International Journal of Research and Review
[Indexed, Peer-Reviewed Journal]
Volume 12; Issue: 5; May 2025
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Development of a Web-Based Eco-Educational Tourism GIS to Meet Tourism Information Needs at the Pasarbanggi Mangrove Bridge Tourist Attraction

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DOI: https://doi.org/10.52403/ijrr.20250539

ABSTRACT

The progress of information technology developments in the tourism sector can currently be used to create effective information facilities for tourists. Unfortunately, there are still many tourist attraction managers who have not made optimal use of information technology. One example is what happened at the Pasarbanggi Mangrove Bridge tourist attraction. The main purpose of this research is to create a web-based eco-educational tourism GIS development design to meet the information needs of tourists. The specific objectives of this study include analyzing the condition of the need for providing educational information facilities at the Pasarbanggi Mangrove Bridge tourist attraction, describing the design and development of web-based eco-educational GIS tourism, analyzing the results of web implementation used by experts, and making improvements to the results of the evaluation provided by experts. The research method used is based on the RnD method through the ADDIE approach. The results of the study show that due to the limited capabilities of managers, it is necessary to develop digital education facilities to meet tourist information. The same thing is also expressed by tourists, where tourists need educational facilities to meet information needs and increase knowledge about various aspects (ecological, economic, socio-cultural, and educational aspects) that exist in tourist attractions. The design and development made have also been adjusted to the results of the analysis of the information needs needed by tourists. The web implementation by media and content experts also showed good results although there were small improvements that needed to be made. The results of the evaluation by experts in the form of the addition of satellite image sub-menus, web usage guides, bibliographies, and writing errors have been corrected so that web-based eco-educational GIS to meet the information needs of tourists at the Pasarbanggi Mangrove Bridge Tourist Attraction can be more optimal when used.

Keywords: Technology, Website, GIS, Tourism, Information Needs

INTRODUCTION

The development of information technology and its usefulness today have advanced very rapidly to be used in various fields of life. In the field of tourism, for example, information technology is used in the creation of information systems or media. The information system is used and used to provide or distribute all information about tourist attractions so that it can attract tourists

to visit. However, the use of information and communication technology in supporting regional tourism is still not effective by business actors (Putra et al, 2020).

The problem of using information and communication technology that has not been effectively carried out also occurs at the Pasarbanggi Mangrove Bridge tourist attraction. Located directly adjacent to the North Coast of Java Island, this tourist attraction has extraordinary mangrove ecotourism potential. The potential of mangroves is even directly supported by the Rembang Regency government, which is contained in Regional Regulation No. 14 of 2011 concerning the RTRW of Rembang Regency 2011-2031, the Pasar Banggi Mangrove Area is designated as a Regency Strategic Area based on the environmental carrying capacity that will be developed as an ecotourism area and mangrove centre so that the utilization of the Pasarbanggi mangrove ecosystem is managed not only for financial benefits but also its conservation, sustainability and sustainability are considered (Lailiiyah & Sanjoto, 2021). The potential of tourist attractions has actually been developed by the manager quite well. This can be seen from the various facilities that have been built, including red bridge facilities, photo spots, food stalls, toilets, and gazebos to attract tourists. Facilities that are not optimally developed by managers are educational facilities.

Educational facilities provided by the manager at the Pasarbanggi Mangrove Bridge tourist attraction are only limited to information boards about mangrove types. In fact, as an ecotourism development area and mangrove centre in Rembang Regency, this facility should be one of the main things that need to be developed in the development of ecotourism. The development of this educational facility is also very useful to meet the information needs of tourists. However, it is very unfortunate that the construction of these facilities has not been carried out properly, so the development of the Pasarbanggi Mangrove Bridge tourist attraction carried out by the manager in the educational aspect is still not optimally developed (Soeprobowati, Purnaweni, & Susarno, 2020). In fact, educational facilities about the mangrove ecosystem can even be presented digitally through the use of information technology so that it is more efficient and cost-effective.

The design of the development of a web-based eco-educational tourism geographic information system containing information and education related to the Pasarbanggi Mangrove Bridge tourist attraction needs to be carried out to provide digital educational facilities in meeting the information needs of tourists. The development of this information system is also one of the steps that need to be taken in accordance with the direction of the Ministry of Tourism and Creative Economy (KEMENPAREKRAF) (2021), which states that the tourism and creative economy sectors need to develop digital tourism strategies as an effort to move quickly to adapt and keep up with the times. This is done to create a web or information system that is accessible and effective in meeting the information needs of tourists, starting from pre-on-post journey activities with the help of digital facilities (Ministry of Tourism and Creative Economy (KEMENPAREKRAF), 2021).

Therefore, in this study, the design of the development of a web-based eco-educational tourism geographic information system containing information and education related to the Pasarbanggi Mangrove Bridge tourist attraction will begin through needs analysis, design and development, media and content validation by experts, and evaluation that needs to be carried out for better web development based on the results of evaluations from experts. These various stages are carried out to create an optimal design for the development of mangrove eco-educational tourism GIS in meeting the information needs of tourists about the educational aspects in the Pasarbanggi Mangrove Bridge tourist attraction.

MATERIALS & METHODS

The location of this study is at the tourist attraction of the Pasarbanggi Mangrove Bridge, Pasarbanggi Village, Rembang District, Rembang Regency. The research method used to make a web tourism-based GIS development design to meet the needs of tourists regarding the Pasarbanggi Mangrove Bridge tourist attraction is based on the Research and Development method through the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) approach. The following are the stages carried out in this study;

1. Analysis, needs analysis is carried out to identify problems according to the goals and ideas regarding the product to be developed.
2. Design is the stage of designing the product to be developed.
3. Development is the process of realizing and building designs that become real.
4. Implementation, product implementation as a form of concrete step from the application of products that have been made through validation from media experts and material experts.
5. Evaluation, the evaluation process is carried out in relation to the implementation stage to see whether the product that has been developed needs improvement or not.

The subject of the research to achieve the goal of needs analysis as the basis for web-based GIS development is a party that has an interest or influence (stakeholder) on the tourist attraction of the Pasarbanggi Mangrove Bridge, consisting of the manager of the tourist attraction represented by the head of the ecotourism development manager of the Pasarbanggi Mangrove Bridge and tourists. The Chairman of the management is used as the main informant because the Chairman has the deepest understanding of the development conditions carried out on the ecotourism object of the Pasarbanggi Mangrove Bridge. The sampling technique to achieve this goal uses the snowball technique, which is a sample determination technique that is initially only selected by one person but will increase the number of samples to complement the previously obtained data until the data obtained is complete. Meanwhile, other research subjects in this study are validators, media experts, and material expert validators to conduct measurements, implementations, and evaluations of web-based GIS that are being developed by researchers through the "jmmangrovepasarbanggi.com" domain to meet the information needs of tourists at the Pasarbanggi Mangrove Bridge tourist attraction. The web that has been developed will be measured by three media experts and three material experts who are selected according to their expertise in their respective scientific fields. The data collection technique in this study uses three techniques, namely interview techniques, questionnaire techniques, and documentation techniques. The results of the research data that have been obtained will then be analyzed qualitatively and quantitatively.

RESULT AND DISCUSSION

1. ANALYSIS

The tourist attraction of Pasarbanggi Mangrove Bridge is a tourist attraction that is used as a strategic area with a focus on development as an ecotourism area and mangrove centre in Rembang Regency, which is contained in Regional Regulation No. 14 2 of 2011 concerning the RTRW of Rembang Regency for 2011-2031. The development of ecotourism carried out by the manager of the Sidodadimaju farmer pond group has gone well, as evidenced by the planting of mangrove seedlings to the development of tourist attraction attractions carried out every year. This tourist attraction has even been designated as an essential ecosystem area (KEE), and the manager of the Siodadimaju Pond group was named the best group in managing marine tourism villages and won the coastal awards from the Ministry of Marine Affairs and Forestry in 2023. The management of the mangrove ecosystem that is already slick needs to be

maintained and continued to be developed so that the mangrove ecotourism area is maintained and increasingly attracts tourists to come to visit.

One of the things that need to be developed by the manager of the Pasarbanggi Mangrove Bridge Tourist Attraction is infrastructure facilities in the aspect of education or education. The educational aspect needs to be developed because, in the tourist attraction area, there is only an information board about the names of the types of mangroves planted. Based on interviews conducted with the manager, actually, the provision of educational information boards regarding the characteristics of each type of mangrove tree planted in the past has been made in collaboration with Undip students, but its sustainability is not maintained optimally because the information boards and banners are difficult to read.

"*There is no mas yet. We have made an information board about the condition and characteristics of mangrove trees, in collaboration with research by Undip students, but now the information board is difficult to read, so we only provide a nameplate for the type of mangrove that is planted" – Informant 1 (Mas pur as the Chairman of the Sidodadimaju Farmer Pond Group).*

With this in mind, the provision of information infrastructure about eco-educational tourism needs to be developed digitally through the addition of a new sub-menu of mangrove eco-educational tourism on the "jmmangrovepasarbanggi.com" website so that tourists do not only enjoy the beauty of nature because tourists also need educational information in order to increase knowledge about the mangrove ecosystem. The development of digital information provision will also make it easier for managers to provide facilities to tourists in a sustainable manner and can also make it easier for tourists to access ecological information and education about the Pasarbanggi mangrove ecosystem properly without space and time limitations. This is in accordance with the results of interviews with visiting tourists; "The development of information and education provision like this needs to be developed so that I as a tourist not only come to see but also can increase knowledge." – Informant 3 (Fitrah as a tourist).

Educational facilities that need to be developed to meet the information needs of tourists are about ecological information and tourist education at the Pasarbanggi Mangrove Bridge tourist attraction in accordance with the concept of mangrove eco-educational tourism development and the results of interviews that have been carried out. Some information that needs to be added includes: 1) the ecological aspect (Information on the thickness of mangroves, mangrove density, characteristics of the type of mangrove planted, the naturalness of mangroves, and biota objects). 2) economic aspects (information about business opportunities, product markets, processed products, and income levels. 3) socio-cultural aspects (information about community organizations that manage, the use of mangrove forest areas, community involvement, and punishments for mangrove destroyers. Finally, 4) educational aspects (information about mangrove care carried out by managers after mangroves are planted).

The development of the provision of information on mangrove eco-educational tourism at the Pasarbanggi Mangrove Bridge tourist attraction needs to be developed because, based on the results of interviews that have been carried out, it was found that tourists need the eco-educational tourism information to add new insight and knowledge about the condition of the mangrove ecosystem in the Pasarbanggi Mangrove Bridge tourist attraction. The development of infrastructure facilities in a tourist attraction must always be developed so that the needs of tourists when carrying out tourist activities can be properly facilitated. The development of these infrastructure facilities is actually always pursued by the manager of the Pasarbanggi Mangrove Bridge tourist attraction together

with stakeholders. Stakeholders need to be involved as partners for the sake of tourism to be better (Mtapuri, B. et al., 2021). Stakeholders must even be involved starting from the planning to the implementation of the development of tourist attractions because the purpose of development is to meet the needs so that tourists' interest in visiting can increase (Woo, E., Uysal, M., & Sirgy, M., J., 2018; Megawati., et al., 2023). Hidayah, N. (2019), in his book states that the so-called tourism stakeholders include tourism actors (tourists), entrepreneurs (private sector), the community (communities/non-governmental organizations), government, media, to the academic community.

Based on the research results, one of the aspects of the facilities that must be developed is educational services at tourist attractions because the development of ecotourism at the Jembatan Merah Hutan Mangrove Pasarbanggi tourist attraction has just begun to add facilities in the educational aspect by creating mangrove plant information boards (Soeprobowati, Purnaweni, & Susarno, 2020; Soeprobowati, et al., 2021). In fact, the information and education needs needed by tourists are not only limited to mangrove plant information. The information and education needs of tourists regarding mangrove ecosystem tourist attractions consist of 2 needs, namely information about ecology and tourism education. The ecological information needed by tourists at the Jembatan Merah Hutan Mangrove Pasarbanggi tourist attraction consists of several aspects, namely ecological aspects, economic aspects, and social aspects in the environment around the tourist attraction. This is relevant to several studies stating that information about ecotourism needed by tourists consists of three aspects of sustainability, including ecological aspects, economic aspects, and social aspects (Sholeh, M., 2017; Saptutyningsih, E., & Diwandi, D., 2019; Juhadi, Rahma, & Santoso, 2020; Asnawi, A., 2021). This is also in accordance with the results of research by Putri et al. (2022), which states that there are 3 aspects of ecotourism that can influence tourism stakeholders consisting of economic aspects, social aspects, and environmental aspects. The ecological aspect of mangroves is related to the condition of the ecosystem and environment in tourist attractions, various types of mangrove plants, to the life of marine biota that live in the ecosystem (Verawati & Idrus, 2023). The economic aspect contains the presentation of information regarding the economic conditions and creative products of the community around the tourist attraction with the aim of increasing tourists' purchasing power so that the economic conditions of the surrounding community can also improve (Verawati, & Idrus, 2023; Rifdan et al., 2023; Masruroh et al., 2023). This is relevant to the research of Putri et al. (2022), which states that information on the economic aspect of ecotourism is an important sector that shows the economic value for the present and the future. Meanwhile, information on the social aspect is related to social conditions and the participation of communities or social institutions in managing the mangrove ecosystem so that its condition is maintained properly (Megawati et al., 2023; Marbun, 2023). In the educational aspect, facts in the field show that tourists do not only need education about the types of mangroves planted. Tourists also need education about the mangrove ecosystem in the Pasarbanggi Mangrove Bridge tourist attraction, consisting of the need for information on the benefits of the mangrove ecosystem and procedures for planting and managing the mangrove ecosystem. This is in accordance with the results of a study by Verawati & Idrus (2023), which explains that tourists need various information both in the educational aspect consisting of information on the important benefits of mangroves, sustainable planting and ecosystem maintenance practices, environmental aspects consisting of information on mangrove ecosystems, types of mangroves, and existing fauna objects, and tourists also need information on the socio-economic

aspect consisting of information on the balance between the conservation environment and the welfare of the local community. Tourists need various educational information about the ecology and education of mangrove ecosystem tourism at the Jembatan Merah Pasarbanggi Mangrove Forest tourist attraction because tourists not only spend time enjoying nature and photo spots but tourists also need information and education to increase their knowledge and insight into the mangrove ecosystem at the tourist attraction.

Thus, the innovation in the development of the provision of web-based eco-edutourism GIS services needs to be carried out to meet the information and education needs of tourists regarding ecological information and education on the Pasarbanggi Mangrove Bridge tourist attraction. Mebri, F. H., Suradinata, E., & Kusworo (2022) in their research stated that efforts in the development of tourist attractions need to be made to improve and improve the condition of tourist attractions, including infrastructure facilities and tourist attractions to serve the various needs of tourists so that tourists can be interested in visiting.

2. DESIGN & DEVELOPMENT

The design of the web-based eco-educational tourism GIS development developed by the researcher is based on the information needs of tourists at the Pasarbanggi Mangrove Bridge tourist attraction made using the help of a third-party application, namely the WordPress application. The "jmmangrovepasarbanggi.com" web design designed and developed contains the information and education needed by tourists according to the results of the needs analysis. The initial stage in making a design or design of a website is to make an initial outline or outline of the "jmmangrovepasarbanggi.com" web development design that will be carried out so that the researcher has a definite reference in its development. The initial description or framework that was created included the creation of a new menu in the form of "mangrove eco-edutourism" and sub-menus in it, along with the contents in the new menu that were created or developed in accordance with the needs of ecological information and education needed by tourists. An overview of the initial design of web development can be seen in the image below:

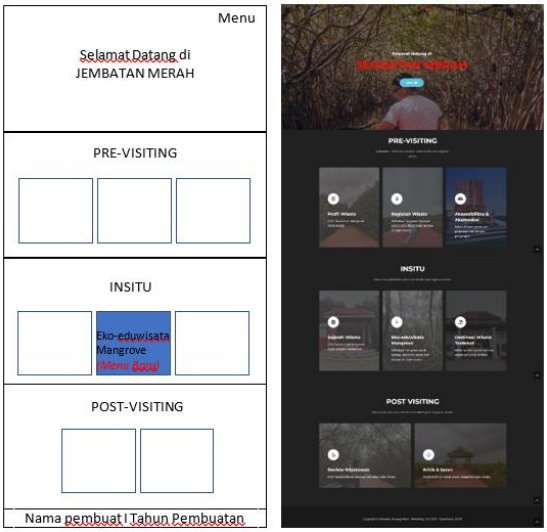

Figure 1. Design and Development of the Web-Based Eco-edutourism GIS Home Page

Figure 1 shows that the "jmmangrovepasarbanggi.com" web development design that was designed and developed provides a new main menu, namely the pasarbanggi mangrove eco-edutourism menu. This main menu will be filled with a new sub-menu regarding ecological information and education about the mangrove ecosystem in the Pasarbanggi

Mangrove Bridge tourist attraction in order to meet the information needs of tourists.

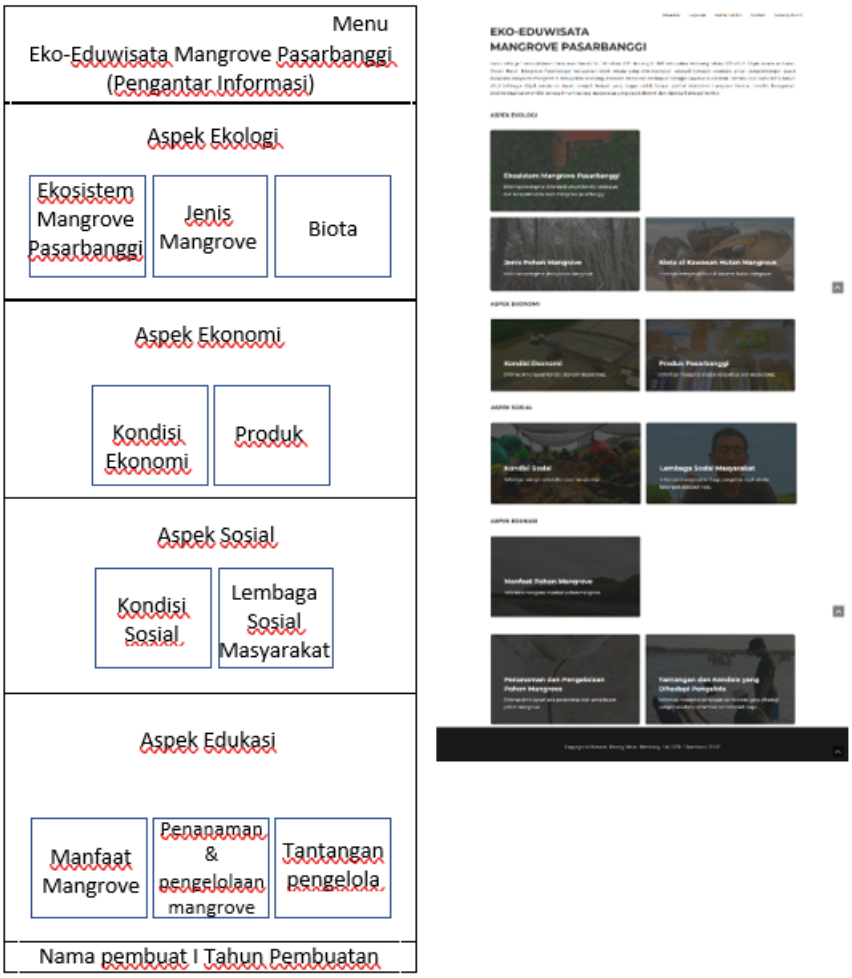

Figure 2. Design and Development of the Content of the Eco-edutourism GIS Sub-menu

Figure 2 shows the development design of the content in the new menu, namely "mangrove eco-edutourism". The contents of the new menu consist of several sub-menus of information and education aspects regarding the ecology of the Pasarbanggi mangroves and the education about the Pasarbanggi mangroves needed by tourists. The ecological information aspect needed by tourists themselves consists of the information aspect of ecological conditions, the information aspect of economic conditions, and the information aspect of social conditions. The aspects of ecological information needed by tourists consist of Information about mangrove ecosystems, types of mangroves, and biota in the Pasarbanggi Mangrove Bridge tourist attraction. The information aspect of economic conditions needed by tourists consists of information on the economic condition of the surrounding community and products made by the community around the tourist attraction. The information aspect of social conditions needed by tourists is based on information about the social conditions of the community and information on the social institutions of the community that manage the Pasarbanggi Mangrove Bridge. Meanwhile, the educational aspect of the pasarbanggi mangrove consists of several pieces of educational information needed by tourists, namely education about the benefits of the mangrove ecosystem, education on how to plant and manage mangrove trees, information about the challenges and

conditions faced by managers in caring for the Pasarbanggi mangrove ecosystem and how to deal with it so that the Pasarbanggi Mangrove Bridge tourist attraction can be well preserved.

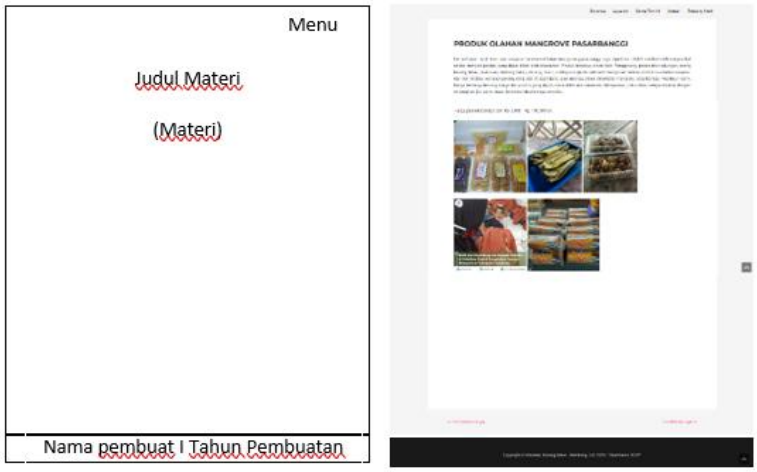

Figure 3. Design and Development of material content in GIS Eco-edutourism

Figure 3 illustrates one of the materials or content presented from the new sub-menu created by the researcher. The sub-menu shown in Figure 4.3 displays the content of the sub-menu "Pasarbanggi Products", namely all products produced by the community around the tourist attraction that can be purchased directly by tourists who visit the Pasarbanggi Mangrove Bridge tourist attraction.

The development of each new eco-educational tourism sub-menu has been ensured to display information according to what tourists choose and need. All the material presented on the web has also been created with the help of triangulation methods. Researchers do not only collect and present information from one source but also through the process of triangulating sources, triangulating methods, and triangulating data, which are then reduced and presented so that the material displayed becomes shorter, more concise, and clearer. Triangulation is an important step taken to ensure the validity of the data presented so that the data presented can be trusted (Susanto, 2023). This process is carried out so that the information presented is easier to understand by tourists, considering that tourists are not only students but tourists who can come from various circles and specific groups. This is in accordance with the results of Putra's (2021) research, which states that tourists in general need media to meet various basic information needs that are interesting about tourist attractions.

3. IMPLEMENTATION

The web-based GIS development design "jmmangrovepasarbanggi.com" that has been developed by the researcher is then implemented to media expert validators and material expert validators to be tested for feasibility. Validation by experts is carried out with the aim of finding out whether or not the development of web-based Eco-educational tourism GIS "jmmangrovepasarbanggi.com" that has been developed by researchers to be used, implemented and accessed by users or tourists who visit in meeting their information needs at the Mangrove Bridge tourist attraction. The validation of media experts and the validation of subject matter experts will be based on the variable "good web criteria" by Suyanto (2007) in his book Step by Step: Web Design Theory and Practices. This variable has many aspects to test the feasibility of media and content feasibility in developing a website. Here are the results of the web feasibility validation test "jmmangrovepasarbanggi.com";

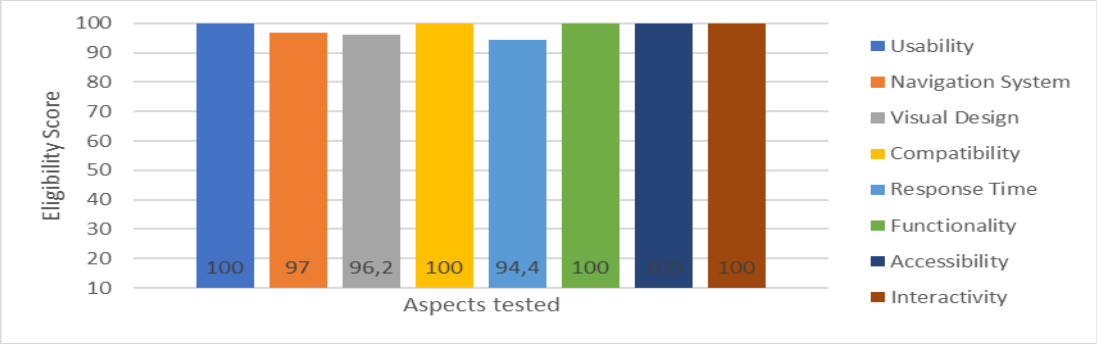

Figure 4. Media validity test results

Figure 4 shows the web-based GIS media development design developed by the researcher with an average feasibility percentage of 98.3% with feasible criteria. This shows that the web developed by the researcher can present information and education through various features in the web well. The acquisition of a high feasibility percentage can be obtained from every aspect or parameter of good web criteria in the development of web-based eco-educational tourism GIS "jmmangrovepasarbanggi.com", which has been tested by three media expert validators to obtain good scores. The first aspect tested was usability, which obtained a 100% feasibility percentage value with feasible criteria. Usability criteria are related to the usability and ease of use aspects in running a media or web technology product (Komninos, 2020; Vlachogianni, P., & Tselios, N., 2021). The results of the test through the usability criteria in this study it can be found that the "jmmangrovepasarbanggi.com" web can provide an easy experience for users or tourists in operating various features on the web to get information about ecology and education on the Pasarbanggi Mangrove Bridge tourist attraction.

The navigation systems aspect obtained a total feasibility percentage of 97% with feasible criteria. The navigation system is related to the consistency of the flow of information using the web, which shows that there should be no formatting errors so that users can achieve their goals well (Anas et al., 2024). Furthermore, the navigation system can also be a guide to the flow of information presentation so that users or tourist visitors can start from a logical order according to their needs and easily determine where to start, where to continue, and where to end access to information because information needs have been met (Khan et al., 2022). This means that the web development carried out in this study has been feasible and has the consistency of an effective navigation system in providing information services regarding the ecology and education of the Pasarbanggi Mangrove Bridge for users.

The next aspect or parameter that is tested is the visual design aspect. The visual design aspect received a total feasibility percentage score of 96.2% with feasible criteria. The visual design aspect in web testing is related to the design or modelling of interface displays through principles such as visibility, colour, and layout in order to have an attractive visual display structure (Bunian et al., 2021; Park, 2022). These results show that the visual design of the development of the web-based eco-edutourism GIS "jmmangrovepasarbanggi.com" has an interesting composition and layout of the display to see and read for users to meet their needs.

The next aspect that was assessed obtained a perfect score, namely the compatibility aspect. The compatibility aspect obtained a 100% feasibility percentage value with feasible criteria. This aspect is very important to test because the web must be accessed through an online web server on various media, both gadgets and laptops so that the web can be accessed practically and efficiently (Fuhad et al., 2020). This

compatibility aspect test shows that the development of a jmmangrovepasarbanggi.com web-based eco-edutourism GIS that researchers have carried out can be accessed through various types of devices and search engines or browsers.

The next aspect that was tested was the response time aspect. The response time aspect obtained a total feasibility percentage value of 94.4% with feasible criteria. The response time aspect is the time it takes to display a page of text in a web browser also known as a request to the server, until the request is served by the server (Prasena & Sama, 2020). The web is said to be fast in displaying information if the time needed to display writing and images is approximately 33 seconds (Suyanto, 2007). This parameter shows the ability of the web developed by the researcher to be able to present and display educational information services quickly.

The validation test of media experts on the last three aspects, namely the functionality aspect, the accessibility aspect, and the interactivity aspect, all obtained perfect scores from media expert validators. The functionality aspect, accessibility aspect, and interactivity aspect both obtained a total feasibility percentage value of 100% with feasible criteria. It needs to be emphasized that the functionality aspect is related to the process and technicality of the web in displaying the accuracy of the features accessed by users (Vila et al., 2021). In testing, the accessibility aspect is related to human experience activities because humans can only access a web in various conditions, anywhere, and whenever arising from human needs (Campoverde et al., 2021). Furthermore, the interactivity aspect emphasizes that the web as a digital media does not only function to present information but the web must also provide space for users to get the opportunity to share information and open discussions about various things between users and managers (Lee-Geiller, Seulki & Lee, Taejun, 2019). From the results of this test, it is known that the developed web can carry out its functions well, the web can also be accessed at any time inclusively by users, and the developed web can provide interactive features to users to provide feedback in the form of communication access with managers, to provide assessments, criticisms, and suggestions.

In addition to media testing by media expert validators, the development of eco-edutourism GIS developed by researchers has also been carried out by material feasibility tests by material expert validators. The following are the results of the feasibility validation test of the "jmmangrovepasarbanggi.com" web material, which can be seen below:

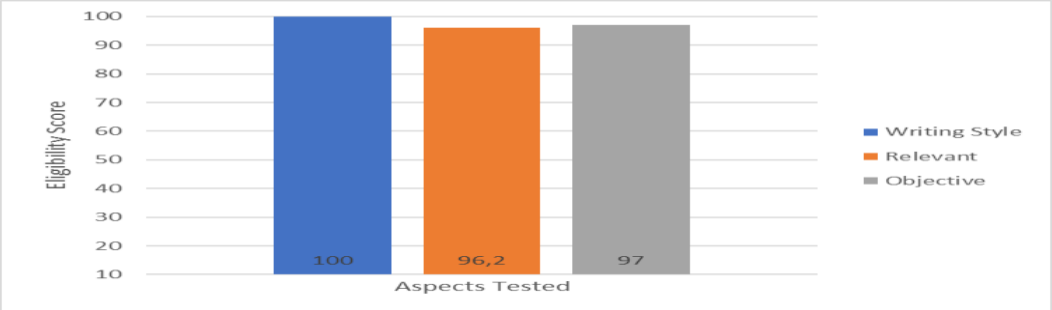

Figure 5. Content Validity Test Results

Figure 5 shows the results of the material feasibility test's value in the web-based GIS media developed by the researcher. The overall results of the material feasibility test obtained a total feasibility percentage value of 97.7% with feasible criteria. This shows that the material in developing the web-based eco-edutourism GIS "jmmangrovepasarbanggi.com" developed by the researcher is suitable for access by users or tourists who visit the Pasarbanggi Mangrove Bridge tourist attraction. A high

percentage of material feasibility can be obtained from every aspect or parameter 3 validators of material experts have testederts. The first aspect tested in the material feasibility test is the writing style aspect. The criteria for writing style in a module or material must be arranged so that the material is complete, not rigid, and users can easily understand the material (Luuk et al., 2014). The application of writing style and language also needs to be adjusted so that users can easily understand the material's content on the web (Putra et al., 2021). The test results in this aspect obtained a total percentage of 100% feasibility with the feasible criteria, which means that the use of writing style and language in the content material presented on the web has minimal writing errors and is easy to understand by the user.

The next aspect is the relevant aspect, which obtained a total percentage of eligibility value of 96.2% with feasible criteria. The content must have a relevant aspect, which means the content of the material on the web must have relevance to the menu features built to meet the user's needs (Ulfa et al, 2023). The test results on this parameter show that the content of the material on the web is relevant and by the information needs needed by users or tourists.

Finally, the objective aspect test obtained a total feasibility percentage score of 97.2% with feasible criteria. Objective aspect testing shows that the material on the web that is being developed is by the original condition of the Pasarbanggi Mangrove Bridge tourist attraction. A good travel website must also be able to assist users in providing objective, accurate, and original relevant information based on existing field facts by the object or location being visited (Abdulrahman et al., 2022).

4. EVALUATION

The media feasibility test and material feasibility test conducted by expert validators to assess the development of web-based eco-educational GIS "jmmangrovepasarbanggi.com" can be concluded to be suitable for use for tourists visiting the Pasarbanggi Mangrove Bridge tourist attraction. However, even though the implementation assessment by the validator has obtained the appropriate criteria, the media expert validator and the material expert validator also provide some evaluation input to improve the developed web. Input by media validators that haveresearchers have then developed can be seen below;

The result of the evaluation of the first expert validator of the design and development of the "jmmangrovepasarbanggi.com" web is the lack of a guide menu for users to access the various existing menus. This guide menu is very important for users because it contains user procedures for using the web (Samsudin et al., 2019; Sari et al., 2022). Guides can also describe how it works when using something. Thus, the addition of this guide menu needs to be developed by researchers. Figure 6 shows an additional menu in the form of a guide menu that has been developed by the researcher, containing a guide page on how to use the "jmmangrovepasarbanggi.com" web to make it easier for users to use the features or menus on the web. The addition of the guide menu can be seen in Figure 6 below;

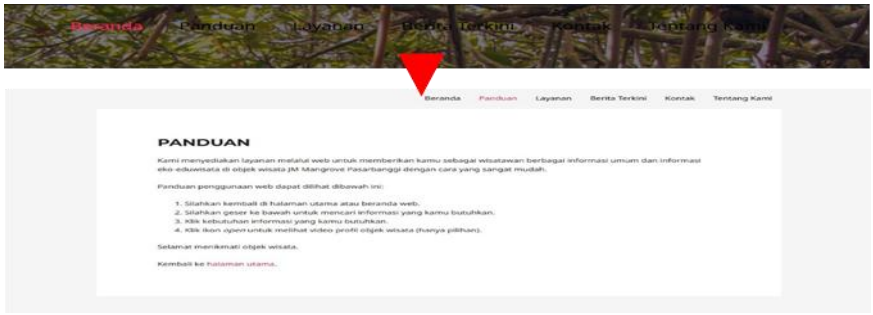

Figure 6. Development of the "jmmangrovepasarbanggi.com" Web Usage Guide Menu

The second "jmmangrovepasarbanggi.com" web evaluation coming from expert validators is the need to add a bibliography used in the material's content in each menu because some of the content is not yet listed in the bibliography. A bibliography needs to be included in each material content to add credibility to the material presented in the menu so that tourists are more confident and believe in the writing of the existing material content. The same thing was also expressed by Wicaksono et al (2023), that a bibliography needs to be included to improve the quality, credibility, and accuracy of writing. The addition of a bibliography in each content is written at the end of the text of the material content presented by the web "jmmangrovepasarbanggi.com" and can be seen in figure 7.

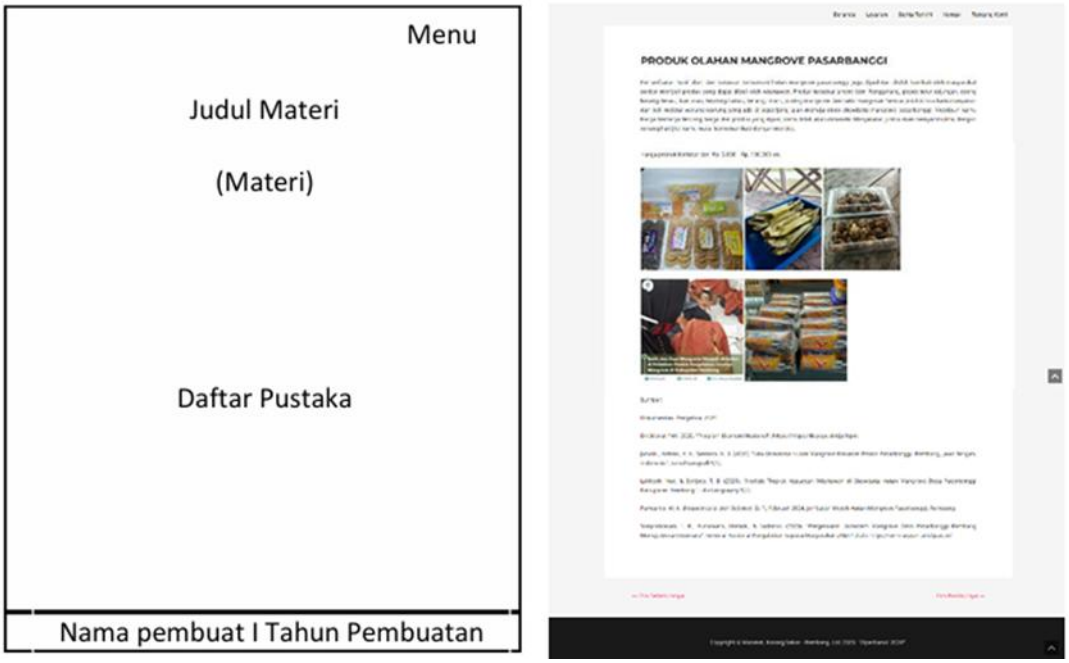

Figure 7. Additional Design of References in Content Materials

The third evaluation from the material expert validator is the lack of optimal map display in a web-based Eco-educational tourism GIS development. Using satellite images for better visualization of mangrove education information is necessary. The use of satellite imagery maps is an essential thing in the development of GIS because the primary use of GIS is to visualize spatial information data related to the condition of the earth's surface for various needs, either spatial analysis or just education (Alvarado et al., 2020; Jannah et al., 2022). The development of a new sub-menu regarding spatial data visualization through the use of satellite imagery maps can be seen in Figure 8 below.

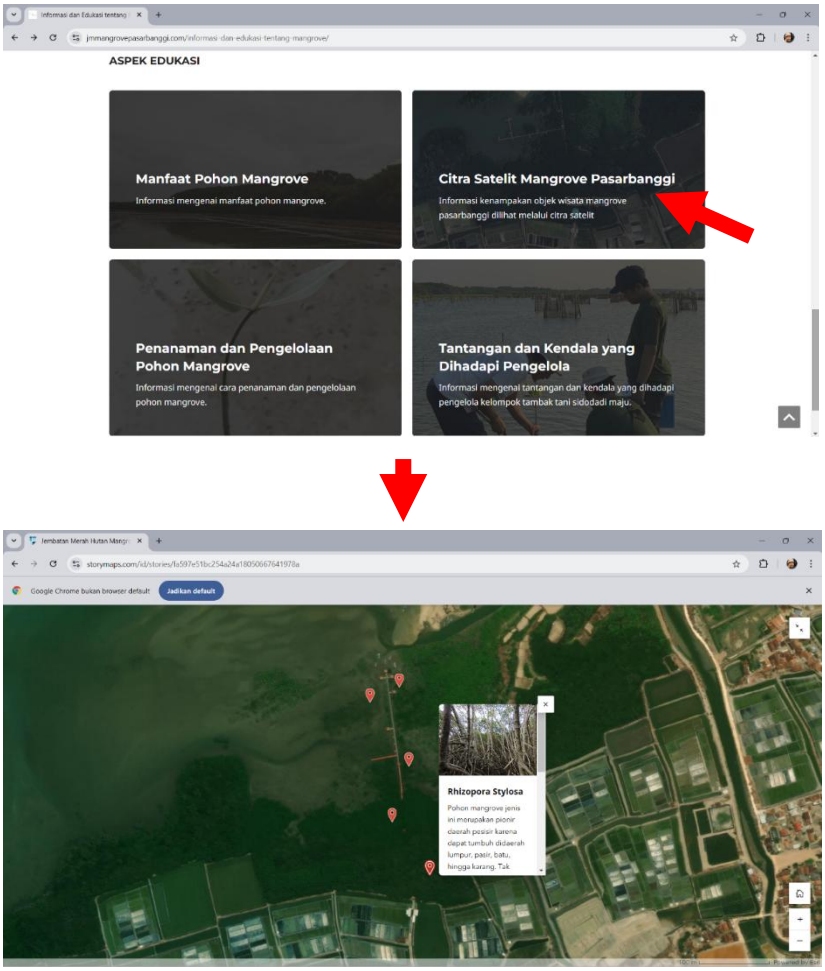

Figure 8. Satellite Image Sub Menu Content Development Design.

CONCLUSION

The Pasarbanggi Mangrove Bridge tourist attraction, which has been designated as an ecotourism development area and mangrove centre in Rembang Regency, still has shortcomings in terms of educational facilities to meet the information needs of tourists. The results of the study show that tourists not only need general information but also ecological information and mangrove tourism education to increase their knowledge and insight. Some of this information includes information on the ecological aspect, social aspect, economic aspect, and educational aspects of the mangrove ecosystem in the tourist attraction. Based on this, the development of a web-based mangrove eco-educational tourism geographic information system "jmmangrovepasarbanggi.com" at the Pasarbanggi Mangrove Bridge tourist attraction needs to be developed to meet the information needs of tourists. The development of a web-based mangrove eco-educational tourism GIS "jmmangrovepasarbanggi.com" is carried out based on the information needs of tourists regarding information on the ecology and education of the mangrove ecosystem in the Pasarbanggi Mangrove Bridge tourist attraction. The development of this service begins with the design of a new service feature in the form of the "Mangrove Eco-Edutourism" feature. This menu will contain a submenu of information needed by tourists consisting of 4 main aspects, namely ecological aspects, economic aspects, social aspects, and educational aspects, where there are new submenus to support the fulfilment of tourist information needs. The finished design was then also tested for validity by media experts and material experts to measure the feasibility of the "jmmangrovepasarbanggi.com" website in

meeting the needs of users or tourists. The results of the feasibility test by experts showed that the website was suitable for use and access by users to meet information needs, but improvements needed to be made as a form of web evaluation to be better. The evaluation of the "jmmangrovepasarbanggi.com" website was the lack of a guide menu, the lack of inclusion of a bibliography, the need to visualize spatial information through satellite image maps, and several writing errors in some of the material content presented on the website. The evaluation from the expert validator was then used as a reference for the development of the "jmmangrovepasarbanggi.com" website to be better so that the website can be used by tourists to meet their needs optimally.

Declaration by Authors

Acknowledgement: None
Source of Funding: None
Conflict of Interest: No conflicts of interest declared.

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How to cite this article: Selamet Dwi Prasetyo, Apik Budi Santoso, Muh. Sholeh. Development of a web-based eco-educational tourism GIS to meet tourism information needs at the Pasarbanggi Mangrove Bridge tourist attraction. *International Journal of Research and Review*. 2025; 12(5): 369-384.
DOI: *https://doi.org/10.52403/ijrr.20250539*

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