

The Development of TANAKA Android-based Application as an Information Media for Taka Bonerate National Park

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Abstract

This study aims to determine the development of the TANAKA application as an Android-based information media for Taka Bonerate National Park. The quality of the application was evaluated based on the ISO 9126 quality standards. The application was built using Adobe Flash CC software. Data was collected using interview techniques, questionnaires, and documentation. The application was validated by two media experts and two content experts. The application was evaluated by 30 respondents, and the data was analyzed using descriptive statistical analysis techniques. Based on the research results, an application was developed that can be used as an offline Android-based information media for Taka Bonerate National Park. According to the ISO 9126 testing, the following results were obtained: a) functionality testing using black box testing method scored 1 with an excellent category and fulfilled the functionality aspect; b) reliability testing using white box method was free from logical errors; c) portability testing on various types of smartphones and different versions of Android ran smoothly without any issues; d) usability testing with 30 respondents resulted in a percentage of 93.33%, with 28 respondents rating it as excellent and a percentage of 6.67% or 2 respondents rating.

Keywords: Research and Development; Android-based Application; Taka Bonerate; National Park; Adobe Flash CC.

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Introduction

The development of communication and information technology allows the use of various media to effectively, efficiently, and optimally convey messages or information to the public (Suri, 2019). Information technology has been widely implemented in various fields in Indonesia, including the tourism sector (Anggarini, 2021). According to Law No. 10 of 2009 on tourism, tourism encompasses various travel activities supported by facilities and services provided by the community, businesses, the central government, and local governments (Rahayu et al., 2022). Tourism in Indonesia is an important economic sector (Yakup, 2019).

Selayar is an island separated from the mainland of South Sulawesi and is an administrative area under the jurisdiction of the Selayar Islands Regency, South Sulawesi, Indonesia (Wahid et al., 2021). The Selayar Islands Regency has many tourist attractions, one of which is Taka Bonerate National Park located in the Taka Bonerate District (Putra et al., 2022). Taka Bonerate National Park is a marine park that has the third-largest atoll area in the world (Panuluh et al., 2020), following Kwajalein in the Marshall Islands and Suvadiva in the Maldives. The tourism potential of Taka Bonerate National Park is significant; however, this potential is not maximally managed by the government or the private sector. According to the Taka Bonerate National Park Office, the number of visitors to Taka Bonerate National Park in 2022 was 2,937 Indonesian citizens and 82 foreigners. This number is disproportionate when compared to Wakatobi National Park, which had 17,000 visitors in the same year. The higher number of visitors to Wakatobi National Park is due to the extensive promotion and marketing efforts by the local government (Central Statistics Agency, 2022).

The most fundamental issue of Taka Bonerate National Park tourism, besides the number of visitors, is the ineffective promotional activities. Currently, promotional activities are only carried out through a website-based information

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system, but they require other information media such as Android-based applications to reach a wider audience and facilitate access to information for potential tourists (Lestari et al., 2021). Based on these issues, it is necessary to utilize information media for promotion that can reach a wider audience, such as Android-based smartphones. By leveraging Android smartphones as an information and promotional medium, Taka Bonerate National Park can expand its promotional reach, provide interactive experiences, and facilitate tourists in planning and exploring the destination. Based on the issues, the researcher is interested in conducting a study titled "Development of the TANAKA Android Application for Taka Bonerate National Park". This research aims to develop TANAKA as a software applications accessible on mobile phones with the Android system.

Method

This research is a software development research and development (R&D) study. Software development involves the structured and planned development of a software product (Rianto, 2021). The software referred to in this research is the TANAKA Android-based application for Taka Bonerate National Park. This study utilized two types of data: primary data obtained through direct observations at the Taka Bonerate National Park Office and interviews with one of the staff members at the office. Secondary data were obtained from various tourism-related sources such as books, journals, and relevant literature that could support this research. The research respondents consisted of 30 individuals who tested the software's quality using ISO 9126 testing, which includes aspects of functionality, reliability, usability, and portability (Wang et al., 2019).

System Analysis

System analysis is the process of examining, evaluating, and understanding a system to identify its components, functions, and interactions. It involves studying the existing system or the requirements for a new system in order to make informed decisions and recommendations for improvements or changes. The key activities involved in system analysis include: requirement gathering, building prototypes, prototype evaluation, coding the system, testing the system, system evaluation, using the system, system evaluation, using the system.

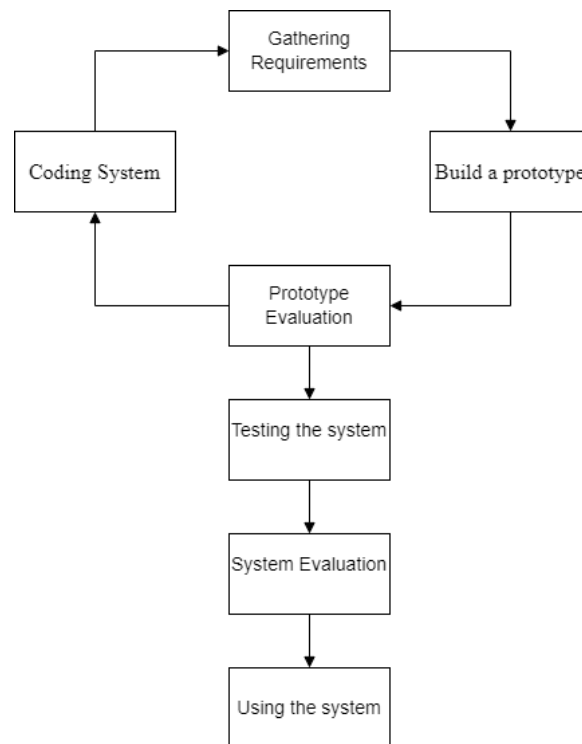


Figure 1. Procedure for Prototyping Development

The activity diagram for the Tanaka application design is as follows:

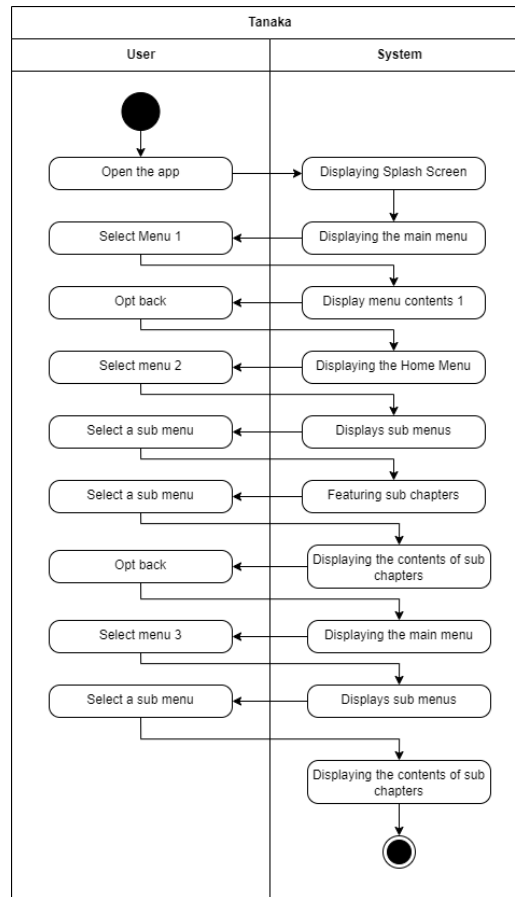


Figure 2. Activity Diagram

System Requirement Analysis

There are several menus in the TANAKA application that can be selected by users, namely Menu 1, Menu 2, and Menu 3. Menu 1 is a history menu that displays the history of Taka Bonerate National Park, Menu 2 is a tourism menu that displays sub-menus containing island tourism, coral tourism, cultural tourism, and gallery, and Menu 3 is an information menu that displays information about Taka Bonerate National Park.

The tools and materials required for system development consist of two categories: hardware and software. The hardware includes: 1) a laptop with specifications of Intel Core i5 6200U 2.8GHz, 4GB RAM, 1TB Hard Disk, Nvidia Geforce 930mx graphics, and 2) an Android-based smartphone. The software includes: 1) Windows 10 operating system; 2) Adobe Flash CC; 3) Adobe Photoshop CC, and 4) Android operating system. The data used in the research consists of data related to the tourist attractions of Taka Bonerate National Park.

System Design

System design is the process of defining and specifying the architecture, components, interfaces, and behavior of a system. It involves transforming the requirements gathered during the system analysis phase into a detailed design that serves as a blueprint for system development (Prabowo, 2020). The initial design (storyboard) of the TANAKA application can be seen as follows:

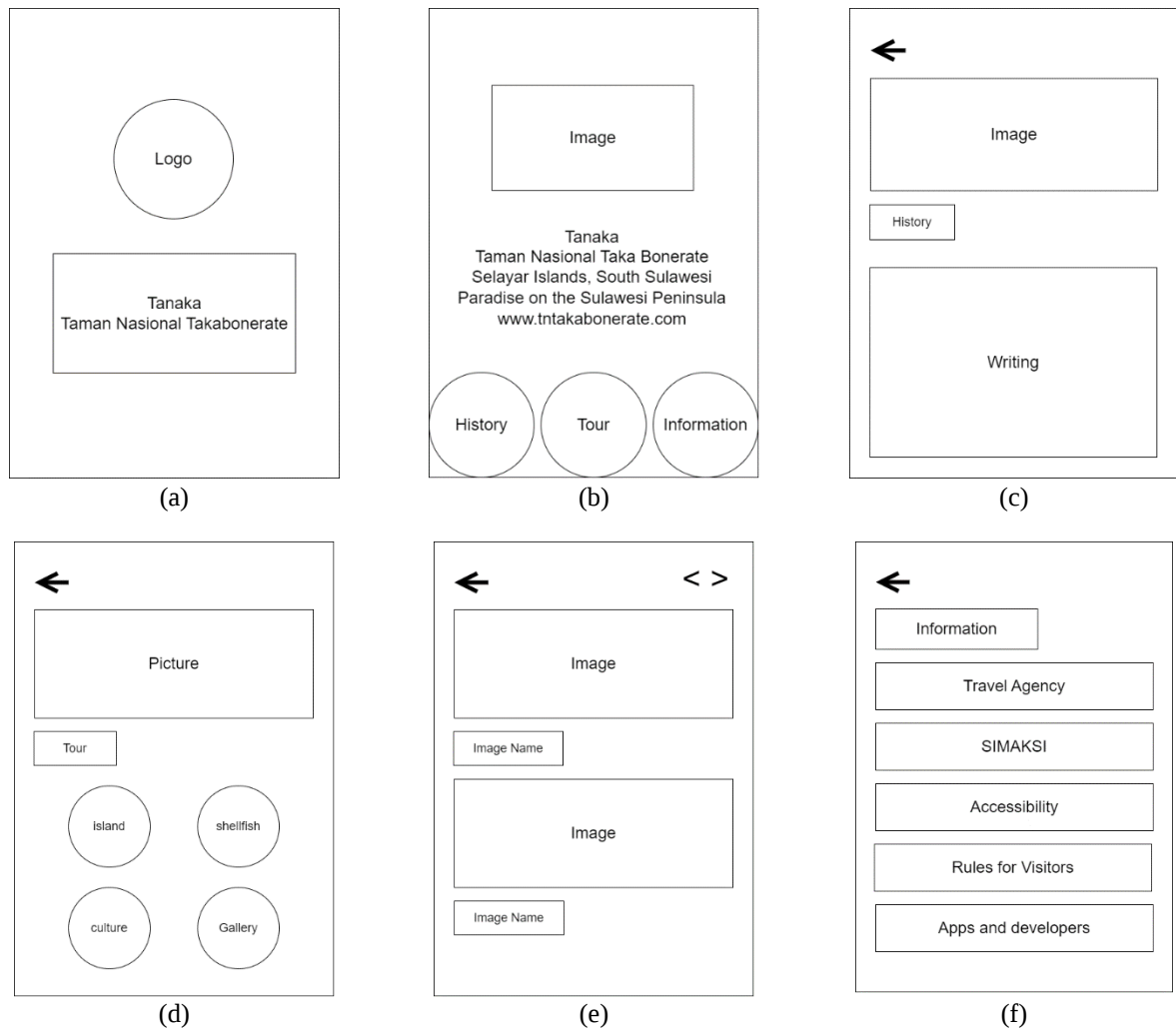


Figure 3. Storyboard

Result and Discussion

Result

In this stage, the research results are presented, which include the stages of requirement gathering, prototype development, prototype evaluation, system coding, system testing, system evaluation, and system utilization. The initial stage of system development begins by collecting requirements through interviews with the management of Taka Bonerate National Park to gather the necessary data for developing an Android application. Next, the prototype development stage is carried out, which includes creating use case diagrams, flowcharts, activity diagrams, and user interfaces. Afterward, the prototype is evaluated to complete the required features.

The second stage is system coding, where the agreed-upon prototype is translated into the appropriate programming language. The programming language used is ActionScript 3.0, and it is implemented through the available action panel in Adobe Flash CC software.

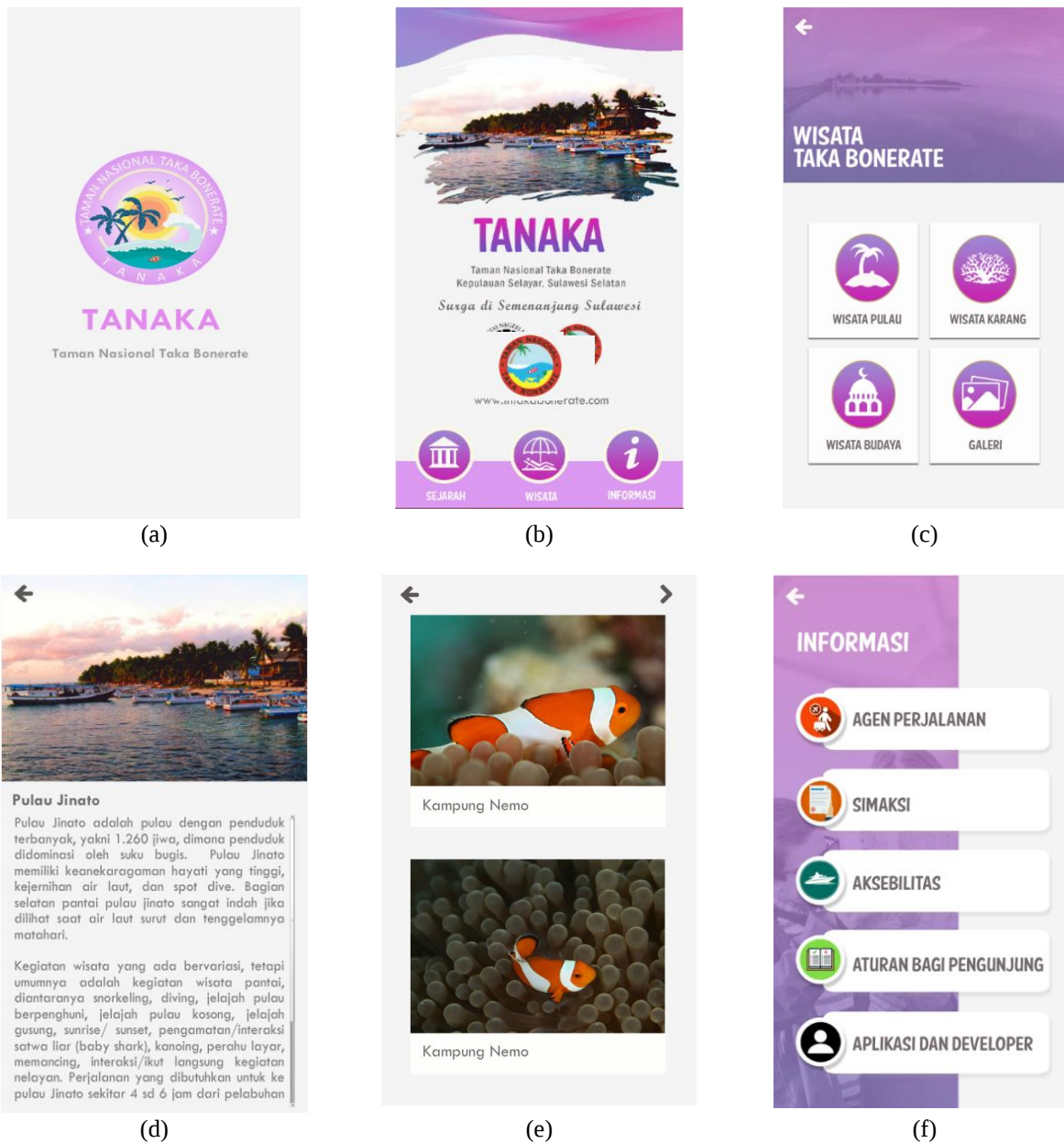


Figure 4. Design Implementation

In Figure 4, the implementation of the design can be observed. (a) The Splash Screen page is the first page that appears when the user opens the application. (b) The Home page is the main page that contains buttons for the main menus of the application, including history, tourism, information, and a link to the Taka Bonerate National Park website (www.tntakabonerate.com). (c) The tourism sub-menu page displays a list of tourist attractions in Taka Bonerate National Park. (d) The island tourism page shows the selected island destinations chosen by the user on the island tourism sub-menu page. (e) The gallery page displays the selected gallery chosen by the user on the tourism sub-menu page. (f) The information sub-menu page displays a list of information about Taka Bonerate National Park that can be selected by the user. These screens collectively form the implemented design of the application, providing an interactive and engaging experience for users.

System Testing

Black Box Testing (Functionality)

Testing for the functionality aspect was conducted using the black box testing method. The assessment was based on an instrument called test case. The functionality testing instrument consists of 56 test factors related to the functions designed in the developed application. The functionality instrument was validated by two lecturers who are experts in the field of media.

Table 1. Black Box Testing

Validator	Number of Designed Features (P)	Number of features successfully tested (I)	Feature Completeness
Media Specialist 1	56	56	1
Media Specialist2	56	56	1
Total	56	56	1

White Box Testing (Reliability)

The testing for the reliability aspect was conducted using white box testing. The results of this white box testing were aimed at examining the internal workings of the software itself, specifically the path coverage (program procedures) or loop processes.

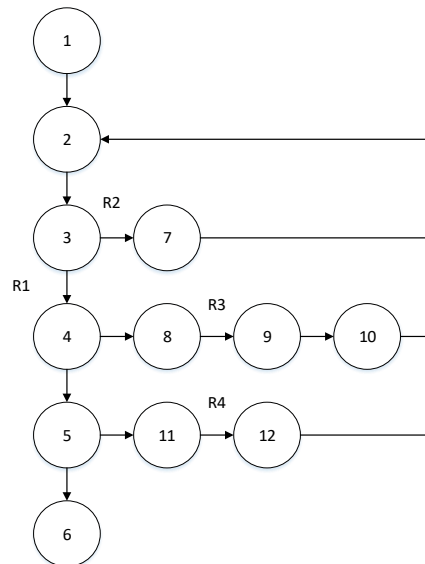


Figure 5. White Box Testing

The test results yielded 4 regions, namely R1, R2, R3, and R4, indicating that there are 4 areas delimited by edges and nodes. Additionally, the cyclomatic complexity $V(G)$ was found to be 4, indicating the presence of 4 conditions in the program connecting the initial and final nodes. Furthermore, there are 4 paths that explain the flow leading to each selected menu. Based on the recapitulation of the above calculation results, the cyclomatic complexity (CC) = 4, Region (R) = 4, and independent path (IP) = 4. As the cyclomatic complexity (CC), region (R), and independent path (IP) show the same results, this test is free from logical errors.

User Testing

Portability Testing

The portability testing was conducted by installing the application on several types of smartphones with different specifications and versions of the Android operating system. The portability testing showed that the installation process

was successful, and the application ran smoothly without any errors on various smartphones and different versions of Android, as seen in the following table:

Table 2. Portability Testing

No	Device Specification	Operating System	Installation Process	Application Process
1	Smartphone Sony Xperia Z3	5.1.1 (<i>Lollipop</i>)	Succeed	Running smoothly without errors
2	Smartphone Xiaomi Redmi 4A	6.0.1 (<i>Marshmallow</i>)	Succeed	Running smoothly without errors
3	Smartphone Xiaomi Redmi 4A	7.1.2 (<i>Nougat</i>)	Succeed	Running smoothly without errors
4	Smartphone Oppo A3s	8.1.0 (<i>Oreo</i>)	Succeed	Running smoothly without errors

Usability Testing

Usability testing is essential to assess user feedback on the developed application. Usability testing was conducted using a questionnaire based on the System Usability Questionnaire by J.R. Lewis to gather user responses regarding the developed application. The results of the usability testing can be seen in the table below:

Table 3. Usability Testing

Percentage of eligibility	Category	Total Respondents	Percentage Assessment
81 % - 100%	Excellent	28	93.33%
61 % - 80 %	Good	2	6.67%
41% - 60 %	Fair	0	0
21 % - 40 %	Poor	0	0
0% -20 %	Very Poor	0	0
Total		30	100%

Based on the table above, it can be concluded that 28 respondents or 93.33% rated the application as "Excellent", 2 respondents or 6.67% rated it as "Very Good", and no respondents rated it as "Fair", "Poor", or "Very Poor".

Discussion

Based on the research findings, the Tanaka application was developed as a media for providing information about the attractions in Taka Bonerate National Park. The development of this application utilized the prototyping model, allowing developers and users to interact throughout the development process. The development process began with the requirement gathering phase. During this phase, requirements were collected through literature studies and interviews with the Public Relations staff of Taka Bonerate National Park. The active involvement of both developers and users ensured the achievement of a clear definition of the application requirements. Furthermore, the prototyping phase involved creating a prototype application based on the gathered requirements. This phase focused on temporary design and layout intended for presentation to the customers.

The prototyping of the Tanaka application consists of designing use cases, flowcharts, activity diagrams, and the user interface of the application. Each element of the design needs to be consistent because any changes to one element can impact other design elements. Next, the prototyping evaluation phase involves users evaluating the quick design outputs provided by the developers. If the design is approved by the users, the process can proceed to the next stage. However, if the design does not meet user expectations, the developers will make improvements based on user feedback and preferences. Subsequently, the system coding phase is carried out to translate the design outputs into a programming language. In this research, ActionScript 3.0 is used as the programming language. ActionScript 3.0 is an ECMAScript-based programming language commonly used in web development and software development using Adobe Flash CC software.

After the coding phase, an Android-based Tanaka application is generated based on the designed specifications. Subsequently, testing is conducted to ensure the quality of the developed software. The testing is performed using specific measures and methods. One of the standards utilized is the ISO 9126 quality standard developed by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). ISO 9126 defines the quality of software products, models, quality characteristics, and related metrics used to evaluate and establish the quality of software. The ISO 9126 standard aims to identify key quality attributes for software.

Based on the conducted testing, the functionality aspect received a score of 1, indicating an excellent rating. The reliability aspect, tested using white box testing, showed the same values for cyclomatic complexity (CC), region (R), and independent path (IP). This indicates that the testing was free from logical errors, signifying that the application can maintain a certain level of performance under specific conditions. The portability aspect was tested by installing the application on different smartphones with varying specifications and versions of the Android operating system, and the application was successfully installed and ran smoothly.

In the final aspect of usability, a questionnaire was distributed to 30 respondents, and the average rating obtained was 90%, which falls within the "excellent" category. This indicates that the application has the capability to be understood, learned, used, and is attractive to users. Based on the conducted testing, it can be concluded that all tested aspects have met the standards of software quality. The test results demonstrate that the characteristics evaluated in each aspect align with the expected quality of the software. These testing outcomes also represent an assurance of the quality of the developed product, indicating its suitability for implementation in real systems.

Conclusions and Suggestions

Conclusions

Based on the conducted research, the following conclusions can be drawn:

1. The development of the Tanaka application was carried out using the prototyping development model, consisting of seven steps: requirement gathering, prototyping construction, prototyping evaluation, system coding, system testing, system evaluation, and system utilization. The application was developed using Adobe Flash CC software and ActionScript 3.0 as the programming language. The outcome of the development process resulted in the Tanaka application, an Android-based media providing information about Taka Bonerate National Park, which can be accessed offline at any time.
2. The quality of the Tanaka application as an Android-based media for Taka Bonerate National Park information, based on the ISO 9126 quality standards, has been fulfilled with the following results: a) functionality testing using black box testing method falls into the "excellent" category and meets the functionality aspect; b) reliability testing using white box testing method is free from logical errors; c) portability testing on different types of smartphones and Android versions runs smoothly without any issues; d) usability testing falls into the "excellent" category.

Suggestions

Based on the research findings, the following recommendations are suggested:

1. The application is currently designed for Android smartphones only. For future development, it is recommended to expand the compatibility of the application to include mobile devices with Windows Mobile and iOS operating systems.
2. Future developers are encouraged to enhance the application by adding additional features to make it more engaging and appealing to users.

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