DEVELOPMENT OF MOBILE APPLICATION
YSS YAMAHA JG MOTOR AREA BANDUNG

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ABSTRACT

The rapid growth of motorized vehicles, especially motorbikes, requires workshops that are comfortable in serving each of their customers. Based on the results of surveys in several workshops, workshop customers often find a variety of uncomfortable problems, such as long waiting times for queues, difficulty in obtaining workshop information, especially the latest queue, information on workshop operating hours, and the location of workshop networks. To determine the location of the workshop when going to do service, estimated service costs and uncertain service time. The rapid development of today's smart mobile devices such as cellphones and tablets that are also owned by users of service services and various problems came to the idea to build an Android-based mobile application. The idea is supported by various technologies that exist at this time. In this study utilizing one of the services from Firebase namely Firebase Cloud Messaging for push notifications as a reminder for customers to service their vehicles. The use of GPS (Global Positioning System) in this application is needed to determine the route of the workshop using the LBS (Location Based Service) service. GPS is a collection of satellites and a control system that allows a GPS receiver to get its location on the surface of the earth. LBS can show the user to the place to go. Based on the results of testing, technology can help users in the process of servicing their vehicles.

Kata kunci : *Service vehicle, Workshop, Firebase Cloud Messaging, Global Positioning System, Location Based Services.*

1. INTRODUCTION

Vehicle maintenance is one of the safety factors that are considered by motorists. With the continued increase in the volume of vehicles, especially motorbikes, a service place is needed or commonly called a workshop that provides convenient services to meet the maintenance needs of these vehicles. As a sample, observations, interviews and questionnaires were conducted at JG Motor BKR. The workshop is one of JG Motor's workshops in the Bandung Area that serves periodic service services and provides Yamaha motorcycle spare parts. In addition the questionnaire was also conducted in several other official workshops in the Bandung Area which aimed to obtain information and problems that existed.

Based on the results of the questionnaire, the problems are relatively the same, namely the workshop customers often find various problems that are less comfortable in service such as waiting times for long queues. Customers also complained about the difficulty of obtaining workshop information, especially the latest number of queues, information on workshop operating hours, and the location of the workshop network. The customer considers the workshop to be directed towards the location of the workshop and the latest queue to avoid the buildup of customer queues in one workshop.

Unknown service cost estimates are also a problem. Some customers want service costs to be estimated from home so they can know the amount of money that must be prepared before service. Irregular service time is a problem for customers. This is because vehicle owners often forget to do regular service for their vehicles

Various information technologies are used by each company to improve process effectiveness, time efficiency and competitive advantage. If the company has implemented information technology in every business process carried out, it is certain that it will have a better advantage compared to rival companies engaged in similar businesses [1]. This proves that information technology helps business processes for companies.

The rapid development of today's smart mobile devices such as cellphones and tablets that are also owned by users of service services and various problems, came the idea to build an Android-based mobile application. Android is Google's open source operating system and is open to the market [2]. The idea is supported by a variety of technologies that exist at this time, namely by utilizing Firebase and GPS technology provided by Google.

Firebase offers convenience to software developers in building better applications and developing businesses through all their complementary features [3]. In this study, one of the features of Firebase is Firebase Cloud Messaging for push notifications. Notification provides important services that help users manage tasks and change information in the applications they use [4]. Firebase Cloud Messaging is able to send notification messages to users [5], with notifications on mobile

devices can help alert users to tasks that must be performed [6].

The use of GPS in this application is needed to determine the route of the workshop using LBS (Location Based Service) services. GPS is a collection of satellites and a control system that allows a GPS receiver to get its location on the earth's surface 24 hours a day [7]. LBS can show the user to the place to go [8], LBS is needed to see the route to the workshop. Google provides a Google Maps API service that allows developers to add Google Maps features in the web and mobile developed [9].

Based on the results of the questionnaire conducted by 45 of 47 customers from the workshops visited and the results of the online questionnaire agreed, if detailed workshop information, spare parts replacement recommendations, estimated costs and service time, service reminders can then be managed in one application accessible on the mobile .

2. RESEARCH CONTENT

This stage consists of a general description of the system, analysis and design of the system to be explained in the form of system architecture, implementation of technology consisting of analysis of GPS sensor technology and geofencing technology, and analysis of geofencing areas. The last step is to do the testing so that conclusions can be obtained.

2.1 System Analysis and Design

In accordance with the current system analysis, the new system to be built is a motorized vehicle service system in the internet-connected JG Motor which will be used by JG Motor Area Bandung customers. The following is Figure 3 analysis of system architecture:
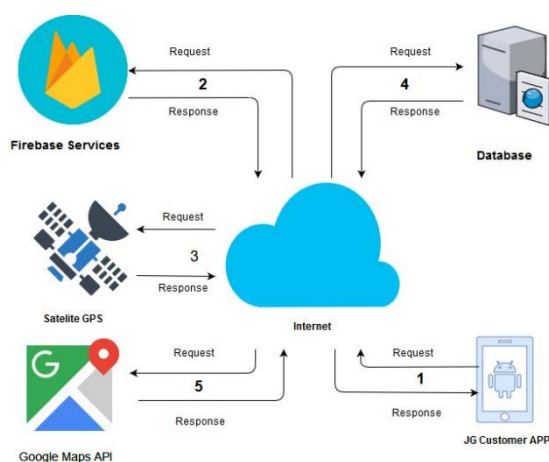

Figure 3 Analysis of System Architecture

The following description of the image above:

1. The whole system uses services that are in Firebase, google maps API, JG central databases that communicate via the internet.

2. Data requested includes spare parts data, and service history data.

3. Service data is then entered into the database. If the spare parts data, and service history data change, then the data will automatically update according to the existing JG Motor database through a web service.

4. After the customer has registered and booked the service, the customer will get a service notification through Firebase Cloud Messaging.

5. To log in the customer uses a google account. customers use a google account that will be authenticated by Firebase Authentication.

6. Data requested by the application is obtained in the available database, the data is in the form of customer data, customer vehicle data, service booking data, spare parts recommendation data, and schedule data and service location.

2.2 Technology Implementation

Technology analysis is a description of the technology that will be used for the application to be built. Some of the technologies that will be used include Firebase and Google Maps API.

1. Firebase

Firebase provides a realtime database and backend as a service that allows the development of APIs to be synced to the client. The firebase service that will be used in the construction of the YSS JG Motor application includes:

a. Firebase Authentication

This service aims to facilitate customers in logging in. Firebase Authentication can use a Google account, Facebook, and also a mobile number. The system will be built using authentication with selection using a mobile number because the mobile number is generally owned by each customer.

b. Cloud Functions

This service can make it possible to run backend code without managing the server. Cloud Functions uses JavaScript functions that are run in the Node.js. environment. This service is used to trigger a Cloud Messaging service to send a notification when a customer who has booked a service, at the time who has been booked will get a notification to immediately go to the booking workshop and also a service reminder notification in the following months.

c. Cloud Messaging

This service is used to send notifications to users. Notifications that will be sent to the user's handphone include when a customer who has booked a service, at the time of the booking he will receive a notification to immediately go to the workshop that has been booked as well as a service reminder notification in the following months.

2. Google Maps API

To find out the map or location of each JG Motor workshop, an online map is needed that can show

where the workshop is located, the distance from the location of the consumer, and how to access it. GoogleMaps is an online map or open maps online, can be done through free services from Google. This service provides an API (Application Programming Interface) that will be utilized in the development of this application. With the support of several supporting technologies namely LBS to determine the location of the nearest workshop. Flowchat the search process for the nearest workshop location using an application on a smartphone can be seen in figure 4 below:
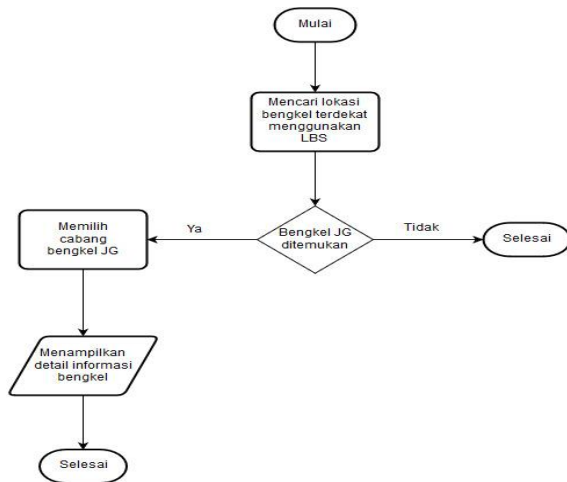

Figure 4 Nearest Workshop Recommendations

From the flowchart, it describes how the nearest workshop location works. LBS will find the recommended JG Motor workshop around the user. The user's position is obtained from the Positioning Service, which is the user's mobile GPS. After that, the user's mobile device sends an information request, which contains the purpose of finding and sending a position through the communication network to the telecommunications gateway. The gateway will store location request information and mobile devices that have requested information. The server application reads requests and activates related services. Then the service will find workshop information, the service will do spatial buffers and query routing to get some of the closest workshops. After that the results are sent back to the user via the internet, gateway and mobile network. Then, information about the JG Motor workshop will be delivered to users in the form of a digital map.

2.3 Recommendation analysis

Recommendation analysis is an elaboration of various recommended features that will be applied to the application to be built. For recommended features that will be used include recommendations for replacement of spare parts based on the number of kilometers, recommendations for replacement spare parts based on service books / service history, recommendations for workshops as service locations.

1. Recommendations for Substitution Based on Kilometers

For the sake of driving safety, it is better to replace vehicle components based on Yamaha standard service rules, instead of replacing vehicle components after being damaged. Components of vehicles or spare parts certainly have a usage age limit or limit on wear and tear.

The replacement spare parts recommendation is one of the features in the development of this application where when the customer enters the vehicle's identity in the application, a replacement spare part recommendation based on the kilometer entered by the user will appear. In addition, customers can find out the estimated costs that will be incurred if they will replace the spare parts. With this recommendation, it is expected to improve serviceability and improve driving safety of every JG Motor customer after servicing the vehicle.

2. Recommendation for Substitution Based on History

In addition to recommendations for replacement spare parts based on vehicle kilometers, other recommendations that will be used are recommendations based on service history. With service history, it is expected that spare parts replacement recommendations will be more accurate. After the customer vehicle is serviced, service data will be obtained for the vehicle to be stored serviced. Added with notes on replacing vehicle components for subsequent service after it was found that the component needed replacement for the next service.

3. Recommended Nearest Workshop

To determine the location of the workshop as a service location to be addressed, a workshop recommendation from the application is required. For recommendations that will be used, that is based on the closest location to the customer who will do the vehicle service. In addition, the customer can see the schedule of the workshop which can be adjusted to the time available for the time that can be implemented by the customer for service.

4. Analysis of Case Examples

For example, there are customers who are in the city hall who will service their N-max vehicles at the JG Motor workshop using the JG Motor service application. The customer logs in the service application using his google account authenticated using Firebase Authentication. Then the customer completes the personal identity form and adds the vehicle identity to the app. After that the customer makes a service booking by selecting one of the JG Motor workshops. For workshop recommendations, the application will display recommended workshops based on the user's closest distance at this stage using the Location Based Service (LBS) technology. The following is a table 1 example of a workshop recommendation:

Table 1 Examples of workshop recommendations

Name of workshop	Distance workshop
JG Motor Asia Afrika	2.8 KM
JG Motor BKR	5.1 KM
JG Motor Cibeureum	8.8 KM
JG Motor Ciwastra	9.6 KM
JG Motor Kopo	7.7 KM
JG Motor Ujung Berung	13 KM

With this recommendation, customers can choose the workshop closest to the city hall, JG Motor Asia Africa. After selecting the workshop, the customer chooses the vehicle that is docked, service time, and fill out the service form. The customer input the number of kilometers of vehicles that is 15,000 KM, the system will display information on replacement spare parts recommendations and prices based on the kilometer of the inputted vehicle. Spare parts recommendations are also carried out based on service records contained in the application service which this can be raised when the customer has previously serviced. The following is a table of recommendations for replacement of spare parts based on the kilometers entered by the customer. Following is the table 2 examples of spare parts recommendations.

Table 2 Examples of spare parts recommendations

Spare Parts Name	Recommended replacement	Price (Rp)
Tune up	-	35.000
Oil	3.000 km	37.000
Spark plug	6.000 km	15.000
Oil Filter	9.000 km	25.000
Canvas rear brake	12.000 km	56.000
Air Filter	9.000 km	45.000
Total		**213.000**

Based on the kilometer entered, the estimated service cost of the customer vehicle is Rp 213,000. If the customer has previously serviced and get a replacement replacement recommendation for the next service. Recommendation data is based on a report from the mechanic, it will add a replacement recommendation for the spare parts that will be stored in the application service record. For example, the recommended front brake canvas is wear. The following is a table of 3 examples of spare parts recommendations.

Table 3 Examples of spare parts recommendations

Nama Sparepart	Anjuran penggantian	Harga (Rp)
Tune up	-	35.000
Oli	3.000 km	37.000
Busi	6.000 km	15.000
Filter Oli	9.000 km	25.000
Kanvas rem belakang	12.000 km	56.000
Filter udara	9.000 km	45.000
*Kanvas rem depan	12.000 km	80.000
Total		**293.000**

2.4 System Implementation

The implementation stage is the stage where the system is ready to be used. Implementation aims to test the system that has been made is in accordance with the expected goals, so that it will be seen the shortcomings in the system built for the next system development.

1. Implementation of the Builder Tool

The specifications of the building devices implemented to run this system are explained in the following table 4:

Table 4 Implementation of Builder Devices

Hardware Components	Specification
Android smartphone	
Processor	Snapdragon 636
Memory	3 GB
Storage	32GB
Android smartphone	
Software Components	Software Version
Operating system	Android
Operating System Version	Oreo 8.0.0
Laptop	
Software Components	Software Version
Operating system	Windows 7 Ultimate
Android Studio	Version 3.2.1.0
Balsamiq Mockup	Version 3.5.15
Google Chrome browser	Version 69.0.3497,1

2. Interface Implementation

The implementation of the system interface is attached, while for the implementation of the forms contained in the application intended for users can be seen in the following picture 5:
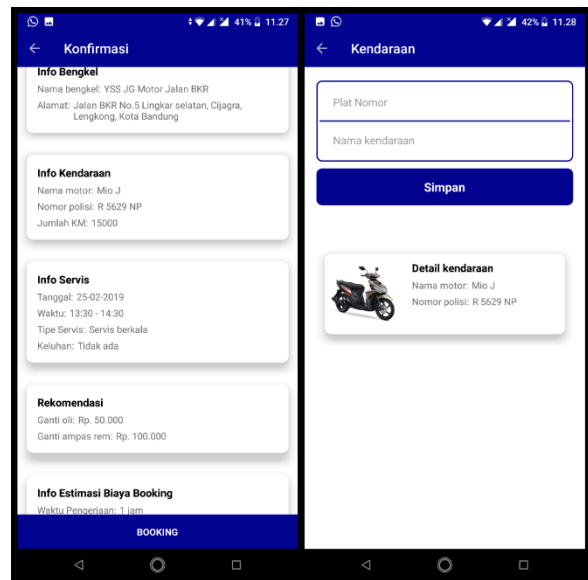

Figure 5 Application Interface

Display Figure 5 is an interface for making service bookings and seeing replacement spare parts
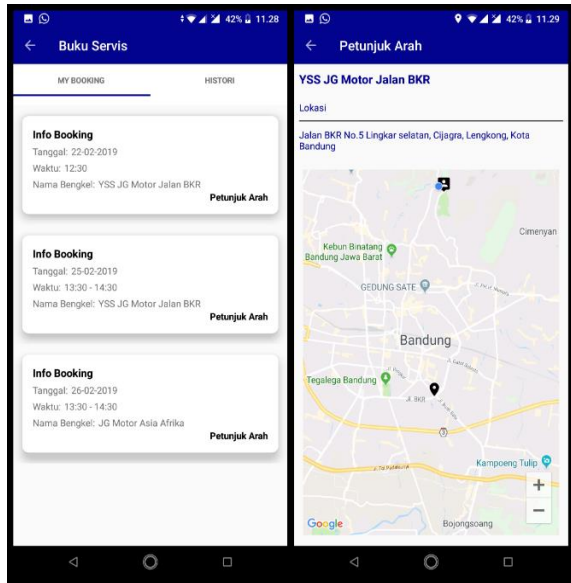
recommendations.

Figure 6 Service Book Interface Display

appearance of Figure 6 is a view to see a service book that contains information on bookings that have been made and see the service data that has been done.

3. System Testing

System testing is done after the implementation of the system which aims to determine the extent to which the system can meet the needs of system users as well as to test the system's ability to process existing data. The answer information can be seen in table 6 below:

Table 5 Results of the Questionnaire Answers

First Question: Can help customers reduce queue waiting times.				
SS	S	RR	TS	STS
12	21	2	0	0
Rata – Rata = (60+84+6+0+0)/35 = 4.28				
Second Question: Can help customers to get information needed such as location and network of workshops, operating hours and the rest of the queue.				
SS	S	RR	TS	STS
7	23	5	0	0
Rata – Rata = (35+92+15+0+0)/35 = 4.06				
Third Question: Can help customers to find out estimated service costs.				
SS	S	RR	TS	STS
16	16	3	0	0
Rata – Rata = (80+64+9+0+0)/35 = 4.4				
Fourth Question: Can give a reminder message in the form of a notification to service.				
SS	S	RR	TS	STS
9	23	3	0	0
Average = (45+92+9+0+0)/35 = 4.17				
Final Average = (4.71+4.06+4.4+4.17)/4 = 4.33				

3. CLOSING

3.1 conclusion

Based on the results of the research and testing, the conclusions are as follows:

1. YSS Yamaha JG Motorbike Mobile Application Area Bandung can help customers reduce queue waiting times.
2. YSS Yamaha JG Motorbike Mobile Application Area Bandung can help customers to get the information needed such as location and network of workshops, operating hours and the rest of the queue.
3. YSS Yamaha JG Motorbike Area Bandung Mobile Application can help customers to find out estimated service costs.
4. YSS Yamaha JG Motorbike Area Bandung Mobile Application can give a reminder message in the form of notification to service.

3.2 Suggestions

Based on the results of the research and testing carried out, the suggestions for developing the application are as follows:

1. Create a management system managed by JG Motor itself so that every customer who makes a booking can be verified.
2. Develop applications by adding features to stock availability and sales of spare parts for each workshop.
3. The system manager is still outside the application system because the system manager is on Firebase where Firebase is not included in the system created.
4. The area can be even wider for Yamaha JG Motor authorized workshops in other areas such as the Greater Jakarta area or throughout West Java.

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