Implementation of *Location Based Services* (LBS) in Android Mobile To Mapping Palm Oil Plantation Management at Riau Indonesia

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**Abstract:** Riau is one of the provinces which has huge palm oil plantation spread out in several locations in this provinces. Air Molek I at Indragiri Hulu Region is one of location palm oil plantation. The problems are many community do not know clearly about detail of location in farms and plantations at this region. However, to manage location of the plantation is need an information system, which is spatially referenced. The purpose of this study is to implement and apply *Location Based Services* (LBS) technologies using android mobile. This application can help user to find out information which is spatially referenced about the location in detail of farms and plantations in Air Molek I Region. This system was implemented using *Location Based Service* (LBS) on android mobile with integrated Google Maps is used to facilitate the search location, distance of the farm palm oil plantation, plantation infrastructure information such as road network, bridges and some information of basic plantation. This application was successfully mapping of Air Molek I farm palm oil plantation, its help community more easily to find the location at farm in accordance with wishes category information.

**Keywords:** mapping; mobile; android; palm oil.

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1. **Introduction**

PT. Perkebunan Nusantara V (Persero) Air Molek-I plantation is one of the many plantation owned by PT. Perkebunan Nusantara V are located in the district of Pasir Penyu, Indragiri Hulu, Riau Province. Air Molek-I plantation currently manage rubber plant commodity with an area of ± 3.536,78 (Ha) located in the Rimpian village of Lubuk Batu Tinggal subdistrict. The total area that has been planted is 3.338 (Ha), this amount does not include areas used for entres breeding area, polybag, and rootstock for commodity of rubber and palm oil crops. Plantation with wide area of rubber and palm oil crops requires support system to generate information quickly and accurately. Systems running on this farm only has information in the form of printed maps, so this information is less accurate and precise as the information on this map is not real time and updates.
Implementation of information and technology is the right choice to provide accurate and precise. Based on the problem above, an option that can be applied with the use of computer-based applications is the use of location based services for processing spatial information (spatial). This application is able to provide the required information regarding the mapping of palm oil and rubber plantations were divided based on blocks, so that employees will be easier knowing the geographic information accessed through the Internet. The research objective to be achieved is to develop mobile applications for mapping of palm oil and rubber plantations, and also displays the location information blocks (department) plantation, planting year, optimization of the cropping area, vast areas of crops and other information. This study does not address the information harvesting of plantation and plant pests and diseases in these plantations. This paper is organized as follows, in section 2 discusses the theoretical basis supporting research, section 3 describes the material and methods of research, section 4 explained results and discussion, finally in section 5 the conclusions and suggestions the future work.

2. Literature Review

Mobile Application
Mobile application is an application that allows a person using a mobility devices such as PDAs, mobile phones or selurer. Using the mobile application, users can easily perform a variety of activities ranging from entertainment, shopping, studying, doing office work, browsing, etc. [1].

Location-Based Service (LBS)
Location-based services (LBS) are information services that can be accessed via mobile devices using the mobile network, which has the ability to take advantage of the location of the mobile device. LBS provide the possibility of communication and two-way interaction [2]. LBS is a service that actively react to changes in the position of an entity that is able to detect the location of objects and provide services in accordance with the location of the known objects. LBS technology based on cellular networks, positioning a mobile communications equipment is determined by the relative position of the equipment to the location of the BTS (Base Transceiver Station) [2].

![Figure 1. LBS Three Interchange Technology](image)

Main elements of LBS
There are two main elements of Location-Based Services are as follows [5] [6]:

1. Location Manager (API Maps)
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Provides tools for LBS resources, Application Programming Interface (API) Maps provide facilities to display or manipulate the map. This package is on the "com.google.Android.maps"

2. Location Providers (API Location)
Providing search technology used by the device location. API Location dealing with data Global Positioning System (GPS) and real-time location data. API Location is the Android package that is in the package "Android.location". The location, movement, and proximity to a particular location can be determined through the Location Manager.

LBS components
There are five main components in the Location Based Services technology, specifically [5] [6]:

1. Mobile Device
   Mobile devices are an important component in LBS. This tool serves as a tool for users to request information. The results of the information requested can be text, voice, images and so forth.

2. Network
   This component serves as a connecting line that can transmit the data sent by users from mobile devices were sent to the service provider and then the results of the request sent back by the service provider to users.

3. Positioning Component (Position Indicator or Location)
   Each service provided by service providers will usually be based on the position of the user who requested the service. The user's position can be obtained through the mobile communication networks or also using the Global Positioning System (GPS).

4. Applications and Service Providers
   LBS service provider is a component that provides a wide range of services that can be used by users.

5. Data and Content Providers
   Service providers did not always store all data and information processed. Because it could be a wide range of data and information processed comes from a developer or a third party who does have the authority to save it.

Google Maps
Google Maps is a very famous free service from Google inc. Google Maps is a map of the world that can be used to view a location, region and area. In other words, Google Maps is a map that can be viewed with the help of a browser application.
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Android

Android is an operating system for smartphones based on Linux. Android provides an open platform (open source) to developers for creating their own applications to be used on mobile devices [2].

3. Material & Methodology

3.1 Data

1. Spasial Data: Data plantation areas coordinate are tracking using Google Maps
2. Non Spasial Data: Data in form of reports and file for distribution of area (section) plantation

3.2 Research Methodology

A flowchart of research activities was designed and described in Figure 4 as below:

![Flow Chart of Research Activities](image)

Figure 3. Android Architecture

Figure 4. Flow Chart of Research Activities
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Requirement of the hardware and software is used in this research with the specification as:

**Hardware**
1. 3.40 GHz Processor Intel Core i3-3120M.
2. 4 GB Random Access Memory (RAM).
3. 500 GB Harddisk as external memory.
4. Modem
5. Smartphone as a device to test and run application with the specifications of Android version 4.4.4 (kitkat) kernel version 3.4.5, CPU Dual-Core 1 GHz Cortex A-9 with 4 GB of internal memory and 1 GB Random Access Memory (RAM).

**Software**
1. Operating System Microsoft Windows 8.1 Enterprise 64-Bit.
2. Android Studio versi 1.2
3. Android Development Tools (ADT) IDE (integrated Development Environment)
4. Android Software Development Kit (SDK)
5. XAMPP
6. Java Development Kit (JDK) versi 1.6.0
7. Adobe PhotoShop CS3
8. Google Chrome
9. Google MAPs /Map Coordinates

### 4. Results and Discussion

This LBS application that is implemented is a client-server application where the application is connected to a web service that acts as a server Air Molek I Plantation. So that when users access these applications via smartphone with android operating system, application of the client is able to display a list of the plantation area (section) as well as the location of a plant oil palm plantations and rubber are located. the results of the implementation of the application are as follows:

i. The application helps the company's employees to know the area of the block they working of, it helps to know the area block section on palm oil and rubber.

ii. Applications are developed with software-based mobile, so that users can access without any limitation of time and space.

iii. This app not only displays basic information area of palm oil and rubber, but also displays the spatial information (spatial) in the area of palm oil and rubber plantations in this region.

#### 4.1 Display of User Interface

Generally the working process of mobile based application technology with Location Based Service (LBS) is display the necessary information for users regarding the geographic information about the mapping of the palm oil and rubber area in the Gardens of Air Molek I Rimpian Rayon region.
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Figure 5. Display of Main Menu Apps

Figure 6. Display of Palm Oil Plantation Menu

Figure 7. Display of Detailed of Palm Oil Plantation

Figure 8. Display of views Palm Oil Plantation Maps

Figure 9. Display of Rubber Plantation Menu

Figure 10. Display of Detailed Rubber Plantation Menu
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5. Conclusion

As the whole can be concluded that of implementation of Location Based Service (LBS) android mobile based in plantation mapping at PT. Perkebunan Nusantara V (Persero) Garden Air Molek-I, follows:
1. This application is expected to increase the level of effectiveness of employees, especially in terms of processing plantation maps.
2. This system can be run online through the mobile platform with the android operating system which has been equipped with a database.
3. The system has been equipped with the coordinates, making it easier for employees the company in determining the location of the work.

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