Consideration of Functional and Economic Obsolescence in the Assessment of Industrial or Commercial Property

BY ROBERT F. REILLY

The current economic climate has caused decreases in value for many types of industrial and commercial properties. Taxing-authority assessors consider these current market conditions in their property assessments. In particular, assessors consider the impact of current market conditions in the application of the cost approach for industrial and commercial property valuation.

First, this discussion summarizes the cost approach to the property tax valuation of industrial and commercial property with an emphasis on the various types of obsolescence that are recognized in a cost approach analysis. Second, this discussion presents the practical procedures that either a taxpayer corporation or a taxing-authority assessor can use to recognize the existence of property obsolescence. Third, this discussion considers practical procedures for analyzing economic obsolescence independently from an income approach analysis. And, fourth, this discussion suggests practical procedures to categorize the various types of property obsolescence.

Industrial and Commercial Property Valuation Approaches

Assessors typically attempt to apply the market (sales comparison) approach, income approach, and cost approach methods in the property tax valuation of a complex industrial or commercial property. This statement is true for appraisals prepared for property tax assessment, appeal, or litigation purposes. However, for many complex, large-scale, and special purpose properties, assessors often have to rely principally (if not exclusively) on cost approach valuation methods.

The income approach is often difficult to apply in the appraisal of such special purpose properties because it can be challenging to allocate the total amount of income generated at the special purpose facility between (1) the property

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income related only to the subject land, buildings, and equipment and (2) the business income generated by the taxpayer intangible assets. The market (or sales comparison) approach is also difficult to apply because there may be very few recent sales of sufficiently comparable industrial or commercial properties available for consideration. In addition, even when there are comparable property sales, the assessor still has to address the issue of allocating the comparable property's sale price between: (1) the land, buildings, and equipment and (2) the business intangible assets operating at the comparable property.

For these reasons, assessors often rely principally on the cost approach in the appraisal of complex, special purpose, or operationally integrated industrial and commercial facilities. The identification and quantification of all forms of obsolescence is also a fundamental procedure in the cost approach valuation of industrial or commercial property. While the necessity of performing this obsolescence analysis is rarely disputed, the specific quantification of obsolescence is often the source of controversy in ad valorem property tax valuation.

Other than the physical deterioration component, property obsolescence is often difficult for the assessor to physically observe. In other words, it may be difficult for an assessor to visually identify the results of functional obsolescence or external obsolescence. In fact, with regard to external obsolescence, the causes of such obsolescence are, by definition, physically outside of the industrial or commercial property.

The data needed to quantify some forms of property obsolescence are often taxpayer-specific. That is, these data have to be supplied to the assessor by the taxpayer/property owner. In addition, these data often cannot be verified or compared in the industrial or commercial real estate marketplace. And, some taxpayer corporations may want to keep these facility-specific data confidential, for both strategic and competitive reasons.

Some forms of property obsolescence analysis are comparative in nature. That is, the obsolescence analysis often compares the subject taxpayer facility with the obsolescence in place to a hypothetical replacement facility without obsolescence. For example, a property obsolescence analysis could compare the subject facility (with its actual obsolescence) that requires excess operating costs to a hypothetical replacement facility (without any obsolescence) that experiences reduced operating costs. Since the hypothetical replacement facility does not actually exist, there may be uncertainty about the hypothetical (and reduced) operating costs of that replacement facility.

The taxpayer/property owner typically does not measure the amount of—or even consider the existence of—property obsolescence. For example, other than the property's original cost accumulated depreciation, there is no provision in taxpayer financial statements for the recognition of either functional or economic obsolescence. For example, the taxpayer management may be aware that competing industrial or commercial facilities are more productive or more cost effective than its facility. However, the taxpayer management may not even associate such indicia of functional or economic obsolescence with the facility's property value.

Cost Approach Procedures

Cost approach appraisal methods are based on the economics principle of substitution. That is, the value of an industrial or commercial property is influenced by the cost to create a new substitute property. All cost approach methods apply a comprehensive definition of cost, including consideration of an opportunity cost during the property design and construction stage. And, the cost of the new substitute property

should be reduced (or depreciated) in order to make this hypothetical "new" property comparable to the actual "old" property.

Cost approach methods are particularly useful in the appraisal of a special purpose industrial or commercial property. In the case of a relatively new property, the taxpayer may have recent construction cost data available and accurate as-built construction plans and drawings. In addition, cost approach methods can be useful in the appraisal of a functionally integrated or process type facility, where it is difficult to segregate tangible property rental income from intangible property (i.e., business enterprise) operating income. Also, the cost approach is particularly useful for the appraisal of functionally unique properties for which there are few comparable property sales.

The assessor understands that the property value is not derived from the current cost measure alone. Rather, the property value is derived from the current cost measure (however defined) less appropriate allowances for all forms of depreciation and obsolescence.

In applying the cost approach, there should be sufficient reliable data available to estimate both the subject property's current cost and all forms of property obsolescence (including any economic obsolescence). There are several common cost approach methods. Each appraisal method uses a particular definition (or measurement metric) of cost. Two common cost definitions are (1) reproduction cost new and (2) replacement cost new. Reproduction cost new measures the total cost, in current prices, to develop an exact duplicate of the taxpayer property. Replacement cost new measures the total cost, in current prices, to develop a new property having the same functionality or utility as the taxpayer property. Functionality is an engineering concept that describes the ability of a property to perform the task for which it was designed. Utility is an economics concept that describes the ability of a property to provide an equivalent amount of satisfaction to the owner or operator.

Regardless of the specific definition of cost that is used in a cost analysis, all cost measurement methods (including reproduction cost new, replacement cost new, or some other cost measurement) require a comprehensive cost analysis. Any current cost measurement should consider the following components: (1) direct costs (e.g., materials and supplies), (2) indirect costs (e.g., engineering and design expenses, legal fees, and the like), (3) developer's profit, and (4) an opportunity cost/entrepreneurial incentive.

Typically, property construction material, labor, and overhead costs are easy to identify and quantify. The developer's profit can be estimated using several procedures. This cost component is often calculated as a percentage rate of return (or profit margin) on the developer's investment in material, labor, and overhead costs. The entrepreneurial incentive component is often measured as the lost income that the property owner or operator would experience during the property's construction period.

The lost income concept of entrepreneurial incentive can be considered in the context of a make-versus-buy decision. For example, let's consider a hypothetical willing buyer and a hypothetical willing seller (i.e., the current owner) of a special purpose plant. Let's assume that it would take two years for a hypothetical willing buyer to construct a replacement plant. If the buyer "buys" the seller's plant, then the buyer can start earning income from the plant operations immediately. By contrast, if the buyer builds its own replacement plant, then the buyer will not earn any income from the plant operations during the two-year construction period. The two years of lost income during the hypothetical plant's development period represents the opportunity cost of "making" (i.e., building) a de novo

replacement plant rather than buying the actual plant.

All cost components—i.e., direct costs, indirect costs, developer's profit, and entrepreneurial incentive—should be considered in the cost approach. In addition, the property's cost new (however measured) should be adjusted for any decreases in property value due to

1. physical deterioration,
2. functional obsolescence, and
3. external obsolescence.

Physical deterioration is the reduction in property value due to physical wear and tear. Functional obsolescence is the reduction in value due to the inability of the property to perform the function (or yield the periodic utility) for which it was originally designed. The technological component of functional obsolescence is a decrease in value due to improvements in technology that make the property less than the ideal replacement for itself.

External obsolescence is a reduction in value imposed by the effects, events, or conditions occurring outside the property's current use or condition. The impact of external obsolescence is typically beyond the taxpayer's control. There are two types of external obsolescence: (1) locational obsolescence and (2) economic obsolescence. Locational obsolescence is a decrease in value due to changes in the neighborhood conditions. Economic obsolescence relates to the inability of the subject property operations to generate a market-based rate of return on investment (ROI).

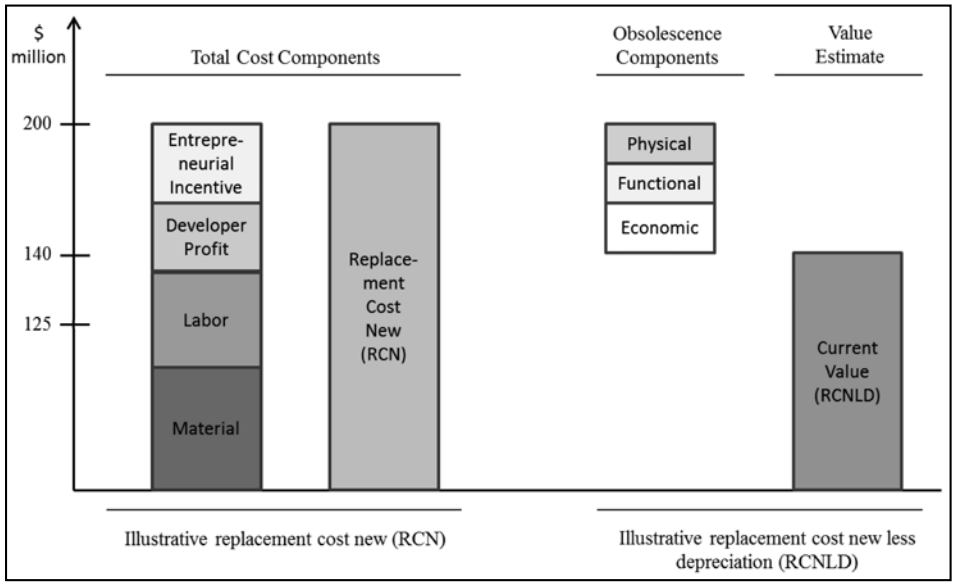
Obsolescence of any type is considered curable if it would cost the taxpayer less to "cure" the inefficiency than the decrease in value caused by the inefficiency. Obsolescence of any type is considered incurable if it would cost the taxpayer more to cure the inefficiency than the decrease in value caused by the inefficiency.

Figure 1 illustrates the relationship between the cost components and the obsolescence components in a typical cost approach analysis. A common formula for quantifying the property's replacement cost new is

reproduction cost new
– curable functional obsolescence
= replacement cost new.

To estimate the property value, the following formula is commonly used:

Figure 1. Industrial property cost and obsolescence components in cost approach analysis



replacement cost new

– physical deterioration

– external obsolescence

– incurable functional obsolescence

= property value.

Property Obsolescence

For purposes of this discussion, obsolescence is defined as any cause of a decrease in the value of an industrial or commercial property. All of the various property obsolescence components are typically categorized as either physical deterioration, functional obsolescence, or external obsolescence.

Physical deterioration represents a decrease in value based on the property's physical condition. There are two common components to physical deterioration: (1) the property's age and (2) the physical wear and tear on the property. Both of these physical deterioration components can be measured either individually or collectively for any particular taxpayer property. In other words, the physical depreciation for each property component can be measured individually. Or, the physical depreciation can be measured in the aggregate for the major taxpayer asset categories. There are several methods that the assessor can use to measure physical deterioration. The most common methods are (1) the age/life method and (2) the observed depreciation method.

Functional obsolescence results in a value decrease when the property is unable to perform the function for which it was originally designed or intended. There are two common components to functional obsolescence: (1) the functional component and (2) the technological component. In the functional component, the property's intended function has remained the same over time, but the property no longer performs that function as well as it did when the property was new. In the technological component, the property may work as well as it did when it was new; however, the property's intended function has become obsolete over time.

Common indications of functional obsolescence include:

1. excess operating and/or maintenance costs
2. excess capacity and/or excess capital costs
3. structural and/or capacity superadequacies or inadequacies.

Typically, functional obsolescence is measured by either

1. capitalizing the property's excess operating costs over the property's expected remaining useful life (RUL),
2. reducing the property's superadequacy cost measurement (however defined) by the amount of capital costs related to the excess capacity, or
3. estimating the amount of capital costs required to cure the functional deficiency or structural/capacity inadequacy.

For example, let's consider a plant owned by the Alpha Manufacturing Company. The Alpha plant is a two-story special purpose facility. However, given the process flow of the current Alpha manufacturing operations, Alpha can use only one story of the two-story plant. The second story remains idle. Alpha management estimates that it costs $2,000,000 per year to maintain, insure, secure, and otherwise keep idle the unused second story.

The assessor concludes that the subject plant RUL is at least 20 years. The assessor further concludes that the appropriate direct capitalization rate is 10 percent. The assessor estimates the reproduction cost new less depreciation (RCNLD) of the Alpha property (before consideration of functional obsolescence) is $120,000,000.

To determine the functional obsolescence, the assessor uses the capitalized excess operating cost method. The calculation is presented in table 1.

The present value annuity factor of 8.5136 is based on the 20-year property RUL and the 10 percent direct capitalization rate. Based on the analysis of the capitalized excess operating cost, the taxpayer property's functional obsolescence is $17,000,000 (rounded) and the taxpayer property value indication is $103,000,000 (rounded).

External obsolescence can cause a decrease in value in an industrial or commercial property from either locational or economic factors. Locational obsolescence occurs when the location of a facility results in either (1) a decrease in the facility's income or (2) an increase in the facility's operating costs. Locational obsolescence is often brought on by changes in neighborhood conditions near the subject property site. For example, locational obsolescence can occur because of the construction of a landfill facility or a wastewater treatment plant next to the subject property. Economic obsolescence occurs when the property owner can no longer earn a market-based rate of return on the operation of—or the investment in—the subject facility. Economic obsolescence often relates to the business enterprise that operates at a special purpose property. A change in industry conditions could cause the property owner to generate decreased revenue, profit margin, or return on investment metrics.

Three common methods for quantifying external obsolescence are:

1. the capitalization of income shortfall method
2. the paired sales comparison method
3. the market extraction method.

Let's consider the use of the capitalization of income shortfall method to test (and then measure) economic obsolescence at the Beta Company's special purpose facility. Let's assume that the Beta Company's market-derived cost of capital is 12.5 percent. Let's further assume that the business operation at the subject special purpose property is earning, based on current net operating income, a 10 percent return on investment (i.e., yield rate). Based on this comparative economic performance metric (i.e., the actual property ROI versus the property required rate of return), economic obsolescence of the Beta Company's special purpose property can be measured as presented in table 2.

Now let's assume the RCNLD of the Beta Company property (before consideration of economic obsolescence) is $600,000,000. By applying the economic obsolescence indication from table 2 to this figure, the cost approach value can be determined as demonstrated in table 3.

It should be noted that, at this $480,000,000 cost approach value indication, the Beta Company should be able to generate a sufficient level of economic support for the subject property value.

Table 1. Alpha Manufacturing Company cost approach analysis—Manufacturing plant functional obsolescence as of January 1, 2012

Capitalized Excess Operating Cost Approach Analysis		
Site and improvements RCNLD (before functional obsolescence)		$120,000,000
Less: Functional obsolescence		
annual excess operating cost	$2,000,000	
× present value of annuity factor	× 8.5136	
= capitalized excess operating costs	$17,027,200	− 17,027,200
Equals: RCNLD less functional obsolescence		$102,972,800
Cost approach value indication (rounded)		$103,000,000

Table 2. Beta Company—Special purpose property cost approach economic obsolescence indication

Comparative Financial Performance Metrics Capitalization of Income Shortfall Method	
Market-derived Beta Company required rate of return (i.e., yield capitalization discount rate)	12.5%
Less: Actual ROI earned on the property operations	− 10.0%
Equals: Income shortfall return measure (based on the shortfall of the performance metric)	2.5%
Divided by: Market-derived required rate of return	÷ 12.5%
Equals: Economic obsolescence indication (i.e., 2.5% return shortfall divided by 12.5% required return)	20.0%

Table 3. Beta Company—Special purpose property cost approach analysis and value conclusion as of January 1, 2012

Beta property RCNLD (before economic obsolescence)	$600,000,000
Less: Economic obsolescence at 20% (i.e., $600,000,000 RCNLD × 20% economic obsolescence)	− 120,000,000
Equals: Beta property cost approach value	$480,000,000

That is, at the $480,000,000 property value indication, the Beta Company should earn exactly a 12.5 percent ROI on the operation of the subject special purpose property (while the Beta cost of capital is also 12.5 percent).

In obsolescence analyses, assessors sometimes distinguish between curable obsolescence and incurable obsolescence. In the case of curable obsolescence, it is assumed that a rational property owner would incur the capital costs to cure the subject obsolescence and thereby eliminate the cause—and the effect—of any future obsolescence. Therefore, for curable causes of obsolescence, the cost-to-cure often sets an upward limit on the property obsolescence measurement.

Some assessors also may be concerned about classifying the type of obsolescence correctly. In other words, should a particular value decrement be identified as functional obsolescence or as external obsolescence? In practice, the correct classification of obsolescence is not as important as the correct quantification of the subject property obsolescence. As long as the cause and effect of the value decrement are correctly identified, the classification of a particular value decrement among the three types of property obsolescence should not affect the final property value conclusion.

Obsolescence Identification Procedures

Some obsolescence types are easier to identify than others. For example, the existence of physical deterioration is often recognized through a property inspection. A physical inspection of the subject facility should allow the assessor to identify the effects of wear and tear. And, a physical inspection of the taxpayer's accounting records should allow the assessor to identify the subject facility's age and the original date placed in service.

A physical inspection may also enable the assessor to identify some types of functional obsolescence. For example, the assessor may be able to observe excess capacity related to either unused facility space and/or unused facility equipment. A physical inspection also may allow the assessor to identify an inefficient facility design or layout or an inefficient equipment production or process line. And, a physical inspection also may allow the assessor to identify any real estate structural deficiencies or personal property material flow/process flow deficiencies.

As mentioned previously, many of the causes of functional obsolescence or external obsolescence are quantified on a comparative basis. The comparative basis can be the property's actual operating

results "with" the obsolescence effect compared to the property's hypothetical (e.g., historical or projected) operating results "without" the obsolescence effect. Alternatively, the comparative basis can be the property's actual operating results "with" the obsolescence effect compared to the operating results of one or more comparable properties (taxpayer or otherwise) "without" the obsolescence effect. Given the comparative nature of these types of obsolescence analyses, a physical inspection alone may not be adequate to identify these causes of obsolescence.

The assessor may need to review property-specific financial documents or operational reports in order to identify many types of functional and external obsolescence. These types of taxpayer documents can include the following:

1. taxpayer property financial statements or financial results of operations;
2. taxpayer property financial budgets, plans, projections, or forecasts;
3. taxpayer production statements, production cost analyses, or operating cost variance analyses;
4. material, labor, and overhead cost of goods sold analyses related to the property business operations;
5. fixed versus variable expense operating statements related to the property business operations;
6. cost/volume/profit analyses related to the property business operations;
7. unit/dollar sales analyses or average selling price analyses.

These data and documents can be utilized by the assessor in various comparative analyses, including:

1. actual (current) taxpayer results versus historical taxpayer results,
2. actual (current) taxpayer results versus budgeted taxpayer results,
3. actual taxpayer results versus specific comparative property results,
4. actual taxpayer results versus specific competitor results,
5. actual taxpayer results versus industry average/benchmark results,
6. actual taxpayer results versus the subject property practical/normal production capacity results.

In addition, the assessor could compare the taxpayer property's historical and projected results of operations to financial benchmarks derived from selected guideline public companies. The assessor also could compare the taxpayer property results of operations to benchmarks derived from published industry data sources. Figure 2 lists some of the industry publications commonly used as sources for benchmark comparisons in obsolescence analyses.

The data sources included in figure 2 allow the assessor to compare the taxpayer property financial results to benchmark industry expense ratios, profit margins, returns on investment, and the like. In addition to identifying

Figure 2. Industry financial ratio data sources

The Risk Management Association *Annual Statement Studies: Financial Ratio Benchmarks*
BizMiner (The Brandow Company) *Industry Financial Profiles*
CCH, Inc. *Almanac of Business and Industrial Ratios*
Fintel, LLC *Fintel Industry Metrics Reports*
MicroBilt Corporation (formerly IntegraInfo) *Integra Financial Benchmarking Data*
ValueSource *IRS Corporate Ratios*
Schonfeld & Associates, Inc. *IRS Corporate Financial Ratios*

the existence of any property obsolescence, such a comparison can assist the assessor in evaluating the reasonableness of the taxpayer's own financial projections. Such taxpayer financial projections can provide yet another benchmark comparison for quantifying property obsolescence.

If the assessor is familiar with competitive or comparative properties, then a physical inspection of the subject property may reveal some types of property obsolescence. However, the assessor will often conduct these physical inspections on a comparative basis. For example, the assessor may note that the subject property's production/process line requires four employee operators while a comparative property's production/process line only requires two employee operators. The assessor may note that the subject property's production/process line produces four product units per operation while a comparable property's production/process line produces eight product units per operation. Or, the assessor may note that the subject property's production/process line produces considerably more scrap or waste material than a comparative property's production/process line produces.

The assessor may be able to identify the causes of certain types of obsolescence through a physical inspection. However, the assessor will typically rely on comparative taxpayer property-related financial and/or operational data to measure the observed obsolescence.

With regard to locational obsolescence, the assessor may be able to identify some causes of obsolescence through a physical inspection of the neighborhood surrounding the subject property. For example, the assessor may observe new construction that is physically between the subject apartment or office tower and a scenic view (such as a lakefront or ocean). The assessor could observe that the neighborhood around a shopping mall or a resort property is deteriorating. More likely though, the assessor will identify locational obsolescence by performing a comparative analysis of market rents, particularly for an income-producing property. This comparative analysis could contrast (1) the taxpayer property's current rental rates with the taxpayer property's historical rental rates or (2) the taxpayer property's current rental rates with rental rates at a comparable property at a different location.

With regard to economic obsolescence, the assessor may analyze property-specific financial data in order to identify the causes of the obsolescence. Particularly with regard to a complex, special purpose property, the assessor may analyze: business enterprise profit margins, business enterprise returns on investment, industrial/commercial product unit average selling price, industrial/commercial product unit cost of goods sold, or industrial/commercial product unit sales volume. Each of these various economic analyses would typically be performed on a comparative basis, such as:

1. current taxpayer results versus historical taxpayer results,
2. current taxpayer results versus planned or budgeted taxpayer results,
3. current taxpayer results versus specific comparative properties,
4. current taxpayer results versus industry average results.

In each case, the assessor will look for some external factor affecting the subject facility that may cause the property owner to not earn a market-based rate of return on the property investment.

Figure 3 presents a list of some of the many conditions that the assessor will look for to consider the existence of economic obsolescence at the taxpayer property. While none of these factors specifically measures the amount of

economic obsolescence, the existence of one or more of these factors may indicate the existence of economic obsolescence at the taxpayer property. To measure economic obsolescence, the assessor will consider (1) taxpayer-specific factors and/or (2) property-specific factors.

Figure 3. Taxpayer property conditions that may indicate the existence of economic obsolescence

1. The subject property's income approach value is less than its cost approach value.
2. The subject property's market approach value is less than its cost approach value.
3. Taxpayer's revenue has been decreasing in recent years.
4. Taxpayer's profitability has been decreasing in recent years.
5. Taxpayer's cash flow has been decreasing in recent years.
6. Taxpayer's product pricing has been decreasing in recent years.
7. Taxpayer industry's revenue has been decreasing in recent years.
8. Taxpayer industry's profitability has been decreasing in recent years.
9. Taxpayer industry's cash flow has been decreasing in recent years.
10. Taxpayer industry's product pricing has been decreasing in recent years.
11. Taxpayer's profit margins have been decreasing in recent years.
12. Taxpayer's returns on investment have been decreasing in recent years.
13. Taxpayer industry's profit margins have been decreasing in recent years.
14. Taxpayer industry's returns on investment have been decreasing in recent years.
15. Taxpayer and/or industry competition has been increasing in recent years.

Economic Obsolescence and the Income Approach

In some cases, the assessor may find that a taxpayer's economic obsolescence analysis is based on just another application of the taxpayer's income approach valuation. In other words, the taxpayer's cost approach valuation analysis has created a clone of its income approach valuation analysis. No matter what starting point the taxpayer chooses for the replacement cost new or reproduction cost new in its cost approach analysis, the cost approach value after the economic obsolescence adjustment will turn out to be exactly the same as the income approach value.

This statement may be absolutely true (and the assessor's objection correct) if the taxpayer (or the taxpayer's appraiser) has not properly performed the economic obsolescence analysis. The economic obsolescence analysis in the cost approach should be independent of the subject property income approach analysis. Both the cost approach and the income approach may rely on common valuation variables, e.g., a property-specific discount rate or a direct capitalization rate. However, the economic obsolescence analysis should not be influenced at all by the value conclusion for the subject property in an income approach analysis.

Some appraisers incorrectly quantify economic obsolescence as a "plug number" or a residual calculation. That is, first, the appraiser quantifies replacement or reproduction cost new less physical depreciation (RCNLD). Second, the appraiser quantifies the income approach value (IAV) indication. Third, the appraiser subtracts the IAV from the RCNLD to measure any property economic obsolescence. Last, the appraiser subtracts economic obsolescence from RCNLD to arrive at the cost approach value (CAV) indication.

For example, let's assume that the taxpayer property's RCNLD is $400 million. Let's further assume that the income approach value indication for the taxpayer's property is $300 million. Some appraisers subtract the income approach value (i.e., $300 million) from the RCNLD (i.e., $400 million) to con-

clude economic obsolescence of $100 million. The cost approach value conclusion then becomes the $400 million RCNLD less the $100 million economic obsolescence, for a cost approach value conclusion of $300 million.

This residual from income approach value procedure is an entirely inappropriate economic obsolescence measurement procedure. Using this inappropriate procedure, the property IAV will always be exactly equal to the property CAV. Using this inappropriate procedure, the cost approach determination is not independent of the income approach determination. In fact, the value conclusion in the cost approach is entirely influenced by the income approach value. Accordingly, this "plug" or residual calculation procedure for measuring property economic obsolescence is fundamentally flawed.

Economic obsolescence is usually calculated on a comparative basis. Some of the many common comparisons include:

1. actual margins, returns, units, or prices versus historical margins, returns, units, or prices;
2. actual margins, returns, units, or prices versus budgeted margins, returns, units, or prices;
3. actual rates of return versus required rates of return (i.e., costs of capital);
4. actual results versus benchmark results from comparable property or industry average.

These comparative economic obsolescence analyses can involve some of the same data points used in the income approach analysis (e.g., unit volume, average selling price, net operating income margin, and the like). However, the results of these comparative economic obsolescence analyses should be independent of the results of (and the value indication derived from) the income approach. The one economic obsolescence comparative analysis that is simply not appropriate is:

cost approach value indication (before the recognition of economic obsolescence)

– the income approach value indication

= property economic obsolescence.

A correctly prepared economic obsolescence analysis can—and should—stand on its own analytical merits. It should (and can) be independent of the income approach analysis. With an economic obsolescence analysis based on comparative financial or operational variables, the cost approach can—and should—provide an independent value indication from the income approach.

Let's consider an illustrative economic obsolescence analysis for hypothetical taxpayer Gamma Corporation. Gamma operates a special purpose manufacturing facility that may be subject to economic obsolescence. The assessment date is January 1, 2012. The analysis is presented in table 4.

Based on the analysis of the Gamma facility financial and operational metrics, the assessor selected 19 percent as the appropriate economic obsolescence adjustment for the subject property's RCNLD value indication. It is noteworthy that this economic obsolescence calculation is independent of an income approach value conclusion. In fact, in this example, the assessor never performed an income approach analysis.

Distinguishing the Obsolescence Influences

The identification and quantification of all types of obsolescence is a necessary procedure in any cost approach analysis. However, the classification of property-specific influences among the different types of obsolescence is a much less important procedure. In other words, the taxpayer and the assessor should be more

Table 4. Gamma Corporation cost approach analysis—Subject property economic obsolescence of January 1, 2012

Subject Property Financial and Operational Metrics	Average of 2007–2010	For Year Ended 12/31/11	Percentage Difference
Earnings Before Interest and Taxes (EBIT) profit margin	24.0%	20.0%	−16.7%
Net cash flow margin	12.0%	10.0%	−16.7%
Pre-tax net income margin	15.0%	12.0%	−20.0%
EBIT return on total assets	16.0%	14.0%	−12.5%
EBIT return on net assets	20.0%	16.0%	−20.0%
5-year compound revenue growth rate	6.5%	4.5%	−30.8%
5-year compound net cash flow growth rate	7.5%	5.5%	−26.7%
Average sales price per unit sold	$1,200	$1,050	−12.5%
Mean percent decline in Gamma metrics			−19.5%
Median percent decline in Gamma metrics			−18.4%
Trimmed mean percent decline in Gamma metrics			−18.8%
Selected economic obsolescence indication			−19.0%

concerned that they both (1) recognize all types of obsolescence at the subject property and (2) do not double count the effect of any type of obsolescence at the subject property. The categorization of a particular obsolescence influence as either functional obsolescence or economic obsolescence is not crucial to the final valuation results.

Nonetheless, there are several guidelines that the assessor can consider when classifying the various types of obsolescence influences at an industrial or commercial property.

First, the assessor should be careful not to double count the same obsolescence influence. This can occur when two related data sources are used to quantify two (allegedly) different obsolescence influences. For example, the assessor capitalizes higher-than-planned operating costs and calls that analysis conclusion functional obsolescence. Then, the assessor capitalizes lower-than-planned operating profit and calls that analysis conclusion economic obsolescence. Those two obsolescence analyses (both based on related taxpayer financial data sources) may result in double counting the taxpayer property obsolescence.

Second, when categorizing the various obsolescence influences, the assessor should consider the basic descriptions of the three types of obsolescence. These basic descriptions were presented earlier in this discussion. Going back to the basics in terms of descriptions should help the assessor to properly categorize the various obsolescence influences.

Third, it is usually helpful for the assessor to identify and quantify obsolescence influences in the order in which they are discussed in most property valuation textbooks: first, physical deterioration; second, functional obsolescence; third, external obsolescence. This sequence allows the assessor to investigate and classify the obsolescence influences in an organized manner.

Fourth, to the extent practical, the assessor should separately explain and quantify each property obsolescence influence. Such separate explanations can help the assessor (and any other party relying on the property appraisal report) to better understand and classify the various property obsolescence influences. The separate quantification also helps the appraisal report reader understand the different obsolescence

influences. It also can help the assessor to identify—and therefore avoid—the use of the same taxpayer data in multiple obsolescence analyses.

Fifth, obsolescence influences can be quantified as either (1) a percent amount value adjustment or (2) an absolute dollar amount value adjustment. Depending on how the various obsolescence influences are quantified, the application order of the obsolescence influences can be important.

The application sequence is not important if all forms of obsolescence are expressed as a percentage adjustment. As an example, let's assume that the taxpayer property replacement cost new less depreciation (RCNLD) is $100,000,000. Let's further assume that the obsolescence influence A adjustment is 10 percent and the obsolescence influence adjustment B is 20 percent. In this case, the order of applying the two obsolescence adjustments does not matter. The cost approach value indication is $72,000,000, regardless of which obsolescence adjustment is applied first and which obsolescence adjustment is applied second.

Likewise, the application sequence is not important if all forms of obsolescence are expressed as an absolute dollar amount. For example, let's assume again that the taxpayer property RCNLD is $100,000,000. Let's further assume that the obsolescence influence A adjustment is $10,000,000 and the obsolescence influence B adjustment is $20,000,000. In this case, the order of applying the obsolescence adjustments does not matter either. The cost approach value indication is $70,000,000, regardless of which obsolescence adjustment is applied first and which obsolescence adjustment is applied second.

However, the application sequence does become important if some obsolescence influences are expressed as a percentage amount adjustment and other obsolescence influences are expressed as an absolute dollar amount adjustment. For example, let's assume that the subject property RCNLD is again $100,000,000. Let's further assume that the obsolescence influence A adjustment is $10,000,000 and the obsolescence influence B adjustment is 20 percent.

As illustrated in table 5, the application sequence of these two obsolescence adjustments will directly influence the final value indication. In this situation, the assessor should (1) conclude the most appropriate application sequence of the various obsolescence adjustments and (2) explain the rationale for the obsolescence application sequence selection in the appraisal report.

Summary and Conclusion

This discussion summarized the cost approach to property tax valuation,

Table 5. Application of multiple property obsolescence influences

Obsolescence Application Sequence 1 Applying obsolescence influence A before obsolescence influence B	
Subject taxpayer property RCNLD	$100,000,000
Less: Obsolescence influence A (fixed $ amount)	– 10,000,000
Subtotal	90,000,000
Less: Obsolescence influence B (@ 20%)	– 18,000,000
Equals: Taxpayer property value indication	$72,000,000
Obsolescence Application Sequence 2 Applying obsolescence influence B before obsolescence influence A	
Subject taxpayer property RCNLD	$100,000,000
Less: Obsolescence influence B (@ 20%)	– 20,000,000
Subtotal	80,000,000
Less: Obsolescence influence A (fixed $ amount)	– 10,000,000
Equals: Taxpayer property value indication	$70,000,000

particularly as it applies to complex or special purpose industrial and commercial properties, and the three generally accepted types of property obsolescence that are recognized in cost approach analysis. This discussion also explained the procedures that both taxpayers and taxing-authority assessors can use to identify the existence of obsolescence at an industrial or commercial property. Finally, this discussion presented practical procedures to ensure that the economic obsolescence analysis is performed independently of the income approach analysis.