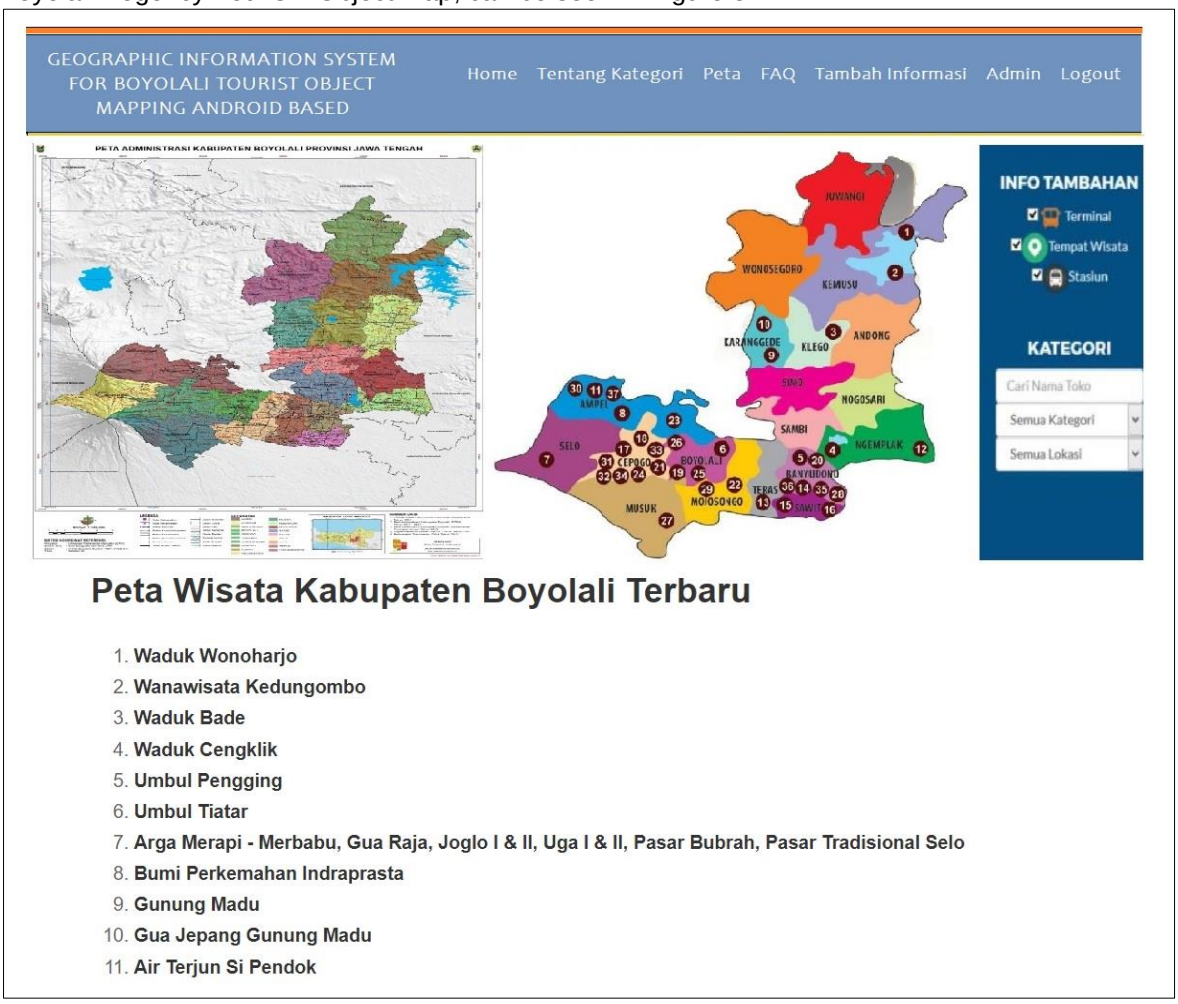

Figure 5. Map distribution of boyolali regency tourist attractions

The category menu explains the Tourist Information Map. in Boyolali district which can be seen in figure 6.

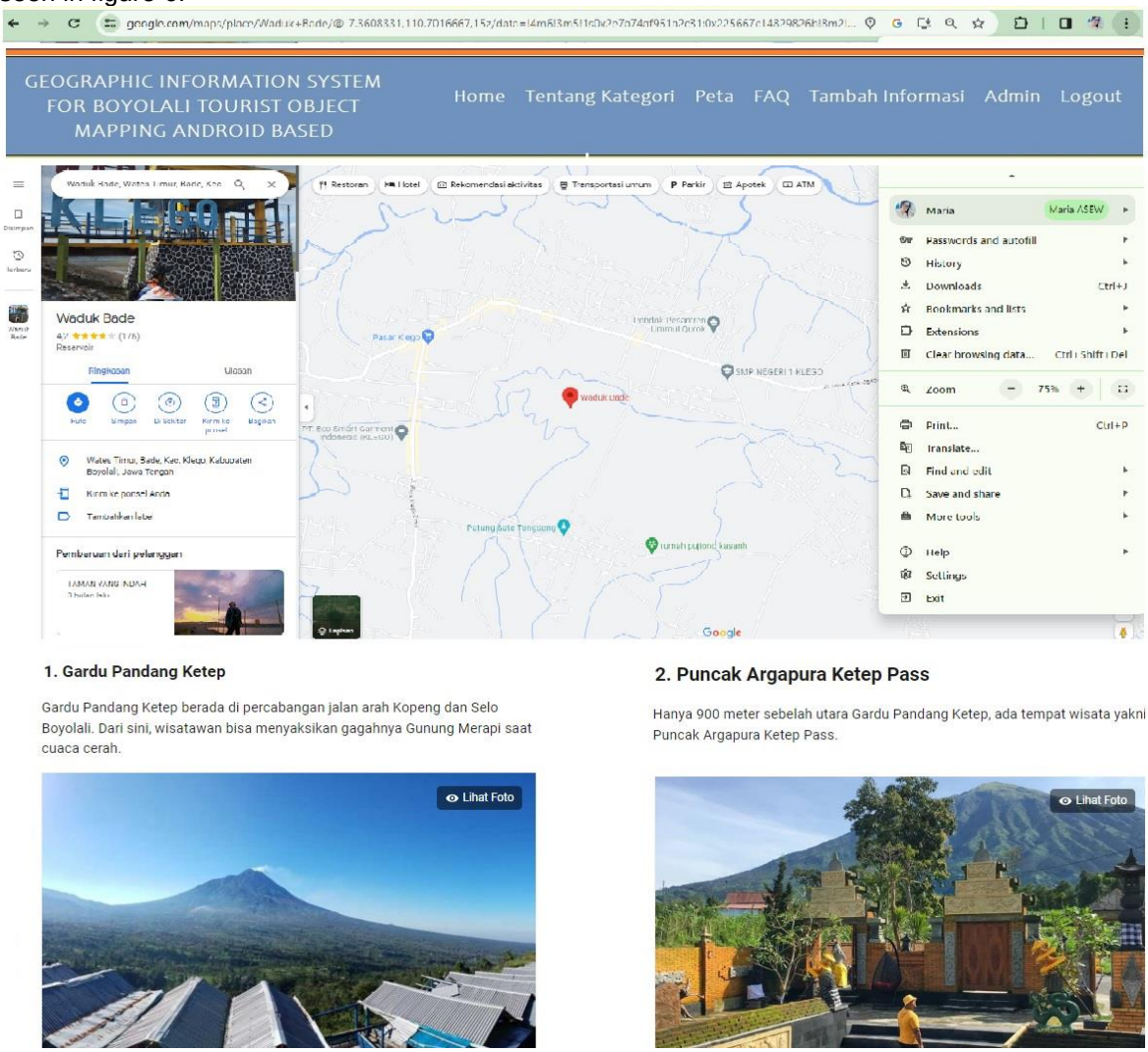

Figure 6. Boyolali Regency Tourist Map Category Menu

Apart from that, there is a checkbox, for additional information about tourism in Boyolali district which can be seen in Figure 7.

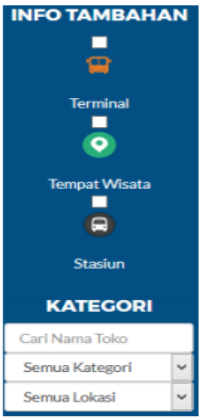

Figure 7. checkbox for additional information about tourism in Boyolali district

The graphic trend of visitors to the Boyolali Tourist Attraction from 2019 to 2023 can be seen in Figure 8.

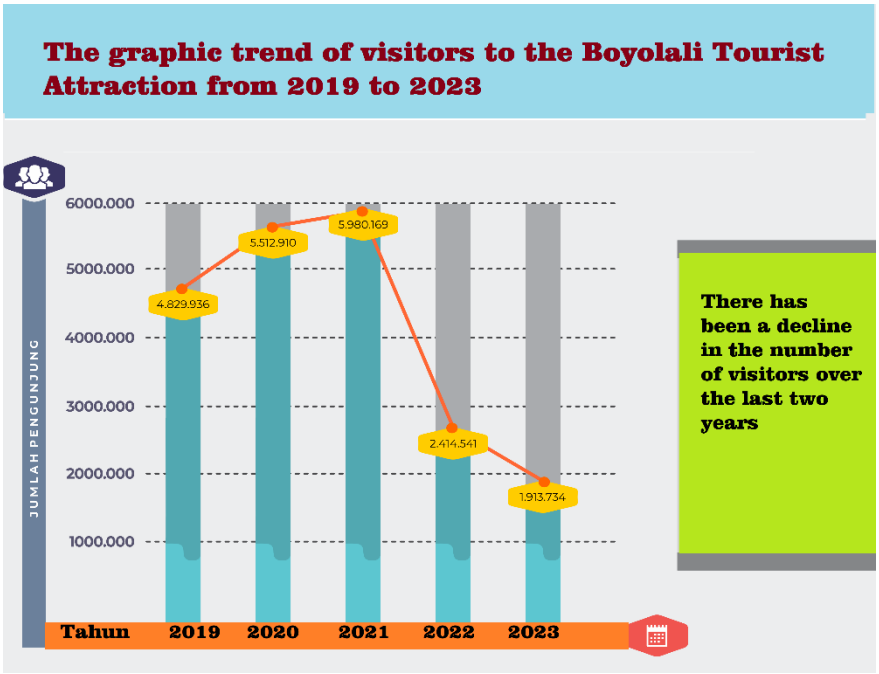

Figure 8. The graphic trend of visitors to the Boyolali Tourist Attraction from 2019 to 2023

Furthermore, the formal Activity Follow-up plan no longer exists. However, it does not rule out the possibility that other researchers would like to develop this development system on google maps we will be happy to help. And the evaluation method used uses a written reporting method.

4. CONCLUSION

An Android-based geographic information system has been built using Google Maps. So to run this application you need a smartphone with the Android operating system. This application also requires the internet to communicate with the web service on the server side. Through the web that is built, it is hoped that it will make it easier for web users to find out the location of tourist attractions in Boyolali Regency. The system built functions as an information system regarding maps indicating the locations of tourist attractions in Boyolali district that users want. For future research development, it is recommended to focus on improving the accuracy of geographic data, integration of new technologies such as augmented reality (AR) for a more interactive tourist experience, and development of cross-platform (iOS and Android) mobile applications to cover more users. In addition, collaboration with tourism agencies, local merchants, and the tourist community can improve data sourcing and promotion. Constant monitoring of technological developments and global tourism trends will also help the research remain relevant and positively impact the development of Boyolali tourism.

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