III. METHODOLOGY

3.1. Time and Location

This study was conducted from January - September 2006, in Desa Nagrak, Gunungputri Sub District, Bogor District, West Java Indonesia. The coordinate location in TM-3° zone 48.2 datum WGS-84 is A (251,592.00 ; 781, 915.14), B (250,121.85 ; 792,001.88), C (248,331.51 ; 792,081.46), D (247,183.42 ; 793,519.41), E (248,581.59 ; 795,542.77). Data analysis was carried out at the MIT (Master of Science in Information Technology) Program, Bogor Agricultural University (IPB), SEAMEO-BIOTROP.

Figure 4. Study Area
(Source: Kantor Pertanahan Kab. Bogor, 2002)

1 The coordinate location in geographic coordinate datum WGS-84 is A (106°59′49.9176″; -6°22′36.2460″), B (106°57′11.1600″; -6°24′11.1312″), C (106°56′12.894″; -6°24′8.5932″), D (106°55′35.4936″; -6°23′21.8112″), E (106°56′20.9364″; -6°22′15.8988″).
3.2. **Data Sources**

The data involve in the research including:

a. IKONOS, data acquisition 2002


c. Analog Data PBB, including transaction value, data acquisition 2005-2006

3.3. **Hardware and Software**

In this study, it is needed the following supporting tools, in terms of hardware and software:

1. Hardware: PC Pentium-4, 1400 MHz, 256 MB RAM, CD ROM Read/Write Drive 48x24x52x; Canon Pixma iP 1000 Color Printer.

2. Software: ArcView 3.1; ArcGIS 9 Extension Spatial Analysis; Arc/Info 3.5; MS Office 2003; AutoCAD 2000; MapInfo Professional.

3.4. **Flow of Thought**

The steps of research will be described in the research methodology as showing in figure 5:
Figure 5. Flow of Thought
3.4.1. Data Collection Method

a. Data Collection

The research starting with data collection method, as the following:

- For market data collection requirement, the research used the transaction value from PBB, the data collected from January to June 2006 in Desa NAGRak, 150 parcels.
- Digital data; including vector data and raster data.

Data requirement for the research as the following:

Table 1. Spatial Data Requirements

<table>
<thead>
<tr>
<th>Layer</th>
<th>Type</th>
<th>Minimal tabular data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road centerline</td>
<td>line</td>
<td>Id, Road type (primary, secondary, local or no access)</td>
<td>Digitizing and generalization</td>
</tr>
<tr>
<td>Road</td>
<td>polygon</td>
<td>Id, Name</td>
<td>Digitizing and generalization</td>
</tr>
<tr>
<td>River</td>
<td>polygon</td>
<td>Id, Name</td>
<td>Digitizing and generalization</td>
</tr>
<tr>
<td>Block</td>
<td>polygon</td>
<td>Id</td>
<td>Digitizing and generalization</td>
</tr>
<tr>
<td>RR-Area</td>
<td>line</td>
<td>-</td>
<td>The assumption of Road and Drainage Area</td>
</tr>
<tr>
<td>Parcel</td>
<td>polygon</td>
<td>Id, Transaction Value</td>
<td>Field Measurements</td>
</tr>
</tbody>
</table>

b. Data Analysis: Land Value Zone Determination

The land value zones determination is based on the accessibility or the road access. They are:

- Zone 1: primary road access
- Zone 2: secondary road access
- Zone 3: local road
- Zone 4: no access
The more explanation to determine the level of land zone and to classify the suitable road will be discussed in chapter 4.

c. Data Analysis: Norm Value of Land Zones

The approach of norm value of land zones utilizes the transaction value of PBB. In the future this approach must be corrected by the market value, with the objective is to get the fair norm value. The parcel value will be calculated by the norm value, the norm value is adjusted by the expert.

3.4.2. Value Zoning Automation

It is different with INLA Project, while the value zoning is done by delineating of market value which has the same classification value. The land value zone in this research by using approach based on the road classification (type of road). The more explanation about the concept design and its implementation in ArcView and the comparison with the ZNT map from PBB will be discussed in chapter 4.

The concept of the automation methodology can be explained as the following:

a. Splitting Process

To edit the polygons, use the Polygon Split tool to draw a line across a polygon to split it into separate polygons. Splitting process is to get the clean block, it is the locations that can be occupied by someone or an institution, used it physically for instance for a house, a supermarket, a farming, etc. and to be sold to another side that has the relationship with ownership right.
The example of splitting process to make a polygon smaller, use the polygon split tool to simply split off the unnecessary part, select it, and delete it.

1. Overlaying the polygon of block and poly-line of fence.

![Figure 6. Unclean Block](image)

2. The next process after overlaying polygon of block and poly-line of fence, then do the splitting process.

![Figure 7. Splitting Process](image)

3. Remove the small polygon area, and then another polygon is the Clean Block (polygon with land value).

![Figure 8. Clean Block](image)
b. Buffering Process

To create a buffer, specify the source feature and the buffer distance. For linear features, the GIS draw a line around the feature at the specified distance. To calculate value zone buffer around roads, specify a distance then GIS draw the buffer width. The specific distance for buffering is given by the expert. The approach distance uses the average wide of the land zone value (ZNT) of PBB, generate as the road centerline. It needs iterative process to get the fair distance. Further this approach needs to be re-adjusted by the expert to get the fair land value zone, but it is not include in the scope of this research.

c. Overlay Process

The utilization of this method is to find which features are inside which areas and summarize the zone values inside one or more areas.

a. Combining two spatial data layers and producing the land zone data from them.

b. Both layers are geo-referenced in the same system.

The input data for overlaying process is the result buffering zones combining with the clean block area, so produce the land zone in some locations that can be occupied, can be used, and can be sold.

3.4.3. Land Zone Valuation Process

Land zone valuation process is a process to give the value to the land zone, it based on the assessor opinion. The assessor opinion refers to the market data,
one of them is the transaction value that consider to the description as the following statement:

According to Gwartney [1999], the data should be verified with two different sources, so it needs to be developed the procedure of land zone valuation, the flow of the procedure as in the following diagram:

![Diagram of Land Zone Valuation Procedure]

There are 150 of transaction value data of Desa Nagrak from PBB, this data is used for the land zone valuation process. The result of the land zone valuation process is used as an approach of norm value land zone. The process of this approach will be discussed later in chapter 4.