

DEVELOPMENT OF GOODS RECOMMENDATION APPLICATION BASED ON WEATHER FOR OUTDOOR EQUIPMENT STORES IN BANDUNG CITY

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ABSTRACT

Outdoor Activity is an activity that full of benefit and goals. Based on this, outdoor activities require support that can facilitate all kinds of activities, not only strong physical, but also outdoor equipment that has competitive quality and price are needed to escort various outdoor activities themselves. As time goes by, more and more outdoor equipment stores in Bandung made outdoor equipment buyers confused when they needed the outdoor equipment itself. Stores that are lacking in promoting their goods and the location of stores that are sometimes difficult to reach make the stores gradually go bankrupt. Therefore, this application can facilitate both buyers and sellers of outdoor equipment to transact. Through GPS and Open Weather technology, this application is expected to be an outdoor equipment store's promotion event, because the technology will send the recommendations to buyers based on predicted weather that will occur, so it'll be easier for buyers to know the quality and price offered by the stores. The method used in this research is problem identification, data collection, designing, testing, and conclusions. The data collection used was literature study and questionnaire. Based on Back Box testing, Alpha testing, and Beta testing, it can be concluded that the development of this application is expected to provide a solution for all difficulties experienced by buyers of outdoor equipment and became a promotional media event that is very useful for outdoor equipment seller themselves.

Keywords: Outdoor Equipment, Promotions, Recommendations, Transactions

1. INTRODUCTION

In some cities, especially developed in their economies and populations, outdoor activities are increasingly in demand by various groups. Outdoor activities are activities that are full of benefits and goals. Even today outdoor activities are widely used for education and identity building. Because of its pleasant nature, the longer it exists, the more it varies, the more its fan. Likewise, the equipment used when conducting outdoor activities, the longer,

more and more sellers are using the momentum to become one of their income fields. [1]

Based on survey results, competition for outdoor equipment's vendors is now starting to happen, so that every store is required to be able to provide different things, in order to make it easier for buyers to buy goods in the store. There are many stores in Bandung that provide a variety of outdoor equipment with varied price, quality, and uses, so that, media that can facilitate buyers in the selection of goods is needed. Another problem that happened is the lack of services some stores give, like the are no recommendations when selecting goods. There are some applications that are specifically intended to solve the problem, such as Tokopedia and Bukalapak. But both applications are more focused on selling goods, not on recommendation for goods that suitable for outdoor equipment's buyer to use as in the discussion of this study.

Otherwise buyers of outdoor equipment, based on the results of questionnaires to the people who use outdoor equipment not only for hiking or vacation, but also for their daily routine to work or school for reasons of its durability, variety, and quality, almost 75% stated that they had the difficulties in choosing items to buy, searching the stores that have low price and high quality items, and also the difficulties in finding out pricelist or product catalog of the store.

Based on the problems that have been described, it can be concluded that there is a need to build software that benefits both sellers and buyers. This application is expected to be a solution that can support each store increasing productivity and income.

Along with the development of technology and information in the field of android, the problems experienced by outdoor equipment sellers and buyers must be overcome. With Android technology, sellers will get ease in facing competition. Also with some features that will be used (GPS and Weather), buyers will get ease in finding sellers with several chosen aspects, namely based on the recommendations of goods according to the weather, price given, store location, and the quality offered by the store.

Purpose of this application developments are:

1. To facilitate outdoor equipment sellers in promoting the goods they are going to sell
2. To ease outdoor equipment buyers in searching and buying the goods that according to the weather that is or will occur, because sometimes the weather in Bandung itself is uncertain
3. To help buyer in finding outdoor equipment's information and price
4. To ease buyer's transaction in purchasing outdoor equipment
5. To help buyer in finding the nearest store from where they are.

2. CONTENT OF THE STUDY

2.1. Outdoor Activity

Outdoor Activity is a series of activities carried out in the outdoor, or commonly called "outbound". Outbound or outdoor is an activities carried out in the outdoor by doing several activities both individually and in groups.

2.2. Android

Android is a Linux-based operating system for cellular phones such as smartphone and tablet computer. Android provides an open platform for developers to create their own application for use by various mobile devices. Android SDK (Software Development Kit) also provides the tools and API that are needed to develop application for android platform using Java programming language.

2.3. Global Positioning System (GPS)

Global Positioning System is a satellite-based navigation system, first introduced starting in 1978. GPS satellites must always be in the right orbit position to maintain the accuracy of the data sent to the GPS receiver, so it must always be maintained in order to ensure the location is right in its place. The positions of these satellites are always monitored by the control station. There are some control stations on earth, such as in Hawaii, Ascension Island, Diego Garcia, Kwajalein, and Colorado Spring.

To find out the position of a person, we need a device named GPS receiver that functions to receive signals sent from GPS satellites. GPS receiver takes the information and makes triangulation calculation to determine the user's location correctly. GPS receiver compares the time the signal is sent with the time the signal is received to determine the satellite distance. By knowing the distance, the GPS receiver can perform calculations and determine the user's position and display it in an electronic map. By determining the user's position, then the GPS can also calculate other information, such as speed, direction, destination, destination, destination, sunrise and sunset and much more.

2.4. API

API is a set of commands, functions, and protocols that can be used when building software for a particular operating system. API allows programmers to use standard functions to interact with the operating system. API or Application Programming Interface is also a documentation consisting of interfaces, functions, classes, and structures to build software.

API eases programmers to unload software to be developed or integrated with other software. API can be said to be a link between an application and other applications. A standard routine that allows developers to use system functions. This process is managed through the operating system. API can be said to be a connector between an applications and another applications. A standard routine that allows developers to use system functions. This process is managed through the operating system.

2.5. Collaborative Filtering

Collaborative filtering is one of the techniques used in the recommendation system. In general, collaborative filtering is information filtering process or pattern using techniques that involve the collaboration between multiple agents, points of view, data sources, etc. Applications in collaborative filtering usually involve sets of data. In particular, collaborative filtering is a method of making automatic predictions about user interests by collecting information on choices and tastes of many users. The assumption that underlies a collaborative filtering approach is that if individual A and individual B have opinions about something, A agrees more with B about it than other randomly selected people.

2.6. Slope One

The *Slope One* algorithm is one of the algorithm used in the collaborative filtering method, which was introduced in a paper by Daniel Lemire and Anna McIlachlan in 2005 [12]. The Slope One algorithm is used to reduce overfitting, improve performance and easier implementation. Slope One is based on "popularity differential" which is calculated by subtracting the average rating from two items (Lemere and McGrath, 2005). The Slope One algorithm has the following equation:

$$p_{ui} = \frac{\sum_{j \in S(u) - \{i\}} (r_{uj} + dev_{ij}) * c_{ij}}{\sum_{j \in S(u) - \{i\}} c_{ij}}$$

2.7. Problem Analysis

Based on the results of interviews with several outdoor equipment vendors and from the results of questionnaires with buyers of outdoor equipment, several problems were found, namely:

1. Outdoor equipment sellers who are still pioneering their careers have trouble in promoting goods sold only by doing promotions

at online stores or buying and selling forums because of the lack of media that directly leads to buyers so that not all prospective buyers are aware of promotions in the store

2. The quality of service provided by several stores is still insufficient due to the absence of a process that can attract buyers
3. Buyers have trouble in finding the location of outdoor equipment stores around them, because sometimes outdoor equipment stores are not located in the center of Bandung City
4. Buyers have difficulty in shopping for outdoor equipment directly to the store due to the absence of online ordering and price list information so that buyers must go directly to any outdoor equipment store to find out the prices and promos provided.

2.8. System Architecture Analysis

System architecture analysis aims to identify the architecture that will be built based on a system, namely a mobile platform to facilitate buyers and sellers in buying and selling process.

The mobile platform is one of the subsystems chosen for the development of this software. Software architecture on the mobile platform describes how software interacts with each other as illustrated in Figure 1. The figure illustrates the overall system architecture on a mobile platform.



Figure 1

The following is a description of Figure 1:

1. The user's mobile device requests data to the web server through the admin
2. The web server receives a data request and determines the type of request requested
3. If the web server receives a location request, the server calls the Google Maps URL to get coordinates
4. Google Maps sends response results to the server
5. If the web server receives a data request, the web server will retrieve the data in the database.
6. If the web server receives a weather request, the server calls the Open Weather URL to get weather data
7. OpenWeather sends response results to the server
8. After the web server receives the requested data, the data will be returned in JSON form to be processed by the user's mobile device.

2.9. Goods Recommendation Analysis

The following are the stages of weather-based goods recommendation analysis:

1. Detect the user's location using the GPS sensor on the smartphone
2. Get latitude and longitude data from the location of the user from the GPS
3. Send latitude and longitude data to the API OpenWeather
4. Get weather data from the API OpenWeather
5. Send weather data to the database server
6. Obtain item data according to weather conditions from the database

In addition to the analysis of goods recommendations based on the weather, Collaborative Filtering method and the Slope One Algorithm are also used to analyze goods recommendations. This method provides recommendations based on other people's rating on an item.

2.10. Non Functional Needs Analysis

The minimum computer hardware requirements specifications needed to run the software are as follows:

Table 1

Type	Specification
Prosesor	2 core with a speed of 2,3 GHz
RAM	2 GB
Harddisk	120 GB
Monitor	10 inches

While the minimum Android hardware requirements needed to run the software are as follows:

Table 2

Type	Specification
Prosesor	1 core with speed of 830 MHz
RAM	512 GB
Internal Memory	2 GB
OS	Android 4.4 Kitkat

The software requirement specifications used to create applications and program simulations are as follows:

Table 3

Type	Specification
Computer Operating System	Microsoft Windows 7 Ultimate 64-bit
Android Operating System	5.0 Lolipop
Browser	Mozilla firefox
Web Server	XAMPP versi 3.2
Java Runtime Environment (JRE)	Version 1.8
Java Development Kit (JDK)	Version 1.8
Integrated Development Environment (IDE)	Android Studio
TextEditor	Sublime text 3
Android Development Tools (ADT)	Version 23.0.6
Software Development tKit (SDK)	API 19 Kitkat
UML Tool	Microsoft visio 2016
MockupTool	Balsamiq Mockup

2.11. Relation Scheme

Relationship Scheme is a series of relationships between two tables or more in the database system. Figure 2 is an overview of the database base on the development of applications for outdoor stores in the city of Bandung.



Figure 2

2.12. Table Structure

The table structure describes details that contain fields, data types, data holders, and other information. The table contained in the database development system for the Development of Outdoor Shop Applications is t_barang, t_cuaca, t_invoice, t_jenis_barang, t_keranjang, t_pembelian, t_pengguna, t_toko.

1. Item Table

Tabel 4

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_barang	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	nama_barang	varchar(50)	id_barang		Tidak	Tidak ada		
3	harga_barang	int(11)			Tidak	Tidak ada		
4	jenis_barang	varchar(50)	id_barang		Tidak	Tidak ada		
5	penjual_barang	varchar(50)	id_barang		Tidak	Tidak ada		
6	id_jenis	int(11)			Tidak	Tidak ada		
7	id_toko	int(11)			Tidak	Tidak ada		

2. Weather Table

Tabel 5

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_cuaca	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	nama_cuaca	varchar(50)	id_barang		Tidak	Tidak ada		

3. Invoice Table

Tabel 6

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_invoice	varchar(200)	id_barang		Tidak	Tidak ada		
2	id_user	int(11)			Tidak	Tidak ada		
3	id_toko	int(11)			Tidak	Tidak ada		
4	total	int(11)			Tidak	Tidak ada		
5	waktu	datetime			Tidak	Tidak ada		
6	alamat	varchar(100)	id_barang		Tidak	Tidak ada		
7	latitude	double			Tidak	Tidak ada		
8	longitude	double			Tidak	Tidak ada		
9	status	varchar(20)	id_barang		Tidak	Belum bayar		

4. Item Type Table

Tabel 7

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_jenis	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	nama_jenis	varchar(20)	id_barang		Tidak	Tidak ada		

5. Cart Table

Tabel 8

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_keranjang	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	id_pengguna	int(11)			Tidak	Tidak ada		
3	id_barang	int(11)			Tidak	Tidak ada		
4	qty	int(11)			Tidak	Tidak ada		

6. Purchase Table

Tabel 9

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_pembelian	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	id_barang	varchar(50)	id_barang		Tidak	Tidak ada		
3	id_barang	int(11)			Tidak	Tidak ada		

7. User Table

Tabel 10

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_pengguna	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	email	varchar(50)	id_barang		Tidak	Tidak ada		
3	nama	varchar(50)	id_barang		Tidak	Tidak ada		
4	password	varchar(50)	id_barang		Tidak	Tidak ada		
5	foto	varchar(50)	id_barang		Tidak	Tidak ada		
6	jenis	varchar(50)	id_barang		Tidak	Tidak ada		
7	active	int(11)	id_barang		Tidak	0		

8. Store Table

Tabel 11

#	Nama	Tipe	Pengertian	Atribut	Tak Terminate	Batasan	Komentar	Ekstra
1	id_toko	int(11)			Tidak	Tidak ada		AUTO_INCREMENT
2	email_toko	varchar(50)	id_barang		Tidak	Tidak ada		
3	nama_toko	varchar(50)	id_barang		Tidak	Tidak ada		
4	password_toko	varchar(50)	id_barang		Tidak	Tidak ada		
5	foto	int(11)	id_barang		Tidak	Tidak ada		
6	alamat	int(11)	id_barang		Tidak	Tidak ada		
7	latitude	double			Tidak	Tidak ada		
8	longitude	double			Tidak	Tidak ada		

2.13. Interface Design

Interface design aims to provide an overview of the application to be built. This design is implemented into a program that is complete and can be used by system users.

1. Buyer Interface Design

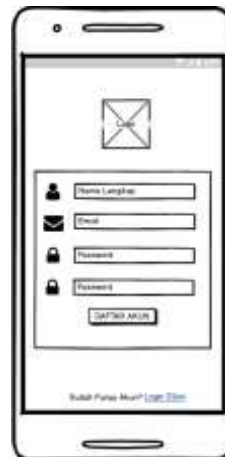


Figure 3. Buyer Interface Design



Figure 4. Login Interface Design

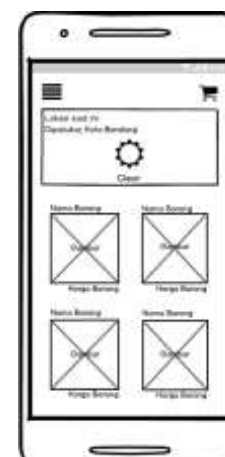


Figure 5. Buyer's Main Menu Interface Design



Figure 6. Ordering Goods Interface Design



Figure 7.
Navigation Towards Stores
Interface Design

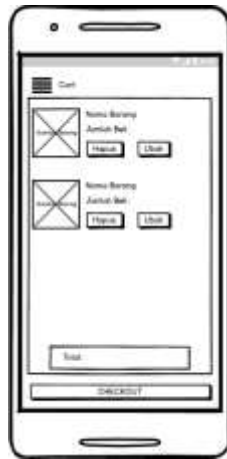


Figure 8.
Items Cart Interface Design

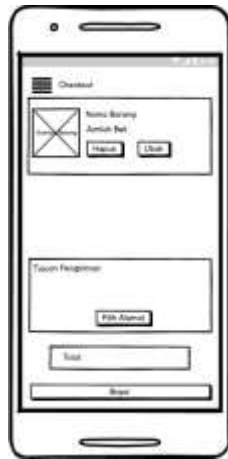


Figure 9.
Checkout for Items
Interface Design

2. Seller Interface Design

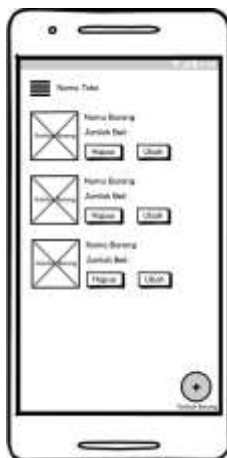


Figure 10.
Seller's Main Menu
Interface Design

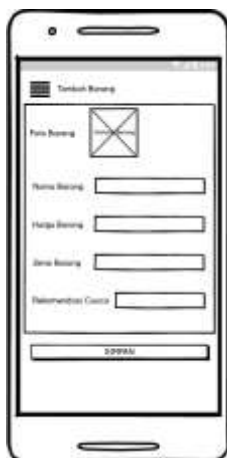


Figure 11.
Items Adding Interface
Design

2.14. System Testing

System testing is a stage to find errors and deficiencies in the software that is built so that it can be known whether the software meets the criteria according to the purpose or not.

The system testing will be divided into two stages. The first stage is Alpha testing which focuses on the functionality of the software built with the black box testing method. Based on the results of the test, it can be concluded that the recommended software that was built has been running as expected both in terms of validation and error handling process.

The second stage is Beta testing which focuses on assessing users of the software that is built, the data collection method that will be carried out is the questionnaire method. Questionnaires were carried out for people who had used this application (30 buyer respondents and 5 seller questionnaires). Beta test results state that the purpose of the software is easy to use, makes it easy for buyers and sellers to transact, provides recommendations for goods that are appropriate to the weather that will occur, and the interface is easy to understand, has been achieved in accordance with the aims and objectives to be achieved.

2.15. Testing Evaluation

Based on the results of software testing conducted, it can be concluded that the software that was built has run as expected both from Alpha testing and from Beta testing. However, some further development is needed, including the following:

1. Expanding the scope of use of software to cities other than Bandung City.
2. Considering third party payments so that the purchasing process becomes safer
3. Develop a platform that can be supported by software, considering that currently this platform only supports the Android platform.

3. CLOSING

3.1. Conclusion

Based on the results of the Outdoor Solution software testing, the following conclusions are obtained:

1. The software that is built makes it easier for sellers to promote the goods in their stores by recommendations according to the weather because the weather is sometimes uncertain
2. The software that is built makes it easier for buyers to find a store or goods they are looking for

3. The software that is built can make it easier to know the price of outdoor equipment that buyer wants
4. The software that was built helped buyers to find stores that sell outdoor equipment because sometimes the outdoor equipment store itself is not always in the center of Bandung.

3.2. Suggestion

The Outdoor Solution software built is a product that focuses on goods recommendations based on weather, looking for outdoor equipment stores, and supporting sales and also income for sellers. Therefore there are some suggestions that can be used as a guide for software development towards a better direction to support the growth of users and content in this software. The suggestions for software development that are built are as follows:

1. Expanding the scope of use of software to cities other than Bandung City.
2. Considering third party payments so that the purchasing process becomes safer
3. Develop a platform that can be supported by software, considering that currently this platform only supports the Android platform.

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