

International Valuation Technical Paper

Mass Appraisal For Property Taxation

1.0 Introduction

- 1.1 This Technical Paper provides supplementary information to the instructions set out in Guidance Note 13, Mass Appraisal for Property Taxation, and describes recognised methods of Mass Appraisal and essentials of systems design.
 - 1.1.1 Technical papers issued by the IVSC address specialised topics outside the purview of the Standards. Compliance with the procedures discussed therein is not considered mandatory.
- 1.2 Amongst IVSC Member States, it is recognised that the Mass Appraisal process requires special education, training, and experience. The emergence of professional valuation institutions at the national level attests to a market need for competent and highly ethical Valuers within each country. The globalisation of property markets and the establishment of IVSC Standards reflect market insistence that Valuers adopt consistent methods throughout the world.
- 1.3 The Valuation profession is constantly reviewing and revising appraisal methods and techniques and devising new methodologies to meet new circumstances. For this reason, it is not sufficient for Valuers to simply maintain the skills and knowledge they possessed when they became Valuers. Each Valuer should continuously update his or her skills to remain proficient in Mass Appraisal.
- 1.4 In developing a Mass Appraisal, a Valuer should be aware of, understand, and correctly employ recognised methods and techniques necessary to produce and communicate credible Mass Appraisal outputs. Mass Appraisal provides for a systematic approach and uniform application of appraisal methods and techniques to obtain estimates of value that allow for statistical review and analysis.
- 1.5 Mass Appraisal systems are typically utilised by appraisal authorities with statutory powers to find and collect valuation data. The statutory process will usually involve other government agencies in the provision of qualitative and quantitative information essential to the process.
- 1.6 Statutory assessments normally apply for stipulated time-frames before a subsequent Mass Appraisal of the local area is again undertaken. Within this time-frame, the system should be capable of recording or making

adjustments to *Assessment Lists* having regard to alterations in property characteristics, the level of values, and consistency of assessments.

2.0 Statutory and Administrative Provisions

- 2.1 There are many variations in national, state, and local statutory provisions, and other administrative instructions where Mass Appraisal techniques are prescribed. Despite these differences, there are several common characteristics of the Mass Appraisal programs in current usage. This Technical Paper defines the principles to be observed, subject to express administrative instructions or statutory provisions to the contrary.
- 2.2 Mass Appraisal assignments often stipulate Standards of *Level and Uniformity of Appraised Values* to be returned under the program. The completed valuation data should be presented in formats whereby the accuracy of existing and subsequent sales information can be demonstrated. For detailed technical information on best practice and the application of statistically based models in Mass Appraisal, practitioners should consult publications of the International Association of Assessing Officers (IAAO).
- 2.3 Mass Appraisal value definitions often apply to the unencumbered value of landed property, that is, the value of the hypothetical fee simple estate in land. Under these circumstances, all subsequent interests such as leasehold and reversionary interests are excluded. This is an established administrative practice due to the very complicated and time-consuming process of establishing the value of fractional interests in land.

3.0 Definitions

- 3.1 *Annual Value of the Income Stream* designates the gross annual income, which, at the time of valuation, the fee simple owner of the land and all appurtenances thereto, where free from any encumbrances and restrictions on its disposal, might reasonably expect to obtain by leasing/letting the land to a tenant on reasonable terms and conditions. See also *Rental Value*.
- 3.2 *Level and Uniformity of Appraised Values* refer to criteria applied to value indications returned under a Mass Appraisal program to ensure equitable results. *Level of Appraised Values* relates to the proximity between the assessment and actual prices and/or rentals. *Uniformity of Appraised Values*, within and between groups of properties, is a measure of consistency of error ratios. Proof of the Level and Uniformity of Appraised Values is gauged by statistical indicators (e.g., measures of central tendency, range between error ratios, absolute and standard deviations,

coefficients of dispersion and variation, and price-related differentials) as well as by comparison with subsequent sales and/or rental data.

3.4 *Assessment List* represents a list of individual property values produced by an assessment authority for the purpose of *ad valorem* property taxation or statistical or economic studies.

3.5 *Improvements* are buildings, structures, or modifications to land, of a permanent nature, involving expenditures of labour and capital and intended to enhance the value or utility of the property. Improvements have differing patterns of use and economic lives.

Improvements comprise all work done or material used on the land by the expenditure of capital on, or for the benefit of, the land, but only so far as:

- (a) the effect of the work done or material used is to increase the value of the land; and
- (b) the benefit of the work is unexhausted at the time of valuation.

See also *Redundant Improvements*, *Site Improvements*.

3.6 *Improved Value* refers to the capital sum which land, held by an owner in fee simple, when free from any encumbrances and restrictions on its disposal, might be expected to realise if it were offered for sale on such reasonable terms and conditions as a *bona fide* seller would require.

3.7 *Land Value (Rateable Land Value)* refers to the sum, which the fee simple interest in the land might be expected to realise if offered for sale, assuming that any Improvements on or appertaining to the land, other than Site Improvements that are considered as a component of Land Value, had not been made. See also *Redundant Improvements*.

3.8 *Linear Regression* designates a process of statistical analysis used to determine whether a dependent variable and set of one or more independent variables share a linear correlation and, if so, to predict the value of the dependent variable on the basis of the other variables. See also *Non-linear Regression*.

3.9 *Multiple Regression* designates a statistical technique, similar to correlation, applied in data analysis to predict the value of one dependent variable, utilising the known values of multiple independent variables.

3.10 *Non-linear Regression* designates a process of statistical analysis, used to investigate whether a dependent variable and set of one or more

independent variables share a non-linear correlation and, if so, to predict the value of the dependent variable on the basis of the other variables.

- 3.11 *Notice of Assessment* represents an official notification of assessed valuations provided to owners or occupiers of real property under statutory provisions to facilitate the process of *ad valorem* property taxation
- 3.12 *Ratio Study* designates a study of the relationship between appraised or assessed values and market values (prices). In Mass Appraisal, these are sometimes referred to as Appraised Value-to-Sales Ratio Studies.
- 3.13 *Rental Value* refers to an alternative term for Annual Value of the Income Stream as defined above.
- 3.14 *Regression* designates a method that examines the relationship between one or more independent variables and a dependent variable, and that is used to identify and weight analytical factors in making forecasts. See also *Linear Regression, Non-linear Regression, Multiple Regression*.
- 3.15 *Redundant Improvements* comprise work done or material used on Improvements, the value of which is exhausted at the time of valuation; the cost of the removal of Redundant Improvements is a factor in determining Land Value.
- 3.16 *Site Improvements* include improvements such as draining, excavation, landfill, retaining walls, or other improvements, which are considered a component of Land Value.
- 3.17 *Unimproved Value* refers to the sum, which the fee simple interest in the land might be expected to realise, if offered for sale, assuming that any improvements on or appertaining to the land, had not been made. See also *Redundant Improvements*.

4.0 Data Collection and System Recording

- 4.1 The recording of data has evolved from the use of manual methods to the creation of sophisticated data banks that facilitate computer-assisted appraisal, often incorporating geographic information systems (GIS). Property data may be quantitative (e.g., land areas, dimensions, building specifications) or qualitative (assessment of the physical condition, character, or market desirability of the Improvements).
 - 4.1.1 Building plans and areas, construction materials, building costs, building accommodation, room counts, and records of structural improvements and demolitions can be recorded in digital format by

the appropriate authorities and imported into other computerised records systems.

- 4.1.2 Property information includes records of zoning and development plans, planning approvals, heritage classifications, contamination listings, landslip, and any processes imposed by a legal or statutory authority, which may impact upon land use or development rights.
- 4.1.3 Other qualitative or quantitative property information gathered from field inspection may be entered into the system. It is not always necessary that such information be encoded by professional staff. However, the accuracy of recorded property information is vital to computer-assisted appraisal models. Where pertinent to the Mass Appraisal process, available details of all tenancies, areas of leasehold occupation, lease conditions, rental values, and review clauses should be recorded.
- 4.1.4 Rural property, industrial property, specialised property and central business districts all have distinctive appraisal characteristics, which should be recorded in appropriate data sets.

5.0 Appraisal Methodology

5.1 Selection of Appraisal Approaches

- 5.1.1 The selection of Mass Appraisal methodology should be consistent with the type and quality of recording information. Methodologies include the Cost approach, the Sales Comparison Approach, and the Income Capitalisation Approach (see section 2.7 of IVS Property Types). Under Mass Appraisal programs, these fundamental processes may be facilitated by computer-assisted methodology including *Linear Regression*, *Non-linear Regression*, and *Multiple Regression*.
- 5.1.2 Constraints on the Mass Appraisal process should not limit the scope of work to a degree that compromises the credibility of the Mass Appraisal results.
- 5.1.3 The Valuer should have sound justifications to support the scope-of-work decision as well as the decision to exclude any information or procedure that would appear relevant to the client, intended users or affected parties.
- 5.1.4 The Valuer should not limit the extent of research or analysis to a degree that would impair the credibility of the resulting opinions and

conclusions in the context of the intended use of the appraisal.

5.2 Extraordinary Assumptions

5.2.1 The Valuer should identify any extraordinary assumptions and hypothetical conditions needed to carry out the assignment.

5.2.1.1 An extraordinary assumption may be made only if:

- (a) it is required to properly develop credible opinions and conclusions;
- (b) the Valuer has a reasonable basis for making the extraordinary assumption as set forth in Valuation Reporting, para. 5.1.7 (IVS 2005);
- (c) use of the extraordinary assumption results in a credible analysis; and
- (d) the Valuer complies with the disclosure requirements set for extraordinary assumptions in Valuation Reporting, para. 5.1.7 (IVS 2005).

5.2.1.2 A hypothetical condition may be made only if:

- (a) use of the hypothetical condition is clearly required for legal purposes, for purposes of reasonable analysis, or for purposes of comparison; and
- (b) use of the hypothetical condition results in a credible analysis and the Valuer also complies with the disclosure requirements set for hypothetical conditions in Valuation Reporting (IVS 2005).

5.3 Mass Appraisal Value Definitions

5.3.1 The values to be determined by Mass Appraisal should be completed in every case in accordance with the stated value definitions. In the case of Mass Appraisal for *ad valorem* property taxation, the value definitions are a provision of local statutes.

5.3.2 Throughout IVSC Member States, there will be a variety of value definitions, their characteristics being in accordance with economic needs or revenue-raising capability.

5.3.3 Commonly applied value definitions are *Land Value*, *Improved Value*, and *Annual Value of the Income Stream*, each imposing its own distinctive parameters upon the potential to distribute or raise revenue.

5.3.3.1 Other value definitions include Unimproved Value, Site Value, Capital Value, Net Annual Value of the Income Stream, Rental Value, Assessed Value, and other value concepts that are at some variance with those stated under 5.3.3 above and will produce differing Mass Appraisal outcomes.

5.3.4 The above value definitions may be subject to special provisions relating to heritage property.

5.3.5 The Valuer/Appraiser/Assessor should be entirely conversant in the valuation methodologies required under differing value definitions and the relationship of these methodologies to the Market Value concept as defined in IVS 1, Section 3.

5.4 Identification of Relevant Data

5.4.1 The effective date of the appraisal should be identified.

5.4.2 The Valuer should define the value being developed. If, under reasonable terms and conditions, the value opinion to be developed is other than Market Value, the relevant basis of valuation should be disclosed (Guidance Note 13, Mass Appraisal for Property Taxation, 5.5.1 [e]).

5.4.3 Each individual property in the grouping should be identified, with the information relating to its identity stored or referenced in its property record (Guidance Note 13, Mass Appraisal for Property Taxation, 5.5.1 [g]).

5.4.4 The Valuer should identify the characteristics of the properties that are relevant to the purpose and intended use of the Mass Appraisal (Guidance Note 13, Mass Appraisal for Property Taxation, 5.5.1 [f]), including:

- (a) the group of properties subject to similar market influence as the subject property;
- (b) the appropriate market area and time-frame relative to the property being valued; and
- (c) the location and physical, legal, and economic characteristics of comparable properties.

5.4.5 Characteristics of the market that are relevant to the purpose and intended use of the Mass Appraisal should be recorded in the system (Guidance Note 13, Mass Appraisal for Property Taxation, 5.5.1 [a]), including:

- (a) location of the defined market area;
- (b) physical, legal, and economic attributes of the properties;
- (c) time-frame of market activity; and
- (d) property interests reflected in the market.

5.4.6 In appraising real property, the Valuer should:

- (a) identify the appropriate market area and time-frame relative to the property being valued;
- (b) identify and consider any personal property, trade fixtures, or intangibles that are not real property but are included in the appraisal;
- (c) identify known easements, restrictions, encumbrances, leases, reservations, covenants, contracts, declarations, special assessments, ordinances, or other items of similar nature that may be taken into account in the Mass Appraisal process;
- (d) identify and analyse whether an appraised physical segment contributes *pro rata* to the value of the whole; and

- (e) identify and analyse whether an appraised fractional interest, or partial holding contributes *pro rata* to the value of the whole.

5.4.7 Where the value of the whole is not identified, the appraisal should clearly reflect that the value of the property being appraised cannot be used to develop the value opinion of the whole by mathematical extension.

5.4.8 The above requirements do not obligate the Valuer to value the whole when the subject of the appraisal is a fractional interest, physical segment, or a partial holding.

6.0 Assessment Lists

6.1 Development of Assessment Lists

6.1.1 In the case of Assessment Lists for *ad valorem property taxation*, the compilation or return of data should be sufficient to ensure the continued operation and administration of the taxation system having regard to the statutory requirements.

6.1.2 The details of Assessment Lists and return of Mass Appraisal data are enumerated in appraisal contracts or by administrative directive. There may be many variations depending upon the purpose of the Mass Appraisal.

6.1.3 The following items may be included in the return of assessments, depending upon the type of Mass Appraisal assignment:

- (a) property description by area, dimensions, lot number or other reference;
- (b) ownership details;
- (c) assessment details of how the defined value was arrived at;
- (d) date of assessment; and
- (e) date on which the assessments come into force.

6.2 Notice of Assessment

- 6.2.1 The statutory assessment process requires that affected property owners be served *Notice of Assessment* in a timely and enforceable format.
- 6.2.2 The *Notice of Assessment* should extract pertinent details for the owner's information, including identification of ownership, property details such as lot numbers, title reference, area, dimensions, date and proclamation of assessment, as well as details about the assessments that apply to *ad valorem* or other property taxation purposes.
- 6.2.3 Upon receipt of the Notice, a property owner may exercise a statutory right to appeal the assessment. Appeal rights also apply to amended assessments. Appeals can be filed via computer which Mass Appraisal systems are now equipped to handle.

6.3 Maintenance of Assessment Lists

- 6.3.1 System design should facilitate the process of making necessary adjustments to the Assessment Lists. Property information is often made available by the responsible authorities for the purpose of adjusting the values shown on Assessment Lists.
- 6.3.2 Assessment Lists should be amended for any of the following reasons:
 - (a) amendments to land area or dimensions;
 - (b) construction, addition or removal of structures;
 - (c) value adjustments for Redundant Improvements;
 - (d) addition or removal of Site Improvements;
 - (e) rezoning, or changes to development procedures;
 - (f) acquisition or resumption/repossession of land;
 - (g) physical changes to the land;
 - (h) changes in boundaries of the study area; and
 - (i) errors or omissions.

7.0 Appraisal Contracts

- 7.1 In Mass Appraisal administration, the trend has been for authorities to engage the services of professionally accredited contractors. The momentum towards outsourcing has been driven by national policy to promote competition, and implemented in some States by government directive.
- 7.1.1 Mass Appraisal contracts generally contain many of the following terms and conditions:
- (a) a description of the study area;
 - (b) requirements for inclusion or exclusion of specified property types from the Assessment List;
 - (c) the contents of Assessment Reports to be provided;
 - (d) a confidentiality agreement;
 - (e) value definitions; such as Land Value, Improved Value or Annual Value, or their many international variations and equivalents;
 - (f) specification of required appraisal methodologies such as the Sales Comparison Approach, Cost Approach (Summation Approach), Income Capitalisation Approach, Deprival Value estimation (for public sector entities), and Regression techniques along with an explanation of how these methodologies apply to various property types;
 - (g) the names of nominated staff to undertake the duties of supervision and field inspection as well as any sub-contractors to be employed;
 - (h) the level of inspection required for various property types;
 - (i) a time-frame for progressive phasing and final submission of appraisal data;
 - (j) penalty and/or termination provisions for non-compliance;
 - (k) termination provisions for non-compliance;
 - (l) standardised data sets for the return of data in digital format;
 - (m) requirements for ongoing maintenance of the Assessment List;

- (n) submission of subsequent sales information and statistical tests required for standards of Accuracy and Uniformity; and
- (o) contract price and progressive or lump sum payment arrangements upon submission of completed data.

8.0 Standards of Appraisal Level and Uniformity

- 8.1 The term Level of Appraised Values relates to the proximity between assessments and actual prices.
- 8.2 The term Uniformity of Appraised Values is a measure of consistency in error ratios.
- 8.3 Proof of Appraisal Level and Uniformity is gauged by statistical indicators in the modelling process and by comparison with subsequent sales data. It is implicit in Mass Appraisal that even when property-specified and calibrated Mass Appraisal models are used, some individual value estimates will not meet standards of reasonableness, consistency, and accuracy. Valuers engaged in Mass Appraisal have a professional responsibility to ensure that on an overall basis, models produce value estimates that meet attainable standards.
 - 8.3.1 This responsibility requires Valuers to monitor the performance of models, using techniques that may include but are not limited to, goodness-of-fit and model performance statistics (e.g., appraised value-to-sales ratio studies of hold-out samples [representative areas used in checking Accuracy and Uniformity]), or analysis of residuals.
- 8.4 Measurement of Appraisal Level and Uniformity is subject to appropriate standards and independent audit.
- 8.5 Should appraisals be undertaken in times of rapidly rising or falling markets, sales prices analysed from these time-frames should be adjusted accordingly. The degree of acceptable variation should reflect the volume and comparability of market evidence.
- 8.6 Measures of Appraisal Level and Uniformity are subject to the following provisions:
 - (a) the comparable property sales or rentals should be investigated and should qualify as arm's-length transactions. Those discarded for non-compliance with market levels should be listed as part of the

assessment procedure and reasons, given for their exclusion from the comparable data.

- (b) the comparable sales or rentals should be indicative of the level of assessments included in Assessment Lists.
- 8.7 Appraisal contracts or statutory provisions may stipulate statistical parameters within which Mass Appraisal assignments should be shown to conform to market evidence.
- 8.8 The Level of Appraisal is measured by one of three measures of central tendency:
- (a) the Median – the middle ratio when ratios are arrayed in order of magnitude;
 - (b) the Mean – the average ratio, found by summing the ratios and dividing by the number of ratios;
 - (c) the Weighted Mean – formed by dividing the sum of all appraised values by the sum of all sales prices.
- 8.9 Uniformity is measured within groups and between groups of properties. Uniformity between groups is measured by comparing measures of Appraisal Level calculated for each group. Uniformity within groups is measured by one of the following:
- (a) Range – the difference between the lowest and highest ratios;
 - (b) Average Absolute Deviation – the average difference between each ratio and the median ratio;
 - (c) Coefficient of Dispersion – the average absolute deviation, divided by the median ratio and multiplied by 100;
 - (d) Standard Deviation – the average difference between each ratio and the mean ratio when the differences are squared. The average difference is divided by the sample size less one, and the square root is then taken of the result;
 - (e) Coefficient of Variation – the standard deviation expressed as a percentage;
 - (f) Price-Related Differential – a statistic for measuring assessment regressivity or progressivity, and calculated by dividing the mean by the weighted mean ratio;

8.10 There is no single statistical indicator that provides absolute proof of Appraisal Level and Uniformity. Users should become familiar with the above statistical applications before making informed judgements on the adequacy of completed Mass Appraisal assignments.