

# Application Model for Travel Recommendations Based on Android

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**Abstract**—Problems encountered by tourists when planning tourism activities, usually do not know complete information related to tourist destinations that will be visited, and can not make weather forecasts from the destination tourist destination. This research aims to provide a model travel recommendation that is implemented into the Android mobile application. Recommendations are obtained from the results of weight calculations of several criteria, namely ticket prices for tourist destinations, weather and rating of tourist attractions using simple additive weighting method. Mobile technology used GPS sensors, Google Maps API, Open WeatherMap API, and Facebook API. Based on the results of testing, the application in this research can help in recommending tourist attractions that meet the criteria desired by tourists.

**Index Terms**— Travel, Google Maps API, OpenWeatherMap API, GPS.

## I. INTRODUCTION

As new tourists or will visit some region sometimes having difficulty in planning the cost and the nearest tourist route, as well as information about tourist attractions, ticket prices, and sometimes also experience problems with the weather when visiting the tourist attractions. Many tourists, especially those from outside the city, find it quite difficult to find locations and complete and accurate information. From the results of questionnaires distributed on february 22, 2018, to february 25, 2018, to 70 respondents, it is known that as many as 64.3% of prospective tourists have difficulty planning a tour. Sometimes they have difficulty preparing a budget to visit several places, and run out or lack of money when traveling. Another difficulty is that it is difficult to determine the nearest route between tourist attractions and sometimes there are tourists who are constrained by the weather while at tourist attractions.

From research written by Triyono et al [1] the application that they build is giving information and being a guide to the direction of the tourist location they want to go to. This application is designed like a tour guide that makes it easier for tourists to get

information-information including culinary data, tourist attractions, hotels, arts, places of worship and transportation. In building this android platform application using google API tools, JDK as the programming language, SDK, android virtual device for configuration of emulators and SQLite as its database. The method used is the Location Based Services (LBS) method. Minimum A-GPS accuracy testing error with a distance of 3 meters and a maximum error of 30 meters. GPS accuracy testing is assisted by the GPS test and GPS status applications.

From other studies written by Dedy et al [2] the system is built in the form of an android-based mobile application. Input from users for the system in the form of tourist preferences includes types of tours, tariff categories, modes of transportation, and tourism activities. The preference along with the location of the user based on the GPS coordinates are then compared with the attributes of the tourist objects stored on the system using the nearest neighbor similarity method. This research resulted in an android-based mobile application program that was able to provide recommendations on tourism destinations by considering the preferences of the user selected preferences and user locations obtained from the GPS coordinates of the device used.

Often tourists when visiting a tourist spot find bad weather or even rain. The irregular and extreme climate and weather patterns in Indonesia will interfere [3]. Of course, it will cause disappointment to the tourists, what else tourists come all the way from outside the area. Therefore, using openweatherMap API technology will provide weather forecasts before tourists visit the place. The OpenWeatherMap API used provides access to the use of various weather data such as current weather, forecasts, deposition, wind, clouds, and other data from weather stations. Weather data is received from global meteorological broadcast services and more than 40,000 weather stations [4].

According to research written by Agus et al [5] the development of mobile devices that are widely

discussed today is android. Android is an operating system (OS) that runs on mobile devices and is open source. This operating system has supported various tools and APIs for making mobile programs including accessing google maps. Most people have relied on mobile devices to obtain information.

From other studies written by Even [6] concluded, the application built can help tourists to get information on tourist objects. The application can also provide hotel information nearby from tourist attractions. As well as public transport recommendations and information on selling typical foods.

People are now making friends using various types of smartphones, especially android. This is in accordance with the ability, motivation, desires, and needs of the community towards the use of the media [7]. From the results of the questionnaire given to 70 respondents, 100% were smartphone users and 91.4% used android smartphones.

Thus, the application that built in this research is expected to help and facilitate potential tourists who will visit some place. The method used in this research when providing recommendations is by calculating the weight of the assessment criteria based on ticket prices, weather tourist attractions that are the destination, and rating of tourist attractions using simple additive weighting method. That is because prospective tourists usually prioritize prices, weather conditions, and rating in determining tourist attractions.

## II. LITERATURE REVIEW

### A. Tourism

Tourism is a whole series of activities related to human movements that travel or temporary transit from their place of residence to one or several destinations outside the residence environment which is driven by several needs without intending to make a living. Tourism is one of the economic driving sectors that need to be given more attention so that it can develop well [8].

Tourism is one of the prima donnas for countries in increasing their sources of income outside of oil and gas and taxes. Currently, Indonesia as one of the developing countries has begun to promote its country in order to attract the eyes of other worlds, this is intended to make Indonesia increasingly famous for citizens/residents of other countries to visit Indonesia. The promotions carried out were selling Indonesia's tourism and cultural diversity, this was responded to positively by the number of foreign tourists visiting Indonesia [9].

### B. Recommendation

Recommendations are suggestions that are advocating, justifying, or reinforcing something or someone. Recommendations are very important, meaning to convince others that something or someone

is right and appropriate. In addition to recommendations, there are also recommendation systems, a recommendation system is a method to provide recommendations by predicting the value of an item for a user and then presenting items with the highest predictive value [10].

Recommendations are also referred to as decision support systems. Decision support systems are interactive information systems that provide information, modeling, and manipulating data. The system is used to assist decisions in semi-structured situations and unstructured situations, where no one knows for certain how a decision should be made [11].

### C. Google Maps API

The Google Maps Android API is a service to display maps in the android application. Developers can add maps to data-based applications in the google maps API automatically handle access to google maps servers, download data, display maps, and respond to map movements. You can also use an API call to add markers, polygons, and overlays to the base map, and change the appearance of certain map areas to users. All of these objects provide additional information about the location of the map and allow user interaction with maps.

### D. OpenWeatherMap API

OpenWeatherMap is an online service that provides the latest weather data, including forecast data and the latest historical data for web service developers and mobile applications. For data sources, OpenWeatherMap uses meteorological broadcast services, raw data from airport weather stations, raw data from radar stations, and raw data from other official weather stations. The following is an example of weather data on openweathermap can be seen in figure 1.

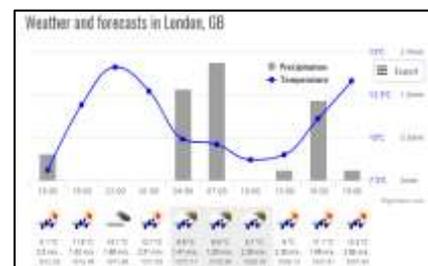


Image Source : <https://openweathermap.org/>  
Figure 1 Examples of weather data on openweathermap

### E. Facebook API

Facebook API is usually called the graph API, is the main way for applications to read data from and write data to facebook. This graph API represents objects in graphs (for example, people) and relationships between objects [12]. Graph API is the main way to get data in and out of social graph Facebook. Graph API is an HTTP-based low-level API that can be used to query data, post new stories, upload photos, and various other tasks that an application may need to do.

F. GPS

Global positioning system or commonly abbreviated as GPS is an electronic navigation tool that receives information from 4 - 12 satellites so that GPS can take into account the position where we are on Earth. GPS satellites do not transmit our position information, the satellite transmitted is the satellite position and the distance of our GPS receiver from the satellite [13]. GPS is usually used to indicate a location on the earth's surface with a fairly good level of accuracy that is less than 10 meters as long as there are no solid objects that can inhibit the signal to get the user's location.

III. RESEARCH METHODOLOGY

The method used is a descriptive method. Descriptive method is a method of examining the status of a group of people, an object, a set of conditions, a system of thought or a class of events in the present. The purpose of this descriptive research is to make a systematic, factual and accurate description, description, or painting of facts, traits and relationships between phenomena investigated [14]. The framework in this research can be seen in figure 2.

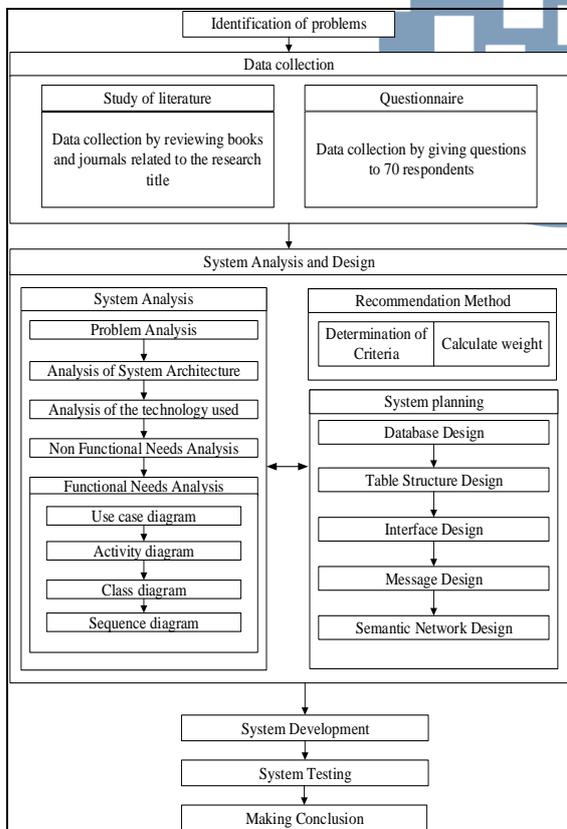


Figure 2 Research framework

IV. RESULTS AND DISCUSSION

At this stage consists of stages of research conducted. The stage consists of analysis and system design, analysis of the technology used.

A. System Analysis and Design

The system to be built is an android-based mobile application as a front-end and web application as a back-end. The system architecture to be built can be seen in figure 3 and figure 4.

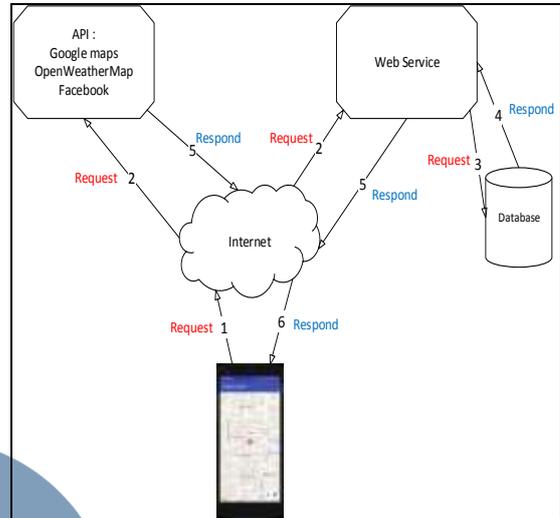


Figure 3 Mobile system architecture

The following is a description of figure 3 software architecture on the android platform :

1. The user's mobile device sends commands via an internet connection.
2. Commands passed to API and web service.
3. The web service sends the query to the database.
4. The web service receives data from the database.
5. The API and web service send a response.
6. Response from the API and web service is forwarded to the user's mobile device via the internet.

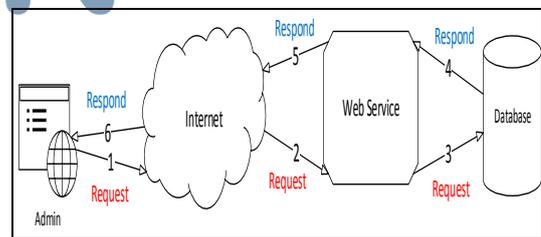


Figure 4 Website system architecture

The following is a description of figure 4 software architecture on the website :

1. Admin sends commands via the internet.
2. Webservice receives commands from the internet.
3. The web service sends commands to the database.
4. The web service receives a response in the form of data from the database.
5. Webservice sends data to the admin via the internet.
6. Admin receives data from web service.

## B. Technology used

The technology used in the system is built are :

### 1. GPS

The technology used in applications that are built in GPS technology with type A-GPS. This technology will determine the position of smartphones with high accuracy. The reason for the high accuracy is the basis for choosing A-GPS as a GPS that is used in applications that are built. The use of A-GPS in this application is used to get the smartphone location faster because it is supported by the telecommunications operator used on smartphones.

### 2. Google Maps API

The maps application programming interface (API) developed by google will be used in the system built. The purpose of this API is to get a digital map service that will be used on the application. In this API, the service that can be used in addition to displaying digital maps in the application is the use of markers, polygons, and overlays to the base map, as well as changing the appearance of certain map areas to users. All of these objects provide additional information about the location of the map and allow user interaction with maps. These features are used to support application needs. The google maps android API technology will be useful in building systems in functions related to the location of an object in a digital map.

As for how the google maps API works on applications that are built, namely :

1. First get the key API. The key functions as an access permission for users of the google maps API service. To get the google maps API key, you can directly access the URL <https://developers.google.com/maps/documentation/android-api/signup>, then follow each step listed.
2. Set up an activity or template for google maps. By default android studio already has a template for google maps activity and can be added directly to the built antenna pointer project.
3. Embed the google maps API key that has been obtained in the `google_maps_api.xml` file in the project. If the key does not match or is not pinned, maps will not appear on the application.
4. Test run application to ensure that the default settings and map display from google maps are successfully loaded on the application.

### 3. OpenWeatherMap API

Openweathermap is used to get weather forecast data somewhere. Because openweathermap provides online weather data services including forecasts and historical data. By using this API the application can get weather forecast data at tourist destinations.

The openweathermap API works on the application that is built, that is :

1. The system will send a request to the openweathermap API via the internet.
2. Openweathermap will receive requests from users.
3. The system will get a reply from openweathermap in the form of JSON data.
4. Users will receive weather forecast data.

### 4. Facebook API

This application also uses facebook API to allow users to log in using Facebook accounts without registering first. That way users can log in more easily. Facebook API is also used to determine recommendations based on user preferences on each facebook account.

As for how facebook API works on applications that are built, namely :

1. Users use the API key to connect to the facebook API.
2. The system requests a request to the facebook API via the API key.
3. Facebook sends a response in the form of JSON data.

## C. Recommendation Method Analysis

Recommendation method analysis aims to identify and calculate the average value of each criterion. The method used in this research when providing recommendations is by calculating the weight of the assessment criteria using simple additive weighting method.

### 1. Criteria

The criteria chosen in this application are accommodation prices, weather, and rating. That because prospective tourists usually prioritize prices, weather conditions, and rating in determining tourist attractions. From the survey results through a questionnaire, 36.4% of people chose accommodation prices, 36.4% chose the weather, and 27.3% chose the rating. Criteria table can be seen in table 1.

TABLE 1. CRITERIA RECOMMENDATION

Criteria	Description
Accommodation price	The cheaper the ticket price, the better.
Weather	The brighter the weather the better.
Rating	The better the rating of tourist attractions, the better.

Accommodation price = entrance ticket price + hotel price + flight ticket price

### 2. Criteria weight

The following is a table of weighting criteria, can be seen in table 2.

TABLE 2. CRITERIA WEIGHT

Code	Criteria	Weight
C1	Accommodation price	36.4%
C2	Weather	36.3%
C3	Rating	27.3%

Here is a table of alternative choices of tourist attractions, can be seen in table 3.

TABLE 3. THE ALTERNATIVE CHOICE OF TOURIST ATTRACTIONS

Place Name	Code
Tourist Destination 1	A1
Tourist Destination 2	A2
Tourist Destination 3	A3
Tourist Destination N	AN

3. Weight of each criteria

Here is a table of accommodation price criteria, can be seen in table 4.

TABLE 4. CRITERIA FOR ACCOMODATION PRICES

C1	Accommodation price (Range)	Description	Value
	Rp. 0 – Rp. 1.000.000	Very cheap	5
	Rp. 1.000.001 – Rp. 1.500.000	Cheap	4
	Rp. 1.500.001 – Rp. 2.000.000	Normal	3
	Rp. 2.000.001 – Rp. 3.000.000	Expensive	2
	More than Rp. 3.000.000	Very expensive	1

Here is a table of weather criteria, can be seen in table 5.

TABLE 5. WEATHER CRITERIA

C2	Weather	Value
	Rain	1
	Light rain	2
	Cloudy	3
	Mostly cloudy	4
	Clean	5

Following is the rating criteria table, can be seen in table 6.

TABLE 6. RATING CRITERIA

C3	Rating	Value
	1 (★)	1
	2 (★★)	2

	3 (★★★)	3
	4 (★★★★)	4
	5 (★★★★★)	5

4. Match rating value

A case example of a recommendation method that is calculated to determine the most recommended tourist locations using simple additive weighting, can be seen in table 7.

TABLE 7. MATCH RATING OF EACH ALTERNATIVE ON EACH CRITERIA

A	Criteria		
	C1	C2	C3
Tourist Destination A1	4	5	4
Tourist Destination A2	5	4	3
Tourist Destination A3	1	3	2

5. Calculation process

The calculation process can be seen as follows:

Tourist Destination 1

$$r11 = \frac{4}{(\text{Max}(4,5,5))} = \frac{4}{5} = 0,8$$

$$r21 = \frac{5}{(\text{Max}(4,5,4))} = \frac{5}{5} = 1$$

$$r31 = \frac{4}{(\text{Max}(4,5,4))} = \frac{4}{5} = 0,8$$

Tourist Destination 2

$$r12 = \frac{5}{(\text{Max}(5,4,3))} = \frac{4}{5} = 0,8$$

$$r22 = \frac{4}{(\text{Max}(5,4,3))} = \frac{4}{5} = 0,8$$

$$r32 = \frac{3}{(\text{Max}(5,4,3))} = \frac{3}{5} = 0,6$$

Tourist Destination 3

$$r13 = \frac{1}{(\text{Max}(1,3,2))} = \frac{1}{3} = 0,3$$

$$r23 = \frac{3}{(\text{Max}(1,3,2))} = \frac{3}{3} = 1$$

$$r33 = \frac{2}{(\text{Max}(1,3,2))} = \frac{2}{3} = 0,6$$

The results of normalized matrix calculations are

$$V1 = (0,364 \times 0,8) + (0,363 \times 1) + (0,273 \times 0,8) = 0,8726$$

$$V2 = (0,364 \times 0,8) + (0,363 \times 0,8) + (0,273 \times 0,6) = 0,7454$$

$$V3 = (0,364 \times 0,3) + (0,363 \times 1) + (0,273 \times 0,6) = 0,636$$

Based on normalized matrix calculation results, it can be seen that the recommended tourist places to visit are A1 locations with a value of 0.8726, followed by A2 tourist destination with a value of 0.7454 and the third position is occupied by A3 tourist destination with value 0,636.

#### D. Use Case Diagram

Use case diagram is used to describe the interaction between actors and activities contained in the system that is built. By describing the use case diagram, the functional contained in the system can be seen briefly. The use case diagram on the built mobile system can be seen in figure 5 :

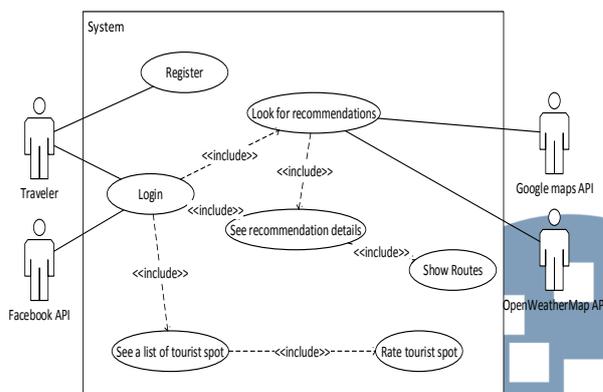


Figure 5 Use case diagram

#### E. System Implementation

The system implementation stage is the design translation stage based on the results of the analysis. Enter into a specific programming language and the application of a system that will be built in an application. The implementation discussion consists of hardware implementation, software implementation, database implementation and interface implementation.

Tourist destinations that will be recommended with the models produced in this study are global, so it depends on tourism data available in the database. However, in this implementation the resulting tourist recommendation model is still limited in the area of West Sumatra. For further research, this recommendation model can be implemented for all tourist attractions in Indonesia.

##### 1) Hardware Implementation

The hardware here is a device that is used to support the running of a system that will be processed. The hardware that is implemented is hardware on smartphones. The hardware used to build application recommendations for travel attractions is using smartphone Android with processor Snapdragon 625, screen size 5", ram 3 GB and free space of rom is 100 MB.

##### 2) Software Implementation

The software is implemented of application recommendations for travel is smartphone android with marshmallow operating system.

#### 3) Interface Implementation

The interface is a display of the results of the application of a travel trip recommendation application. Interface implementation built can be seen in figure 6.

##### a) Mobile Application Interface

The appearance of the mobile application interface can be seen in figure 6 :

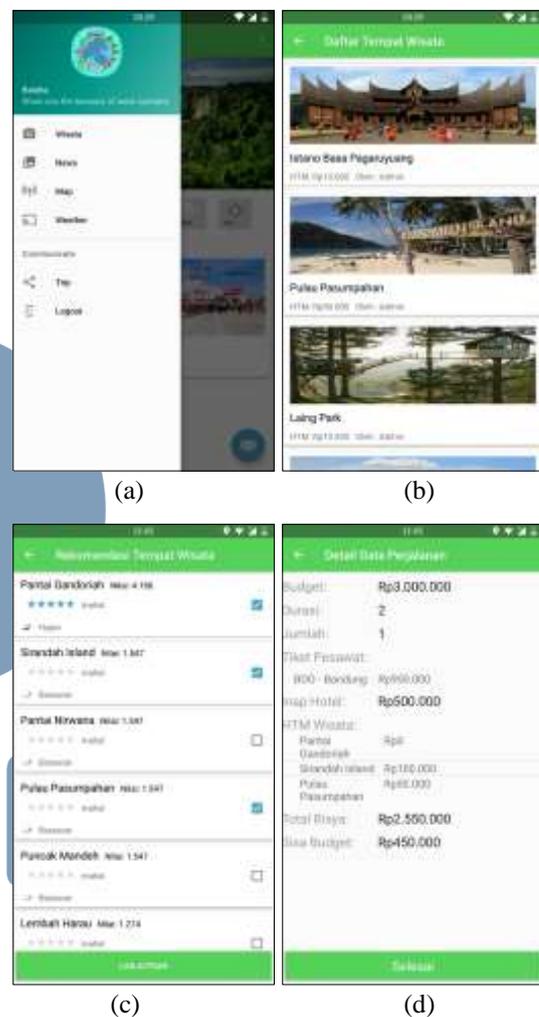


Figure 6 Mobile application interface

Figure 6 (a) is the initial display after the user has successfully logged in. The initial display can provide information about the details of a tourist spot, a map of a tourist spot, and weather forecasts from the location of tourist attractions. Figure 6 (b) displays a list of tourist attractions in an area. Complete with detailed information and rating values from previous visitors who have visited these attractions.

Figure 6 (c) is the recommended display of tourist recommendations for application users to visit. The tourist attractions displayed in these recommendations are the results of calculation of the criteria for price accommodation, weather and rating. Users can calculate the estimated costs needed to carry out tourism activities as in figure 6 (d). Estimated costs are

obtained from the results of calculating the cost of travel tickets using an airplane, the price of admission of selected tourist attractions, as well as lodging costs that will be used to stay overnight.

b) Website Interface

Website interface display which is a back-end program can be seen in figure 7.

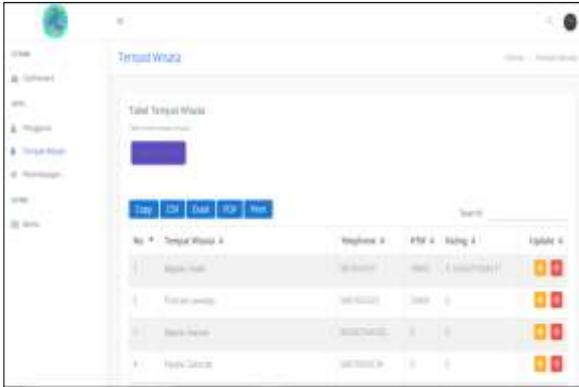


Figure 7 Admin backend interface

Figure 7 is a display of the backend application that can be used by administrator to process tourism data monitoring and application users. In addition to monitoring data, the backend application can also be used for tourism data processing, which includes tourist information, ticket prices and rating of tourist attractions.

F. System Testing

Testing is an important part of the software development cycle. Testing of the program itself aims to make the program run smoothly without experiencing interruption or error and allows for further system development. This test was carried out on 4 August 2018 to 8 August 2018 to 23 respondents, with the results as shown in table 10.

TABLE 10. BETA TESTING

Q1 : Does this application make it easier for you to plan a trip based on costs ?				
SS	ST	RG	TS	STS
11	11	1	0	0
Average = (102 / 15)*100% = 88.7				
Q2 : Does this application help you in determining the closest route from tourist attractions ?				
SS	ST	RG	TS	STS
10	10	3	0	0
Average = (99 / 115)*100% = 86.0				
Q3 : Is this application giving you information about weather prediction at tourist attractions ?				
SS	ST	RG	TS	STS
10	10	3	0	0
Average = (99 / 115)*100% = 86.0				
Q4 : Is this application easy to use?				
SS	ST	RG	TS	STS
9	12	2	0	0
Average = (99 / 115)*100% = 86.0				
Q5 : Does this application have an attractive appearance?				

SS	ST	RG	TS	STS
6	13	2	2	0
Average = (92 / 115)*100% = 80.0				
Final Average = (88.7+86.0+86.0+86.0+80.0) / 5 = 85.34				

Based on the results of testing in table 10, it was found that the functional objectives of the study could be categorized as successful, because they obtained a total value of 85.34%.

V. CONCLUSION

The conclusion obtained from the results of this research are this application helps prospective tourists in planning their travel trips to tourist attractions in some place. With this application, tourists can be given information in the form of total costs that must be provided, information on the nearest route of each tourist spot and given weather prediction information from tourist destinations. For further research, the duration of weather prediction to be longer so that potential tourists can find out weather conditions from long ago.

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