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Research Article

WEBGIS-BASED TOURISM POTENTIAL MAPPING USING QUANTUM GIS (QGIS)

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Abstract
Currently, technology plays an important role in the digital information era. Digital mapping based on WebGIS is one form of Geographic Information System technological output that can impact the development of the tourism sector. The limitation of information sources on tourist attractions is one of the obstacles to tourism development in Indonesia. Therefore, the presence of WebGIS-based tourist attraction mapping can increase the availability of digital information that can impact increasing tourist visits. This research aims to analyze the potential of tourist attractions, perform WebGIS-based mapping of tourist attractions, and analyze the strategies for developing the potential of tourist attractions in Dukuh Village. This research is conducted using a qualitative descriptive method with a geographical spatial approach. The sampling techniques used are saturated sampling to determine tourist attraction samples, purposive sampling to select informants, and accidental sampling to determine tourist samples. The analysis techniques in this study include scoring analysis and Geographic Information System. The research results indicate that there are 16 tourist attractions, consisting of 8 very potential, 6 quite potential, and 2 less potential. Based on these results, WebGIS-based mapping of tourist attractions was performed and tested by 3 media experts. The testing results show that WebGIS media has a good level of effectiveness to be used as one of the media for information and promotion of tourist attractions in Dukuh Village. To support the development of tourist attractions, strategies for developing tourist attractions were formulated and categorized into growth, diversification, and conservative strategies.

Keywords: Geographic Information System, Tourism, WebGIS.

INTRODUCTION

Indonesia is an archipelagic country that has a wealth of natural and socio-cultural resources that can be used to support the development of the tourism sector. This condition has a positive impact on the tourism sector because the tourism sector has been one of the major foreign exchange earners and has become a commodity that the government relies on to be the main pillar of national economic development in Indonesia (Ikasari, 2021; Hardi et al., 2023; Pamungkas et al., 2023; Rahmawati et al.,

2023; Yohanie et al., 2024). The tourism sector is one of the most important sectors of Indonesia's national economy as it contributes to the well-being of local communities, such as creating job opportunities and strengthening local culture (Suparno et al., 2021; Khoiruddin et al., 2023; Perdana, Zakariah, & Alasmari, 2023; Saputro et al., 2023).

Based on the Rencana Pembangunan Jangka Menengah Nasional IV (RPJMN IV) Tahun 2020-2024, tourism is designated as a strategic priority project for national development in the form of superior tourism to increase the number of tourists and increase the country's foreign exchange. Based on data from the Central Bureau of Statistics Indonesia, the number of domestic and foreign tourists continues to increase every year. This is supported by data on the number of domestic tourists in 2015 as many as 256,419,006 and in 2019 as many as 722,158,733 while for data on the number of foreign tourists in 2015 as many as 10,230,775 and in 2019 as many as 16,106,954. However, at the beginning of 2019-2021, there was a decrease in the number of tourists caused by the COVID-19 pandemic. The event had an impact on tourism activities, especially in decreasing the number of national and foreign tourist visits. Based on data from the 2019 National Labor Force Survey, 11.83% of the workforce in Indonesia works in the tourism industry which contributes 4% to the Gross Domestic Product (GDP) each year (Anggarini, 2021). The contribution of tourism to increasing GDP can be seen directly, such as the costs incurred by tourists to undertake tourism activities, while the indirect contribution is that the tourism sector can create new jobs for local communities (Mawardani et al., 2023; Nuraeni & Inthaud, 2024; Purnomo et al., 2024).

A tourism development strategy is a comprehensive and integrated planning carried out to examine the obstacles experienced, internal environmental conditions, and external environmental conditions of each tourism object so that it can be directed to become sustainable and highly competitive tourism (Asmawati, 2021). The development of tourist attractions must be carried out by paying attention to various aspects of the conditions and potentials of each tourist attraction because each tourist attraction has different characteristics. Tourism object management is an important aspect of achieving quality tourism destinations and can have an impact on the economic sector and regional development (Hardiyanto & Ahmad, 2023; Oktaviani & Elmojahed, 2023; Taufik et al., 2023; Jaya Putra et al., 2024). One of the tourism sector programs in Indonesia is the Tourism Village. The tourism village is a sustainable tourism development program to improve the welfare of village communities through the development of sustainable tourism and also as an effort to preserve local wisdom and regional culture (Wijanarko et al., 2023). The development of tourist villages can provide benefits to the community, such as improving the economic conditions of the community, increasing socio-cultural values, and can be a form of environmental conservation (Pantiyasa et al., 2023; Rinaldi & Hema, 2024; Susana & Nwanya, 2024).

Banyudono District, Boyolali Regency is one of the areas that has potential in the tourism sector. Based on Boyolali Peraturan Daerah Kabupaten Boyolali Nomor 9 Tahun 2011 about Rencana Tata Ruang Wilayah (RTRW) Kabupaten Boyolali Tahun 2011-2031, it can be known that Banyudono District is designated as a Tourism Designation Area. Dukuh Village is part of the Banyudono District which has a lot of tourism potential in the form of natural tourism; culture; religion; and artificial so the area has very potential to be developed into a tourist area. With so much tourism potential, it can be managed optimally so that it can make Dukuh Village a tourist village that has many attractions to attract tourist visits. However, there are several obstacles in the development of tourism in Dukuh Village, namely the lack of public knowledge about the potential of the area, limited information media about tourist attractions, no promotion of tourist objects, and no optimal management of tourist objects. This is reinforced based on Wibowo's research (2019) that there are several obstacles in the development of tourism objects in the Banyudono District, namely the management of tourist objects has not been optimal, the limited availability of access to tourist object information, and limited promotional media for tourist attractions.

According to the World Travel and Tourism Council, to obtain successful tourism development in the post-pandemic period, alignment between health, sustainability, safety, and technology components is needed (Talwar el al., 2022; Sirait & Ratti, 2024). Currently, the development of information technology is growing, in the tourism sector a media is needed that can present various information about tourist attractions completely and interestingly to increase the interest of tourist visits. In geography, maps are a medium that can make it easy to find out information on the location of the distribution of each potential tourist attraction. Map preparation is carried out using the Geographic Information System as a means of technological equipment to promote tourism and the proposed development of the tourism sector

(Firmansya et al., 2018). One of the GIS outputs is WebGIS which is a web-based digital map and can be accessed using the internet network.

WebGIS is a web mapping that can display maps dynamically (Oktaviani, 2015). WebGIS is one of the media that can contain information visually and can be disseminated through the network through the World Wide Web (Firmansya et al., 2018; Abrianto, Amaefuna, & Onyemowo, 2024; Anggraini, Nnko, & Zikri, 2024). WebGIS is prepared by combining web design and web mapping (Mertha et al., 2019). This media has several advantages, namely having an attractive appearance, displaying complete information, being easy to understand, easily accessible, does not require a lot of internet data, and the information contained in WebGIS can be edited and updated. In addition, users can access WebGIS easily because it is a link that can be operated via a computer or smartphone without having to use additional mapping applications, so that information can be disseminated with a wider range. WebGIS attractions can display various types of information in the form of description text, images, photos, videos, and links from various platforms so that access to information acquisition becomes more effective and efficient. WebGIS can be compiled using QGIS or Quantum GIS applications that are open-source and user-friendly (Sandhaya, 2020).

Dukuh Village faces several challenges in developing its tourism sector, including numerous potential tourist attractions that have not been managed and developed to their fullest, limited information media related to these tourist attractions, and stakeholders not utilizing advanced technology such as WebGIS-based Geographic Information Systems for developing tourism potential. This research aims to analyze the potential of tourist attractions, perform WebGIS-based mapping of tourist attractions, and analyze strategies for developing tourism potential in Dukuh Village.

The novelty of this research lies in its approach; it not only analyzes the potential tourist attractions but also examines the use of WebGIS-based Geographic Information Systems and tests the effectiveness of WebGIS media while formulating tourism development strategies. This research can serve as an example of utilizing information technology in the tourism sector through WebGIS media. By creating a WebGIS, the availability of tourist information in Dukuh Village can be enhanced, allowing tourists to easily obtain detailed information about tourist attractions.

This study focuses on analyzing the potential tourist attractions in Dukuh Village using the 4A components theory (Attraction, Accessibility, Amenities, and Ancillary Services). It involves WebGIS-based mapping of the distribution of tourist attractions, conducted through Geographic Information Systems (GIS) stages: data input, data processing, and data output. To assess the effectiveness of the WebGIS media, a media testing phase conducted by WebGIS experts is included. To determine development strategies for each tourist attraction, SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) theory is employed.

RESEARCH METHOD

This research was conducted using a qualitative descriptive method with a geographic spatial approach. The research was carried out in Dukuh Village, Banyudono District, Boyolali Regency, Central Java. Data collection in this research was carried out by observation, interviews, questionnaires, and documentation. The sampling technique used was a saturated sampling technique to determine a sample of tourist objects, purposive sampling to determine interview sources and media experts, and accidental sampling to determine a sample of tourists. The results of the data that have been obtained are analyzed using scoring analysis techniques, Geographic Information Systems. Data analysis techniques for potential tourist attractions are carried out using weighting or scoring techniques. In this analysis, the 4A indicators according to Cooper (2005) are used, namely attraction, accessibility, amenity, and ancillary service. The preparation of digital map media in the form of WebGIS is carried out using a Geographic Information System (GIS) with stages of data input, data processing, and data output. WebGIS media results were analyzed using media testing with three testing stages, namely functional testing, compatibility, and user acceptance testing. Then, to determine the strategy for developing potential tourist attractions is carried out using a SWOT analysis in the form of indicators of the strengths, weaknesses, opportunities, and threats of each tourist attraction.

Analysis of Potential Attractions

Analysis of tourism potential is carried out using tourism potential components according to Cooper (2005) and indicators according to Alfitriani et al., (2021) which consist of components of attractions, accessibility, amenities, and ancillary service. To analyze and determine the classification of

highly potential, potential and less potential tourism, this is done using scoring guidelines based on research by Nurgoho (2020). The following are indicators and sub-indicators used for guidelines for assessing potential attractions:

Attractions

Attraction is an attraction owned by every tourist attraction. This component is an important indicator because it shows the uniqueness and differentiation of other tourist attractions. Based on Table 1, it can be seen that the 5 indicators of attraction components are uniqueness of resources; abundance of potential resources; tourism activities that can be done by tourists; cleanliness of the location of the tourist attraction; and comfort of the location of the tourist attraction.

Table 1. Indicators and Sub-Indicators of Tourism Potential Attraction Components

No.	Indicator	Sub Indicators
1	Resource uniqueness	Waterfalls, springs, rivers, caves, flora, fauna, forests, conservation, parks, historical relics, traditional ceremonies, traditional arts, festivals, and community culture.
2	The abundance of potential resources	Rocks, flora, fauna, water and artificial.
3	Tourist activities that tourists can do	Enjoy the beauty of nature, see flora and fauna, fishing, climbing, swimming, camping, outbound, selfies, culinary, enjoy entertainment events or festivals, shopping, do sports, do pilgrimages, worship, and do education/research.
4	Cleanliness at the attraction site	There is no pollution, no garbage, no *vandalism,* and there is an environmental hygiene awareness.
5	Convenience of attraction location	Clean environment, free from noise, far from residential areas, and good service to tourists.

Accessibility

Accessibility is an aspect of easy access to transportation taken by tourists to get to tourist attractions. Based on Table 2, it can be seen that there are 4 indicators of accessibility components road conditions to the attraction; distance of the attraction from the highway; means of transportation to the attraction; and distance of attractions from the city center.

Table 2. Indicators and Sub-Indicators of Tourism Potential Accessibility Components

No.	Indicator	Sub Indicators
1	Road conditions to the attraction	Types of asphalt roads, cast roads, cobblestone/dirt roads, and footpaths.
2	Distance of the attraction from the highway	Distance less than 1 km, 1-2 km, 2-3 km, and distance of more than 4 km.
3	Means of transportation to the attraction	Public transportation is 4-wheeled, 4-wheeled, 2-wheeled, and cannot be passed by vehicles.
4	Distance of attractions from city center	Less than 5 km, 5-10 km, 10-15 km, and more than 15 km.

Amenites

Amenities are aspects of facilities provided by tour managers for visitors to support all the needs of tourists while in tourist attractions. Based on Table 3, it can be seen that there are 4 indicators of amenities components toilet or bathroom facilities; facilities for places of worship; parking facilities; dining facilities; and attraction information board.

Table 3. Indicators and Sub-Indicators of Tourism Potential Facility Components

No.	Indicator	Sub Indicators
1	Toilet	There are ≥5, there are 3-4, there are 1-2, and not available.
2	Facilities for places of worship	The condition is well maintained, adequately maintained, poorly maintained, and unavailable.
3	Parking facilities	Extensive, quite spacious, limited, and unavailable.
4	Dining facilities	There are ≥ 5, there are 3-4, there are 1-2, and not available.
5	Attraction information board	Good condition, good enough, less good, and not available.

Ancillary Service

An ancillary service component is an aspect of an institution or organization that has the task of managing tourist attractions. Based on Table 4, it can be seen that the 2 indicators of ancillary service components are tourism management and security post.

Table 4. Indicators and Sub-Indicators of Institutional Components of Tourism Potential

No.	Indicator	Sub Indicators
1	Tourism management	Well-managed, good enough, less good, and unmanaged.
2	Security post	Good enough, good enough, less good, and not available.

The Effectiveness of WebGIS Media Attraction Potential

Effectiveness is a measurement used to determine the achievement of the success of a goal (Abdurahman & Alghifari, 2022). Media testing is an effort to determine the level of effectiveness of a media that has been prepared. WebGIS media testing can be carried out in three stages, namely functional testing, compatibility, and user acceptance testing (Firdaus et al., 2022). Here are the stages of testing WebGIS media: Functional Test, System functional testing is carried out by testing each menu component or feature contained in WebGIS. Compatibility Test, Compatibility testing is carried out by testing accessing WebGIS media using various types of *different web browsers*. User Acceptance Testing, User testing is carried out by testing media users by distributing questionnaires to find out the success of WebGIS media that has been prepared.

Attraction Development Strategy

The strategy of developing tourism objects is carried out using SWOT analysis to maximize various strength and opportunity factors and minimize the weaknesses and threats factors owned by a tourist attraction to assist in the formulation and making of strategic decisions (Utama & Mahadewi, 2012). The following is an explanation of each component of the SWOT: Strength, Strength is an aspect of advantages or advantages possessed by a tourist attraction that can be an attraction for tourists to make tourist visits. Weakness, Weakness is a deficiency found in tourist attractions. Weaknesses are an important factor so good management is needed to minimize weaknesses owned. Opportunities, Opportunities are everything in a tourist attraction that can be developed to create new ideas to attract tourist visits. Threats, Threats are everything that can be a threat to the sustainability of a tourist attraction that can be caused by various things that can be caused from inside and outside the scope of the attraction.

Based on the results of the analysis of each SWOT component, the results are visualized in the form of IFAS and EFAS graphs consisting of four quadrants, including (Ajibroto, Keizer, & Pringgabayu, 2018). Quadrant 1 (growth) is a favorable situation for tourism objects because it has opportunities and strengths that can be utilized for tourism development, the right strategy for this quadrant is to support aggressive growth policies. Quadrant 2 (diversification) is a situation where tourist attractions have great strengths but are faced with several threats, the right strategy for this quadrant is to minimize threats that can arise due to aspects of the weakness of tourist attractions. Quadrant 3 (conservative) is a situation where tourist objects have great opportunities but are faced with weaknesses of tourist attractions, the right strategy for this quadrant is to minimize weaknesses, especially in the internal tourist attraction. Quadrant 4 (survival) is a situation where the tourist attraction is at a disadvantage because it has many weaknesses and threats, the right strategy for this quadrant is to minimize weaknesses and increase the advantages of the tourist attraction.

RESULTS AND DISCUSSION

Analysis of Potential Tourism Objects in Dukuh Village

Dukuh Village is an area that has a lot of tourism potential consisting of 6 natural tourist attractions, 2 cultural attractions, 3 religious attractions, and 5 artificial attractions. Tourism potential is a condition found in tourist objects that can support the existence of the main object (Juliana, 2019). Tourism potential can be analyzed using the 4A indicator consisting of attraction, accessibility, amenity, and ancillary service. This component is vital because the more attractions a site has, the greater its potential to attract tourists. The accessibility component involves the ease with which tourists can reach a destination. This aspect is essential for increasing tourist interest (Amanda & Lely, 2022; Leekhot, Payougkiattikun, & Thongsuk, 2024; Ulandari, Ferry, & Damni, 2024). The amenity component encompasses the facilities provided by a tourist attraction to meet the needs of visitors. It is important because it can influence tourists' decisions to return (Amini & Suriadi, 2023). The ancillary services component pertains to institutions responsible for managing tourist attractions. This includes various aspects of management, development, coordination, and organization at the site (Fabanyo & Syaodih, 2023). Based on the results of the analysis that has been conducted, there are 16 tourism potentials in Dukuh Village, as presented in Table 5 and Figure 1.

Table 5. Distribution of Potential Tourism Objects in Dukuh Village

No.	Potential Tourism Objects	Classification
1	Umbul Temanten	Very Potential
2	Umbul Ngabean	Very Potential
3	Umbul Dudo	Very Potential
4	Kolam Renang Anak Pengging	Very Potential
5	Umbul Peceren	Very Potential
6	Pemancingan Win-Win	Very Potential
7	Taman Handayaningrat	Very Potential
8	Alun-Alun Pengging	Very Potential
9	Umbul Kendat	Quite Potential
10	Makam Raden Tumenggung Padmanegara	Quite Potential
11	Pasar Burung	Quite Potential
12	Makam Ki Ageng Pengging Handayaningrat	Quite Potential
13	Makam Empu Supo	Quite Potential
14	Festival Layang-Layang	Quite Potential
15	Umbul Planangan	Less Potential
16	Situs Yoni Bodean	Less Potential

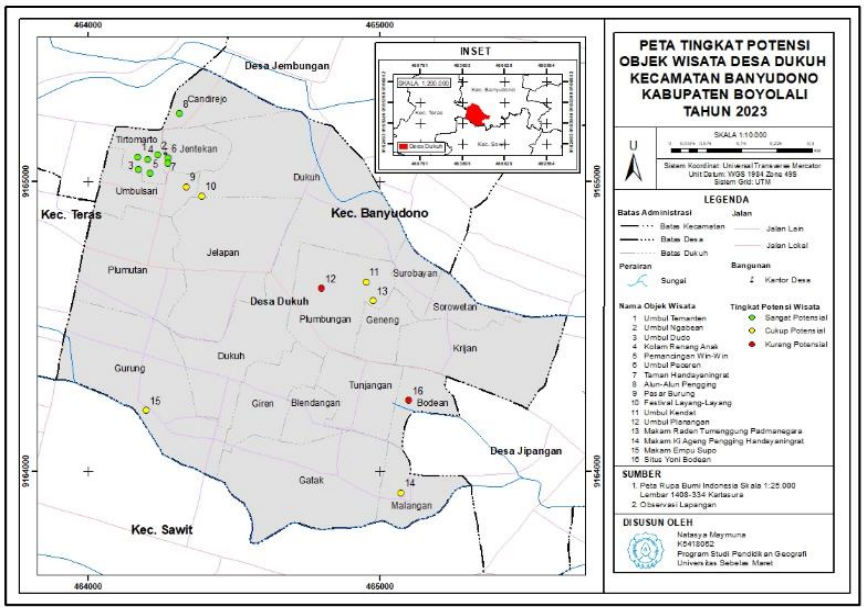

Figure 1. Map of Tourism Potential Level of Dukuh Village

Based on Table 5 and Figure 1, it can be concluded that there are 8 potential tourist attractions, 6 tourist attractions have quite potential, and 2 less potential tourist attractions. There are 8 potential tourist attractions (Umbul Temanten; Umbul Ngabean; Umbul Dudo; Kolam Renang Anak Pengging; Umbul Peceren; Pemancingan Win-Win; Taman Handayaningrat; dan Alun-Alun Pengging) is the most visited tourist attraction, this is because the tourist attraction has high appeal, complete facilities, easy accessibility, and has a well-structured management system. There are 6 tourist attractions have quite potential (Umbul Kendat; Makam Raden Tumenggung Padmanegara; Pasar Burung; Makam Ki Ageng Pengging Handayaningrat; Makam Empu Supo; dan Festival Layang-Layang) is a tourist attraction that is visited by tourists at certain times so that it is necessary to improve the attraction, facilities, management, availability of information, and promotional efforts for the tourist attraction. The are 2 less potential tourist attractions (Umbul Planagan and Situs Yoni Bodean) which has a low number of tourist visits, this is due to limited attractions, inadequate facilities, limited accessibility, and less than optimal management.

Based on these results, it can be seen that there are several strategies for developing tourist attractions in Dukuh Village, namely: First, the need to increase the attraction of tourist attractions. This is the main point because the more attractions each tourist attraction has, the more advantages can be used to attract tourist visits. Second, it is necessary to increase accessibility to increase interest in tourist visits because the easier the accessibility when going to a tourist attraction, the higher the interest of tourists to visit the tourist attraction (Amanda & Akliyah, 2022). Third, it is necessary to improve public facilities at each object provided by each tourist attraction, this is an important aspect because it can be a determinant for tourists to make repeat visits (Amini & Suriadi, 2023). Last, it is necessary to improve the function of tourism management institutions in Dukuh Village, the ancillary services component is important because these institutions play a role in managing, developing, coordinating, and regulating everything at tourist attractions. Tourist attractions will be able to develop and be of interest to tourists or have competitiveness if they are managed well. In managing tourist attractions, a strategy is needed to gain added value and combine the various potentials in the region to have competitiveness in the development process (Pantiyasa et al., 2022).

Based on the results of the analysis of the potential of tourist attractions in Dukuh Village, a WebGIS media was compiled containing information about tourist attractions. WebGIS is one of the media that can contain information visually and can be disseminated through the network through the World Wide Web (Firmansya et al., 2018). WebGIS is a web-based digital mapping that can be used for distribution, publication, integration, and information exchange databases for free, practically, effectively and efficiently (Susetyo et al., 2024). The WebGIS was compiled using the Quantum GIS (QGIS) application. QGIS is an application created to visualize, edit, and analyze geospatial data (Chavoya et al., 2022). WebGIS potential of tourist attractions is one of the uses of technology in the tourism sector. With WebGIS, information can be presented in detail, completely, interestingly, and easily understood. The following are the results of the preparation of WebGIS media Potential Tourism Objects in Dukuh Village.

Figure 2. WebGIS Potential Tourism Objects of Dukuh Village

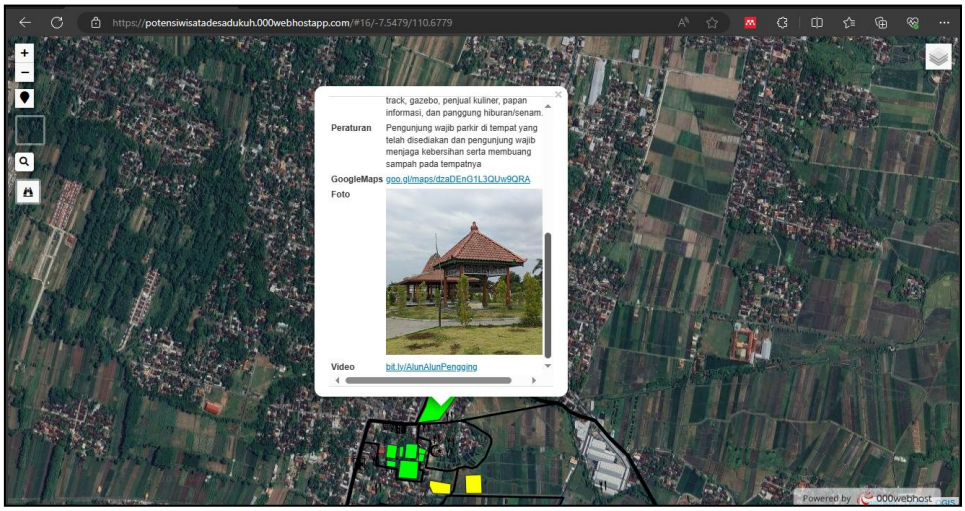

Figure 3. WebGIS Potential Tourism Objects of Dukuh Village

The Effectiveness of WebGIS Media Potential of Dukuh Village Tourism Objects

WebGIS media needs to be tested to determine the level of media effectiveness. Effectiveness testing is carried out through three stages, namely functional testing; compatibility testing; and user acceptance testing (Firdaus et al., 2022). Functional and compatibility testing is carried out by 3 media experts to ensure more valid results. WebGIS media experts are individuals who have specializations, are involved in mapping, or have extensive knowledge of web-based mapping (WebGIS). The selection of media experts is based on expertise or professional background in the field of WebGIS. For this study, the three media experts were selected from ESRI Indonesia, Sebelas Maret University, and the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency. Meanwhile, user acceptance testing is carried out by tourists visiting the Dukuh Village tourist attraction.

Functional Testing

Functional testing is one of the media testing methods carried out to test the function of each feature contained in a media. This test is carried out by testing all features to find out if each feature can work properly.

Table 6. Functional Test Results

No.	Evaluator	Test Results										Total
		1	2	3	4	5	6	7	8	9	10	
1	Media Expert 1	5	5	4	5	4	5	4	5	4	4	45
2	Media Expert 2	4	5	4	5	5	4	4	4	2	3	40
3	Media Expert 3	4	4	5	5	4	4	4	5	3	4	42
Mean												42,3

Based on Table 6, the assessment results of the three WebGIS media experts show an average value of 42.3. Referring to the guidelines for classifying the level of effectiveness of functional media testing, it can be concluded that WebGIS media has a good level of functional effectiveness. All features in WebGIS can run well according to the function of the feature..

Compatibility Testing

Compatibility testing is a method of media testing to find out that composed media can be accessed in several web browsers. Compatibility testing is carried out by accessing WebGIS using several different applications or web browsers.

Tabel 7. Compatibility Test Results

No.	Media Expert	Test Results										Total
		1	2	3	4	5	6	7	8	9	10	
1	Media Expert 1	2	2	2	2	2	2	2	2	2	2	20
2	Media Expert 2	2	2	2	2	2	2	2	2	2	2	20
3	Media Expert 3	2	2	2	2	2	2	2	2	2	2	20
Mean												20

Based on Table 7, it can be seen that the assessment results of the three media experts have an average value of 20. Referring to the guidelines for classifying the level of effectiveness of media compatibility testing, it can be concluded that WebGIS media has a good level of compatibility effectiveness. WebGIS media can be accessed on various web browsers and applications both on laptops and smartphones, making it easier for tourists to access information.

User Acceptance Testing

User Acceptance Testing is one of the media testing methods conducted to determine the effectiveness of media use. This test was conducted by giving questionnaires to a sample of media users, namely 112 tourists spread across 16 tourist attractions in Dukuh Village.

Table 8. User Acceptance Testing Results

No.	Indicator	Result				
		1	2	3	4	5
1	WebGIS is easily accessible on *mobile* phones or laptops.	0	0	47	54	11
2	WebGIS has an attractive appearance.	0	0	27	61	24
3	WebGIS has an attractive photo and video display.	0	0	23	56	33
4	WebGIS has an easy-to-read typeface and font size.	0	0	29	46	37
5	WebGIS has a language that is used easy to understand.	0	0	2	50	60
6	WebGIS is easy to operate.	0	0	58	42	12
7	WebGIS contains complete information.	0	0	7	54	51
8	WebGIS contains valid information in accordance with existing conditions in the field.	0	0	7	58	47
9	WebGIS can help travelers to obtain information about attractions.	0	0	41	65	6
10	WebGIS is feasible and suitable for use as a promotional medium for tourist attractions.	0	0	2	85	25
Total (scor x weight)				4543		
Mean (total : 112 tourists)				40,5		

Based on Table 8, the test results can be obtained with an average of 40.5. Referring to the guidelines for classifying the level of effectiveness of media user testing, it can be concluded that WebGIS media has a good level of effectiveness of use. Based on the three media test results, it can be concluded that WebGIS potential tourist attractions are a media that has a good level of effectiveness. This shows that WebGIS can be used as one of the media for information on potential tourist attractions in Dukuh Village. With WebGIS, it can become a database regarding all information about tourist attractions in Dukuh Village. The availability of information about tourist attractions is an important factor in tourism development so that with WebGIS media it can be used as one of the supporting media for tourism development and increasing tourist visits to Dukuh Village.

SWOT Analysis of Potential Tourism Objects of Dukuh Village

SWOT analysis is one of the analysis techniques to determine development strategies that can provide an overview of tourist attractions seen from four perspectives so that decisions taken can be more comprehensive (Hamin & Pongoliu, 2023). SWOT analysis can be used to analyze development strategies

in the tourism sector. The determination of SWOT analysis is determined based on the results of interviews with stakeholders who have a role in the tourism sector in Dukuh Village. Based on these results, questionnaires were then distributed to all tourists in Dukuh Village. The following are the results of the SWOT analysis of the potential tourist attractions in Dukuh Village:

Table 9. Distribution of Potential Tourism Objects in Dukuh Village

No.	Potential Tourism Objects	Classification
1	Umbul Temanten	Growth
2	Umbul Ngabean	Growth
3	Umbul Dudo	Growth
4	Kolam Renang Anak Pengging	Diversification
5	Umbul Peceren	Growth
6	Pemancingan Win-Win	Growth
7	Taman Handayaningrat	Growth
8	Alun-Alun Pengging	Growth
9	Umbul Kendat	Growth
10	Makam Raden Tumenggung Padmanegara	Growth
11	Pasar Burung	Growth
12	Makam Ki Ageng Pengging Handayaningrat	Growth
13	Makam Empu Supo	Growth
14	Festival Layang-Layang	Growth
15	Umbul Planangan	Conservative
16	Situs Yoni Bodean	Conservative

The results of the SWOT analysis are presented in the form of a graph consisting of four quadrants. Quadrant I is growth, which means that the tourist attraction has very great strength, quadrant II is diversification, which means that the tourist attraction has potential or strength but faces several weaknesses, quadrant III is conservative, which means that the object has great opportunities but faces several very strong weakness factors, and quadrant IV is survival, which means that the tourist attraction has unfavorable conditions.

Based on Table 9, it can be seen that there are 13 tourist attractions included in quadrant I (growth), these tourist attractions have very profitable tourism characteristics so their development strategy is to maintain their appeal and improve several supporting tourism components such as facilities and tourism institutions. Then there is 1 tourist attraction included in quadrant II (diversification), the development strategy for these tourist attractions is carried out by increasing the appeal and advantages of the tourist attraction so that they can compete in facing threats both from internal and external. Then there are 2 tourist attractions included in quadrant IV (conservative), the right tourist attraction development strategy is to conduct an evaluation related to various deficiencies and threats to the tourist attraction both in the attraction components; amenities; accessibility; and ancillary service.

The development of the tourism sector requires the participation of several parties, both the community and the local government. Community participation is a major factor in tourism development because it plays a role as the main figure in tourism development (Farel et al, 2023). In addition, the local government has an important role in the development of the tourism sector. With this research, it is expected to be used by policymakers, both local governments, and BUMDes as parties that have institutional roles. The implications of this study can be used as reference material in the process of formulating policies for the management and development of the tourism sector in Dukuh Village. The results of this study can be used as a reference in determining the management and development strategy for each potential tourist attraction and determining information media and promotion of tourist attractions that are by current technological developments. In addition, this research can be used as a consideration for each tourist attraction manager to better understand the characteristic conditions of each tourist attraction because tourist managers are parties that have a direct institutional role with tourist attractions so that they can be used to determine strategies for management, development, and promotion of tourist attractions to increase the attraction and tourist visits.

This research can contribute to the availability of reference for research related about tourism, geography, WebGIS, Quantum GIS, and technology development. This research can be used as an effort

to preserve culture, environmental conditions, and social life of the community in the aspect of tourism. This research has limitations in the research unit of regional analysis which only analyzes the coverage of the village level area, so that it can be a recommendation for further research. Further research recommendations can conduct WebGIS-based tourism object mapping by covering a wider area and with more detailed information and can be developed in the form of an application. In addition, further research recommendations are needed regarding the analysis of the direction of development regarding the use of WebGIS media in order to determine efforts to develop better and more interesting WebGIS media.

CONCLUSION

Dukuh Village is an area that has a lot of tourism sector potential consisting of natural, cultural, religious, and artificial tourist attractions. The management of tourism potential that has not been maximized and limited information are some of the problems in the development of the tourism sector in Dukuh Village. WebGIS is a web-based mapping media that can be used as a medium for information on potential tourist attractions. To determine the level of effectiveness of WebGIS, media testing was carried out with three stages of testing, namely functional testing, compatibility, and user acceptance. Based on the test results, it was obtained that WebGIS media is an effective media to be used as a medium for information on potential tourist attractions in Dukuh Village. The development of potential tourist attractions in Dukuh Village is one of the roles of various stakeholders to formulate a policy to maintain and preserve the tourism potential it has, such as increasing the attractiveness of each tourist attraction, increasing the availability of the number and quality of tourist attractions, increasing accessibility to tourists. tourist attractions, improving the institutional system of managing tourist attractions, and increasing the availability of information and media that is interesting to tourists. This research can contribute to the availability of reference materials for research related to tourism, geography, and technology development. This research can be used as an effort to preserve the culture, environmental conditions, and social life of the community in the aspect of tourism. This study has research limitations on the village-level area analysis unit, that it becomes a recommendation or direction for further research, WebGIS tourist objects can be mapped by covering a wider area and with more detailed information and can be developed in the form of an application. In addition, further research is needed regarding the analysis of the direction of WebGIS media development to determine efforts to develop better WebGIS media so that it can have an impact on tourists in the availability of tourist object information media.

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AUTHOR CONTRIBUTIONS

The author's contribution to this study is the role of the first author contributing to data collection from research samples, conducting data input, conducting analysis, determining relevant research, and the process of compiling articles. The role of the second author contributes to the mapping process, namely the preparation and testing of WebGIS media and the interpretation of research results. The role of the third author contributed to the process of determining ideas, determining the title of the manuscript, determining research questions. Then the role of the fourth author contributed to the process of interpreting research results and compiling article conclusions.

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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