



# Android Mobile Application for Promotion of Pangandaran Leading Tourism in Augmented Reality Technology

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## ARTICLE INFO

Received February 3<sup>rd</sup>, 2020  
Revised June 15<sup>th</sup>, 2020  
Accepted July 7<sup>th</sup>, 2020  
Available online July 24<sup>th</sup>, 2020

Keywords  
Augmented Reality, Tourism,  
Android

## ABSTRACT

The use of smartphone devices has become a part of people's lives in finding the information they need, including finding tourist locations that suit their desires. The problem is when tourism site managers cannot keep up with technological developments needed by the community, where most still use conventional paper media marketing methods such as brochures and travel pocketbooks. Therefore, the development of tourism promotion applications is needed to support the marketing of tourist destinations such as in Pangandaran, West Java. This application's development uses the Prototype method, which only focuses on functionality needs, which uses video media that is displayed with Augmented Reality technology. The results of the development of this application can only display 7 (seven) superior tourism location videos in Pangandaran, West Java.

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<https://doi.org/10.25124/ijait.v4i01.2523>

Paper\_reg\_number IJAIT000040102 2020© The Authors. Published by School of Applied Science, Telkom University.  
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## 1. Introduction

The development of the tourism industry has a strong influence on the development of the region in the area around tourist attractions. Similar to tourism in Pangandaran, where the tourism sector is the main sector that can improve the economy of the community in tourist sites. That's because Pangandaran is an area with great tourism potential, which must be supported by a superior tourism strategy to become the main tourist destination of choice for tourists.

For the sake of tourism development in an area, of course, it must be supported by good tourism promotion. Promotion is one of the keys in the marketing business, both in the marketing of products and services, including tourism. Tourism promotion can be done through digital and conventional media. However, public interest in conventional print media seems to have been regarded as ordinary and less attractive media. This is shown by Indonesians' low reading interest, who is ranked 108 out of 187 countries [1].

Promotion strategies carried out by the Tourism and Culture Office of Pangandaran are very conventional, so the use of information technology is needed so that promotional media can be more interesting and interactive. Through the use of information technology such as applications that can be seen on mobile devices, it can also display tourist attraction and have the potential to attract people to visit. Prospective tourists prefer promotional media presented through digital media such as websites because they can access information through their hands [2][3]. An attractive and interactive display can also increase tourist interest in considering their future visits.

Augmented Reality technology offers an interface that can integrate the real and virtual world, where virtual data such as images, videos, or animations can be added to real objects [4]. This is the background of developing a tourism promotion application using video media as an Augmented Reality object that still uses conventional promotional media brochures and travel pocketbooks as a marker. Augmented Reality is a technology that requires marker as its trigger to emerge objects according to marker. The shape of the marker itself can be anything, such as image, location, face detection, sound, etc. [5].

## 2. Research Method

The development of mobile tourism promotion applications with Augmented Reality technology uses the MADLC (Mobile Application Development Lifecycle) model, explicitly recommended in developing mobile device applications. Figure 1 is the stage in the MADLC model [6].

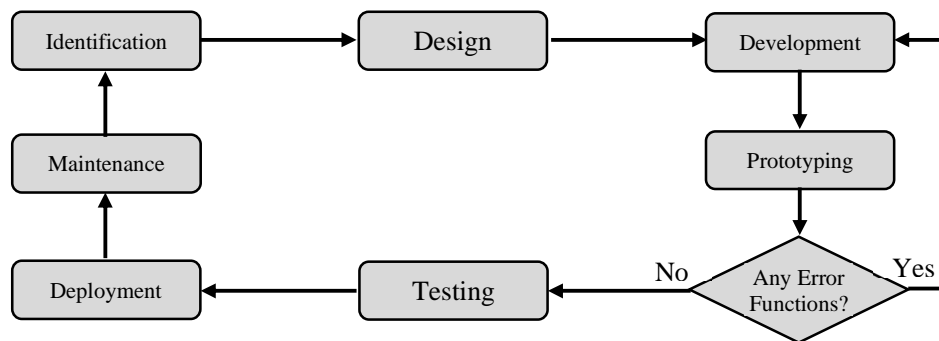


Figure 1 Mobile Application Development Lifecycle

Figure 1 describes the stages of development carried out using the MADLC model with an explanation of each step as follows.

### 2.1. Identification phase

In this phase, ideas were collected and categorized. The main objective of this phase was to develop a new idea or improvements from the existing application. These ideas can come from existing application weaknesses, users, or the developer.

From the results of identifying user problems and existing conditions, it was found that there have been no digital promotional media in the form of mobile applications for Android, iOS, or other Operating Systems.

### 2.2. Design phase

This tourism promotion application was designed to be used easily by tourists, especially potential tourists, so that some applications are expected to be easily used by anyone. The application's user interface was made very clear and easy to see, using splash screen video as the first attraction of the application as a characteristic of Indonesian tourism.

In designing the application, the development team also designed a brochure and travel pocketbook, which also became an application marker later. The display of the brochure and pocketbook has a design that is easily recognized and read by the application with the aim of offline video media on the application that can be directly displayed.

### 2.3. Development phase

In this phase, the application is coded. Coding for different modules of the same prototype can proceed in parallel. The development process can be in two stages; they are coding for Functional and UI requirements. The code is developed first for the core functionalities. Parallel development can be done for modules of the same prototype that are independent of each other.

This application development used main software such as Adobe Premiere CS7, Unity 2018, and Vuforia. Adobe Premiere was used to edit videos; Unity was used to design flows and publications to the Android file format. Vuforia was used as a database between markers for each video displayed [7][8].

This application uses eight videos consisting of 1 (one) video for splash/intro screen, 7 (seven) for Augmented Reality tourist destination videos. Details on the size and format of each video can be seen in Table 1.

**Table 1** Detail of Videos

No	Video	Details		
		Resolution	Format	Size (KB)
1	Idea Inspire "Wonderful Indonesia"	720p	MP4	558
2	Cagar Alam	1080p	MP4	28373
3	Citumang	1080p	MP4	27718
4	Green Canyon	1080p	MP4	27648
5	Batu Hiu Beach	1080p	MP4	29295
6	Batu Karas Beach	1080p	MP4	28640
7	Karapyak Beach	1080p	MP4	28640
8	Pangandaran Beach	1080p	MP4	27248

#### 2.4. Prototyping phase

Finally, the Augmented Reality mobile tourism promotion application was tested on the Office of Tourism and Culture staff, Pangandaran. The test results found no errors or functional deficiencies, where the application is ready to be marketed.

#### 2.5. Testing phase

Testing is one of the most important phases of any development lifecycle model. Testing the prototype types is performed on an emulator/simulator followed by testing on the real device. This test is done by testing several devices with different brands and specifications with different versions of the Android operating system.

#### 2.6. Deployment phase

Deployment is the final phase of the development process. After the testing and the final feedback were obtained from the client, the application was ready for the deployment. In the end, the mobile tourism promotion application using the video media Augmented Reality was submitted to the Department of Tourism and Culture, Pangandaran. The application will be used as a supporting promotional media, as well as further treatment.

#### 2.7. Maintenance phase

The maintenance is the final phase of this model, and this maintenance is a continuous process. Feedbacks are collected from users, and required changes are made in the form of bug fixes or improvements. After the application is published, the Department of Tourism and Culture will continue to receive input from users and develop features to complete the application's functions.

### 3. Result and Implementation

This application's development resulted in a prototype of digital promotional media that only displays seven leading tourist sites in Pangandaran.

#### 3.1. Marker

Augmented reality technology use markers to trigger objects or media to be displayed. This application using 2D markers from brochure media and travel pocketbooks as conventional tourism promotion media. The results of the brochure and travel pocketbook can be seen in Figure 2.



**Figure 2** Brochure and Travel Pocket Books

The marker is located on the map image. It is placed on the back page of the brochure and travel pocketbook, where the page will be scanned by the application when in camera mode.

### 3.2. Tourist Location Points

This page displays seven tourist sites displayed in the form of blue location icons. These location icons will appear when the device's camera is pointed at the map image located on the back of the brochure or travel pocket book that is a marker of this application. The results of scanning this marker can be seen in Figure 3.



**Figure 3** Augmented Reality for Tourist Location Points

The display shows several icons that appear using Augmented Reality, and if the icon is pressed [9][10], it will go to video mode in displaying the footage of the tourist location.

### 3.3. Tourist Location Videos

This page will appear when one of the location icons on the previous page is pressed. This will bring up a cinematic video showing the landscape of the tourist location. This video is only 30 seconds long and will follow the marker position when moved or moved position [11]. The results of the video display are shown in Figure 4.



Figure 4 Augmented Reality Videos

#### 4. Testing

Testing on the application is to run the application on seven samples of various brands and specifications of Android devices. The list of mobile devices used in testing is in Table 2.

Table 2 List of Testing Devices and Specification

No	Device	OS Version	RAM	Camera Resolution	Loading Time (s)			Scan Distance (cm)	
					Initial App	Marker Scanning	Exit App	Min	Max
1	Samsung Galaxy J7 (2017)	7.0	3GB	13 MP	10	< 1	5	7	130
2	Xiaomi Redmi 5A (2017)	7.1.2	2GB	13 MP	12	< 1	5	8	120
3	Samsung Galaxy Grand Prime (2014)	4.4.4	1GB	8 MP	17	< 1	7	11	95
4	Vivo S1 (2019)	9.0	4GB	16 MP	6	< 1	4	7	140
5	Oppo A71 (2018)	7.1	3GB	13 MP	8	< 1	4	7	120
6	Oppo Neo 5 (2015)	4.4.2	1GB	5 MP	19	< 1	6	12	90
7	Realme 2 (2018)	8.1	3GB	13 MP	13	< 1	5	9	120

On all types of devices, all functions and features in the application can be run properly. From Table 2, the following conclusions can be drawn:

1. All devices show different initial and exit loading times, where the greatest RAM capacity impacts the application's loading time speed.
2. All devices show a relatively fast scanning time of less than 1 second.
3. The minimum distance of scanning markers that can be done is 7 cm, while the maximum distance can reach 140 cm depending on the size of the camera resolution owned by the device.

The application can be explained to the following minimum specifications requirements from the specifications of all these devices.

1. The minimum operating system version of Android 4.0 (Kit Kat)
2. Recommended minimum of 1GB RAM
3. Minimum 8MP camera resolution

#### 5. Conclusions

The development of this application produced a digital promotional media in the form of an application for the Android platform, which can display seven

leading tourist video sites in Pangandaran that use Augmented Reality technology. Whereas from the results of the tests that have been carried out, the specifications of the mobile device will determine the performance in running the application [5], especially in the loading time and scan distance, which can be concluded with the following results.

1. The greater the device's RAM capacity, the faster it will load (initial app, marker scanning, and exit app).
2. If the camera resolution of the device has is higher, the scanning distance can be even further. This is because the scanning process will see detailed images of the markers used.
3. Also, this application has a fairly large file size due to the use of videos stored in a local directory (offline), with features that are still simple when compared to similar Augmented Reality video applications [11].

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