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An Experimental Study on Property Valuation Accuracy in Indonesia: A Government Valuers' Perspective

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ABSTRACT: Market value estimated by property valuers is essential as it is used for various purposes both in public and private sectors. Hence, the accuracy of market value estimate is of paramount importance. However, valuation involves subjectivity, so it is bound to suffer from errors. This study is aimed at studying such errors. For this purpose, this study uses a market price of a parcel of land in the southern part of Jakarta. This particular area was chosen due to its significant number of property transactions compared to other regions in Jakarta. Government valuers at the Ministry of Finance were invited to provide their value estimate of that property. They were only allowed to use a pre-made worksheet provided by the researchers. This study shows the estimated market value is around 16.9% of the market price. Differences in rank, experience, or neighborhood knowledge have no significant relation to the accuracy of market value estimate. Most participants can demonstrate that their market value estimates are relatively similar, showing low variation between valuers.

Keywords: Accuracy, Noise, Bias, Valuation, Indonesia

INTRODUCTION

Valuation has a profound role so that the economy can run in an efficient manner, as an accurate market value estimate allows parties in the market to make better decisions (Geerts et al., 2023)For instance, valuation produces an estimate of an asset's value in the financial report. It is one of the key indicators investors use to assess an entity's economic health. Similarly, an estimate of a collateral's market value calculated by valuers is essential whether a credit will be granted.

Valuation, however, is not a science. It is a combination of science and art where art plays a more important role (French & Gabrielli, 2004; Mohammad et al., 2018). Although differences of value estimates are of a concern, the probability for two valuers to arrive at the same market value estimates is generally small (Mohammad et al., 2018). This is because property valuation involves judgment, which may lead to errors (Setijono, 2025).

In the end, property valuation is a modelling process. However, by definition, all models are wrong (Box, 1976) and estimates of market value are also bad. However, Box (1976) notes that some models can be useful. Therefore, although it might contain errors, some value estimates can still be useful. The key is limiting the forecast errors to an acceptable level. In the context of property valuation, as has been stated, subjectivity cannot be avoided, which may lead to valuation problems such as inaccuracies or variations. Such problems are commonly known in valuation (Cheloti & Mooya, 2021). As an example, Chen and Mak (2024) report that there is a significant difference in market value estimates in valuation projects commissioned by representatives of buyers and sellers. Such inaccuracies or variations persist even when efforts to improve valuation practices have been made (Cheloti & Mooya, 2023). This challenges the property valuation profession as accuracy is part of the quality indicators in valuation practice (Amidu et al., 2021).

Several factors are cited in the literature as the source of valuation inaccuracies. This includes a wide scope of practice, lack of experienced valuers, inappropriate use of graduate valuers, stakeholders' expectations, access to relevant information, differing approaches, valuer attitudes, and dissatisfaction with compensation (Amidu et al., 2024) as well as the complexity of property valuation and valuers' cognitive limitations (Liman et al., 2024). The use of an inaccurate and unreliable approach may also contribute towards inaccuracies of the market value estimate (Abidoye & Chan, 2018).

In developing countries, factors such as weak valuation system and regulatory system marked by an opaque engagement process, under-pricing of valuation services, inefficient domestication of international valuation standards, poor implementation and monitoring system, and concerns about the training and certifications to meet global norms may also be responsible for valuation inaccuracies (Adilieme et al., 2024). Psychological and behavioural aspects are also known to have significant impacts towards the accuracy of the market value estimate (Ali et al., 2020).

Current literature seems to suggest that studies in this topic lean towards the use of technology and less emphasis on non-technical factors, such as behaviour, to improve property value estimates (Liman et al., 2024). Nevertheless, a valuation property model that produces value estimates containing an unacceptable error cannot be useful simultaneously. Such significant errors can have dire legal consequences. When writing, a search at the Indonesian Supreme Court website for the word 'appraisal' results in nearly 4,200 court decisions.

However, it is important to note that an acceptable level of inaccuracies is sufficient; thus, the model may still be useful. The results are still inaccurate but within the professionally acceptable limit. According to Kahneman et al. (2021)There are two kinds of errors: bias and noise. A bias occurs when the errors are systematic, perhaps because of a systematic mistake in applying adjustment. In addition, a market value estimate can also be inaccurate without a clear pattern. Thus, it is not quite. However, although error can be either of the two types, this also means that a market value estimate error can be a combination of both noise and bias, which certainly complicates matters even more.

Nonetheless, the question remains: do valuers make errors in estimating a property's market value? If so, is it something that we need to worry about? This paper aims to answer these questions in the context of Indonesian government valuers. This paper's contributions are twofold. It firstly measures the error in market value estimates made by Indonesian government valuers. Secondly, it demonstrates a method for calculating such errors without property transactions. For this

purpose, this paper is divided into four sections. The following section outlines data description and the research method. This is followed by the presentation of the results of the data analysis and its discussion. This paper then concludes with a brief conclusion and recommendation section.

METHOD

The research reported in this paper aims to study the accuracy of market value as estimated by the government's valuers in Indonesia. The most direct method in doing so is by comparing the value estimate reported by valuers and the transaction price of the asset being valued once it is sold (Cannon & Cole, 2011; Hariharan GG et al., 2021; Kok et al., 2017). However, this method is difficult to implement for this research. This is because the Indonesian government valuers mostly deal with the valuation of state-owned assets for accounting purposes. These assets are generally not for sale; hence, unless in an extraordinary situation, obtaining their transaction price is normally almost impossible.

To deal with this difficulty, this research uses a different approach than one described in the literature. Rather than comparing value estimates and their corresponding sale price, this research starts with the property's sale price in the market. Since all are already sold, their market prices are known. This research uses only the sales price of four comparable parcels of vacant land in Cilandak, South Jakarta. Some of the attributes of these properties, such as physical characteristics and location, were collected. These attributes are generally identified in the literature as significantly affecting property value.

The researchers selected one of the properties whose market value was to be estimated. Valuers from the Directorate General of State Asset Management, a government agency under the Indonesian Ministry of Finance (MoF), were invited to participate in the research. They could only use the market data comparison approach using three other parcels as comparables. The actual sale price of the valued property, IDR 6 million per square meter (approximately USD 397.30 at the time of writing), was kept confidential and thus was not revealed to the research participants. The research participants then were asked to consider only the property attributes provided by the researchers when estimating the market value. The researchers also provided a spreadsheet containing formulas and functions tailored to produce market value estimates based only on the percentage adjustment technique for this research. The spreadsheet also included details of the three properties for comparables. Thus, the only task that the research participants needed to complete was providing percentage adjustments as they see fit to produce an estimate of market value fairly. The spreadsheet then automatically calculated the market value estimate based on the adjustments provided by the research participants. Thus, variations or inaccuracies in market value estimates arising from this research were purely a result of adjustments made by the participants.

After completing the value estimation worksheet, the research participants were also required to supply some demographic data. They were also asked to rate their confidence in their value estimates and their knowledge of the neighbourhood where the property being valued is located on a Likert scale.

The spreadsheet was distributed electronically to all research participants using Google form. In addition to Google, providers such as Survey Monley or Qualtrics provide similar services. The decision to use Google Forms was motivated by providing quick access to a large and diverse

sample of people (Wardropper et al., 2021). As a result, it efficiently facilitated data collection because it is free and a large amount of data can be collected rapidly (Sabrina, 2021). It is subject to several limitations, such as being limited to participants with internet access and a self-selection problem that may lead to multiple submissions from one participant (Andrade, 2020). The effects of these problems were not limited, as participants in this research had internet access through their employment. The Google form was designed to include an email account to prevent multiple submissions.

In total, 117 government valuers participated in the research, approximately 62% of all valuers registered at the DGSAM. However, five participants provided incomplete information, making market value estimation impossible. These five records were, therefore, excluded from further analysis. Some participants recorded value estimates far below or above the asset's sale price. Once these outliers were removed, 95 records were left for further study.

Table 1 Research participant details

No	Participants' Rank	Number	%
1	Beginner valuer	61	64.2%
2	Intermediate valuer	27	28.4%
3	Pre-advanced valuer	7	7.4%
	Total	**95**	**100.0%**

Once all data were downloaded from Google form, the researchers proceeded with the following analysis:

1. The accuracy of value estimates.

At this stage, the researchers are equipped with two data sets: estimates of market value as calculated by the research participants and real sale price of the property obtained from the market. Armed with these two datasets and the research participants' demographic data, the researchers can now estimate the accuracy of the value estimates calculated by the research participants. Further statistical data analysis is also conducted to study how these demographic elements affect market value estimates. The accuracy of value estimates for this research is defined in equation (1).

$$\delta = |V_m - V_e| \quad (1)$$

where:

V_m : market value
V_e : market value estimate
δ : the accuracy of value estimate

2. The variability of value estimates.

Another study reported in this research is the variability of value estimates. As the literature notes, market value estimates involve a certain degree of subjectivity. One valuer might consider a 6% adjustment for location appropriate for the vacant parcel of land being valued. A different valuer, however, may consider the 6% location adjustment too high. This makes value estimates vary. It is of course generally difficult to see which valuer is correct. The literature seems to agree that several factors, such as valuers' experience or skill in analysing market data, may affect the accuracy

of their value estimates (Abidoye et al., 2021). It is desirable to have value estimates of a certain property that do not differ significantly between the valuer and another. In other words, less variability is more desirable. Standard deviation is a good method of measuring variability (Kahneman et al., 2021). This research, however, chooses to use mean absolute deviation (MAD) instead of standard deviation as it is easier to understand and more efficient in practice as standard deviation only works well in an ideal condition (Gorard, 2013).
This research uses the percentage of δ from Vm, as seen in equation (2), to measure the variability of value estimates between valuers.

$$\delta = \frac{|V_m - V_e|}{V_m} \times 100\%$$

Means δ calculated using equation 2 are then compared based on demographic factors of the research participants. The purpose is to learn whether differences in, for example, experience significantly affect errors of value estimates. In other words, this method enables the researchers to study whether valuers with higher experience have more uniform market value estimates.

3. Grouping of research participants.

The data analysis part groups the research participants based on their δ calculated using equation 1. The research uses the K-means clustering method, which is calculated using SPSS version 27. Here, the research participants are classified into three groups based on their δ into three groups: low, medium, and high δ. The following section discusses the results of the data analysis using the method described previously.

RESULTS AND DISCUSSION

This section discusses the results of the analysis in two parts. The first part discusses the accuracy of the market value, while the second part discusses the variability of the estimates. This paper will now move on to the first part of this section.

1. The accuracy of value estimates.

The difference between the actual sales price and the calculated market value estimate measures accuracy in this research (Parker, 1999). The preceding section outlines several factors that may contribute to such inaccuracies. Overall, on average, the research participants calculated an estimate of market value approximately 16.9% of its actual sales price (N=95, SD=12.3%). Most participants (44%) agree that ideally, the difference between an actual and estimated market value is between 5% and 10% (Table 2), which is smaller than their actual accuracy.

Table 2 Ideal estimate to actual market value difference

No	Difference	Participant Number	%
1	> 10% - 20%	16	16.8%
2	> 20%	1	1.1%

No	Difference	Participant Number	%
3	0 - < 5%	13	13.7%
4	0 - 20%	20	21.1%
5	5% - 10%	42	44.2%
6	5% - 20%	3	3.2%
	Total	**95**	**100.0%**

When classified into three groups, most participants have an average actual to market value difference of approximately 9%. Those with a large difference in δ are only a minority (Table 3). Most research participants can estimate market value at an acceptable error level.

Table 3 Cluster of participants (accuracy)

Cluster	Mean difference	Participant Number	%
1	9%	63	66.3%
2	44%	7	7.4%
3	28%	25	26.3%
	Total	**95**	**100.0%**

The largest difference is reported by those who belong to the *Penilai Madya* (pre-advanced valuer) group (M=18.9%, SD=15.1%). Although the mean difference is not statistically significant (F(2, 92)=[0,4]; p=0,7), interestingly, as shown in Table 4, participants who belong to the lowest level of valuers (*Penilai Muda*/beginner valuer) have the lowest estimate to actual market value difference (M=16,0%; SD=12,2%).

Table 4 Accuracy of market value estimate

No	Rank	Mean Difference	Standard Deviation
1	Beginner valuer	16.0%	12.2%
2	Intermediate valuer	18.2%	12.3%
3	Pre-advanced valuer	18.9%	15.1%

The results in Table 4 are consistent with Table 5, where valuers with less experience have a lower mean estimate to actual market value difference. The results shown in Table 4 and Table 5 are surprising, as it is generally believed that inexperienced valuers are the main source of valuation inaccuracy (Abidoye et al., 2021; Ajibola & Oletubo, 2011).

Table 5 Mean of value difference based on experience

No	Experience	Mean Difference	Standard Deviation
1	< 2 years	12.4%	9.9%
2	2-5 years	15.6%	11.8%
3	> 5 years	18.6%	12.9%

However, experience and knowledge are important in understanding the property market and clients' behaviour (Amidu et al., 2019). Nevertheless, this research shows no significant correlation between the participants' knowledge of the neighbourhood where the property is being analyzed and the difference in estimate to market value ($r=-0.02$, $p=0.9$). It seems that, at least in the context of this research, a valuer who knows the property's neighbourhood better does not always estimate market value more accurately. The same can be said with experience in valuing property in Jakarta. This research shows no significant difference in estimate to actual market value between valuers who have valued properties in Jakarta and do not have such experience ($t(93)=-0.3$, $p=0.7$). This indicates that, based on the participants' view, knowledge of the property's location may not significantly improve the accuracy of property market value estimates. These two findings are certainly interesting and warrant further investigation in more detail.

Nonetheless, it is almost impossible to expect a property's market value estimate to be the same as its actual market price. Valuation, according to Pagourtzi et al. (2003), is none other than an estimate of the '… trading price of a building.' It uses art more than science, and hence, it is common for valuers to arrive at different market value estimates for the same property (French & Gabrielli, 2004; Mohammad et al., 2018). What matters more is not whether differences exist, but whether these differences are acceptable. Valuers are only expected to observe the applicable standards without the need to arrive at the same market value estimate (Crosby, 2000). This does mean that valuers are free to do as they wish. Crosby (2000) provides a guide based on courts' decisions (Table 6). It demonstrates that most participants in this research (Table 3) can produce market value estimates at an acceptable level of accuracy. However, further research is needed to understand the reasons behind a large discrepancy in market value estimates by a few participants.

Table 6 Range of market value accuracy

No	Differences from the market price	Number of decisions	%
1	< 10%	2	7.7%
2	10%	6	23.1%
3	10%-14.99%	7	26.9%
5	15%	6	23.1%
6	15%-20%	5	19.2%

2. The variability of value estimates.

The second part of the analysis concerns the variability of market value estimates. This part of the analysis studies how large market value estimates differ from one valuer to another (Adegoke, 2016; Atilola et al., 2019; Crosby, 2000). Although it is common, value estimates that differ widely from one valuer to another can be considered, according to (Kahneman et al., 2021)contain much noise. This, as stated by Atilola et al. (2019), may be related to:

a. Factors relating to valuers. This, for instance, includes knowledge, experience, or the valuer's integrity.
b. Factors relating to legalities such as rules or standards issued by relevant bodies.

c. Factors relating to environment and valuation process such as quality control or client's influence.

In this research, participants reported an average market value estimate of IDR 17.2 million per m^2 (approximately USD 1,138.00 at the time of writing), N=95, SD=3.6 million. The average difference between the participants' value estimates and the mean value estimate is IDR 2.7 million (approximately USD 178.69), which is 15.8% of the mean of their market value estimates (N=95, SD=13.3%). Most participants have a relatively small variability of market value estimates (Table 7).

Table 7 *Cluster* of the variability of value estimates

Cluster	Mean	Number of Participants	%
1	6.5%	55	57.9%
2	73.4%	1	1.1%
3	27.5%	39	41.1%

As Table 8 shows, early career participants tend to have a lower level of variability than their peers.

Table 8 Market value estimate variability according to participants' rank

No	Rank	Mean	Standard Deviation
1	Beginner valuers	14.4%	11.2%
2	Intermediate valuers	17.9%	13.0%
3	Pre-advanced valuers	20.4%	26.4%

Similarly, less experienced participants are shown to have lower market value estimate variability than more experienced participants (Table 9).

Table 9 Market value estimate variability according to participants' experience

No	Participants' Experience	Mean	Standard Deviation
1	< 2 years	11.1%	11.3%
2	2-5 years	14.7%	11.8%
3	> 5 years	17.5%	14.2%

The value estimate variability also does not seem to be associated with their knowledge on the property's neighbourhood (r=-0.07, p=0.5) or their experience in valuing properties in Jakarta (t(93)=-0.4, p=0.7). Their confidence on the accuracy of their value estimates does not seem to be significantly associated with their market value variability (r=-0.07, p=0.5).

Unfortunately, Indonesia has no guidance on this matter. Elsewhere, Crosby (2000) mentions that having a property's market value estimate with each 9.5% difference from the mean market value estimate in the UK is commonly accepted. In the US, quoting (Crosby, 2000), the variation is closer to 3.7% to 5.3% from the mean market value estimate. Only 3 out of 46 samples exhibit a

larger than 10% difference from the market value average. In Malaysia, the Board of Valuers, Appraisers and Estate Agent requires a maximum of 10% market value estimate variation (Atilola et al., 2019) which seems to be complied with by practitioners (Nasir, 2015).

Referring to Table 7, most participants can produce relatively similar market value estimates. Care must be taken, nevertheless, in interpreting this result, as nearly a third of the participants have quite a large valuation variability. A further study based on a qualitative approach might be required to understand the causes of this large variation.

CONCLUSION

Property valuation involves a series of complex activities involving both science and art. It is a process aimed at building a model to quantitatively measure the benefits and liabilities of owning a property. Models, by definition, contain errors. Hence, it is generally accepted that valuers are not required to be pinpoint accurate so long as they adhere to the standard care of reasonableness acknowledged within the profession. It is, however, often noted that there is more art to valuation than science. As such, differences in market value estimate of a property from one valuer to another are expected. Valuers are not likely to produce the same market value estimates. A degree of differences is normal so long as it is within the acceptable limit. As no such guidance exists in Indonesia, this research turns to the literature.

This research aims to see whether government valuers in Indonesia market value estimate within an accepted limit. Using experimental research, valuers are requested to calculate a market value estimate of a parcel of land whose market price is known. This research concerns two factors. First, it seeks to analyse the accuracy of the market value estimate. By evaluating the difference between the known market price and the valuer's market value estimate, it can be demonstrated that most participants can produce a relatively accurate market value estimate. The second purpose of this research is to address this issue. It indicates that most research participants produce market value estimates that are relatively uniformed within the acceptable level set out in the literature.

Readers must carefully interpret these results, as many participants have relatively inaccurate value estimates. Similarly, nearly a third of the participants produce market value estimates with high variability. These and the insignificant effect of experience and knowledge on market value estimate accuracy need further investigation.

Returning to the questions posed at the beginning of this paper, it can be said that, as the theory predicts, there is an error in the market value estimate calculated by the Indonesian government valuers. This error is not to be worried about. However, readers and key decision makers must be wary, as many of these valuers made a significant error in their value estimates. Care must be taken to ensure that this error does not grow larger.

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