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Analysis and Design of an Android-Based Tourism E-Ticket Application System in The Toba Caldera with a CRM Approach

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Keywords

E-ticketing, The Caldera Toba, Tourism, User satisfaction, Information technology.

Abstract. This research aims to develop and evaluate an e-ticketing application to enhance the tourist experience at The Caldera Toba. Employing a comprehensive software development methodology, the application is designed to streamline the ticket purchasing process and improve information accessibility for tourists. Evaluation is conducted through a user satisfaction survey, measuring aspects such as usability, functionality, and application reliability. The research results indicate a high level of satisfaction among users, with a particular emphasis on user-friendliness and the efficiency of the ticket purchasing process. This study not only underscores the potential of e-ticketing applications in the tourism sector but also provides valuable insights for further development in the context of other tourist destinations. The implications of these findings are significant for stakeholders in the tourism sector, especially in efforts to enhance the tourist experience through technology.

1. INTRODUCTION

Tourism is a crucial component of the national economy, experiencing rapid growth with numerous flight routes, new tourist destinations, and an increasing number of accommodations. The potential economic impact of tourism on a country is substantial, generating significant revenue for regions that recognize the potential of their tourism industry. Each region, being autonomous, strives to maximize its own potential. Tourism can be defined as the overall system of signs and symptoms caused by foreigners staying in a place, as long as they do not engage in significant work that provides permanent or temporary benefits. It is intertwined with culture and society, reflecting how people utilize their leisure time and vacations. Additionally, recreation has evolved into a societal need.

The Caldera is one of the tourist destinations in the five Super Priority Destinations (SPD) developed by the Government of Indonesia, specifically by the Ministry of Tourism and Creative Economy. It is located in North Sumatra, in the village of Sibisia, Ajibata District, Toba Regency.The Caldera Toba was inaugurated in 2019 during the term of Tourism Minister Arief Yahya. The location is strategically positioned at the edge of the cliff, overlooking the gorge that leads to Sigapiton Village. Sigapiton is a tourist village initiated by the Ministry of Tourism. This destination stands on the land of the Lake Toba Tourism Authority Zone, covering more than two hectares. Currently, to obtain tickets for The Caldera Toba, visitors must go directly to the location, resulting in difficulties and delays in the ticket reservation process. To address these weaknesses, the implementation of an electronic Customer Relationship Management (e-CRM) application is essential. CRM (Customer Relationship Management) is a modern approach to managing corporate and customer relationships at the business level, maximizing communication and marketing through the management of various customer contacts via technological media. The presence of e-CRM can assist customers in obtaining information related to reservations and simplify the process of obtaining tickets through electronic tickets (e-tickets).

In this context, a smartphone-based information system application is needed that can quickly display tourist destination screens, available facilities and all information data for each destination to increase visitor satisfaction. Therefore, this application is needed to make it easier for local and new visitors (tourists), as well as the people of North Sumatra, to choose tourist destinations without encountering difficulties. Therefore, an application is needed to make the process more effective for visitors, ensuring easy access to tourist destination information, available facilities and relevant details. This application aims to meet the needs of both local residents and tourists, making it easy to choose various tourist destinations in North Sumatra. For this reason, the e-ticketing system is deemed suitable for the tourism industry. Makes the process easier for travelers to get tickets by utilizing internet-based mobile media which can be accessed via smartphone or mobile device. The web serves

as a standard display that can be accessed on any internet-connected device, offering a seamless and versatile platform for users to explore and access information about various destinations.

2. METHOD

The methodology employed on this thesis encompasses several crucial stages. These include requirements analysis, user interface design, application development using Android Studio, and CRM system integration. The application testing involves functionality testing, responsiveness assessment, and user trials. The research culminates in an effective application that simplifies the ticket booking process and provides easily accessible tourist information.

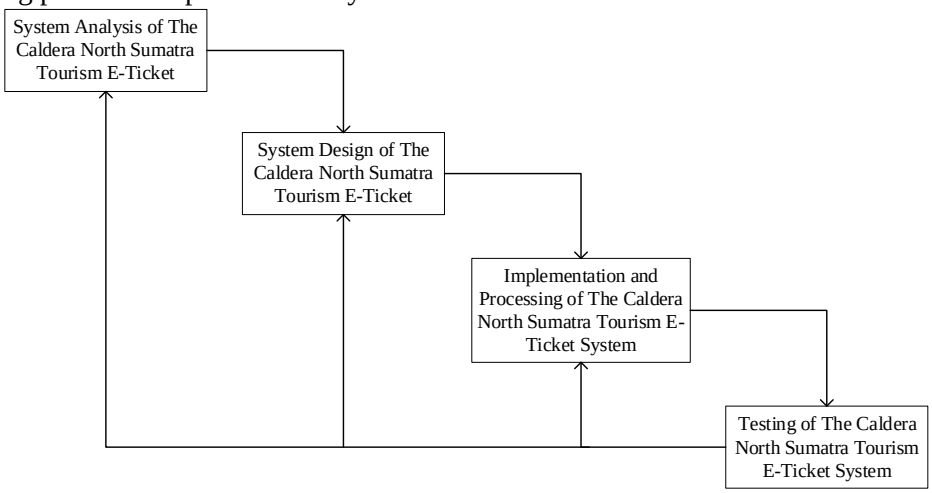

Figure 1. System Design Methods

This comprehensive methodology follows the Waterfall Model, progressing through each stage systematically. It starts with a thorough needs analysis, proceeds to system design, moves on to implementation, and concludes with rigorous testing to ensure the effectiveness and accuracy of the developed E-Ticket System for The Caldera Tourism in North Sumatra. Explanation of the Development Methodology for E-Ticket System using e-CRM with Waterfall Model:

a. Requirements Analysis
   In this stage, the author identifies the overall requirements and necessary elements for designing the E-Ticket System for The Caldera Tourism in North Sumatra. The analysis involves examining the existing system, both in terms of processes and archives used for recording data related to ticket bookings and returns.
b. System Design
   After analyzing the current system for The Caldera Tourism E-Ticket, the next step is the system design phase. This involves creating use case diagrams, class diagrams, and activity diagrams to visualize the structure and flow of the system.
c. Implementation and System processing
   This stage extends from the system design phase, involving the actual development of the designed system. The system, designed using Java programming language, is implemented in accordance with the established system design. The application is tested in a real-world environment at The Caldera Toba, allowing researchers to observe users' direct interactions with the application and identify potential areas for improvement.
d. System Testing
   System testing is conducted at this stage to evaluate the entire software. Black-box testing method is employed to verify if the software aligns with the design and ensures the system operates smoothly, producing results that meet the identified requirements.

Tools and Materials Used

a. Android Studio
   This is the official Integrated Development Environment (IDE) for Android application development. Android Studio provides all the necessary tools for designing, developing, and

testing Android apps. This includes a code editor, an emulator for testing the app on various devices and Android versions, and tools to assist in debugging and optimizing application performance.

b. Figma
Figma is a cloud-based graphic design tool popularly used for user interface (UI) and user experience (UX) design. Figma enables collaborative design and prototyping, making it a good choice for application development teams to design and iterate on the app's user interface.

c. Windows operating system
As the main system in designing Android applications, and to ensure the installation of the application design software, namely Android Studio, and the software for designing the appearance of the application, namely Figma.

d. Android Device
To test the created application, a real Android device is needed so that the application can be tested for its stability and efficiency.

Research Sites

The research sites used in this study are located at several tourist locations in The Caldera Toba. The research activities involved observations and interviews aimed at understanding the needs and expectations of users, as well as identifying challenges and potential for the development of The Caldera Toba tourism e-ticketing application.

Data Collection

The processes undertaken by the author in data collection to assist in this writing are as follows:

a. Literature Review
The author searches for theoretical research books in the library, bookstores such as Gramedia, as well as official journals on the internet to gather information about the theoretical aspects of the thesis title. Specifically, to avoid constraints in the research, the author conducts observations on the theories used and identifies the objectives of these observations. Consequently, the author selects theories from various journals to aid in the design of the system.

b. Interviews
After conducting observations, the author will interview several students or members of the community regarding what should be included in the application to be designed. This includes aspects such as the app's appearance, suitable tourist destinations to be included in the database and application, and preferences for the menu. Involving students and the community enhances user experience in the application.

c. Questionnaire**
The author creates a questionnaire for several users about their experience using the created application, focusing on the user interface and user experience. The questionnaire consists of several questions about the application. Consequently, the author can understand the shortcomings of the application, allowing for the addition of improvements to the program.

3. RESULTS AND DISCUSSION

Implementation Phase (Application Implementation)

Implementation is the stage of application and testing for the system based on the results of the analysis and design that have been conducted earlier. In this chapter, the implementation of the designed results into The Caldera Tourism E-ticket application is discussed.

a. Onboarding Page Display

This page serves as the initial screen that appears when the application is opened for the first time. It showcases a design reflecting The Caldera Toba's visual identity. The background image features an iconic Batak traditional house, establishing a direct connection with the local heritage and cultural beauty.

Figure 2. Onboarding Page Display

b. Login Page Display

This page serves as the login page designed for every user before entering the application or system. Its purpose is to ensure that only users with proper access can enter the system. Users can enter the previously created username and password. Upon successful login, they will be directed to the dashboard page.

Figure 3. login Page Display

c. Dashboard Page Display

The dashboard page provides a warm welcome by greeting the user by name, adding a personalized touch to enhance the user experience. The search feature is included to facilitate users in quickly finding specific destinations or travel information. The dashboard displays a selection of tourist destinations presented in visually appealing cards with captivating images. It highlights featured destinations to inspire users and make it easy for them to discover

interesting places to visit. This dashboard page serves as the starting point for users to explore all the possibilities offered by The Caldera Toba, emphasizing visual beauty and ease of access.

Figure 4. Dashboard Page Display

d. Tourist Destination Page Display
This page displays a list of available tourist destinations. Each tourist destination is presented in the form of individual cards, making it easy for users to view essential information. Users can scroll up and down to explore various options and select the destination they desire.

Figure 5. Tourist Destination Page

e. Tour Description Page Display
This tourist description page provides detailed information about the tourist destination. The "View Reviews" button offers users the option to read reviews from other visitors, providing additional insights and aiding in decision-making. The price and rating section clearly presents the entrance fee and overall rating from visitors, assisting users in evaluating the quality of the destination based on others' experiences. The "Book Now" button provides a direct way for users to make reservations, facilitating a seamless transition from exploration to transaction. This tour description page enables users to gather all the information they need to make informed decisions about their visit and take the next steps in planning their trip by relying on reviews and making direct bookings through the application.

Figure 6. Tour Description Page

f. Checkout Page Display

This page displays a summary of the tickets to be purchased. The "Non-refundable" section outlines the ticket policy, providing transparency and making it easy for users to understand the purchase conditions. This page also includes options for selecting the date and time of the visit, easily adjustable through a dropdown menu, offering flexibility for users to plan their visit. The "Total Guests" section allows users to adjust the number of visitors with the '+' and '-' buttons, providing intuitive control for users to determine the quantity of tickets they want to purchase. In the "Payment Summary" section, a breakdown of costs, including the price per person and total payment, ensures users are aware of the amount to be paid. The "Buy Ticket" button is the final step in the checkout process, guiding users to the payment stage.

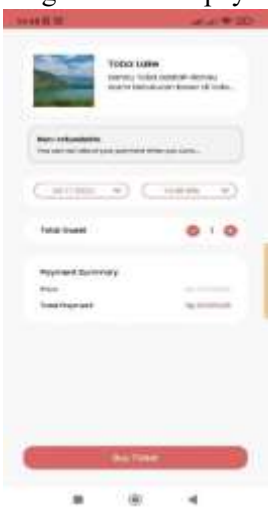

Figure 7. Checkout Page Display

System Testing

System testing is the process of executing software systems to determine whether the system meets the specified requirements and operates in the desired environment. System testing is often associated with bug hunting, identifying program imperfections, and addressing errors in the program that may lead to failures in the execution of the software system.

Table 1. Functional System

No	Function	Test Cases	Input Data	Expected Results	Test result	Status
1	Login	User enters valid credentials	Valid credentials	Successful login to the aolication	Successful	Success
2	Login	User enters invalid credentials	Invalid credentials	Display error message	Error message displayed	Success
3	Register new account	Register with compplete data	Complete data	New account successfully created	Account successfully created	Success
4	Register new account	Register woth incomplete data	Incomplete data	Display error message	Error message displayed	Success
5	Search destination	Search with spesific keywords	“Toba” keyword	Display seearch results for “Toba” destination	Results as expected displayed	Success
6	Purchase ticket	Complete ticket purchase process	Valid purchase data	Purchase successfully with confirmation	Purchase successful	Success
7	Manage destination (admin)	Add new tourist destination	New destination data	Destinaation successfully added	Destination sucessully added	Success
8	Manage destination (admin)	Edit a tourist destination	Select destination to edit	Destination successfully edited	Destinasi berhasil dihapus	Success
9	Manage destination delete	Delete a tourist destination	Select dedstinationn to delete	Destination successfully deleted	Destination successfully deleted	Success
10	Manage user profile	Update user profile	New profile data	User profile successfully update	Profil successfully updated	Success
11	Logout	Perform logout operation	Logout operation	Use successfully logged out and session	Logout successful	success

4. CONCLUSION

In this research, an Android-based e-ticketing application for The Caldera Toba tourism was developed using a structured methodology. The research stages included literature study, problem identification, objective determination, data collection, analysis of the existing system, analysis of system requirements, and analysis of both software and hardware requirements. This process was followed by the design of the database and the system, including the user interface design. The application was built using Android Studio and integrated with Customer Relationship Management (CRM), providing significant benefits for both tourism destination managers and users. The development of the application successfully enhanced the quality and convenience for users by providing comprehensive information about tourist destinations and ease in ticket booking, thus offering a responsive and user-friendly solution.

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