

Objectivity In Valuation Techniques

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Abstract

The issue of valuation accuracy is important for real estate professionals. The issue of accuracy and the techniques of valuation for assessing it, has been the subject of recent academic research and debate. This paper focuses on two main areas related to the topic of objectivity in valuation techniques. Firstly, it examined part of the methodological problem in traditional method of valuation including subjective elements and suggestions to improve it by using quantitative techniques to valuation. Finally, the element of risk and uncertainties in traditional approach should be treated by incorporating risk analysis tool to the valuation techniques. It is concluded that the application of quantitative techniques and risk analysis tools in valuation techniques will lead to produce more objective valuation.

1.0 INTRODUCTION

The subject of valuation and the techniques used are integral in the discussion and debate within the property industry. This is inevitable especially after the profession came under scrutiny when public aired their disappointment with the valuations carried out. Amongst the topic heatedly discussed were the ways and means to improve the approaches in which valuation process is carried out. As a result, a number of researches have been carried out with emphasis to the methodology. The outcome which is very encouraging pushes for a more scientific or technical approach and the objectivity in valuation is established as the way to carry out valuation exercises.

For the purpose of this discussion, we will use the definition compiled by Hamid (1996) which reads as follows:

"objectivity is defined as the means to interpret the market without personal bias, value, emotion and, poor assumptions, and to support estimates of value by putting more logic and evidence into valuation, taking into account various considerations. These considerations include how the many and varied characteristics of property affect value, and how changes in social, economic, and political factors are likely to influence value. These considerations are then incorporated into modeling tasks which encompass consideration of value factors, utilization of sales evidence, measurement of variables, choice of functional forms, correlation, and statistical inference."

The paper will be of two parts; Part One being discussion on the valuation techniques incorporating statistical tools whilst Part Two discussed the treatment of risk in valuation . . .

2.0 QUANTITATIVE TECHNIQUES IN VALUATION

Valuation is a process of estimating market value for a specific purpose of a particular interest in property. It takes into account all the features of property and also considers all the underlying economics factors of the market, including the range of alternative investments. Some valuers could describe the process as an art where skills are acquired through practice, dismissing suggestion of any scientific basis. Others seek support from a scientifically based statistical process. Most opinions extend over the wide range between

these two positions. However, the most important in the process is such that the estimated value should reflect objective value in the real estate world.

There should be a clear objective methodology in valuation leading to a consistency in the opinions of value. Market transaction has been used widely as a basis to produce accurate estimates of market value. However, the lack of evidence and the uncertainties in the market make it difficult for the valuation process. Valuers were nervous about giving positive advice, and clients were becoming disenchanted with the process. There was a lot of criticism thrown at valuers for always looking backwards at past comparable.

As long as value is market driven and as long as there are an indefinite number of factors influencing value, the valuation process will always be ingrained with the valuer's opinion. But on the other hand, the ideal world would like to see value be completely separated from the valuers opinions. These does not match and the best policy is perhaps to keep this subjective role to a minimum. In so doing, the objective techniques of valuation in particular statistical-based approach to valuation would ideally come into play.

3.0 THE ROLE OF QUANTITATIVE TECHNIQUES

In real estate and valuation analysis, the application of elementary statistical concepts has been recognized as useful and important for many years (Brown 1972). Richard U.Ratcliff (1972) suggested the application of statistical analysis to deal with uncertainty in value prediction, which results from imperfection and lack of market knowledge.

The statistical-based approach of valuation has surfaced not only because of criticisms directed toward the profession but mainly because of the drastic changes occurring in the property market and on advances conceived in computerization.

The area of greatest development in real estate appraisal today is in the use of computerized data banks disseminating market information, and the application of sophisticated statistical techniques, particularly regression analysis, to aid in making a near-accurate estimate of value. The availability of data and the advent of the computer is breaking down the valuer's resistance to complex mathematical equations, which when used by other valuers should help to produce similar or acceptable results.

The quantitative techniques that have the potential to be applied in valuation and real estate analysis are:

- a. Descriptive Analysis
- b. Inferential Analysis
- c. Multivariate Analysis

4.0 DESCRIPTIVE ANALYSIS

Descriptive statistics involves the analysis of the characteristics of a sample and includes measures of central tendency, dispersion, association and statistically reliability of samples data. Descriptive statistics also allow analysis of the market and it is useful for screening data.

Measures of a central tendency provide a summary measure of data sets representing a typical value for the variable in the sample set and also represent the single value which around all other values in the sample tends to cluster. It will also show the existence of an outlier or outliers in the sample set. The three most common measures of a central tendency are mean, mode and median, which represent the most probable magnitude of the distribution, i.e., the most probable market value.

Measures of dispersion represent the variation of the entire data set from its mean. The most common parameter of dispersion is the standard deviation. Standard deviations measure the average of the differences between each value and the sample mean value. In valuation the measure of dispersion is used

to see the difference of market value, and variation in the values of the data set to test whether the observation is likely to come from the same population as the sample set.

The mean and standard deviation have been used as a foundation of the normal distribution concept. The normal distribution is usually depicted as a curve and histogram of events. The greatest proportion of observations are expected to cluster around the central part or mean. The least number of events is expected at the extremities of the curve, is usually measured in standard deviation units. With this information we can add a little more objectivity to our assessment of the data.

5.0 INFERENCEAL TECHNIQUES

Inferenceal statistics involve making predictions of value that are not really known. It is applied to establish if there is a relation between variables. This relationship later can be used to predict the value of other which is unknown. The most common techniques used are correlation analysis and regression analysis.

6.0 CORRELATION ANALYSIS

This analysis explores and measures the relationship between any two variables. It determines the degree of similarities which exist between any two characteristics. In valuation the correlation analysis provides a starting point in gaining an overview of data characteristics and variables can be screened for significant and to test assumptions about the type of relationship expected.

The main objective of correlation analysis is to measure the association of two variables. If the price of a house is greater when the area of the building is larger, than we may assume that there is a relationship between price and area. This situation can be defined as having a positive correlation. On the other hand, if the price of land is less at the suburban than it is at the city center, we can assume an inverse relationship between price and distance translated to mean a negative correlation.

Correlation between two variables can be measured by a correlation coefficient. Several techniques can be used such as graphical, mathematical formulas and statistical analysis where Pearson Product-Moment correlation has been applied. The correlation coefficient has a value ranging from "-1" to "+1" indicating a positive and negative correlation among those variables. The value of zero is representing no relationship between them. From the analysis, the valuer should be able to decide which variable deserves attention in the valuation process and which are less important.

7.0 REGRESSION ANALYSIS

Regression analysis is a statistical technique that can be used to analyze the relationship between a dependent variable and several independent variables. The objective of regression analysis is to use the independent variables being factors affecting property values, whose values are known to predict the dependent variable, e.g., property values that are unknown. Regression analysis will produce information about the nature and strength of influence of value determining factors, as well as to estimate the correct weights for adjustment, and to produce an estimate of the correct value.

Regression Analysis is well established as a value estimating method in many valuation communities around the world but it demands a sensible, well-informed approach for successful application (Cooper, 1993). As a modern valuation technique, it offers a number of advantages which include robustness, objectivity and educational reliability (Cooper, 1991). In the market analysis and property valuation exercises, by using regression technique, the valuer can explain the market situation better and be able to predict what probably would happen in the future. This objective is most often achieved through the statistical rule of least squares. For example, the variation of office rental per annum (dependent variable) can be explained objectively by factors affecting rental (independent variables) such as building area, floor storeys, design of building etc. Similarly, the valuer might attempt to predict an office rental in the future based on the developed model.

8.0 MULTIVARIATE ANALYSIS

The computer technology available today has made extra ordinary advances in the analysis of market data. Apart from the ability to manipulate and analyze the data, computers also afford to engage in more substantive development and testing of their theoretical models by using statistical techniques known as multivariate analysis.

Multivariate analysis is not easy to define. One of the reasons is that the term multivariate is not used consistently in the literature (Hair, 1995). For the purposes of this paper, multivariate analysis will include any simultaneous analysis of more than two variables. Some of the analysis can be applied in property valuation and property market researches are factor analysis, cluster analysis, multiple discriminant analysis and multidimensional scaling.

9.0 FACTOR ANALYSIS

This technique is used to analyze interrelationships among a large number of variables and to explain these variables in terms of their common underlying factors. The objective is to find a way of condensing the information contained in a number of originals into a smaller set of factors or composite variables.

The basic form of factor analysis is Principal Component Analysis which assumes that all the variation in a data set is capable of association with a set of components or factors.

Applications in property market research include the identification of sub-market, summarizing demographic data and the construction of main factors affecting property values. Lockwood demonstrates the applications of factor analysis in valuation, used in conjunction with regression analysis to reduce multicollinearity (Lockwood, 1984).

10.0 CLUSTER ANALYSIS

This is one of the numerical taxonomy statistic techniques. It can be used to classify cases using numerical data. In property valuation, it can be used to classify a property into an appropriate sub-market. Similarly, in market research, it can be applied to classify a people into a suitable group.

The analysis has an objective to reduce the differences between individuals in a group based on a level of similarity and maximizing the difference between different groups (dissimilarity among groups).

11.0 DISCRIMINANT ANALYSIS

The concept of discriminant analysis is quite similar to regression analysis. A major difference is the dependent variable where regression used metric data while discriminant used nonmetric data. The purpose of discriminant analysis is to estimate the relationship between a nonmetric (categorical) dependent variable and a set of metric independent variables. The analysis is useful in situations where the total sample can be divided into groups based on a dependent variable characterizing several known classes.

For example, we may wish to distinguish between high, medium and low value of the properties. The dependent variable, e.g., property values, will be converted to nonmetric form which classify into three groups. The independent variables would be the factors influencing property value. Discriminant analysis will select variables or factors which are significant in explaining the grouping used which is illustrated in discriminant function.

If the discriminant function is statistically significant and the classification accuracy is acceptable, the valuer should focus on making substantive interpretations of the findings. The independent variable in discriminant function or equation is used as a measurement in discriminating between the groups.

12.0 MULTIDIMENSIONAL SCALING

This technique provides quantitative measurement of the feeling, preference or qualitative measurement. It has been developed to meet the possibility that there might be more than a single (multidimensional) preference for any relevant characteristic.

An example in market research is to measure consumer preference in housing analysis. If houses A and B are regarded by consumers to be the most similar compared with all other possible pairs, MDS techniques will position houses A and B so that the distance between them in a perceptual map (multidimensional space) is smaller than the distance between any other two pairs of houses.

This technique is based on the comparison of objects (house). Any type of house can be thought of as having both objective and perceived dimensions. For example, consumer X may see the houses as having big building area, many numbers of rooms and good design. These are the objective dimensions. On the other hand, consumers may also perceive the house as expensive looking or fragile. These are perceived dimensions. Two houses may have the same physical characteristics (objective dimensions) but be viewed differently because the different types are perceived to be different in quality (a perceived dimension) by many consumers. The challenge to the valuer is first to understand the perceived dimension and then to relate them to objective dimensions.

13.0 RISK ANALYSIS IN VALUATION METHODS

In the valuation of a development site, it may be necessary to determine the highest and best uses of a property that can be put in the future having regard to the planning permission likely to be granted. A property is said to have development potential whenever an element of latent may be released by the expenditure of capital upon that property (Baum, 1978).

Real estate decision makers claim that they take calculated risks but few of them make it clear just how they calculate these risks (Phyrr 1973). As essential prerequisite of any investment or development decision is an assessment of the future, which by its nature is uncertain. At this point one can differentiate between uncertainty and risk. Some valuers differentiate between risk and uncertainty along the lines that risk can be quantified about the outcome but uncertainty, cannot (Byrne and Cadman, 1984). Risk refers to a set of unique consequences for a given decision of which probabilities can be assigned, while uncertainty implies that it is not possible to assign probabilities, (Pike, 1986). A risk and uncertainty elements in development appraisals are reflected in the property development process. Byrne (1984), defined three stages of a development process comprising site acquisition, construction stage and disposal phase. Site acquisition is often the start of the development process. Land cost is either open to negotiation or already fixed and therefore does not represent a major area of uncertainty. The main element of uncertainty at the second stage is the construction cost. The principle uncertain factors at the disposal phase are sale price, rent and investments yield.

There are a number of methods that can be used to determine and analyse risk in arriving market value of the property development/investment. For the purpose of this paper, the method to be discussed would be the sensitivity analysis, the discounted cash flow technique and probability analysis with particular in Monte Carlo Simulation as an improvement tool.

14.0 SENSITIVITY ANALYSIS

The residual valuations could be expressed in the form of a simple equation where the answer is the residue (a sum left over) after deducting the cost of development from the value of development. Risks are minimized by using current costs and incomes with no estimation of likely changes during the development period. The assumption is that incomes and costs would change at similar rates so that effects would cancel themselves out. The variables which have the greatest impact on the site value are reflected in the

"All Risk Yield". A high risks will represents a higher yield. The value for each variable and the market site value is based on the best possible single value with deterministic approach.

Unfortunately, the magnitudes of these variables are not certain. The valuer often makes an educated guess as to the true magnitude of the particular variable. If the site value is sensitive to the development value and development cost variable, an error in judgment will lead to a substantial error in the site value. It is therefore important that in residual valuation, the valuers use quantitative method, in this case, to test the sensitivity of site value. Sensitivity analysis is useful when we want to determine to what extent one variable is affected by another variable with the assumption that others remain constant.

15.0 DISCOUNTED CASH FLOW TECHNIQUE (DCF)

DCF is a more sophisticated technique of an appraisal to supplement the traditional residual because of the increasing sophistication, ease of use and reduced cost of computers and programmable calculators.

The basic method of deducting total development costs from total development value to arrive at the site value, remains unaltered. The basic difference between the traditional residual method and the cash flow method is that, in the cash flow method, all development costs are divided up into monthly, quarterly or yearly amounts, the net cash flows calculated and short term finance allowed for separately each period.

The risk of the development which is represented by NPV and IRR, is determined by using sensitivity analysis. Sensitivity testing is used to examine how changes in individual variables affect land value by three scenarios - optimistic, realistic and pessimistic without considering the probability of selected values of all the variables occurring together. It only considers on the capital value from that particular range with these scenarios without considering the probability of each variable.

16.0 PROBABILITY ANALYSIS

The Probabilistic Valuation approach reconsiders the variables used and accounts for the possibility of them changing or not achieving the single-point estimates. This is done by assigning each variable a range of likely values with its probability of occurrence. From the probabilities assigned for each variable, a probability distribution can be drawn. The form of the distribution can be derived from long run frequencies measured for that variable, or on subjective estimates made by the valuer.

The variables used in the analysis can be classified into two main categories; controllable variables and uncontrollable variables. Controllable variables are the variables which are controlled by the relevant authorities. These variables do not differ in cost and they are determined by reference to the authority which manage them. These variables include, number of units to be developed; pre-development cost (site plan, registration fee, conversion premium, survey fee); professional fees; and legal fees. As these cost are small in amount related to the total development cost and are normally fixed by the relevant authority, their probabilities are not assigned.

Uncontrollable variables are the variables which are determined by the market forces and thus enabling the valuer to make an accurate estimation of the cost involved. These variables include, selling price for the completed buildings, construction cost, infrastructure and earthwork cost, ancillary cost, contingencies and financial charges (rate of interest). For these uncontrollable variables, a probabilistic analysis is done to estimate the chances of a particular value occurring.

A simulation technique, like the Monte Carlo approach involves estimating the range of values for each variable together with its probability of occurrence. The method is known as the Monte Carlo simulation because it makes use of random numbers to generate probability distributions which match those previously assigned to the variable included in the simulation. The program which requires computers then selects at random a combination of the variables and calculates the capital value or net present value of the property. The program will simulate all the probable values in a real world situation arrived from the

extreme pessimistic to the extreme optimistic values for each of the variables identified. The accuracy of the final value will however depend on the number of iterations done in the simulation. A reliable figure to arrive at the final value is about 2,000 iterations. At present, there are computer packages available namely in the form of "@Risk" and "Crystal Ball" making the exercise easier and more manageable.

The shapes of the distribution can be fixed over the complete simulation, they can be changed for each time period or they can be changed in response to changes in the performance of other variables in the model. This will depend on how close to reality the simulation is supposed to go.

The greatest advantage of simulation in general and in particular Monte Carlo simulation is that it provides the means of experimenting and it tries to provide a realism or attempts to initiate the various ways that all the variables could combine as the complex future unfolds.

17.0 CONCLUSIONS

The application of traditional methods of valuation is exclusively and generally accepted by Malaysian valuers with no evidence of questioning their suitability or accuracy (Md. Yusof A, 1992). The valuer is continuing to apply the standards developed in 1930's, or before which have been made obsolete by new advances in theory and technology.

Current traditional methods of valuation which are commonly practiced throughout the real estate world, seemed to be associated with uncertainties and subjective elements. Comparison method which is generally considered as the best and most reliable method is full of subjective elements in the adjustment process.

The weakness of cost method is the assumption cost is equal to value, and the calculation of depreciation where most of the valuers only consider physical aspects. The limitation of residual method is only suitable for site value. The method does not consider the existence of risk and uncertainty elements in the valuation process.

The income or investment approach is used to value property with income flow (rental). Most of it were based on the mean or maximum number of occurrence of the rental. They neglected the actual total number of occurrences by using frequency distribution such as normal distribution and weighted rental.

Having regards to the weakness and limitation of traditional methodology, the application of risk analysis and statistical approach should be imbedded into the valuation techniques. Some of them have been applied successfully in some countries like Australia, New Zealand and United States of America. The main methods are Discounted Cash Flow and Regression Analysis, whilst the other relevant one, is the Multivariate Analysis.

After experiencing an economic downturn in the mid 1980's and receiving criticism, there is a need to reevaluate and improve the valuation techniques. These improvements are needed to produce a more objective and acceptable value estimates and it may well be provided by the statistical-based approach and risk analysis.

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