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Design and Development of a Website-Based 360° Virtual Tour for the Agrotourism of Teluk Village

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Abstract

This study aims to develop a digital promotional medium based on a 360° Virtual Tour to introduce the agrotourism potential of Teluk Village, Pemayung District, Batanghari Regency, Jambi Province. The development process employed the Multimedia Development Life Cycle (MDLC) method consisting of six stages: Concept, Design, Material Collecting, Assembly, Testing, and Distribution. At the design stage, an interactive user interface and 360° panorama navigation flow were created and integrated with multimedia content obtained using a VR camera. The implementation utilized the 3DVista Virtual Tour platform, enabling users to explore panoramas, information hotspots, and location maps interactively. System testing using the Black Box Testing method showed that all main functions performed properly, including panorama navigation, information display, and multimedia playback without technical issues. The final product is a functional 360° Virtual Tour website accessible at panorama-desa-teluk.fst.unja.ac.id, serving as a digital, educational, and promotional tool for supporting community-based agrotourism management. The novelty of this research lies in its contextual application of immersive 360° virtual tour technology to promote the agrotourism potential of Teluk Village, which possesses substantial tourism assets but previously lacked digital promotional media, and in providing a structured MDLC-based development model that can be replicated for rural tourism digitalization initiatives in Indonesia.

Keywords: Agrotourism, MDLC, Village Digitalization, Virtual Tour 360°, Website

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INTRODUCTION

The development of digital technology in the era of the Industrial Revolution 5.0 has had a significant impact on various sectors, including tourism. Tourism digitalization has become one of the global strategies widely implemented to expand information access, strengthen promotion, and increase the attractiveness of tourist destinations through the use of information and communication technology [1]. The concept of a 360° Virtual Tour is one form of digital innovation capable of providing an immersive visual experience, allowing users to virtually visit a place as if they were there in person [2]. This innovation is considered effective in increasing tourist interest while strengthening the image of destinations in the competition of digital-based tourism.

In Indonesia, the tourism sector has a strategic contribution to the country's economic growth [3]. Data from the Ministry of Tourism and Creative Economy shows that tourism is one of the leading sectors in increasing national foreign exchange, with a value reaching 16.71 billion US Dollars in 2024 [4]. This figure shows a significant recovery trend after the COVID-19 pandemic, following a sharp decline in tourism foreign exchange to 0.52 billion US Dollars in 2021 from 16.91 billion US Dollars in 2019. In line with this, the government continues to promote the tourism digitalization program through the development of smart tourism destinations as an effort to expand promotion and strengthen global competitiveness [5].

A similar condition can be seen at the regional level, particularly in Jambi Province, which has great tourism potential, including natural, cultural, and agrotourism attractions [6]. Data on tourist visits to Jambi shows fluctuations from year to year. In 2012, there were 1,587,470 visits, which increased to 2,752,155 in 2015, then decreased significantly to only 966,837 in 2019. The impact of the pandemic worsened the situation, with the number of tourists dropping drastically, although it began to recover in 2021 with 2,311,638 visits and continued to increase, reaching 3,264,327 visits in 2022 [7]. These fluctuations indicate that although Jambi has great potential, the attractiveness to tourists is still highly influenced by promotional factors and the utilization of digital technology. According to the research of Gomez-Carmona et al. [8], one of the main obstacles to the development of tourism villages is the low utilization of digital technology in information dissemination. This situation has implications for the limited reach of promotions, resulting in the local economic potential not being fully optimized.

One of the villages that represents this condition is Teluk Village in Pemayung District, Batanghari Regency, Jambi Province, which has agrotourism potential based on productive agriculture. This potential offers great opportunities to be developed as an educational as well as recreational and competitive destination. However, there are several obstacles that hinder its optimal development. The promotional strategies used are still conventional, relying on verbal information dissemination and simple publications on social media, thus limiting the promotional reach. In addition, information about agrotourism potential has not been systematically documented or made available in digital media that can be accessed by the public. On the other hand, the absence of interactive media capable of providing a realistic representation of the village's attractions makes it difficult for prospective tourists to gain a comprehensive picture of the offered destinations. These various conditions result in a low level of tourist visits and suboptimal contributions of the agrotourism sector to the improvement of the local community's economy.

To address these problems, it is necessary to have an innovative promotional medium that can present agrotourism information in a more engaging, interactive, and easily accessible manner. One relevant approach is the implementation of a website-based 360° Virtual Tour. This technology allows visitors to explore a tourist destination through a 360-degree panoramic display that can be rotated in all directions [9]. With the help of devices such as computers, smartphones, or even Virtual Reality (VR) headsets, users can experience an immersive visual sensation as if they were directly at the tourist site [2]. Not only displaying static images, but the 360° Virtual Tour can also be equipped with interactive hotspots, descriptive information, narration audio, and supporting videos that provide a comprehensive overview of the destination's potential [10]. Thus, the 360° Virtual Tour functions not only as a promotional tool but also as an educational and branding medium that can enhance tourists' interest in visiting. In line with the findings of Yang et al. [11], this technology can overcome the limitations of space and distance, allowing potential tourists to conduct an initial exploration before making an actual trip. This is very important in the context of digital tourism, where tourists' decisions to visit are often influenced by the visual information they obtain online.

Several previous studies have shown that the application of virtual tours is effective in improving the quality of promotion and expanding the reach of destination information. The studies of Syahputra et al. [12] and Wismantoro et al. [13] proved that promotional media based on virtual tours can increase tourists' interest in visiting tourism villages, while Chang & Suh [14] emphasized that the interactive visual experience offered by 360° Virtual Tours is an important factor in strengthening the image of digital-based tourism destinations. Referring to these findings, this research focuses on the implementation of a website-based 360° Virtual Tour as an information medium for agrotourism in Teluk Village.

In this study, the development of the 360° Virtual Tour was carried out using the Multimedia Development Life Cycle (MDLC) method. This method consists of six stages, namely Concept, Design, Material Collecting, Assembly, Testing, and Distribution [15]. The selection of MDLC was based on its suitability for the characteristics of multimedia applications that require a structured development process and are oriented toward the quality of the final product. Each stage allows systematic evaluation so that the results obtained are not only visually appealing but also tested in terms of functionality and usability. Through this approach, the resulting digital promotional media is expected to be an effective solution to overcome promotional limitations, strengthen the documentation of agrotourism potential, and support the increase in tourist visits to Teluk Village.

METHODS

This study uses a qualitative approach employing the Multimedia Development Life Cycle (MDLC) method. MDLC was chosen because its stages are designed for the development of multimedia applications that combine text, images, audio, and interactive video [15]. This method also allows for the evaluation of user satisfaction with the resulting media, making it relevant in the design of multimedia websites as a medium for tourism promotion [16].

Research Design

The development of the website refers to the MDLC stages, which consist of six phases, namely:

1. Concept: formulating ideas, objectives, target users, and the scope of the website. This stage was carried out through observation of village tourism potential, interviews with village officials, and preliminary surveys of potential users.

2. Design: creating the website structure, user interface (UI/UX), and the interaction flow of the 360° panorama.

3. Material Collecting: gathering multimedia content in the form of 360° photos and videos, as well as descriptive data regarding agrotourism potential.

4. Assembly: integrating the design with multimedia content into an interactive website using the 3DVista Virtual Tour platform.

5. Testing: conducting system functionality testing through black-box testing to ensure all features run according to the specified requirements.

6. Distribution: officially launching the website, accompanied by training in management and digital promotion.

The research was conducted from August to September 2025 in Teluk Village, Pemayung District, Batanghari Regency, Jambi Province.

Research Subject

The research subjects included: • Village government: the Head of the Village, the Secretary, and village officials as the tourism management authority. • Village community: representatives of residents as potential website users. • Local tourism actors: farmer groups and agrotourism managers as the subjects of promotion. • Community leaders: neighborhood (RT/RW) heads and traditional leaders as representatives of

local community users.

Research Procedure

The research stages were carried out systematically as follows: 1. Preparation: literature study on tourism digitalization and virtual tour technology, as well as a preliminary survey to Teluk Village. 2. Data Collection: field observations, interviews with village officials and agrotourism managers, and documentation of tourism potential. 3. Data Analysis: reducing and categorizing data according to system requirements, then aligning it with the concept of tourism digitalization. 4. System Design and Development: designing and building the website according to the MDLC stages. 5. Testing: conducting website functionality testing. 6. Report Preparation: compiling a research report and recommendations for the development of virtual tour–based tourism promotion media.

Data Collection Techniques

Data were collected qualitatively through: • Participant observation: directly observing tourism potential and supporting facilities in Teluk Village. • Open interviews: exploring promotional needs and constraints from village officials and tourism actors. • Documentation: collecting secondary data in the form of village profiles, agrotourism potential, and 360° photos/videos.

Data analysis technique

Data analysis was carried out through several systematic stages. First, data reduction was conducted by sorting information from observations, interviews, and documentation relevant to the development of the tourism promotion website. Second, the reduced data

were presented in the form of categories such as agrotourism potential, supporting facilities, accessibility, and user needs for promotional media. Third, interpretation and conclusion drawing were conducted by linking field data with tourism digitalization theory and the MDLC method. The results of this analysis were used as the basis for determining the design of features, navigation structure, and types of multimedia content to be displayed on the 360° virtual tour website.

Implementation

The system implementation was carried out by processing all multimedia content obtained during data collection using the 3DVista Virtual Tour software. The 360° photos were processed to create an interactive experience, then combined with supporting elements such as destination description texts, audio, location maps, and navigation links between tourist spots. All these contents were then integrated into the village website so that they could be easily accessed by users.

RESULTS AND DISCUSSION

This section presents the results and discussion of the study, which was developed following the stages of the Multimedia Development Life Cycle (MDLC), consisting of concept, design, material collecting, assembly, and testing. Each stage was conducted systematically to produce a multimedia system that meets user requirements. The testing phase employed the black-box testing method to ensure the system's functionality aligns with the predefined specifications. The findings from all development stages are presented and analyzed in this section.

Concept

The Concept stage aims to formulate the ideas, objectives, target users, and scope of the development of the virtual tour website. Activities were carried out through observation of tourism and agrotourism potential in Teluk Village, interviews with village officials, and surveys of potential users. Based on the results of this analysis, the main objectives of the website were determined as follows:

1. To serve as a digital-based tourism and agrotourism promotion medium that is informative and attractive.

2. To provide an interactive virtual tour experience so that users can explore Teluk Village online. 3. To increase the visibility and attractiveness of the village as a leading agrotourism destination in

Pemayung District, Batanghari Regency, Jambi Province.

Design

The Design stage is the process of structuring the website, designing the user interface (UI/UX), and designing the interaction flow of the 360° panorama. At this stage, a visual design was created that illustrates the relationships between pages, navigation, and panorama views so that users can interact easily and intuitively. This design also takes into account user comfort in exploring the panorama, including the placement of navigation buttons, information icons, panorama lists, and location maps. All these elements are arranged in such a way that the exploration experience feels natural and interactive. The design results can be seen in Figure 2, which shows the interaction flow between panoramas along with additional elements such as the panorama list, location information, and map.

Material Collecting

The Material Collecting stage aims to gather and prepare all multimedia content needed in the development of the virtual tour application. This activity includes recording 360° videos and photos at two tourist sites and six agrotourism areas using a VR camera, collecting data related to local products for tourism documentation, and preparing educational narratives containing information about sustainable agricultural practices and local community wisdom. The results of this stage are a multimedia content library consisting of 360° videos, high-quality photos, and infographics, as well as educational narration scripts ready to be used in the application. This stage was completed within approximately three months.

Assembly

The Assembly stage is the process of combining the user interface design with multimedia content into an interactive website using 3DVista Virtual Tour. At this stage, 360° panoramas, maps, and navigation elements are integrated through hotspots so that users can explore locations interactively.

Testing

The Testing stage was carried out to ensure that all features and functions of the virtual tour application run according to user needs. The testing was conducted using the Blackbox Testing method, which tests the system's functionality based on input and output without considering the program's internal process. At this stage, a series of tests were conducted on main components such as panorama navigation, location information display, 360° video playback, and interaction with buttons and hotspots on the 3DVista Virtual Tour platform. Each feature was tested based on the system's response to user actions to determine whether it functioned correctly or experienced errors.

The test results showed that all main functions worked properly and as expected, including panorama transitions, information display, and multimedia content playback. Therefore, it can be concluded that the testing stage successfully ensured that the virtual tour application functions optimally and is ready for user operation.

Table 1. Functional Testing Results Using Blackbox Testing

No	Test Scenario	Testing Steps	Expected Result	Status
1	Accessing the main page	Open URL panorama-desa-teluk.fst.unja.ac.id	The main page opens without error	✓
2	Displaying title and initial description	Check the initial page view	The title "Panorama Desa Teluk" and description are clearly displayed	✓
3	Displaying VR tour area	Wait for the page to load completely	360° panorama view appears on the screen	✓
4	Left-right view movement	Click and drag panorama left-right	The view moves following the drag direction	✓
5	Up-down view movement	Click and drag panorama up-down	The view moves smoothly up/down	✓
6	Zoom panorama	Scroll mouse / pinch screen (mobile)	Panorama zooms in or out	✓
7	Navigation to another point	Click hotspot / panorama navigation area	Switches to another panorama without error	✓
8	Displaying additional info (popup/tooltip)	Click info hotspot or icon in panorama	Text, image, or place description information appears	✓
9	Closing popup info	Click close button or outside popup area	Popup closes without causing error	✓
10	Resetting view position	Click reset / home button	View returns to initial panorama position	✓
11	Location button	Click location / map button (if available)	Displays location list or switches panorama accordingly	✓

12	Access from desktop	Open website via Chrome/Edge on PC	VR displays normally and interactively	✓
13	Access from smartphone	Open website on Android/iPhone	Panorama view adjusts to screen size	✓
14	Screen orientation	Rotate orientation (portrait ↔ landscape)	VR adjusts to screen position without error	✓
15	Loading speed	Measure loading time of main panorama	Loading time ≤ 10 seconds under normal connection	✓
16	Control response	Test drag and zoom repeatedly and quickly	No lag or freeze occurs	✓
17	Access under slow connection	Simulate weak connection using DevTools	Page continues loading until VR appears	✓

Distribution

The Distribution stage is the final phase of development, namely the process of officially launching the virtual tour website to the Teluk Village authorities to be integrated into the main village website. This activity also includes training on content management and digital promotion for village officials, with the goal of improving their ability to update data, add new content, and utilize the website as a medium for tourism and agrotourism promotion. Through this activity, it is expected that website management can be carried out independently and sustainably. The final result of this stage is an active and publicly accessible virtual tour website, accompanied by increased competency of village administrators in tourism digitalization. The virtual tour can be accessed through the main village website: desa-teluk.fst.unja.ac.id, or directly via the link: panorama-desa-teluk.fst.unja.ac.id.

CONCLUSIONS

This study concludes that the implementation of a website-based 360° Virtual Tour in Teluk Village has successfully become an effective digital innovation in introducing the village's agrotourism potential through an immersive and interactive visual experience. The system development was carried out using the Multimedia Development Life Cycle (MDLC) method, which consists of six stages: Concept, Design, Material Collecting, Assembly, Testing, and Distribution, ensuring that the development process proceeded in a structured manner from conceptualization to launch. The implementation results show that the developed website is capable of integrating multimedia content such as 360° photos and videos, informative narration, interactive hotspots, and location maps that allow users to explore each agrotourism area virtually. Based on the results of the Black Box Testing, all main features functioned properly without technical issues, including panorama navigation, location information display, and multimedia content playback.

Practically, this website serves as a digital promotional medium that expands the reach of tourism information and enhances the attractiveness of destinations for potential visitors. In addition, this project also provides a positive impact on village officials by improving their ability to manage content and conduct technology-based promotion. Conceptually, this research strengthens the role of Virtual Reality technology in the digital transformation of village tourism, while also serving as a model for the implementation of smart tourism that can be replicated in other regions. Thus, the development of a website-based 360° Virtual Tour not only functions as a means of promotion and education but also as a strategic step in supporting village digitalization, empowering the local creative economy, and fostering sustainable tourism development in Jambi Province.

Academically, this study contributes to the body of knowledge on virtual-tour–based tourism development in rural contexts by demonstrating the effectiveness of the MDLC methodology in producing immersive multimedia systems. This work also provides a replicable framework for future researchers developing similar virtual tour applications in rural or agrotourism environments.

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AUTHOR CONTRIBUTIONS

The research team leader (Author 1) was responsible for project conceptualization, overall coordination of implementation, supervision, and was the primary author drafting the article. Author 2 specifically assisted the Team Leader in data processing, statistical analysis, and evaluation of research results. Authors 3 and 4 made substantial contributions to the implementation of data collection in the field. Meanwhile, Author 5 played a key role in coordinating the implementation of the research with Teluk Village partners and participated in data collection. Finally, Authors 6 and 7 contributed to data collection and were also actively involved in the evaluation phase of the research results. All authors have read, revised, and approved the final version of this manuscript.

CONFLICT OF INTEREST

The authors hereby declare that there are no potential conflicts of interest, either financial or non-financial, in the conduct of this research that might influence the results of the research, the interpretation of the findings, or the publication of the article. The research was conducted independently and objectively without any relationship of interest with the object of research.

REFERENCES

1. Jiang C, Phoong SW. A ten-year review analysis of the impact of digitization on tourism development (2012–2022). Humanities and Social Sciences Communications, 10(1). 2023. doi:10.1057/s41599-023-02150-7.
2. Argyriou L, Economou D, Bouki V. Design methodology for 360° immersive video applications: the case study of a cultural heritage virtual tour. Pers Ubiquit Comput. 2020;24:843–859. doi:10.1007/s00779-020-01373-8.
3. Mun'im A. PENYEMPURNAAN PENGUKURAN KONTRIBUSI PARIWISATA: ALTERNATIF PERCEPATAN PERTUMBUHAN EKONOMI INDONESIA. Jurnal Kepariwisataan Indonesia (JKI). 2022;16(1):1–14.
4. Kemenpar.go.id. Perkembangan Jumlah Devisa Dari Sektor Pariwisata Tahun 2015-2024 [Internet]. n.d. [cited September 26, 2025]. Available from: https://kemenpar.go.id/direktori-statistik/perkembangan-jumlah-devisa-sektor-pariwisata-tahun-2015-2024.
5. Kemenpar.go.id. Siaran Pers: Kementerian Pariwisata Perkuat Promosi Pariwisata Indonesia ke Pasar Dunia [Internet]. 2025. Available from: https://www.kemenpar.go.id/ragam-pariwisata/siaran-pers-kementerian-pariwisata-perkuat-promosi-pariwisata-indonesia-ke-pasar-dunia.
6. Hardiani H, Amril A. Socio-economic determinants of tourism trips by Jambi residents. Jurnal Perspektif Pembiayaan Dan Pembangunan Daerah. 2017;4(4):2338–4603.

7. Opendata.jambiprov.go.id. Statistik Kunjungan Wisatawan Provinsi Jambi [Internet]. n.d. [cited September 28, 2025]. Available from: https://opendata.jambiprov.go.id/visualisasi/show/35/storyboard.
8. Gómez-Carmona O, Buján-Carballal D, Casado-Mansilla D, López-de-Ipiña D, Cano-Benito J, Cimmino A, Poveda-Villalón M, García-Castro R, Almela-Miralles J, Apostolidis D, Drosou A, Tzovaras D, Wagner M, Guadalupe-Rodriguez M, Salinas D, Esteller D, Riera-Rovira M, González A, Clavijo-Ágreda J, ... Bujalkova N. Mind the gap: The AURORAL ecosystem for the digital transformation of smart communities and rural areas. Technology in Society, 74. 2023. doi:10.1016/j.techsoc.2023.102304.
9. Pratisto EH, Thompson N, Potdar V. Immersive technologies for tourism: a systematic review. Information Technology and Tourism. 2022;24(2):181–219. doi:10.1007/s40558-022-00228-7.
10. Stappung Y, Aliaga C, Cartes J, Jego L, Reyes-Suárez JA, Barriga NA, Besoain F. Developing 360° Virtual Tours for Promoting Tourism in Natural Parks in Chile. Sustainability (Switzerland), 15(22). 2023. doi:10.3390/su152216043.
11. Yang T, Lai IKW, Fan, Z. bin, Mo QM. The impact of a 360° virtual tour on the reduction of psychological stress caused by COVID-19. Technology in Society, 64. 2021. doi:10.1016/j.techsoc.2020.101514.
12. Syaputra H, Abdullah A, Sjafirah NA. Social networks analysis of anticorruption messages on Twitter. Jurnal Manajemen Komunikasi. 2024;9(1):107–127. doi:10.24198/jmk.v9i1.50121.
13. Wismantoro Y, Aryanto VDW, Pamungkas ID, Purusa NA, Amron, Chasanah AN, Usman. Virtual Reality Destination Experiences Model: A Moderating Variable between Wisesa Sustainable Tourism Behavior and Tourists' Intention to Visit. Sustainability (Switzerland), 15(1). 2023. doi:10.3390/su15010446.
14. Chang S, Suh J. The Impact of Digital Storytelling on Presence, Immersion, Enjoyment, and Continued Usage Intention in VR-Based Museum Exhibitions. Sensors, 25(9). 2025. doi:10.3390/s25092914.
15. Suryani M, Sakti Rusidiawan R, Rosadi R. Development of Historical Learning Media Based on Virtual Reality of The National Awakening Museum. Inform : Jurnal Ilmiah Bidang Teknologi Informasi Dan Komunikasi. 2022;7(2):125–131. doi:10.25139/inform.v7i2.4709.
16. Putri H, Shadiq I, Putri GG. Interactive Learning Media for Cellular Communication Systems using the Multimedia Development Life Cycle Model. Jurnal Online Informatika. 2021;6(1):1–10. doi:10.15575/join.v6i1.554.