

DEVELOPMENT OF SALES TRACKING APPLICATION BASED ON ANDROID USING LOCATION BASED SERVICE & GEOFENCING TECHNOLOGY IN PT. REMAJA ROSDAKARYA BANDUNG

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ABSTRACT

PT. Remaja Rosdakarya is a book publishing and printing company based in the city of Bandung. This company has sales to visit or offer, sell, and send books to outlets as customers. The current problem is the company is difficult to monitor the existence of its sales location while on duty outside office hours, the difficulty of the company in overseeing the assigned sales has visited the outlet or not, the difficulty of some sales who do not know the location of the customer so they often get lost. Based on these problems the use of Location Based Service technology and Geofencing technology using the Google Maps API in this sales tracking application can help companies in tracking the whereabouts of their sales locations while on duty, and can help sales to find out the route to the location of the customer's presence, and bring up notifications if sales already within 100 meters of the customer's location. Based on the results of testing with the Black Box method, that sales tracking application based on android using Location Based Service and Geofencing technology at PT. Remaja Rosdakarya can help companies to track the whereabouts of their sales locations while on duty outside the office, and can help their salespeople visit outlets as customers.

Keywords: Sales, Geofencing, Tracking, Location Based Service, Notification.

1. INTRODUCTION

1.1 Background

PT. Remaja Rosdakarya is a book company based in the city of Bandung, this company has publishing and printing. PT. Remaja Rosdakarya has sales offices in the cities of Bandung, Jakarta, Yogyakarta, and Surabaya. There are various categories of books that have been published. In the sales system that runs at PT. Remaja Rosdakarya city of Bandung at this time the company gave the task to its sales for offer, sell, send the book to the customer.

Based on the results of an interview with Mr. Nurhadi Sunandar who works in the Management

Information System at the company, explaining that there was a problem that had occurred at PT. Remaja Rosdakarya that is the company does not know the location of sales at work, so there are cheats committed by sales at work, sales never take away book products when assigned by the company. Then when sales are assigned to visit the outlet, the sales do not visit the outlet and the sales do not send the book to the outlets. The company does not know whether the sales have visited the outlet according to the task of the company or not [1], The company does not know whether the book products that are sent to the hands of outlets or not, so the company is worried about sales, especially new sales when during visits and delivery to outlets. At the time of the sales visit, there are some new sales that do not know the location of the outlets visited. Currently PT. Remaja Rosdakarya needs an application for tracking sales outside the office during working hours. The company wants to know the location of its sales at work, the company wants to know whether the sales are on duty or not, the company wants to facilitate sales in making visits by knowing the route to the outlet location.

Based on the description above, it is necessary to build an application of the existing problems, the application that is built has two subsystems, namely website-based aimed at companies in tracking sales who can find out the presence of sales. Android application that is built there is a feature to search for the closest travel route for sales to outlet locations by utilizing Location Based Service technology. Sales can visit outlet locations easily, and this Android application uses Geofencing technology and notifications, namely when sales are near the outlet area that is in the destination, there will be a notification directly to the sales application based on a predetermined radius [2]. With the above description, the researchers expect to give a solution to the problems that exist today in the company of PT. Remaja Rosdakarya with the title Development of Android-Based Sales Tracking Application By Utilizing Location Based Service & Geofencing Technology at PT. Remaja Rosdakarya Bandung.

1.2 Purpose And Objectives

The purpose of this thesis research is to build applications that are needed by the company PT. Remaja Rosdakarya makes it easier for companies to obtain more effective information.

The objectives of this research are as follows:

- The company can track the location of sales presence when the sales are being assigned during working hours.
- The company can find out whether the sales have visited the outlet according to the task of the company or not, and whether the book products that have been sent have reached the outlets or not.
- It can facilitate sales when they want to make a visit that is sales can find the route to the location of the outlets they visit.

2. RESEARCH CONTENT

2.1 Android

Android is an operating system for cellular phones based on Linux. Android provides an open platform for developers to create their own applications for use by a variety of mobile devices [3]. Not only being an operating system on a smartphone, currently Android is a very complete platform both in terms of its operating system, application and development tools, android application market and very high support from the open source community in the world, so that it will develop more rapidly in technology. or the number of devices in the world [4].

2.2 Tracking

Tracking is a process of how to monitor the presence of a moving object and its path. The definition of moving in a geographic perspective is the movement of the position of an object from one coordinate to another. Tracking is obtained by recording the displacement data [5].

2.3 Sales

Sales is an activity or activities that are tasked with selling products, offering products, distributing, and aiming to increase product sales. The job of a salesperson is to look for prospects or customers, as well as attract prospects or customers interest in the goods or services offered, then listen to comments on the products and services offered. Sales must be able to grow and motivate customers to buy the products offered [6].

2.4 Research Metodologi

Research methodology is a process of stages to support the implementation of a study. This research uses descriptive methods. A descriptive method is a research method that aims to describe or painting systematically, factually and accurately about the facts, properties, and relationships between the phenomena investigated [7]. The research steps can be seen in Figure 1. Research Stages.

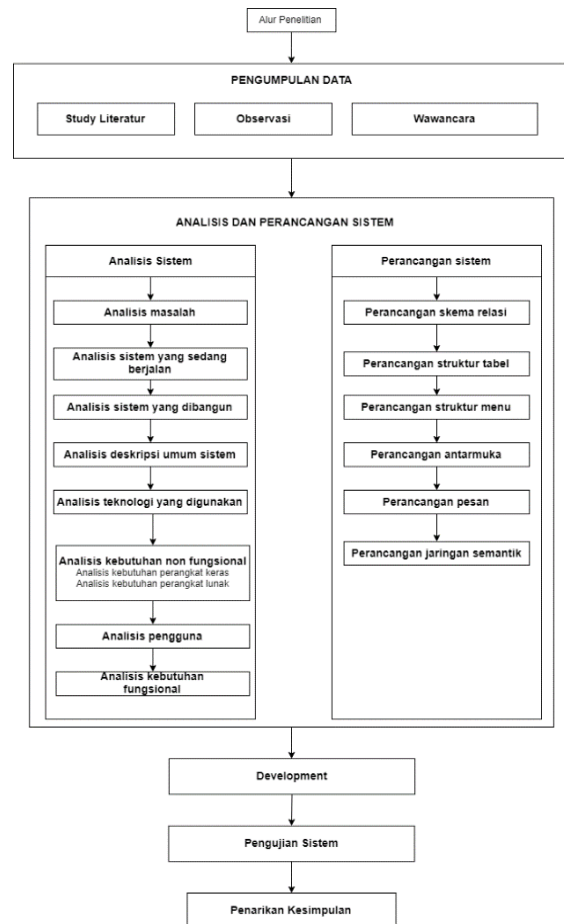


Figure 1. Research Stages

2.5 Software Development Method

The method used in software development in this study is the waterfall method [8]. The following picture software development methods such as Figure 2. Waterfall Method

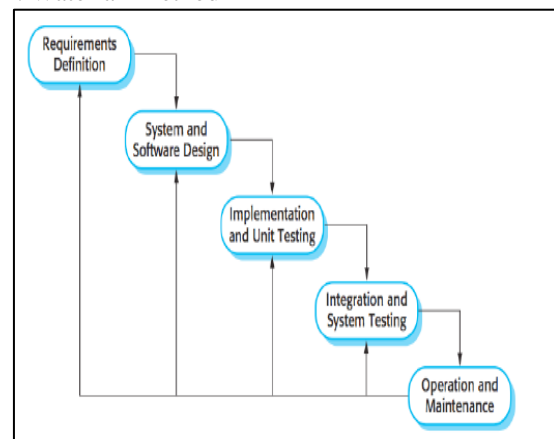


Figure 2. Waterfall Method

2.6 Analysis of System Architecture

Sistem yang akan dibangun adalah aplikasi sales tracking. Aplikasi sales tracking ini bertujuan untuk membantu perusahaan dalam monitoring salesnya pada saat berkerja. Arsitektur sistem yang akan dibangun dapat dilihat pada

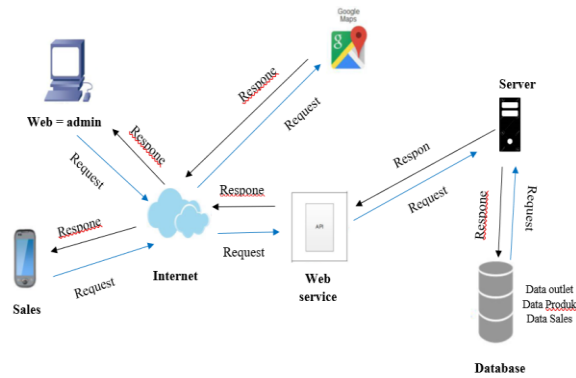


Figure 3. Architecture System

2.7 Analysis of Problems

Problem analysis is the stage of gathering and determining the existing problems. Analysis of the existing problems is as follows:

- a. The company does not know the location of sales during work so the salesperson has carried away the book product when assigned by the company.
- b. When sales are assigned to visit an outlet by the company, the sales do not visit the outlet and the sales do not send the book's products to the outlets.
- c. Most new sales do not know the route to get to the locations of the outlets they visit

2.8 Analysis Procedures To Be Developed

The following procedures will be built:

1. Admin can make the assignment of outlet visits to sales.
2. Sales can find out the list of outlets that must be visited on the application.
3. Sales determine the outlets visited on the application.
4. The android application displays outlet data information and outlet locations.
5. Sales can visit the outlet location in the application that displays route information to the outlet location.
6. The android application can accept or display notifications when sales are already near where the outlets are headed.
7. Sales can check in if it is already at the location of the outlet.
8. Company admins can find out the location of sales on the website subsystem, the company can select or search for sales names that want to be tracked.
9. Company admins can find out if the book's product has reached the hands of the outlet owner after the sales check-in on the Android application company admins can find out which outlets have been visited by sales.
10. Company admins can find out the graphs and results of sales performance on the web subsystem.

2.9 Analysis of the Technology used

Technology analysis is to identify the technology used in the application being built. The technology is

applied to the sales tracking application at PT. Remaja Rosdakarya, including Location Based Service technology, Geofencing and Google Maps API.

1. Geofencing

Geofencing is software that is used in conjunction with a global positioning system (GPS) when determining geographic boundaries or virtual parameters of a map. Programs that use geofencing can provide information or notifications when a certain target enters or exits a predetermined limitation [9]. Geofencing is used to create a radius that will provide information about the presence of sales if the sales are in the outlet area. In the implementation there are several processes, namely taking latitude and longitude data, and making a radius to find the location of the outlet if the sales are traveling, so that when new sales make a visit to an outlet and the sales are already in close within the specified radius, then automatically in the sales application notification will appear in the form of a notification. The application of geofence in this built application is in the form of a circle. If the sales are 100 meters at the designated outlet location, a notification will appear that the sales are at the outlet location.

2. Location Based Service

Location Based Services (LBS) is a service that is active in changing the position of objects so that they can detect the location of objects and provide services by the location of the object that is known [10]. With LBS services, companies can find out where the sales are, and sales can find out where the outlet is.

3. Google Maps API

The Google API (Application Programming Interface) technology used in the form of Google Maps API is used in sales tracking applications at PT. Remaja Rosdakarya. Google Maps API technology to provide services such as digital maps to direct sales to the location of the outlet [11].

2.10 Functional Requirements Analysis

Functional requirements analysis describes the process of activities that will be applied in a system and explains the needs needed by the system so that the system can run well as needed [12]. Analysis of functional requirements on the system built includes two platforms, web, and mobile systems. Both platforms are represented by UML (Unified Modeling Language) Diagrams. There are several diagrams on UML tools that are commonly used to describe functional systems, among others, Use Case Diagrams, Use Case Scenarios, Activity Diagrams, Class Diagrams. Analysis of functional requirements will be explained as follows :

2.10.1 Functional Requirements Specifications

Functional requirements specifications are system specifications provided to users. Specifications for functional requirements of android users can be seen in Table 1.

Tabel 1. Android User Functional Specifications

Functional Requirements Specifications	
Code	Software Requirements Specifications
SKPL-F-M-001	Android application provides facilities for sales to log into the system
SKPL-F-M-002	Android application provides facilities for sales to forget passwords
SKPL-F-M-003	Android application provides facilities for sales to visit outlets
SKPL-F-M-004	Android application provides facilities for sales to check-in
SKPL-F-M-005	Android application provides facilities for sales to determine the route to the outlet location
SKPL-F-M-006	Android application provides facilities for sales to view the profile
SKPL-F-M-007	Android application provides facilities for sales to change the profile

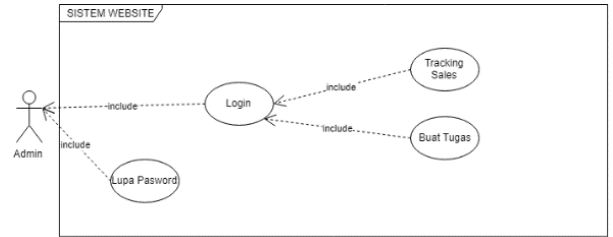
While the functional requirements of the website specifications are as follows:

Tabel 2. Website Functional Requirements Specifications

Functional Requirements Specifications	
Code	Software Requirements Specifications
SKPL-F-W-01	Website provides facilities for administrators to log in to the system
SKPL-F-W-02	The website provides facilities for administrators to forget passwords
SKPL-F-W-03	The website provides facilities for administrators to track sales
SKPL-F-W-04	Website provides facilities for administrators to create tasks

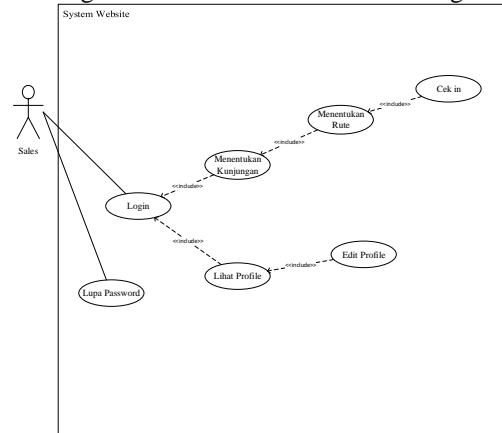
2.11 Use Case Diagram

Use case diagrams illustrate the expected functionality of a system. The use case diagram itself is more emphasized on what the system does and how a system works. A use case represents an interaction between actors and the system. Use Case Diagram on the website can be seen in Figure 4. Use Case Diagram Website.



Gambar 4. Use Case Diagram Website

Whereas the Android Use Case system can be seen in Figure 5. The Android Use Case Diagram.



Gambar 5. Use Case Diagram Android

2.12 Scenario Use Case

The use case scenario aims to explain how the steps of each process exist in each use case. The use case scenarios created can be seen in Table 3. Use Case Tracking Sales Scenarios.

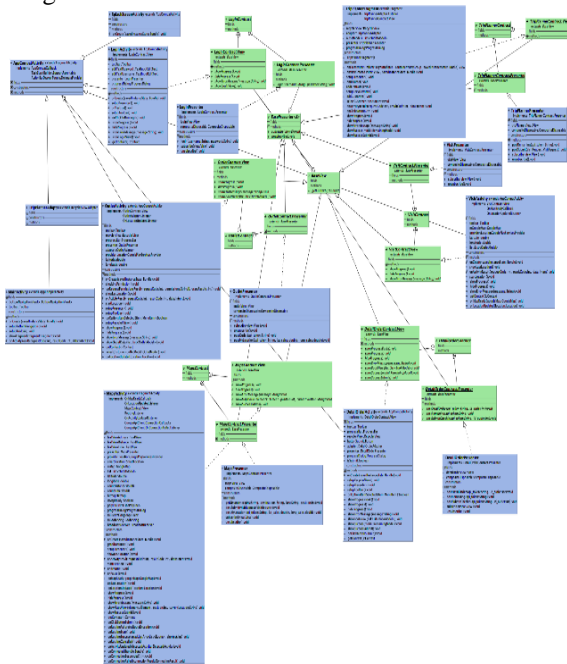
Tabel 3. Scenario Use Case Tracking Sales

Use Case Name	Tracking Sales	
Related Requirement	SKPL-F-W-03	
Goal in Content	To track sales	
Precondition	Admin has not succeeded in tracking sales	
Successful End Condition	Admin successfully tracking sales	
Failed End Condition	Admin failed to track sales	
Primary Actor	Admin	
Secondary Actor	System	
Trigger	Admin asks CMS for tracking sales	
Included Cases	Log in	
Main Flow	Step	Action
	1	Admin choose the sales tracking menu
	2	The system displays the tracking sales menu page

Extention	3	Admin determines the sales that you want to track
	4	Admin chooses the search button
	5	The system displays a map where sales are available
	Step	Branching Action
	4.1	The system does not display the location folder
	4.2	The system displays an error message
4.3	The system displays the tracking sales page menu	

2.13 Class Diagram

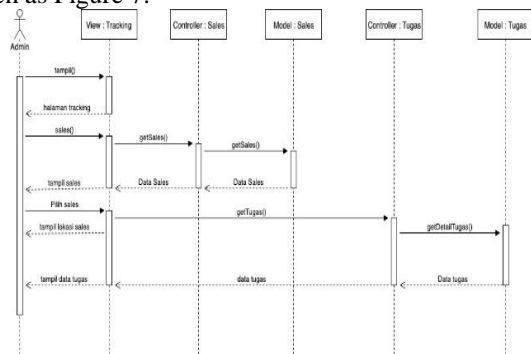
Class Diagram is used to describe the classes involved in the analysis of a system to be built. The class diagram created is as in Figure 6. Class Diagram.



Gambar 6. Class Diagram

2.14 Sequence Diagram

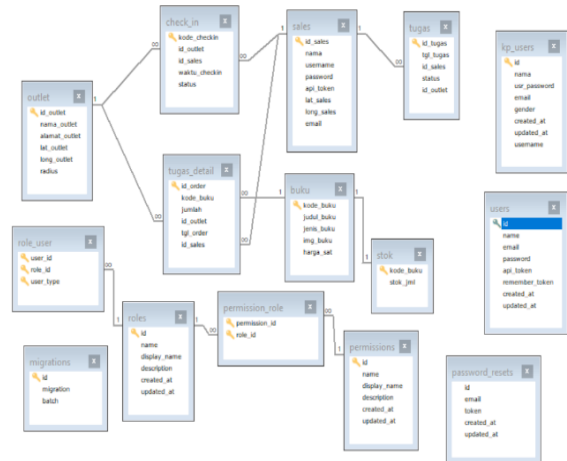
Sequence Diagram is describing the interaction between objects that serves to indicate communication between these objects. There are several sequence diagrams in the system that is built, such as Figure 7.



Gambar 7. Sequence Diagram Tracking Sales

2.15 Schema Relation

The table relation scheme is a table relation that is interrelated with other tables. Relation Scheme The table contained in the application created can be seen in Figure 8. Relation Schema.

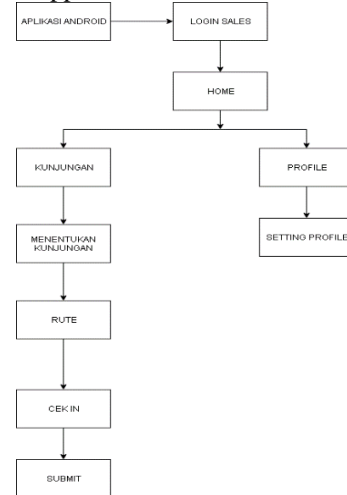


Gambar 8. Schema Relation

2.16 System Planning

2.16.1 Menu Structure Design

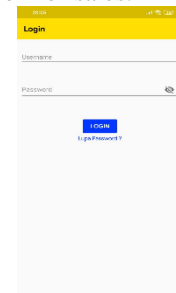
The design of the menu structure is a description of the path of application usage so that applications that are built are easy to understand and easy to use. The following application menu structure can be seen in Figure 9. Application Menu Structure.



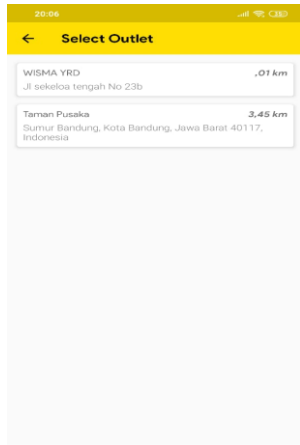
Gambar 9. Application Menu Structure

2.17 Application Implementation Results

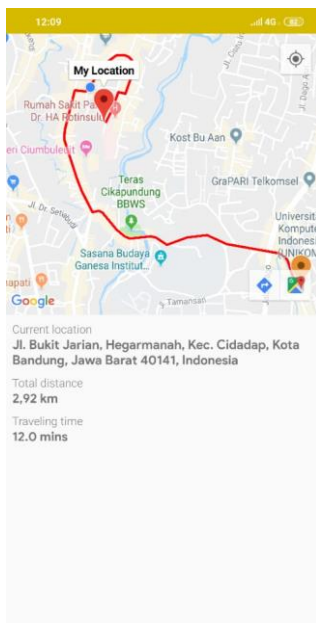
Here are the results of the implementation of the Android application for sales:



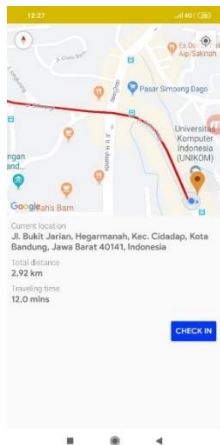
Gambar 10. App Log in Display



Gambar 11. Define the Outlet



Gambar 12. Route (Display If Not At Outlet Location)

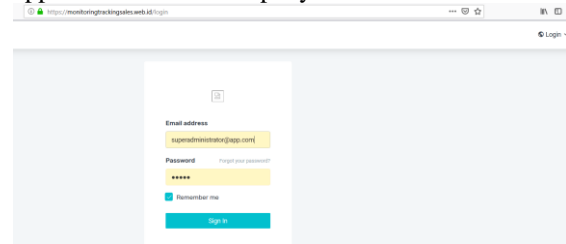


Gambar 13. Display If Sales Are At Outlet Locations

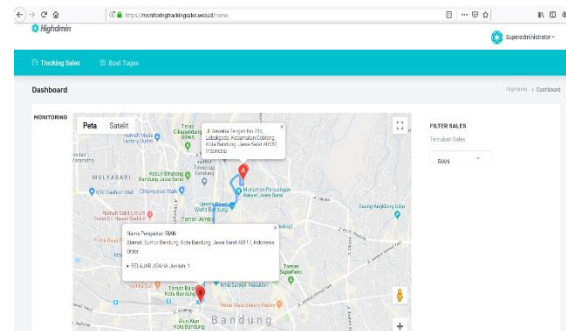


Gambar 14. Geofencing

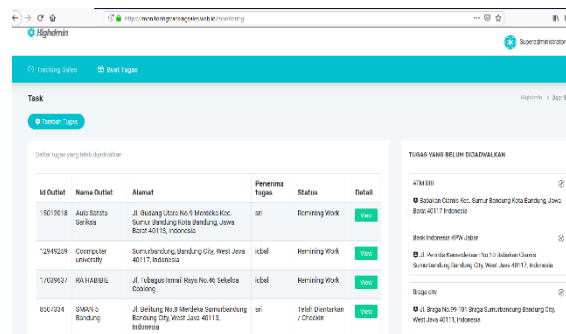
Here are the results of implementing a website application for the company:



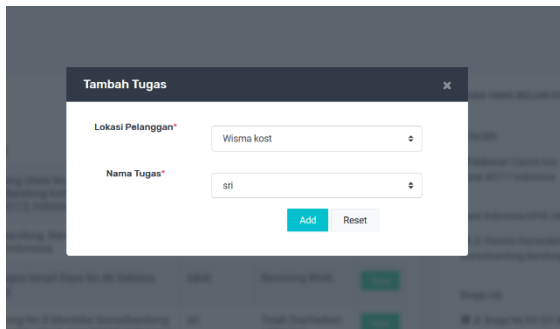
Gambar 15. Display Login Website



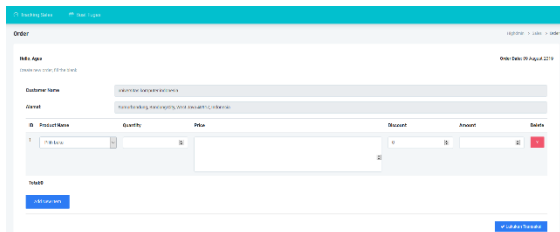
Gambar 16. Sales Tracking Process



Gambar 17. Create Assignment page



Gambar 18. Add Task



Gambar 19. Book Delivery Assignment Page

2.18 Application Testing Results

Testing this application has been tested using the Black Box method to test the functional and output generated by the application. The test is done by interviewing 2 company salespeople and 2 company admins. The following are some of the questions raised by the company PT. Remaja Rosdakarya.

a. Interview with Mr. Nurhadi Sunandar as the information system admin :

1. Applications built can facilitate supervision tracking sales when doing company assignments to visit outlets?

Answer result: Yes, the application that is built can track the presence of sales positions while working.

Conclusion Results: Agree

2. Applications that are built to know the sales have visited the outlet according to the task of the company and the book products sent have reached the outlets or not?

Answer result: The application that was built was quite good at knowing outlets and shipping books that had been assigned to sales.

Conclusion Results: Agree

3. Utilization of GPS (LBS & Geofencing) technology in applications that are built to make it easier for sales to visit the outlet location has been successfully implemented?

Answer result: Yes, it's good. The application raises a notification to the sales when it is at the intended outlet location.

From the results of the interview above shows that Mr. Nurhadi agreed that the application that was built has succeeded in implementing its functionality, especially in the tracking section.

The following are some of the questions raised by PT. Remaja Rosdakarya.

a. Interview with Mr. Asep as sales at the company on July 18, 2019 :

1. The application that was built can facilitate the supervision of tracking to sales when doing the task of the company to visit the outlet?

Answer Results: The sales tracking application is quite good at monitoring sales during visits.

Conclusion of Results: Agree.

2. The application that was built can find out the sales have visited the outlet according to the task of the company and the book product sent has reached the outlets or not?

Answer: The application that was built is good enough in this process.

Conclusion Results: Agree

3. Utilization of GPS (LBS & Geofencing) technology in applications that are built to make it easier for sales to visit the outlet location has been successfully implemented?

Answer: There is a notification to enter if the sales have entered the intended outlet area.

Conclusion of Results: Agree

Based on an interview with one of the salespeople who worked at the company agreed that the Android-based sales tracking application was able to implement sales tracking, geofence technology and LBS.

3. CLOSING

3.1 Conclusion

Based on the results of system testing it can be concluded that:

1. Android-based sales tracking application by utilizing location based service & geofencing technology at PT. Remaja Rosdakarya has been able to track sales when working outside the office. Tracking has been successfully implemented in the website platform that will be used by company administrators.

2. Android-based sales tracking application has been able to facilitate sales in visiting the location of outlets by utilizing location-based service technology and geofencing as a direct notification to sales when they are at the location of these outlets.

3. Android-based sales tracking application has been able to find out if the sales have visited the outlet according to the task of the company or not, as well as the book product that has been brought to the outlet or not.

3.2 Advice

The suggestions for the further development process in this sales tracking application are:

1. Add a chat feature between sales and admin.
2. Adding an order feature for customers to order the book's products online.

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