

# **Land Value Indexation in Indonesia: A Pilot Study in Pontianak City**

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Indonesia**

**Key words:** land valuation, price index, Indonesia, map.

## **SUMMARY**

Land is just like other commodities. It gives benefit to the owner or the right holder. Land right is also being sold and purchased in the market. As part of market transparency, an Index that indicate the movement of price could also be developed to help people to get the information of land market.

In Indonesia, it is a quite new thing to have a land market index. In Malaysia, yearly housing index has been released by its Valuation Agency. It provides the information of the price movement of the housing which includes every types and location in every year. In Indonesia, property index could be commenced by introducing the (vacant) land price index.

There are two reason why Indonesia should start with land price index. First because Land is very static in supply but on the other hand always have increasing demand. It affect the increasing value of land overtime. The second reason is modeling land market is quite simpler than property market. There are very few uniform housing in Indonesia. Most other area have a vary kind of housing. It is difficult to generalize the market of big variety of housing type.

In order to develop the land price Index, the National Land Agency of Indonesia conducted a pilot study in 2009. In the beginning phase, the pilot study is done in the City of Pontianak in West Kalimantan.

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## **1. BACKGROUND**

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In order to develop the land price Index, the National Land Agency of Indonesia conducted a pilot study in 2009. In the beginning phase, the pilot study is done in two City of Pontianak in Central Java and the City of Pontianak in West Kalimantan.

## **2. THEORY**

### **2.1 Price Index**

#### **2.1.1 Subtitle, level 3**

Price Index is a figure which is develop to compare the same activities in differens period of times. From the price index, people can see the whether the price goes up or comes down between two points of time. We can use price index to measure quantitatively the movement of any commodities or production. In addition, price index could be used to measure the economical performance and as additional data to se the relationship between economic performance and the market of certain commodity. Price Index could also be used to predict the trend of such market.

In order to generate price index, it needs to point of time. The first one is base period and the second one is current period. Base period is a point of time which is used as a base for the comparison or denominator. On the other hand the current period is a point of time that used as a numerator to be compared with base period. In other words land price index illustrates the comparison of the land price in certain area over time which could also categorized as a spatial index.

## 2.2 Price Index Method

There are some method to generate price index. Each method has its own advantage and weakness. Each method shows its own focus in reflecting the movement of price. In General there are 3 (three) kind of method that is used especially in Stock Market. It includes Price-weighted index, market value weighted index and equally weighted index.

### 2.2.1 Price-Weighted Index

This method use the arithmetical average of the land price of each land value zone. The nominal movement of every zone is compared arithmetically with the value in the base period. The formula used is:

$$\text{Index} = \frac{\sum \text{current value of each value zone}}{\sum \text{zone value in the base period}}$$

In this method, the higher price difference will have a higher weighted in calculating the price index. If this index is used, the movement of the price index will be more influenced by the movement of land price in the commercial or residential zone which is higher transaction price than agricultural zone. It is due to every land value zone is treated equally.

### 2.2.2 Market Value-Weighted Index

This method is using the land market capitalization in a certain area. Land market capitalization is got from the multiplying the land price by the area of its land value zone. The current land capitalization is the one that compared with the land capitalization in the base period. The formula for this method is:

$$\text{Index} = \frac{\sum P_t Q_t}{\sum P_o Q_o}$$

Where:

$P_o$  = zone value in the base period.

$Q_o$  = area of zone

$P_t$  = Current value of each zone

$Q_t$  = Area of zone

The advantage of this method is it shows the movement of total value of land in a certain area. IT provides the information of the growth of total asset of certain area. However the higher the capitalization of one land value zone will contribute more in the movement of index. The smaller area of zone will affecting the price index less than the wider area.

### 2.2.3 Equal Price (Unwieghted) Index

In this methode, every (percentage) movement of any land will be considered equal in contributing the price index. It does not consider whether the land value zone has a higher price or wider area. The formula is shown below:

$$\text{Price Index} = \frac{\sum P_t / P_o}{\sum Q_t}$$

Where

Po = zone value or land price at the base period/time.

Pt = Current land price at the t time

Qt = Number of land transaction at t period/time

The price index derived from this method will show the average percentage of price movement of every zone. Every transaction will contribute equally to the movement of the price index regardless the price and the area of the zone. This method is suitable for the zones which have a big variety of land use and area in one municipality without any preference.

## 3. PRICE INDEXING OF MUNICIPALITY OF PONTIANAK

In this studi, there two data set that come from different time. Fist dataset is the land price at the base period (Po). This information is derived from the Land Value Zone Map published by BPN at 31<sup>st</sup> of December 2008. The second daa set is the transaction price gathered along the pilot study which indicate the price of 30<sup>th</sup> of June, 2009. Those two data set will then compared to generate the land price index.

### 3.1 Land Value Zone Map of December 31<sup>st</sup>, 2008 as an Index Base

Land value zone used as index base is generated from the transaction data before December 31th 2008. The zones within the area shows the similar land use, accessibility, physical condition and social ecomic characteristics. The scale of the map itself is 1:25.000. It means some generalization was made in defining the zone boundary. The other constrain in defining

the boundary of value zone is the lack of up to date base map. Base map is the combination of quickbird satellite prior to 2007 and ALOS image of 2006. Using the available basemap, it is quite difficult to define the land value zone according to the existing land use. However it assumed the land use was not changed since the image captured in 2006 and 2007.

Once land value zones have been defined, all collected transaction data are then adjusted by the date of transaction, type of data and land right. All adjusted value then averaged to have final zone value at that point of time.

The constrain in generating the land value for each zone is the minimum number of valid land transaction for every zone. The market is not perfect. The transaction in Indonesia is not very transparent. The land transaction tax policy discourage seller and buyer to report the true price. It means the recorded transaction price can not be used. The (informal) survey to get the true price must be done which needs a lot of efforts and cost. Some of the zone have not achieved the statistical requirement to get the final land value due to the minimum number of valid land transaction.

In order to increase the number of data, the offered price are used. Offered price is the price offer by the owner who is willing to sell their land. This data can be acquired from the house for sale board or from the newspaper advertisement. The offered price data is believed closer to the market price than the reported price itself. However, offered data is not a transaction data. It should be adjusted or discounted to have a transaction data. The figure of discount itself derived from the valuer experience. It contains subjectivity and of course error. In this area the number of offered data is more than the amount of transaction data.

The other constrain is some data actually is the real property data which contains land and building. The valuer must deduct the value of the building in order to have the land value. It contain error while there are big variety of the building type. A lot of this kind of data in the urban area.

The land value zone map with all the limitation described above then used as the index base in generating the Land Price Index.

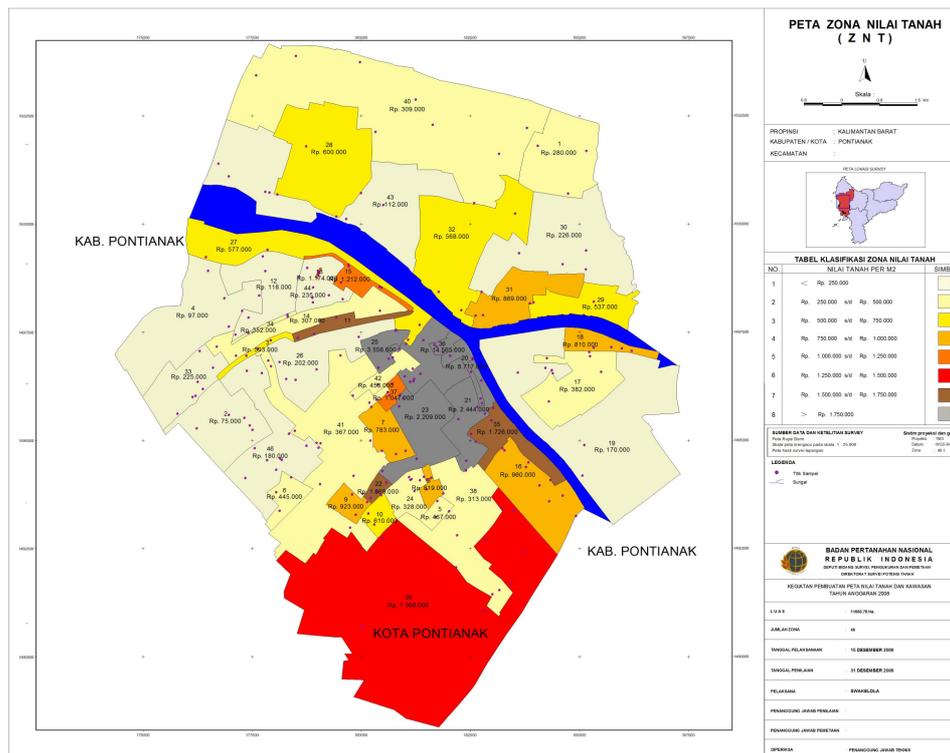


Figure1: Land Value Zone Map at 31<sup>st</sup> of Desember 2008

### 3.2 Land Price Survey

The second data set is the transaction data which occurred after the land value zone map has been published until the end of June 2009. Those data are treated similarly with the treatment of data in the previous one. It includes time adjustment, building reduction and discount of transaction data if any. It is expected by comparing two data sets, the price index will be generated.

In this study, the goal is to generate index for two different land use which are agricultural use and non-agricultural use which includes residential and commercial use. Survey was conducted to acquire the transaction data and offered data between January 1st to June 30th 2009. About 411 data are collected for all 46 zones all over the municipality.

The constraints in this survey is exactly the same with the constraint in defining the land value zone map as base index. However the significant constraint is the number of transaction is even less. It is due to the limited period of the data which is only 6 (six) months..

As a result of the limited data, not all data are distributed in each zone. The data for index purpose is only availability in certain zone which considered as active land market. However

the index generated is expected to represent all zones in Pontianak City. The accuracy of the price index is being concerned.

### 3.2.1 Price Index Calculation

The method chosen for generating the price index in the pilot study is the unweighted price/equal weighted. This method is chosen to treat every transaction in every zone whether in urban or rural area equally. This method does not take the capitalization or zone area into account. In this method every price (percentage) movement of each transaction contribute equally to the movement of the total price index. The index will focus its reflection to the average of every transaction price comparison between current period and base period.

In this study, there are two types of data collected. The first one is the transaction data and the second one is the offered data. For the second type of data, the price is discounted to 10% to match the transaction data. The figure of 10% is from the local real estate agent that suggest the 10% difference between offered and transaction price.

The second adjustment to be applied to the data is the land extraction. Not all of the data is the vacant land price. Some of them is the real property transaction or offered price. If there is a building on the land, the value of the bulding is deducted from the real property price.

All data are occurred between January 1<sup>st</sup> to June 30<sup>th</sup> 2009. Considering that the price index will use the 30<sup>th</sup> of June, all transaction and offered price occurred prior to that date is adjusted to 30<sup>th</sup> of June. The adjustment ratio is plus 12% per year which derived from the las year appreciation in the area.

Once every data is adjusted, the Land price index is calculated based on the comparison of each zone where the data lies. The formula is:

$$Index = ( P1/Poi + P2/Poi + P3/Poi + ..... Pt/Poi) /Qt$$

Where:

$P_t$  = Land market price of land no t which lies in zone i on 30<sup>th</sup> of June 2009.

$P_{oi}$  = The Value of the land Zone i on the land value zone map of 31<sup>st</sup> of December 2008 (index base).

$Q_t$  = The quantity of transaction data in the City.

However, not all price movement ( $P_t/P_{oi}$ ) data can be used to generate index. The land value zone map as a base index has a relatively small scale of 1:25.000. There are some generalization in defining the zone boundaries. Eventhough the zone value has its standard deviation of 30%, there are some small cluster within the zone that has a significantly different value with the zone value. Unfortunately only 99 of 411 data are within the range.

The other 312 data can not be used to generate index due to the value is outside the  $\pm 30\%$  range. Those data are excluded from the price index calculation. This outlier could affect the average significantly. Instead, such data (if form regularity) may be used to define another (smaller) zone within the existing zone. This additional zone will make the land value zone

map more accurate over time. The review of those outlier data result to have additional 40 value zones in the municipality.

The results of the survey shows that the price index is about 0.9838 for the non agricultural use and 0.8465 for agricultural use. It indicates that the price movement is about sideways or slightly change compared with the market 6 months earlier. The table 1 below shows the calculation of each data to contribute to the price index.

### 3.2.2 Utilization of Land Price Index

In general, land price index can be used to monitor the change of the land price in certain area. The Index can also be analysed to be more specific for certain land use for example commercial use index, residential use index or agricultural use index in addition to the area composite index. However, to have a more specific index, more data is required for each index.

Land price index can also be treated as a benchmark against other industry price index, stock market index, consumer price index, inflation rate etc. Another study could be excercised to relate land price index with other index whether they are independent or correlated. Other researcher could also exercise the impact of the change of one economic condition to the land price.

In addition, land price index can be used also to forecast the land value in certain area in certain point of time. In this study, the average composite land price index is used to update the land value zone of December 31st 2008 into land value zone map of June 30th, 2009. It apply the land price index to every zone value on the map using this simple formula:

$$P_{ti} = P_{oi} \times Index$$

where :

$P_{ti}$  = The Value of the land Zone i on the land value zone map of 31<sup>st</sup> of December 2008 (index base).

$Index$  = Average composit land price index in the municipality.

$P_{oi}$  = The Value of the land Zone i on the land value zone map of 31<sup>st</sup> of December 2008 (index base).

The result of updated land value zone map at June 30<sup>th</sup>, 2009 is shown in the figure 2.

Figure 2 : Land Value zone Map at June 30<sup>th</sup>, 2009 (updated using land price index)

#### 4. CONCLUSIONS

Land price index is the reflection of the price change from time to time based on a certain point of time. The accuracy of the index itself is influenced by:

- Number of transaction; A lot of transaction data will indicate an active market. The amount of the data is also provides the better accuracy in statistic.
- Market transparency; If the data recorded are reflecting the true transaction price, the data is valid. It is difficult to find valid data if the market is not transparent due to tax regulation or other things. A lot of effort must be done to have data that can be considered valid.
- Map accuracy and availability; Smaller map shows generalized land value zone and Bigger map shows more accurate land value zone. Due to generalization of land value zone, some data captured in the field sometimes are not belong to the zone eventhough they lie within the zone. They are belong to a smaller zone in the sampe place which could have different value. With the smaller map, an effort of data cleaning should be applied to avoid the noise or outlier influence the calculation of land price index.

In order to enhance the accuracy of land price index, at least two land policy should be done. Firstly is acceleration of land registration in order to have spatial information of all land parcels with the more accurate (bigger) map. The definition of land value zone can be more accurate overlaid to this cadastral map. Secondly is to have a land policy that encourage people to report the true price of transaction. The policy could be incentive or disincentive or another change of land tax policy.

However, regardless the existing limitation in Indonesia, the index study should be continue to be developed. It will support the land market transparency in Indonesia by providing the information of land price index. It could also provide the additional data to update the existing land value zone become more accurate.

## REFERENCES

- \_\_\_\_\_. *Mengenal Index Dow Jones*. <http://www.mahadanalearning.com/2nd/index.php/artikel/pasar-Modal/141-mengenal-Index-dow-jones.html>. Updated : 30/11/2009.
- Agus Prawoto. 2003. *Teori dan Praktek Penilaian Properti*. Yogyakarta: FEUGM
- Austin Jafe, Sirmans CF. 1995. *Fundamentals of Real Estate Investment*. New Jersey: Prentice Hall Englewood Cliffs.
- Budi Frensidy. *Memahami Perhitungan Index Saham*. [http://webdev.ui.ac.id/download/kliping/010208/memahami\\_perhitungan\\_Index\\_saham.pdf](http://webdev.ui.ac.id/download/kliping/010208/memahami_perhitungan_Index_saham.pdf). Updated: 30/11/2009
- Carl Gunter. 1995. *Real Estate Fundamentals*. NSW : Bricar Publishing.
- Direktorat Survei Potensi Tanah. 2009. *Pedoman Internal Kegiatan (PIK) Survei dan Pemetaan Nilai Tanah dan Kawasan pada Direktorat Survei Potensi Tanah*. Jakarta
- \_\_\_\_\_. 2009. *Laporan Kinerja Direktorat Survei Potensi Tanah Tahun 2009*. Jakarta
- GAPPI. 1999. *Penilaian Real Estate* terjemahan dari *The Appraisal of Real Estate* (eleventh edition) The Appraisal Institute, Chicago
- Iwan Hindawan Dadi dkk. 2007. *Metododologi Penilaian Properti*. Jakarta: DJKN. Departemen Keuangan.
- Joseph K. Eckert. 1990. *Property Appraisal and Assessment Administration*. Chicago: IAAO.
- Wahyu Hidayati, Budi Harjanto. 2003. *Konsep Dasar Penilaian Properti*. Yogyakarta: FEUGM.

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