

# Developing Mobile Apps to Support Smart Tourism in Indonesia

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**Abstract.** The Covid-19 pandemic brings a severe impact on the tourism sector in Indonesia. In East Java, Bromo Tengger Semeru National Park (TNBTS) has forced the park to close temporarily. This research aims to provide the habits of visitors and visitors' knowledge about the official website of Bromo Tengger Semeru National Park. Therefore, to restore tourism to Bromo Tengger Semeru National Park in the post-pandemic era, the researcher presents a solution in the form of a graphical user interface of a mobile application developed from an existing website. The target researcher wants to achieve this application that is able to facilitate and reduce the concerns of visitors when visiting Bromo Tengger Semeru National Park. As a research development material, the researcher conducted design thinking research and data collection methods in the form of a questionnaire. Hopefully, this research can be used as a recommendation for further development to make the tourism sector relatively productive during the pandemic or post-pandemic.

## 1 Introduction

Covid-19 is a virus that is being faced by almost all countries in the world. This virus was first discovered in Wuhan, China. The World Health Organization (WHO) has declared the Covid-19 virus a global pandemic [1]. This certainly affects the lives of everyone in the World. The first case of covid-19 was discovered in March 2020. There were two people who were infected and then spread throughout the archipelago in just a short period of time. There are around 4.24 million positive patients in Indonesia per day. In addition, more than 143,000 people died [2].

The situation is getting worse because of the Covid-19 virus that has harmed many countries, including Indonesia. The tourism sector is one of the sectors most affected by the COVID-19 pandemic [3]. According to BPS statistics from 2021, both domestic and international tourism numbers have declined [4]. 4.02 million foreign tourists traveled to Indonesia overall in 2020. There were 75.03 percent fewer foreign visitors in 2018 than there were in 2019 [5]. Based on nationality, Timor Leste, Malaysia, Singapore, and China were the top 5 nations that visited Indonesia in 2020. Except for China, most of these nations border each other [6]. The negative impact was also felt by 2,800 local residents who depend on tourism in the TNBTS environment for their economy [7]. They opened a variety of businesses, ranging from rental jeeps, lodging, motorcycle taxis, there are also street vendors and porters [8]. To help the surrounding community, TNBTS helps promote village community products through virtual activities and social media [9]. Even to come to TNBTS, people also have to

rely on the website to book online. All activities began to be diverted by utilizing existing technology. Social media is the main way to promote tourist attractions so that there are still people who are interested in visiting [10]. In addition, people's fear of traveling in the midst of a pandemic like this is also a complicated problem. Especially when visiting TNBTS people have to rent a Jeep because the road is difficult to pass by a regular car [11]. Therefore, Jeep drivers in the Bromo area must have qualified SOPs and health so that tourists can be comfortable and feel safe when traveling [12].

The website owned by the TNBTS is indeed good in use. However, in terms of design and features offered are still not qualified. If the existing website is developed into a mobile application, it will make it easier for tourists to book online or check the health status of the Jeep driver who will accompany their trip. Their safety will be maintained during the trip. Judging from the enthusiasm of tourists when the traditional ceremony is held, it is possible that other cultures will also attract tourists to the Bromo Tengger Semeru Tourism Park. It is hoped that this research will be able to revive the tourism sector, especially in the Bromo Tengger Semeru Tourism Park.

## 2 Literature Review

In the table of State of art below, there are several previous research journals that the research obtained to examine differences or compare the research that has been done before with the researcher will do.

Based on the state-of-the-art journal, it shows similarities to the research conducted by the researchers,

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eventhough that these journals are more concern to the management or how pandemic affect Taman Nasional Bromo Tengger Semeru.

**Table 1.** State of The Art

Researcher	Kurnia, A. (2017)	Kristi, A., Nafia, A. I., & Handriyono, H. (2021).	Utami, H. S. (2017)
Research Title	The role of Bromo tourism development in improving the economy of the community around Sukapura District, Probolinggo Regency	Economic Condition of the People of Bromo Tengger Semeru as International Tourism in Indonesia During the Pandemic	Management of Tourism Areas (Study at the Bromo Tengger Semeru National Park Center).
Research Methods	Qualitative Methods	Qualitative Methods	Qualitative Methods
Result	Focused on Bromo tourism development	focused on covid-19 impact on Taman Nasional bromo Tengger Semeru	focused on Taman Nasional Bromo Tengger Semeru management

The research that conducted by the researcher provides a final solution in the form of an application about Taman Nasional Bromo Tengger Semeru. Meanwhile, based on previous journals, the first journal is focused on Bromo tourism development [13]. The second journal is more focused on covid-19 impact on Taman Nasional bromo Tengger Semeru [14]. The third journal is focused on Taman Nasional Bromo Tengger Semeru management [15]. The researcher wants to create interesting applications in order to encourage people to visit Taman Nasional Bromo Tengger Semeru. By using this TNBTS application, the public can read information about TNBTS or information about jeep driver vaccination. Therefore, the researcher presents a TNBTS application as a form of solution.

### 2.1 Preliminary Research

In this research, the researchers have conducted a preliminary study of several literatures.

1) *Covid-19 impact on Taman Nasional Bromo Tengger Semeru.*

Non-Tax State Revenue (PNBP) from the management of the Bromo Tengger Semeru National Park (TNBTS) in 2020 fell drastically compared to the previous four years [16]. Because, in 2020, activities in the Mount Bromo and Semeru areas are often closed to prevent the spread of the Covid-19 pandemic. Acting Head of

the Bromo Tengger Semeru National Park Center (BB TNBTS) Novita Kusuma Wardani said, in 2020, the total state revenue sourced from activities in the TNBTS area was Rp 6,418,797,000. This number decreased drastically from the previous year's revenue which reached Rp 22,859,776,986 in 2019, Rp 26,179,112,649 in 2018, Rp 21,998,787,714 in 2017, and Rp 18,120,987,218 in 2016. This figure is in line with the number of tourist visits. to the area of Mount Bromo and Semeru. In 2016, the number of visits by domestic tourists (wisnus) was 424,391 people and foreign tourists (tourists) were 30,409 people. In 2017, there were 623,895 foreign tourists and 23,568 foreign tourists. Then, in 2018, the number of foreign tourists was 800,130 people and foreign tourists were 25,076 people. Furthermore, in 2019, the number of foreign tourists was 699,021 and 22,061 foreign tourists. Then in 2020, the number of foreign tourists dropped to 193,733 people and 2,658 foreign tourists [17].

2) *Definition of Application*

Now that information technology has advanced so quickly, human performance is more effective and efficient [18]. Applications are also described as using one of the application data processing techniques to solve a problem, typically in opposition to a planned or anticipated computation [19].

3) *Differences of Application and Website*

Mobile app is a program that is downloaded and installed onto a user's mobile device and can be accessed both online as well as offline [20]. whereas a mobile website is simply a website adapted to tablet and smartphone formats and accessed by the user via the Internet (therefore requires being online) [21].

### 2.2 Research Roadmap

The road map is a diagram that shows the steps or routes taken by the researcher while investigating the development of applications to combat cyberbullying and raise self-awareness using comic illustration media. While a result, the researcher refers to and draws encouragement from this road map as she completes the six stages of her research study. The created and followed road map is as follows:

Determining design thinking application development is the initial step in the research process. The researcher will first complete the design thinking stage [22] before moving on to the more in-depth analysis of this application as part of the process of designing the TNBTS application to improve TNBTS on technology. The second stage involves creating the research for the application by doing a literature review across various publications and data sources. The third step involves dedicating a thorough investigation of the effects of a pandemic to Taman Nasional Bromo Tengger Semeru. The researcher must have a thorough understanding of Taman Nasional Bromo Tengger Semeru and have access to accurate data at this level before designing the application.

The next step is to examine the responses and viewpoints of the respondents. In order to obtain the respondent's opinion about the Taman Nasional Bromo Tengger Semeru website and application, the researcher must develop a questionnaire. To finally solve the issues at Taman Nasional Bromo Tengger Semeru, the researcher must collect and process the data in the fifth stage. Producing the final product, which is the TNBTS application, is the last stage. Before it is ready to be published or developed, the researcher will need to complete a prototype and evaluation stages for the application itself.

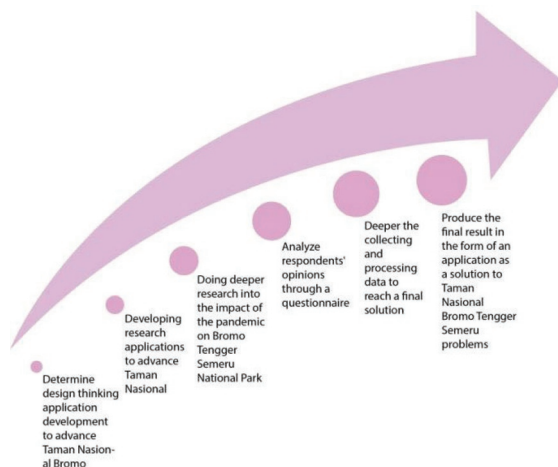


Fig. 1. Research Roadmap

### 3 Research Methods

In order to gather information for the research, the researcher used an open-ended questionnaire as a data collection approach. A Google Form was used to deliver the survey to responders. Due to limited access to direct observation or interviews as a result of the Covid-19 epidemic, the research is being done online. As a result, the procedure is implemented online and involves a questionnaire and literature review.

According to the findings of a survey that was given out and completed by up to 100 respondents, as many as 94 percent of respondents enjoy going to tourist spots. However, they are worried about visiting tourist attractions during the pandemic. Therefore, they still attach importance to each other's safety when going on vacation. From the data obtained, respondents who have visited Bromo Tengger Semeru National Park (TNBTS) have never made an online booking using the TNBTS website. However, most of the respondents agreed that the TNBTS website is very interesting to access. After the respondents tried to access the website, they felt that the TNBTS website was easy to use. Although some of the respondents prefer to use an existing website, they do not rule out the possibility that the TNBTS application can greatly assist them in finding information about TNBTS. Especially if the TNBTS application has a more attractive design and features than the existing website. Some respondents think that the TNBTS application will make it easier for them to find information about TNBTS so they are very

interested in this application. They hope that the TNBTS application can recover TNBTS from the impact of the pandemic over the last two years.

## 4 Result and Discussion

### 4.1 Visual Concept

Color is a very important element, because through color we can see objects clearly. Color can also evoke spontaneous feelings for those who see it. The difference presented by color is very important for everyday life. Color can be defined subjectively/psychologically which is a direct understanding by our visual sense experience and objectively/physically as the nature of the light emitted. Objectively / physically the color is projected from the wavelength (wave length), and the wavelength of color that can still be caught by the human eye ranges from 380-780 nanometers. Visible light to the eye is a form of narrow energy emission of electromagnetic waves [23]. In the world of design such as graphic design, interior design, and even fashion design apply color with a lot of consideration and focus on the meaning of the color itself. Color is something that cannot be separated from the world of design. To produce a good design, color must also be considered. Color can also often be a medium of communication for designers. Submission of messages can be realized with colors that are in accordance with what you want to convey. In this case, TNBTS mobile apps will pay great attention to the use of color. The colors chosen are natural colors because this application is used to implement beautiful nature. To create a good aesthetic, the color chosen is blue. In accordance with the natural colors that can be seen from the visualization of Mount Bromo. Apart from color, an important thing that cannot be separated from the world of design is typography. The selected typography must match the visuals you want to display. In this case, TNBTS chose Roboto as the main font. The illustration chosen is a simple illustration with the dominant blue color. Tnbts Mobile Apps will also include some visualizations in the form of photos of Mount Bromo.

### 4.2 Concept of Graphical User Interface

Graphical user interface (GUI) is a system of interactive visual components for computer software [24]. GUI displays objects that can convey information and represent user actions. With the GUI, we can know that what we input has been received and the response is shown visually [25]. GUI can be seen from changes in color, size, visibility, and the like when an interaction occurs. Initially, the GUI was developed in the late 1970s by Xerox Palo Alto. After success, this system is used by Apple for its Macintosh and also the Windows operating system which is owned by Microsoft. The discovery of the GUI provides a solution to the problem of response that is felt by the user. GUI is displayed in graphical form such as images, icons, shapes, and others [26]. GUI has many advantages that can be very profitable. The convenience offered through the GUI

allows users who are not experts in the coding world to understand well. The GUI display is also much more attractive so that users will be very interested in using it [27]. The image resolution also makes it easier for users because the resolution is not broken and very clear. The GUI does not require any special skills to operate so it will be really easy [28].

TNBTS Mobile Apps uses simple icons in blue, according to the primary color of the application. Pictures were also added to illustrate the visuals of TNBTS more clearly. TNBTS Mobile Apps are very easy to use and easy to understand because everything is clearly visible. TNBTS Mobile Apps will also always be consistent in terms of design and appearance to make it easier for users even though there are updates in the application. Minimizing control actions such as eye or hand movements is very important for efficient application. The system will be ensured to respond to user actions quickly. The application will be visually simple to make it easier for users to access the application without difficulty.

### 4.3 User Interface Prototype of TNBTS Application

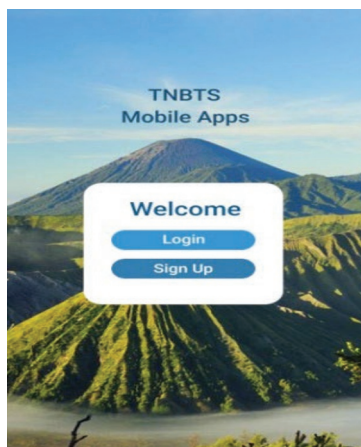


Fig. 2. TNBTS Mobile Landing Page

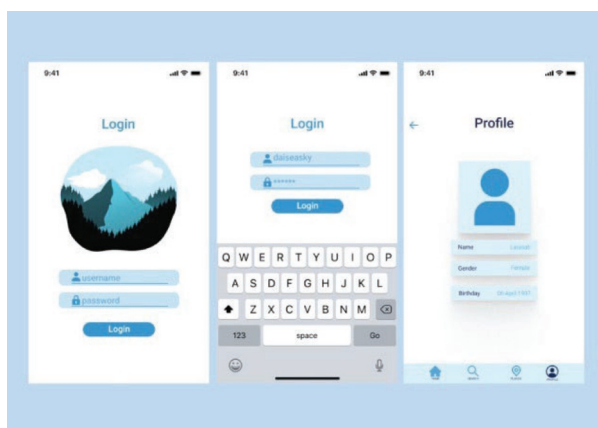


Fig. 3. Login Page

The concept of TNBTS Mobile Apps is simple and easy. From the selected colors, pictures, illustrations and various visuals that are displayed are also very simple

but able to attract the interest of users because their use is very easy and efficient. Efficiency is our focused so that users do not find it difficult to use it. The features provided have also been developed from the existing website. If the website only allows users to book online, this application will provide very interesting features. These new features will greatly assist users in visiting Bromo Tengger Semeru National Park. From access to Bromo, transportation that can be used, complete information about performances or traditions that are held every year, to health information that makes it easier for users to visit during a pandemic like this. Everything is available in full in this application. Something that cannot be obtained when accessing The concept promoted by TNBTS Mobile Apps is simple and easy. From the selected colors, pictures, illustrations, and various visuals that are displayed are also very simple but able to attract the interest of users because their use is very easy and efficient. Efficiency is very focused so that users do not find it difficult. The features provided have also been developed from the existing website. If the website only allows users to book online, this application will provide very interesting features. These new features will greatly assist users in visiting Bromo Tengger Semeru National Park. From access to Bromo, transportation that can be used, complete information about performances or traditions that are held every year, to health information that makes it easier for users to visit during a pandemic like this. Everything is available in full in this application. Something that cannot be obtained when accessing TNBTS official website.

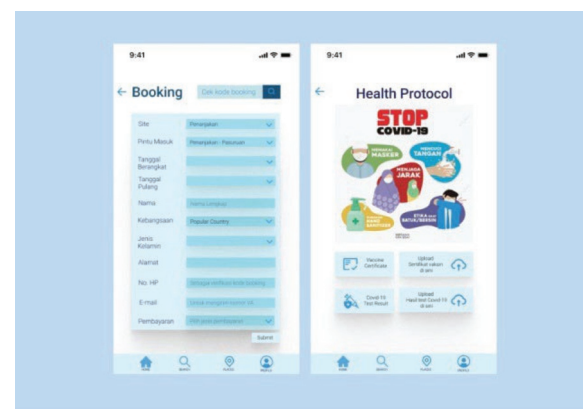
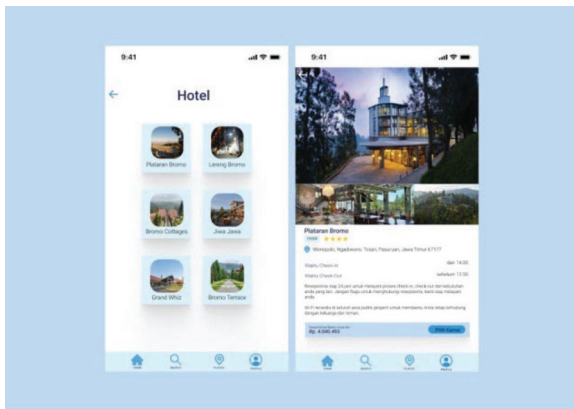


Fig. 4. TNBTS Application's Booking and Health Protocol 1

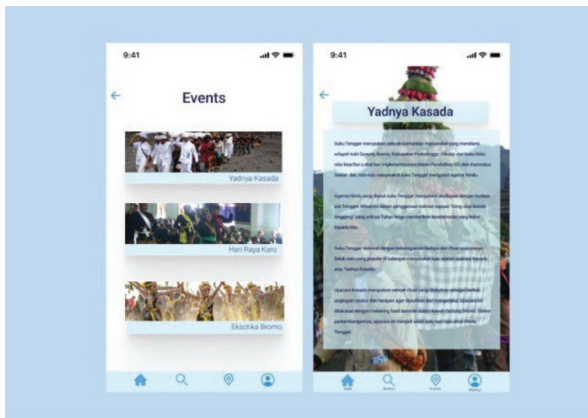
The elements used will make it very easy for users to be able to access this application anytime and anywhere. The online booking system will also be very profitable both for visitors and for tour managers because then anyone who will visit can feel safe. Especially in the midst of the Covid-19 pandemic which has not subsided until now. With this application, tourism managers and the surrounding community who depend on tourism can recover. Visitors can travel safely, comfortable, and easily. So even though we are still facing the pandemic, everything can go well and safely. Because after all the comfort of visitors is the main thing that must always be considered by the tour



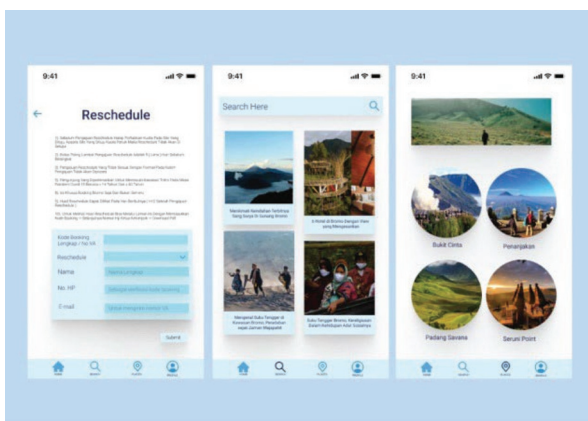
manager. We have to get used to living side by side with the pandemic so that we can continue to survive and be able to return to carrying out activities as before.



**Fig. 5.** TNBTS Hotel and Application's Transportation Feature



**Fig. 6.** Design of TNBTS Application's Events Feature



**Fig. 7.** Design of TNBTS Application's Reschedule, Search and Places Feature

#### 4.4 Prototype Evaluation

The semantic differential is a psychological scaling technique used to measure the subjective meaning of concepts or objects based on people's perceptions and

evaluations. It was developed by Charles E. Osgood, George J. Suci, and Percy H. Tannenbaum in the 1950s. The semantic differential consists of a series of bipolar adjectives or descriptive word pairs, with opposite meanings at each end. These pairs of adjectives are used to represent different dimensions or attributes along which people can express their attitudes or evaluations [29]. For example, a semantic differential scale for evaluating a product might include word pairs such as "good-bad," "pleasant-unpleasant," "easy-difficult," "modern-outdated," and so on. Respondents are asked to rate the product on each of these dimensions by placing a mark on a scale between the two opposing adjectives.

The resulting data can be analyzed to understand how people perceive and evaluate different concepts or objects [30]. It allows researchers to quantify and compare people's attitudes, preferences, or perceptions along specific dimensions. The semantic differential technique has been used in various fields, including psychology, marketing, and social sciences, to assess attitudes toward products, brands, advertisements, political candidates, and more. It provides a structured and quantitative approach to understanding subjective evaluations and can reveal insights into how people perceive and respond to stimuli. Every day, the information in everything around us is absorbed by our five senses. We can transform knowledge into affection, impressions, desires, or emotions by using our five senses. Semantic responses are among the human reactions to things or artifacts. The Semantic Differential approach was employed in this study to comprehend respondents' perceptions of the TNBTS GUI design.

In order to gauge the user's perception, the Semantic Differential assessment focuses on frequency values on a scale from 1 to 7. When the questioner is given an ad-hoc object, semantic differential is utilized to explain the impression of that thing at that moment. The adjective chosen for the Semantic Differential assessment is divided into two categories: the value of consumer confidence, which is chosen from the TNBTS interface design, and the visual value (GUI) of the program. The seven words Interesting, Cheerful, Easy, Simple, Neat, Unique, and Modern are used to evaluate visual values. The seven words Comfortable, Readable, Informative, Effective, Productive, Practical, and Relevant will measure respondents' trust in the TNBTS GUI display. In order to prevent responders from changing their answers, all of these descriptors in the presentation are randomized.

**Table 2.** Assessment Result

	1	2	3	4	5	6	7	
(V) Interesting								Boring
(K) Comfortable								Uncomfortable
(V) Cheerful								Sad
(K) Readable								Not readable
(K) Informative								Uninformative



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