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Utilization webGIS to map the distribution of tourist attractions in Kemiling subdistrict Bandar Lampung city

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ABSTRACT

This study aims to map the distribution of Rabbit Garden Tourism Objects, Durian Farm and Stable Valley, Tahura Wan Abdul Rachman, Gita Persada Butterfly Park, Rainbow Slide, Camp 91, Kampoeng Vietnam, Paraduta Hill, Curved Sky II, Kemiling Hill Permai Housing Complex Valley Tourism Park, Star Hill, Betung Garden, Pelangi Valley, Vietnam Cliff, and Nature Gate in the Kemiling District of Bandar Lampung City by using WebGIS as a web. This study uses a quantitative descriptive method. The data collection technique is observation, interview and documentation. The data analysis technique is descriptive analysis. The results of this study are webguard-based tourist maps, contain information: accessibility, facilities, infrastructure, appeal, security and comfort and users by using quantumGIS, plugins QGIS12Web, leaflet and github as a webhositing. Validity test scores for SIG (System Information Geography) (3,36), pragmatic (3,54), and user (3,72). This means that webGIS gate value with the good category of each expert, which also revision. However, the revision has been repaired by the researcher. The results of the usability test results are 80,46%. This means that webGIS is included in the proper category and has fulfilled usability testing criteria and can be used by users effectively, efficiently and gives the user to use it.

KEYWORDS

mapping_1
tourist_2
webGIS_3
quantumGIS_4

1. Introduction

Tourism is a sector that plays an important role in the effort to increase income, because the actual tourism is a sector that is considered profitable and has the potential to be developed as one of the assets used as a source that produces the nation and state (Roslin and Tumangkeng, 2023). The tourism sector in Indonesua began to show its superiority as one of the industries that should be taken into account and the very potential and very rapidly developed (Prasta, 2021). At present, Indonesia has many tourist destinations that have enormous potential, ranging from exotic places, amazing natural panoramas, historical relics that can still be enjoyed by its beauty and historical sites, until the characteristic of the culture that reaches the mainstay of the sector Pariwisata. This is in line with the wealth possessed by the state of Indonesia.

Tourism in Indonesia generally has problems in the effort to meet human needs of tourism (Husin and Saputra, 2022). So, to meet these needs, it is necessary to provide various tourist facilities that support to support the tourism activities. In essence, the function of tourism facilities must be serving ang facilitating visitor activities or tourists who come to a tourist attraction. In addition to functioning as a media that can support tourist satisfaction, tourist facilities also function as a benchmark for an object to increase tourist attractiveness of an object that can later be used as a reference to improve service to tourists (Boleng, 2018). Tourism is one of the important sectors in the economic development of an area by making a significant contribution in the revival of state foreign exchange, job creation and the development of other businesses related to tourism (Sukmana, 2018).

Lampung Province is one of the contributors to the national economy from the tourism service sector which is quite large (Yanto and Ammaru, 2024). Based on data from the Kemiling District Central Statistics Agency in number 2023, Lampung Province is one the eleven provinces most frequently visited by rourists (Regional Director General of Director General of Lampung, 2019). Lampung tourism sector has contributed to the success of the development of Lampung Province during 2023. This was marked by the achievement of tourist visits of 10,26 million people until September 2023. The visit raet increased by 123% compared to 2022 (Triananda, et al., 2024).

One of the cities in Lampung Province is Bandar Lampung City, which is one of the cities with quite good tourism potential to be developed. Currently, people prefer to go to tourist attractions for vacations (Tinambunan and Sintaro, 2021). The diverse tourism sector with its uniqueness and supported by facilities and transportation facilities available in the tourist area can provide a very large income for the government or traders who sell around the tourist area (Bustamam and Suryani, 2021). According to the Bandar Lampung City Tourism Office, Bandar Lampung City is one of the tourist destinations in Lampung Province which has many tourist attractions that need to be developed or improved in order to be used as an opportunity to increase Regional Original Income (ROI) in order to develop existing tourist attractions (Tinambunan and Sintaro, 2021). Bandar Lampung City has several areas that have the potential to be developed into tourist destinations because they are supported by high hilly topography and lowlands near the coast which are directed as tourism support areas so that many tourists from domestic to foreign countries visit tourist attractions in Bandar Lampung City (Luthfi, 2013). The data on the number of domestic and foreign tourist visits in Bandar Lampung City is presented in the following table.

Table 1. Number of Domestic and Foreign Tourist Visits to Bandar Lampung City

Mark	Year	Tourist	
		Archipelago (soul)	Overseas (soul)
1	2019	1.064.493	22.218
2	2020	819.492	1.767
3	2021	852.673	1.411
4	2022	1.723.355	6.740
5	2023	2.010.547	9.839

[a] *Source: Bandar Lampung City Tourism Office, 2023*

Based on the table, the number of tourist visits from both domestic and foreign tourists from 2019 to 2023 has increased significantly. This means that it reflects the growing appeal of its tourist destinations. Bandar Lampung City itself has various tourist attractions that have high tourist appeal. These tourist attractions are spread across several sub-districts, one of which is Kemiling District. In Kemiling District, there are various tourist attractions that can be visited by domestic and foreign tourists.

Kemiling District is one of the areas in Bandar Lampung City that has very diverse tourist attractions (Prihartini, 2023). In addition, Kemiling District has quite large tourism potential with several interesting tourist attractions. Tourist attractions can be divided into natural tourist attractions (attractions to the beauty and richness of nature), cultural tourist attractions (attractions to historical relics, museums, and art attractions), water tourist attractions (attractions to water areas that can be used for swimming, diving, surfing, fishing, and rowing) (Sinaga, 2010). Kemiling District has various tourist attractions ranging from natural attractions to artificial attractions, so based on preliminary research conducted by researchers, namely according to the surrounding community and also the management of tourist attractions, there are around 15 tourist attractions in Kemiling District which are very famous among residents and also have great potential for Regional Original Income which are spread across several sub-districts, including:

- Sumber Agung Subdistrict, namely the tourist attractions of Kampoeng Vietnam, Vietnam Cliff, Tahura Wan Abdul Rachman, Nature Gate, Paraduta Hill, Curved Sky II, Rainbow Slide and Star Hill.

- Kedaung Subdistrict, namely the tourist attractions of Rabbit Garden Tourism Objects, Durian Farm and Stable Valley, Gita Persada Butterfly Park, Camp 91, Pelangi Valley and Betung Garden.
- Kemiling Permai Subdistrict, namely the tourist attraction of Kemiling Hill Permai Housing Complex Valley Tourism Park.

Fig. 1. Map of Distribution of Tourist Attractions in Kemiling District.

Then some tourist attractions in Kemiling are also designed to provide an educational experience. For example, Lembah Durian Farm and Stable does not offer natural tourism, but also provides opportunities for visitors to learn about horse riding and get to know various types of trees. This potential is interesting for webGIS research which can provide comprehensive information about these educational tourist locations. Kemiling is located in a cool hilly area and has very interesting and instagrammable photo spots. This visual appeal makes Kemiling an attractive destination for young tourists, so it requires a web based geographic information system (webGIS) to facilitate virtual access and exploration of tourism (Ardilla, 2023). In recent years, tourism in Kemiling has increased, both in terms of visits and the development of tourist facilities. With webGIS, the management and promotion of tourist attractions can be carried out more efficiently, allowing tourists to find information about routes, facilities, and activities at various tourist locations easily. Overall, Kemiling District offers a combination of natural beauty, tourism diversity, and educational potential which makes it an ideal location for webGIS research to support tourism management and promotion.

Tourists who want to visit tourist attractions in Kemiling District need information related to the tourist attractions they will visit. Information about these tourist attractions can be conveyed in various ways, one of which is by making a map of the distribution of tourist attractions (Errica, 2023). Maps can be used as a medium of information about various things so that map users can utilize the information and as a communication system that presents information about an object to map readers so that the information is easily accepted and quickly understood, the delivery of information must be clear and use simple language (Daumi, et al., 2013).

Current technological advances have many benefits for society. In particular, equal access and equal distribution of information (Boleng, 2018). Technological advances also make it possible to obtain remote information, especially in searching and mapping in geography (Susanto, et al., 2021). Mapping the distribution of tourist attractions in Kemiling District serves as information for both tourists and related actors. This information is expected to be useful in managing and attracting tourism in order to increase tourist visits (Errica, 2023). Tourism mapping is very important for every region, with tourism mapping in an area, the community can find out information and tourist location points and make it easier for local and foreign tourists to determine the tourist destinations they want to visit (Selviana, 2019).

Mapping the distribution of tourist attractions in Kemiling District is used to provide information on geographical conditions, accessibility, facilities, infrastructure, attractions, security and comfort. In making webGIS, namely using a page in the form of webGIS mapping software or web based using the quantumGIS application. QuantumGIS was chosen because this software is lighter to run on devices and is one of the open source software that is good for processing GIS (Geography Information System) data by being able to visualize spatial data, process, analyze data to create map layouts (Ardilla, 2023).

The page will provide information about a predetermined object, in the form of geographical conditions, accessibility, facilities, infrastructure, attractions, security and comfort accurately and relevantly, so that it becomes the best way to encourage and increase the number of tourist visits to tourist attractions, especially those in Kemiling District, Bandar Lampung City. One of the advantages of webGIS is that it makes it easy to present geospatial data using the internet without having to use GIS (Geography Information System) software and can be accessed via mobile phones, so that it can be accessed by many users widely (Ardilla, 2023). WebGIS can also help tourists from distant areas to explore the area as a whole and plan trips according to their interests by conducting GIS (Geography Information System) searches online and can obtain all the information needed and make it easier to reach an area, especially its location point (Ardilla, 2023).

2. Method

This research was conducted in 2024. The location of this research is Kemiling District, Bandar Lampung City. The type of research used is quantitative research. Meanwhile, the method used in this research is quantitative descriptive. This research consists of several stages, namely the data input stage, system requirements analysis, system design, implementation (validity test) and system testing (usability test).

At the system design stage, namely to design the webGIS to be created. Global design with object oriented data modeling using UML (Unified Modeling Language) which includes use case diagrams with detailed system design consisting of input, process, and output designs. The following will present an overview of the use case diagram display in creating webGIS during the system design stage.

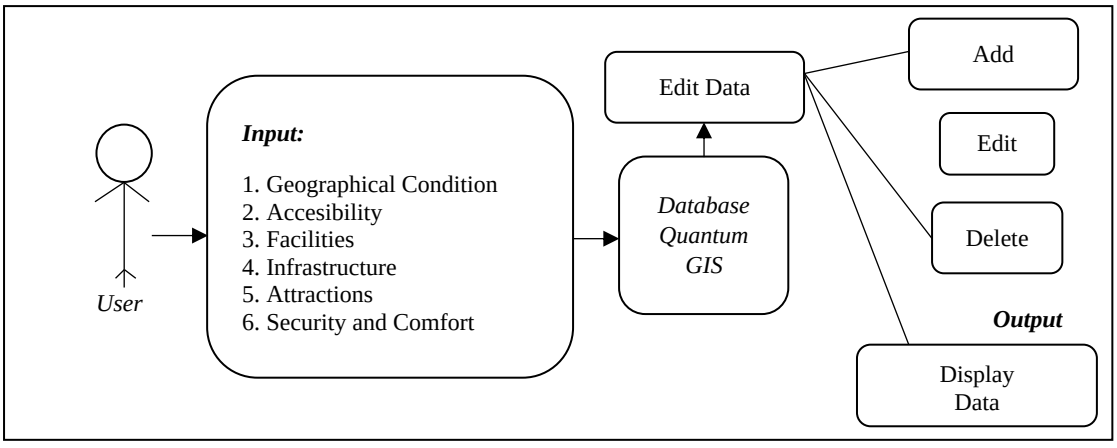

Fig. 2. Use Case Diagram Input Data.

In detail, the design consists of input, process, and output. Then, the following will present a picture of the main display of webGIS that will be created, namely by displaying the webGIS title, an abstract of the map, then a toolbar such as (zoom in, zoom out, search, geolocation or location point). The following is the picture obtained:

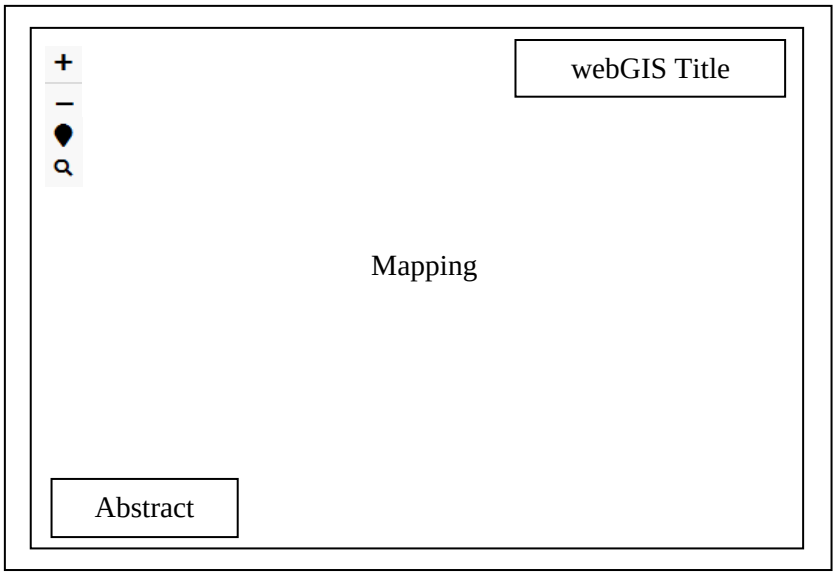

Fig. 3. Overview of webGIS Main Display.

The implementation phase (validity test) was carried out by the SIG (System Information Geography) expert, a pragmatic expert (representative of the Bandar Lampung City Tourism Office) and one representative of the Kemiling District (user) community with the making of the webGIS validity instrument table which there was an assessment of display aspects and convenience. Rating weight use numbers 1,2,3 and 4. Remession of rating; 1= very less good, 2= less good, 3= good and 4= very good.

After weighting the assessment of the validity test. Here is a classification of the validation test assessment results:

Table 2. WebGIS Achievement Level

Value	Kualifikasi	Information
1	Very Less Good	It cannot be used and still requires consultation
2	Les Good	Can be used with many revisions
3	Good	Can be used with a little revision
4	Very Good	Can be used without revisions

b. *Source: Assessment Instrument (Ardilla Ayu Ningtyas), 2023*

After testing the validity, webGIS will also go through the usability test (feasibility test) to 100 respondents. Testing is done to determine the assessment and response regarding the function and benefits of webGIS applications that have been created. The ting asked for respondents is about the effectiveness of the application, ease of use, and user satisfaction. Assessment weight on the results of the questionnaire using a scale of 1-5 rating. Rating of description: 1= not good, 2=less good, 3= pretty, 4= good and 5= very good. Here are the frmulas used to calculate the results of the acquisition of webGIS feasibility:

$$\text{Feasibility Percentage} = \frac{\text{Observed Score}}{500} \text{ X } 100$$

Information:
Observed Score = Score results from the questionnaire
500 = Maximum score (100 respondents x 5)

After the results of the total number of respondents assessment to all aspects of measurement, it can be seen that the appropriate category in the following table:

Table 3. WebGIS Feasibility Category

Category	Score
Very Decent	81%-100%
Decent	61%-80%
Pretty Decent	41%-60%
Not Decent	21%-40%
Very Not Decent	<21%

c. *Source: Ardilla Ayu Ningtyas, 2023*

3. Results and Discussion

The results obtained from this study are products in the from of webGIS the distribution of Rabbit Garden Tourism Objects, Durian Farm and Stable Valley, Tahura Wan Abdul Rachman, Gita Persada Butterfly Park, Rainbow Slide, Camp 91, Kampoeng Vietnam, Paraduta Hill, Curved Sky II, Kemiling Hill Permai Housing Complex Valley Tourism Park, Star Hill, Betung Garden, Pelangi Valley, Vietnam Cliff, and Nature Gate in the Kemiling District of Bandar Lampung City. WebGIS can be accessed through the following link:
https://objekwisatakemiling.github.io/WebGIS-Kemiling/#12/-5.4226/105.2661

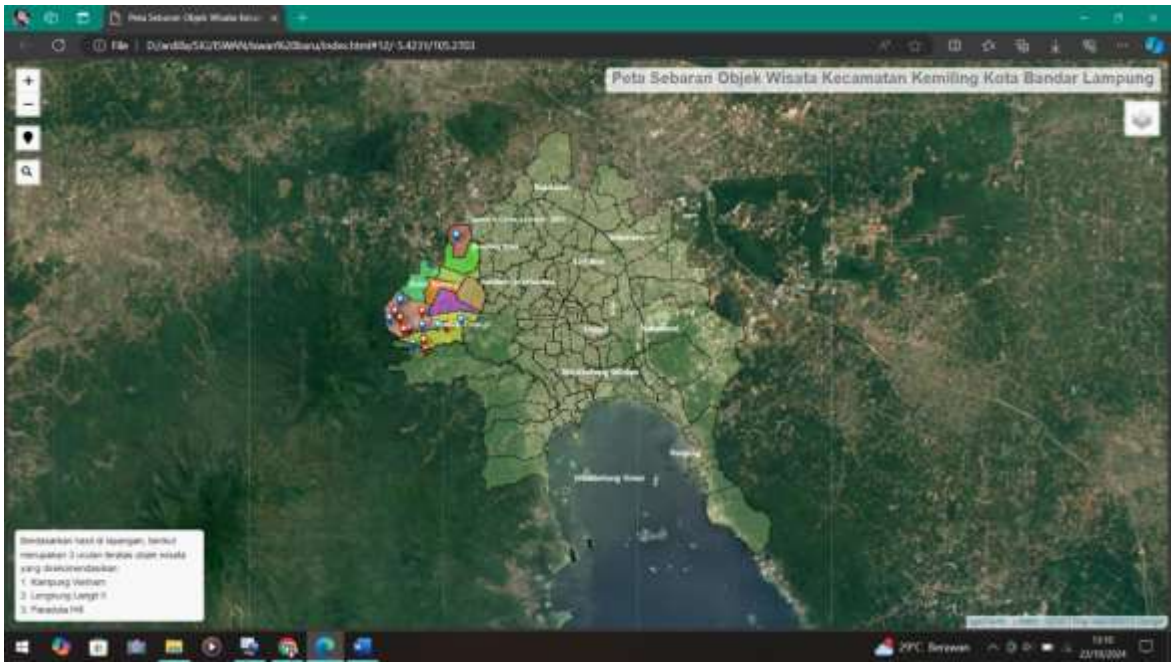

Fig. 4. WebGIS Display When Successfully Opened.

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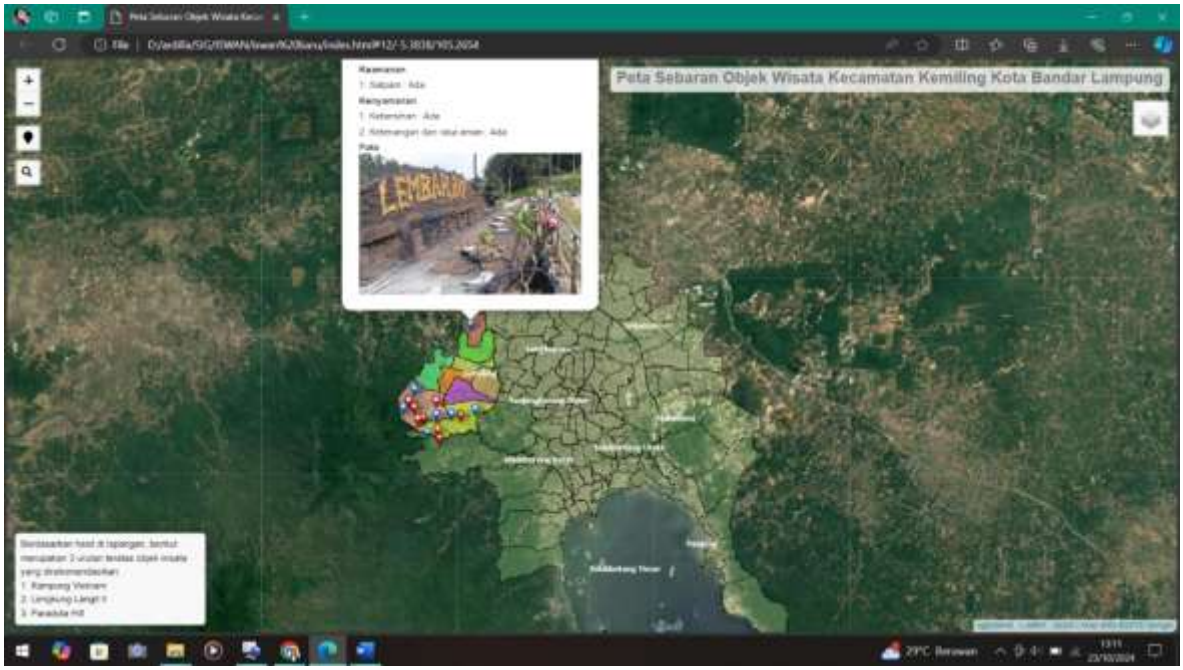
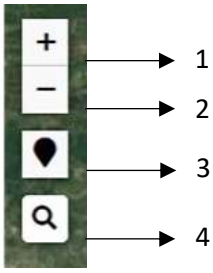
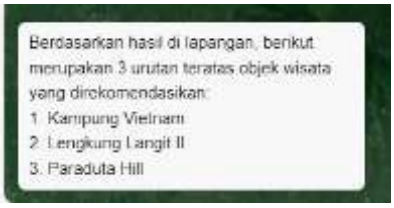


Fig. 5. WebGIS Display When Opening One of The Attraction Information.

In addition to the main view that displays information distribution information in Kemiling Subdistrict, there are also several tools that serve to operate this webGIS, the toolbar on the top left and right. For more details, it can be seen in the following table:

Table 4. The Toolbar Function on WebGIS

Left Toolbar	Function
	1. The zoom button to increase the size of the map. 2. Zoom out button to reduce the map size. 3. Geolocation to find out the current location point. 4. Search serves to find a location by typing the name of the place on the feature.
Right Up Toolbar	**Function**
	• Title functions as a title or informating the contents of the map. • Legend functions to explain the symbol contained in webGIS. As for the legend on the side, if we do not want to use one of the legends available, we can understand. Once the opposite, if we want to display, then we can do a checklist on the legend you want to display on webGIS. • Basemap serves to display and replace the default map according to your needs.

Left Down Toolbar	Function
	• Abstract serves to explain what attractions are the top 3 recommendations this webGIS.

Source: Research Results, 2024

In addition, webGIS can also be accessed via mobile or other gadgets. The link addres used is the same as used on a laptop or computer. However, webGIS that has been made has a better look if opened using a laptop or computer. This is because laptop or computer have a larger screen area than similar cellphones or gadgets. The pop up display of tourist attraction information can be seen clearly by using a laptop or computer, so on the opposite if you use a cellphone or gadget, then the display of the pop up information on the distribution of tourist objects can still be read, but the size of the screen is not large. The following is a webGIS display when opened via a cellphone or gadget.

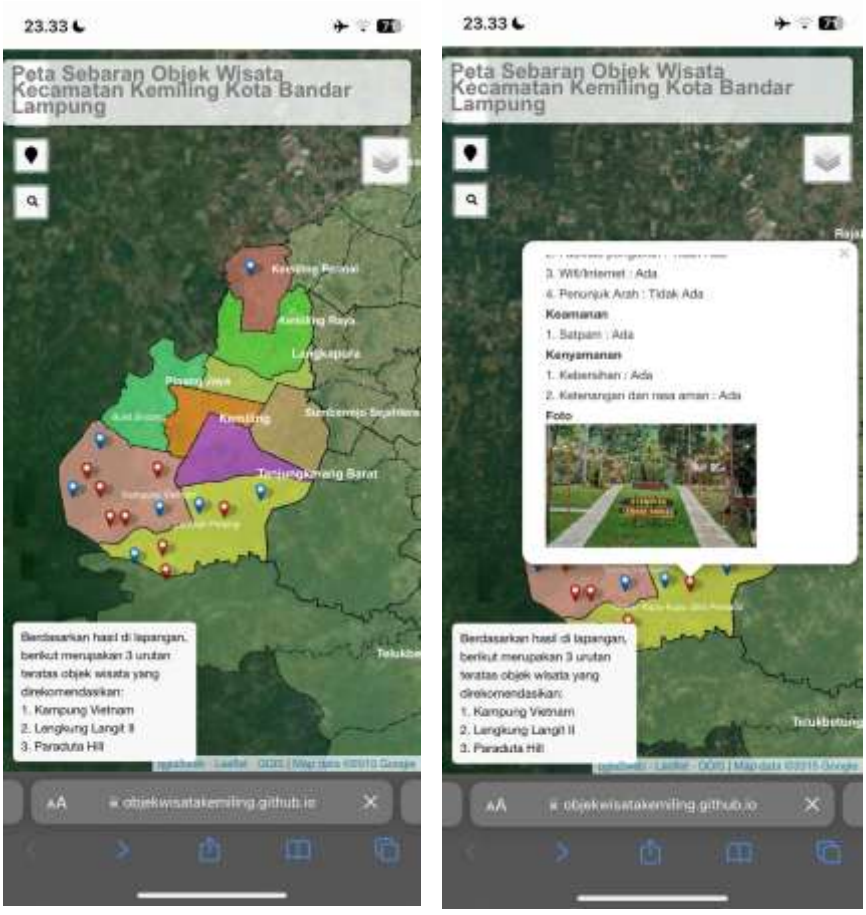


Fig. 6. WebGIS Display When Opened on a Cellphone or Gadget.

The data generated from the export plugins QGIS2Web is a data leaflet in the from of *html*, but it cannot be widely accessed by all users, so it needs to do the online stages of the *html* data by uploading html to webhosting github. To get github access, we need to register the account first. After registering and entering, it will successfully login.

The nect step is to create a domain or website name to be used, namely by clicking profile > your repositories ? new. After the create new history page appears then fill in the name for the website to be created and then select public > ceklis add a readme file > click create repository. The next step is to upload files, namely by selecting add files and then select upload files. After that, the new window will open. Then select the choose your files menu > upload files from quantumGIS which has been exported (plugins QGIS2Web). Then a new window will appear, then click commit change.

Then upload all the files that have been exported from the QGIS2Web plugins results which contain 7 folders and 1 file (*html index*) then drag to drag add files here to add them to your repository and place the files there. When all the files have been uploaded, the next step is to select settings > pages then a display will appear. Then on the page click on the branch section then change it to main and root > save. After that wait 2-3 minutes and the website link is ready to use. The data that has gone through the upload process above will form a web. The webGIS that has been created can be accessed online by anyone. The link address used is still the same as the link address mentioned earlier.

At the implementation stage, the webGIS that has been created will then be tested for validity by several experts starting from 1 GIS (Geography Information System) expert, 1 pragmatic expert (Bandar Lampung City Tourism Office) and 1 user (Kemiling District Community). The validation test was conducted to check the level of webGIS achievement. These three experts were selected to test the feasibility of the webGIS that had been created based on their expertise in their respective fields, such as a GIS expert, namely someone who has expertise in the field of GIS (Geography Information System), especially in mapping. A pragmatic expert, namely someone who is selected from the relevant office, namely the Bandar Lampung City Tourism Office. The user is selected as a representative of the Kemiling District community according to the location of this research.

The GIS (Geography Information System) expert has obtained a score of 3,36. Then, the pragmatic expert has obtained a score of 3,54. Furthermore, the user has obtained a score of 3,72. This means that the WebGIS that has been created gets a score from each expert, namely in the good category. Referring to table 2, which means that this webGIS can be used but there are slight revisions. However, the revisions given by each expert were not that many and were immediately revised by the researcher before continuing to the system testing stage (usability testing).

After the implementation stage is carried out by conducting a validity test on three experts, the next step is to test the system. System testing is carried out by means of a usability test (feasibility test), namely a webGIS test conducted online using google form involving 100 respondents consisting of tourists who are visiting several tourist attractions that researchers have determined as tourist attraction locations, namely Rabbit Garden Tourism Objects, Durian Farm and Stable Valley, Tahura Wan Abdul Rachman, Gita Persada Butterfly Park, Rainbow Slide, Camp 91, Kampoeng Vietnam, Paraduta Hill, Curved Sky II, Kemiling Hill Permai Housing Complex Valley Tourism Park, Star Hill, Betung Garden, Pelangi Valley, Vietnam Cliff, and Nature Gate. In this usability test there are three aspects of assessment, namely the effectiveness aspect (efficient in use), the learnability aspect (ease of use) and the user satisfaction aspect (subjective satisfaction for users). In addition to these three aspects, there is also data that must be filled in, in the form of name, domicile/area, occupation and tourist attractions visited by tourists/respondents. Then, when you have carried out the usability test assessment, the next step is to calculate the total score from the usability test results.

The effectiveness aspect consists of 4 questions for 100 respondents. With the lowest weight value of 1 being the ineffective criterion and the highest weight of 5 being the very effective criterion. Referring to table 3, the effectiveness of this webGIS falls into the feasible category with a value of 80.4%. From the effectiveness aspect, there are 4 main points for assessing this webGIS, namely in terms of appearance, buttons, use of base maps, and other features.

The user ease aspect consists of 3 questions for 100 respondents. With the lowest weight value of 1 being the ineffective criterion and the highest weight of 5 being the very effective criterion. Referring to table 3, the ease of use of this webGIS falls into the very feasible category with a value of 82.53%. From the user ease aspect, there are 3 main points for assessing this webGIS, namely ease of accessing, viewing, and searching for tourist attractions.

The user satisfaction aspect consists of 3 questions for 100 respondents. With the lowest weight value of 1 being an ineffective criterion and the highest weight of 5 being a very effective criterion. Referring to table 3, the satisfaction of using webGIS is included in the feasible category with the

value obtained being 78.46%. From the aspect of user convenience, there are 3 main points for assessing webGIS, namely satisfaction with the product, benefits of the product, and suitability of the information.

Based on the three aspects, namely the effectiveness aspect 80,4%, the user friendliness aspect 82,53% and the user satisfaction aspect 78,46%, if averaged will produce a value of 80.46%. This value shows that the webGIS distribution of tourist attractions in Kemiling District has met the usability testing criteria. This means that this webGIS is included in the category of being suitable for users, where it can be used effectively and provides satisfaction to users who use it.

Then, webGIS distribution of tourist attractions in Kemiling District that has been created will then be used widely by users. After webGIS is available, we can use the web to facilitate prospective tourists who want to go to tourist attractions in Kemiling District. The procedures for using or using webGIS in its use as a web are as follows.

- Open the available link.
  https://objekwisatakemiling.github.io/WebGIS-Kemiling/#12/-5.4226/105.2661
- After being opened, the initial webGIS display will appear which can be opened via laptop or computer and via cellphone or gadget.
- Then, if we want to open one of the tourist attraction information that has been provided at the distribution point, then the method is to click on one of the points you want to open. If the distribution of natural tourist attractions you want to open, then click the red distribution point symbol. Meanwhile, if the distribution of artificial tourist attractions you want to open, then click the blue distribution point symbol. Then, information will appear in the form of geographical conditions, attractions, accessibility, infrastructure, facilities, security and comfort.
- Furthermore, we can also change it or set it by checking or unchecking the legend feature that has been provided, for example when we do not want to display the Kemiling District boundary feature, we can uncheck the legend feature available on the right and vice versa and so on.
- In addition, we can also utilize other tools or features, such as zoom in, zoom out, geolocation, search, title, abstract buttons on webGIS to make it easier for users.

The above method is a few steps or procedures in using webGIS in its use as a page (web) so that it can be easily done directly by users widely through various tools and features available on webGIS.

4. Conclusion

The conclusion of this study is that the distribution map of webGIS based tourist attractions in Kemiling District contains information on accessibility, infrastructure, attractions, facilities, security and comfort, which can be easily accessed by users using quantumGIS, QGIS2Web plugins, leaflets and github. The validity test score for GIS (Geography Information System) experts is 3,36. Pragmatic experts are 3,54 and users are 3,72. This means that webGIS gets a score in the good category from each expert, which also means that it can be used but there are slight revisions. However, the revision has been corrected by the researcher. Furthermore, the usability test result score is 80,46%. This means that webGIS is included in the feasible category and has met the usability test criteria and can be used by users effectively, efficiently and provides satisfaction to users who use it.

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