

# *Development of GIS for Rural Bank with Financial and Graphical Report*

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**Abstract** - Geographic Information System (GIS) is a system designed to capture, store, manipulate, analyze, manage and present all types of geographically referenced data. Merging of cartography, statistical analysis and database technology. Global Positioning System (GPS) A system of satellites, computers, and receivers that is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver. Bank Perkreditan Rakyat (BPR) or Rural Bank based on Indonesia Regulation Indonesia Central Bank in this case, is a bank that conduct their businesses based on conventionally or syariah prinships, which in their activities do not give payment services. If the asset of such A BPR already reached 10 billion rupiah, then it has the obligation to make a financial report to Bank of Indonesia. These reports should be deliver to Central Bank in regularly basis. Bank of Indonesia on their web site has a report gather from all of BPR but only some financial reports and the report is in form of table. There are no reports about Rural Bank location geographically and such diagram like pie diagram, bar diagram and any other diagram to show such growth or trend. The combination between GIS, GPS that shows a map and information about where the location of BPR, several diagram that show like trends and also financial reports will give additional information to Central Bank to monitor BPR in such places.

**Keywords** - GIS, GPS, Rural Bank (BPR), Periodic Financial Reports, Diagrammatic report.

## I. INTRODUCTION

In the Indonesia Banking Architecture (API) Bank in Indonesia has a structure consisting of Commercial Banks, Regional Banks and Rural Banks (BPR). BPR as one of the backbone of development in Indonesia has been obliged to make a report to Bank of Indonesia (BI) periodically if it already has assets of 10 billion rupiahs and above. Inside the BI web site the information relating to the report can be found at <http://www.bi.go.id/id/publications/financials/bank/bpr-conventional/default.aspx>. [1].

In the report on the page there is only information related to financial aspects in an BPR. BI has no information related to the growth of an BPR or the location where a BPR is geographically. At this time GIS technology can be used to locate a place more accurately based on the position of North / South Latitude and East / West Longitude.

By adding geographical location and information related to the growth of BPR an other information diagrammatically it is expected to provide additional information related to BPR so that it can further assist Central Bank in monitoring a BPR.

## II. MATERIAL AND METHODS

### A. Geographic Information System

A geographic information system (GIS) is a computer based technology and methodology to collect, store, manipulate, retrieve and analyse spatial data or georeferenced data. GIS is a system of hardware, software, data, people, organisation and institutional arrangement for collecting, storing, analyzing and displaying information about the areas of earth. [2]

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. The acronym GIS is sometimes used for geographic information science

(GIScience) to refer to the academic discipline that studies geographic information system and is a large domain within the broader academic discipline of geoinformatics. What goes beyond a GIS is a spatial data infrastructure, a concept that has no such restrictive boundaries. [3]

The Global Positioning System (GPS) is a satellite-based navigation system made up of at least 24 satellites. GPS works in any weather conditions, anywhere in the world, 24 hours a day, with no subscription fees or setup charges. [4]

GIS information contains an understanding of information about the place of place on the surface of the earth, the knowledge of the location of an object on the surface of the earth, and information about the attributes that exist on the surface of the earth whose position is known.

Data for GIS applications includes; digitised and scanned data, databases, GPS field sampling of attributes and remote sensing and aerial photography.

## **B. Global Positioning System (GPS)**

The Global Positioning System (GPS), is a satellite-based navigation system that was developed by the U.S. Department of Defense (DoD) in the early 1970s. Initially, GPS was developed as a military system to fulfill U.S. military needs, it was later made available to civilians. GPS provides continuous positioning and timing information, any-where in the world under any weather conditions. It serves an unlimited number of users and GPS is a one-way-ranging (passive) system, that is users can only receive the satellite signals. [5]

## **C. Apache**

The Apache HTTP Server Project is an effort to develop and maintain an open-source HTTP server for modern operating systems including UNIX and Windows. The goal of this project is to provide a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards. [6]

## **D. PHP and MySQL**

PHP started out as a set of tools for doing simple web-related tasks. It was expanded to interact with databases. PHP is a programming language in web or web programming.

MySQL is database, open-source database system. MySQL is essentially a warehouse in which things store to be looked up later and provided mechanism to find all things store in the warehouse whenever it's needed.[7]

## **E. Web GIS**

Web GIS is a type of distributed information system, comprising at least a server and a client, where the server is a GIS server and the client is a web browser, desktop application, or mobile application. In its simplest form, web GIS can be defined as any GIS that uses web technology to communicate between a server and a client. [8]

Few key elements essential to web GIS:

- The server has a URL so that clients can find it on the web.
- The client relies on HTTP specifications to send requests to the server.
- The server performs the requested GIS operations and sends responses to the client via HTTP.
- The format of the response sent to the client can be in many formats, such as HTML, binary image, XML (Extensible Markup Language), or JSON (JavaScript Object Notation)

## **F. Rural Bank (RB)**

An BPR or Rural Bank (RB) is a Bank conducting business in a conventional or sharia-based manner, in which its activities do not provide services in the payment services. [9]

BPR activities are much narrower than those of commercial banks because BPRs are prohibited from receiving demand deposits, forex activities, and insurance.

Business activities that may be performed by BPR are as follows:

- Collect funds from the public in the form of deposits in the form of time deposits, savings, and or other similar forms.
- Giving credit.
- Provide financing and placement of funds based on Sharia Principles, in accordance with provisions stipulated by Bank Indonesia.
- Placing funds in the form of Bank Indonesia Certificates (SBI), time deposits, certificates of deposit, and / or savings in other banks.

There are two kinds of Rural Banks, namely Conventional Rural Bank and Sharia Rural Bank. Each Bank is required to make a financial statement. Financial Statements that must be submitted by Conventional Rural Banks consist of:

- Balance Sheet Report

- Income statement
- Statement of Commitments and Contingencies
- Other Information Report

As for BPR Syariah have different report with Conventional BPR.

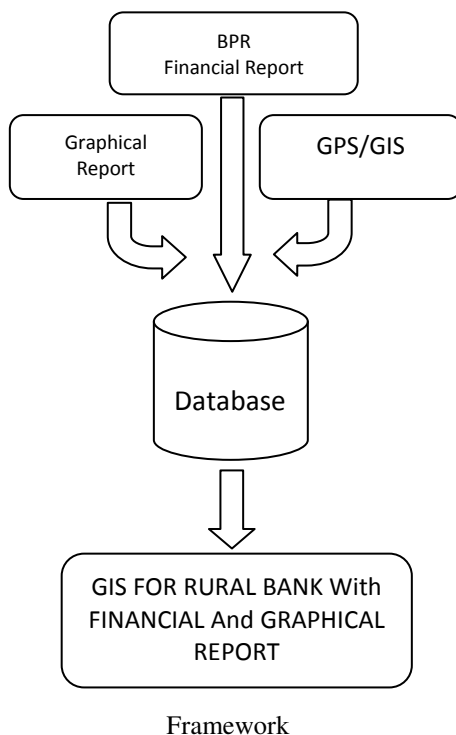
Table 1. Balance Report Example

(Ribuan Rp.)

| No | Pos-Pos                                  | Posisi Juni-2017 | Posisi Juni-2016 |
|----|------------------------------------------|------------------|------------------|
| 1  | Kas                                      | 42,307           | 56,869           |
| 2  | Kas dalam Valuta Asing                   |                  |                  |
| 3  | Surat Berharga                           |                  |                  |
| 4  | Pendapatan Bunga yang Akan Diterima      | 9,592            | 35,508           |
| 5  | Penempatan pada Bank Lain                | 969,902          | 1,350,843        |
| 6  | Penyisihan Kerugian -/-                  | 4,000            | 5,275            |
|    | Jumlah                                   |                  |                  |
| 7  | Kredit yang Diberikan                    |                  |                  |
|    | a. Kepada BPR                            |                  |                  |
|    | b. Kepada Bank Umum                      |                  |                  |
|    | c. Kepada non bank - pihak terkait       |                  |                  |
|    | d. Kepada non bank - pihak tidak terkait |                  |                  |
|    | Jumlah Kredit yang Diberikan             |                  |                  |
| 8  | Penyisihan Kerugian -/-                  | 1,629,925        | 1,662,181        |
|    | Jumlah                                   |                  |                  |
| 9  | Agunan yang Diambil Alih                 |                  |                  |

Four reports in a form of table are shown in Central Bank web site.

## G. Method



The framework of this research is to develop GIS for BPR in such location and combine with financial reports in the form of table and graphical diagram.

Data used for this research collected from Central Bank web site. For the location which consist of latitude and longitude collected from 2 sources :

1. <https://itouchmap.com/>, put the name of place, if the system found the place, it will show the map with the position of the place on the map including latitude and longitude.
2. using smartphone to collect the latitude and longitude information directly from the BPR place.

The financial report table use to create table to keep and combine financial reports with location information.

## III. RESULT AND DISCUSSION

Some structure of the main table to keep the information can be shown in figure 1.

| #  | Name    | Type          | Collation         | Attributes | Null | Default | Comments | Extra          |
|----|---------|---------------|-------------------|------------|------|---------|----------|----------------|
| 1  | id      | int(10)       |                   | UNSIGNED   | No   | None    |          | AUTO_INCREMENT |
| 2  | bprname | varchar(30)   | latin1_swedish_ci |            | No   | None    |          |                |
| 3  | lat     | float(10,6)   |                   |            | No   | None    |          |                |
| 4  | lng     | float(10,6)   |                   |            | No   | None    |          |                |
| 5  | tahun   | char(4)       | latin1_swedish_ci |            | No   | None    |          |                |
| 6  | triw    | char(1)       | latin1_swedish_ci |            | No   | None    |          |                |
| 7  | kas     | decimal(12,0) |                   |            | No   | None    |          |                |
| 8  | kdva    | decimal(12,0) |                   |            | No   | None    |          |                |
| 9  | sb      | decimal(12,0) |                   |            | No   | None    |          |                |
| 10 | pbyad   | decimal(12,0) |                   |            | No   | None    |          |                |

Figure 1. Table structure

Based on the data from BPR in one city, then save in the table.

Using Google Map API(Application Programming Interface), PHP and MySQL then create some script to connect to MySQL database, open the tables needed and then show the BPR location on the map like shown in figure 2.

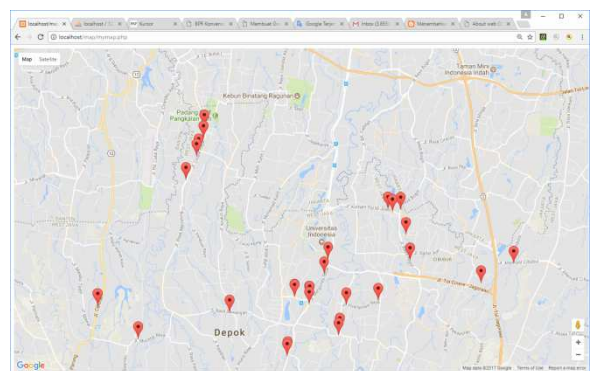


Figure 2. BPR location on Map

Adding the Marker to such BPR can show other information about financial report like shown in figure 3.

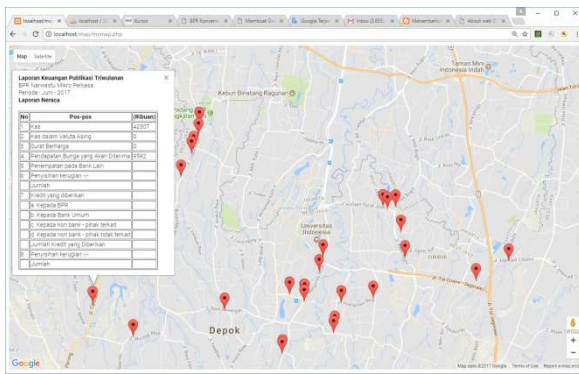


Figure 3. BPR location with Financial report

Some of financial report growth or trends can be shown using chart, such a bar chart. BPR cash in financial quarterly report can be shown year-on-year using bar chart shown figure 4.

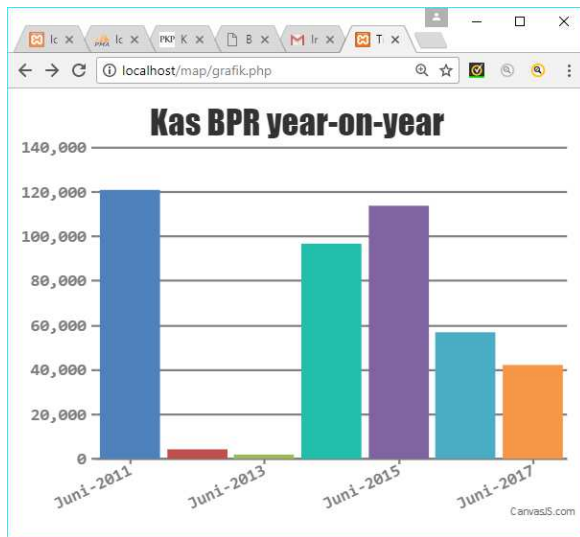


Figure 4. BPR cash year-on-year

#### IV. CONCLUSION

The conclusion can be made from the results of the research conducted as follow :

1. By using GIS technology, the information presented not only in form of table but also Map and some diagrams.
2. Information presented in graphical form showing map and location of a branch or bank office can be integrated with information related to financial reports.

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