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Extracting Depreciation for Real Estate Market Value in the Cost Approach

[ABSTRACT]

IN the world of real estate valuation, cost approach, market approach and income approach are the three widely used approaches in valuing real estate market value. Elements and application of cost approach have been debated for sometime especially the depreciation aspect of the method. Many discussions as well as articles have been written on how the real estate value actually depreciates and whether the straight line method in the accounting procedures really reflect the depreciating of real estate market value. Evidences from various researches, and real estate valuation standards prove otherwise and suggest more reflective methods in detecting real estate market depreciation.

Keywords: Book value, Market Value, Depreciation, Physical depreciation, Functional depreciation, Economical depreciation, Actual age, Effective age, Useful life, Economic life.

1. Real Estate Depreciation and Types of Its Depreciations

DEPRECIATION (C. Marwick 1995) is a reduction in the value or price of something. If that something is real estate market value then how should one approach in detecting it and what cause a real estate or a real property to depreciates. The issue of detecting depreciation is often raised when an appraiser attempts to use the cost approach in valuing property.

The cost approach in valuing a property has the following formula;

Property Market Value = Market value of land + Market value of improvement (1)

From (1);
Market value of improvement = (Replacement Cost New - Accumulated Depreciation) (2)

Therefore;
Property Market Value =
Market value of land + (Replacement Cost New - Accumulated Depreciation) (3)

As we can see that accumulated depreciation plays one-third a part of property market valuation.

Types of Real Estate Depreciation

(Shea-Joyce 1996) assigned three major causes operating individually or in combination affecting the depreciation of an improvement. These causes are physical deterioration, functional obsolescence and external obsolescence. Furthermore (Ellis 1990) described property depreciation as following **"**Property depreciation has been defined in the UK as a reduction in capital or rental value or, more specifically, under-performance relative to **'**prime**'** (or best) property, created by physical deterioration and functional/aesthetic obsolescence.**"**

Physical deterioration is when the improvement becomes less than new. It can be caused either by any act of nature or human or a combination of the two such as acid rain, extreme sun exposure or wear and tear cause by occupying the improvement.

Functional obsolescence/depreciation is usually caused by too much or too little of structure, material and design input towards the improvement that caused the market to perceived the improvement as either being inadequate or super adequate than what the market requires.

External obsolescence is sometimes referred to as economic depreciation. This is mainly because one of the most influential external factors that can cause a property to diminishes in value is economic condition. But again apart from economic conditions there might be other external causes such as a change of city zone, permitting the land a different highest and best use.

People often perceive depreciation occurrence after sometime from the day the improvement was completed. This is perhaps because it might seems to make more sense if the eye can witness the deterioration but in theory depreciation of any kind or in combination can occur since day one of the project.

2. Alternative methods in detecting real estate market depreciation

(WHIPPLE 1995) warned that this view of depreciation should not be confused with the accounting provision, which goes under the same name. When a long-lived asset is acquired, the cost is not expensed in the books of account in the year of acquisition but is spread out over its assessed life. Again (Shea-Joyce 1996) also mentioned that the term depreciation is used in both accounting and appraisal so it is important to distinguish between the two usages. Book depreciation is not market-derived, in contrast to depreciation estimates developed by appraisers which are.

With the above concept, we now know that depreciation used in calculating market value of real estate should be market derived and the followings are some of the approaches used in detecting the subject depreciations.

2.1. Age-Life Method

The formula:

$$\text{Percentage of accumulated depreciation} = \frac{\text{Estimated effective age}}{\text{Economic Life}}$$

Actual age is the age or number of years of improvements from the beginning of its construction completion up to the date of valuation.

Estimated effective age is the age or number of years of improvements that reflects the conditions of the improvement. The effective age can be equal, more than or less than the actual age (since the completion of the construction) of the improvement. The reason that effective age is used rather than the actual age is mainly because the effective age reflects the physical attributes of the improvements more than the actual age itself. Some owners or property managers takes good care of their property that the physical attribute of the improvement appears to be better than those of the same actual age and vice versa. (Derbes 1987) suggested a more precise definition of effective age, such as effective age is equivalent to the chronological age of typical properties having the same utility and in the same condition as the subject. He also continued to mentioned that this link effective age to the market, and makes it clear that effective age will reflect the current level of maintenance related to typical practices and any change in the state of art.

From the above definition perhaps we can concluded that ***effective age can either be equal, less than or more than actual age*** of a property and that the effective age contributes towards the value of the property more than the actual age because it reflects the market perception of the property's condition.

Useful Life (Shea-Joyce 1996) stated that it is a term that relates to the physical components of an improvement. It is a period of time over which the components of the improvement may reasonably be expected to perform the functions for which they were designed. The author continues to state that although the useful life of some physical components, such as concrete and steel, may be hundreds of years, it is unlikely that the improvements containing these components will have economic life expectancies that long.

Economic Life is the life span of an improvement that it will be able to contribute to the value of the property. This is different from useful life. Useful life of an improvement is the total number of years that the improvement is expected to still be physically sound or exist. The economic life is usually shorter than the useful life this is mainly because market behavior changes within years shorter than the life of a physical improvement. For example, a shop house can have a physical life span of 80 years but it might run out of demand within 25 years, therefore, its economic life is 25 instead of 80.

The economic life and effective age (Derbes 1987) mentioned that these are difficult concepts that can easily be misapplied in measuring accrued depreciation in the cost approach. If misapplied and use the actual age divided by the useful life instead of using the effective age divided by the economic life, the valuation of the same property has a high probability that the final value will be different due to depreciation calculation. (Miller 1998) said that since we are measuring actual age against physical life, we are computing only physical depreciation. If an estimate of economic life is used instead of physical life, the computed depreciation will include normal functional and economic obsolescence as well as physical deterioration. The usefulness of a building seldom terminates because of physical deterioration alone.

An example of how to calculate depreciation with the age-life method is as follows;

Assume that

1. The actual age of building A is	15	years
2. The effective age of building A is	10	years
3. The useful life of such building is	50	years
4. The economic life of such building is	40	years
5. The replacement cost new of such building is	10	million baht
6. The market value of land	2	million baht

- Depreciation = $\frac{10}{40}$ = 25%
- Market Value of Building A
  = 2,000,000 + (10,000,000 - (25%x10,000,000))
  = 2,000,000 + (10,000,000 - 2,500,000)
  = 2,000,000 + 7,500,000
  = 9,500,000 baht

Comment on the Method

Though this method reflects the precision of depreciation more than the use of the actual age divided by useful life but it is still another form of a straight-line calculation. (Cannady 1986) mentioned in (Dotzour 1990) indicated that the economic age-life method, which assumes a straight-line rate of depreciation, may not be the most appropriate method. Their results in the empirical study indicated that a reverse sum of year digits method more closely reflects depreciation in single-family houses. Boykin and Ring, from the following statement concur with Cannady regarding the methods straight line rate of depreciation. (Boykin) also stated that the effective age and economic life method offers the advantages of simplicity and adaptability to a wide variety of property classifications. However, it has some drawbacks, including: it is based on economic life and effective age-both being difficult to estimate accurately; it relies solely on a straight line pattern of accrued depreciation; it uses an overall rather than component measure of depreciation; and it fails to distinguish either between curable or incurable obsolescence or short-life or long-life structural components.

2.2. Market Extraction Method

In (Shea-Joyce 1996) the market extraction method is considered as the most direct means of measuring depreciation because it is based on the transactions of market participants. This means that it is market derived. (Boykin) stated that the market extracted depreciation accounts for all aspects of accrued depreciation. It might be argued that it is not as precise as the engineering breakdown method. However, in reality it is probably as accurate but offers the advantage of being market derived and easily understood by clients. This method is particularly well adapted to larger projects where a greater number of similar properties are being appraised.

The followings are steps in calculating the market extraction method.

Step 1 : Find sale price of comparable sales of the subject property.

Step 2 : Subtract the sale price with the market value of the land/site. The remaining value is the depreciated price of the improvements.

Step 3 : Find the replacement cost new of each comparable improvement.

Step 4 : Subtract the depreciated price of the improvement from step 2 from the replacement cost new found in step 3. The remaining amount is the lump-sum dollar depreciation of that comparable.

Step 5 : Divide the depreciation from step 4 with the replacement cost new and that is the lump-sum percentage depreciation of each comparable.

Step 6 : Divide the lump-sum percentage depreciation with the age of each comparable sales to find the average annual depreciation rate.

Step 7: Appraiser must now weigh in the most percentage towards the comparable that is the most similar in all aspects with the subject property and find the subject annual rate of depreciation.

The following example is based on the market valuation of a low-rise office building located at 2991/39 Soi Ladprao 101/3 Visut Thanee Compound: (Niti Sujinprom 2003) mentioned in the market valuation report that a close by property, a low-rise office building 2991/33 located in the same compound was sold in May 2003 for 13 million Baht. Physical and locational attributes are very much similar to the 2991/39 subject property. By this they have attempted to use the market extraction approach in detecting market depreciation as follow.

Items/Comparables	2991/33
Sale price (Baht)	13,000,000
Less market value of land	-3,744,562
Depreciated price of improvement	9,255,438
Replacement cost new of improvement	8,913,000
Less depreciated price of improvement	-9,255,438
Lump-sum depreciation	-342,438
Lump-sum percentage depreciation	-3.84%
Age of sale	12
Average annual depreciation rate	-0.32%

With the market depreciation that the author and colleague extracted from the market, the group was able to carry out the cost approach of the subject property as follow.

Market Value = Market Value of Land + (Replacement Cost New Accumulated Depreciation)

= 3,739,837 + (10,705,284 - (10,705,284 * 3.84%))

= 14,856,418

= approximately 14,800,000 Baht

To be able to verify the accuracy of the market extraction method of detecting depreciation, a cross check with other method such as market approach should be done.

(Prapansak Rakchaiwan 2003) valuing the same property as (Niti Sujinprom 2003) but using market approach instead of cost approach mentioned in the report that by using the Direct Comparison Approach the market value of the subject property at the date of valuation was 14,200,000 Baht.

The difference between the market approach-direct comparison to the cost approach conducted by (Niti Sujinprom 2003) was 600,000 Baht or 4.2%.

(Prapansak Rakchaiwan 2003) also used the Weighted Quality Score method in the market approach in finding the market value of the subject. The result was 14,500,000 Baht which was 300,000 Baht or 2.1% different from the cost approach Niti Sujinprom 2003 conducted.

Whether it is a comparison between the direct comparison or the weighted quality score in the market approach the difference between the market approach is not significant to the cost approach in the way that the depreciation was extracted from the market.

Conclusion

If the depreciation(s) that affect(s) the market value is more accurately extracted or detected, the accuracy of the cost approach in which the deduction of depreciation plays one third of the formula will very much improve. Whether using the effective age and economic life method, break down method or the market extraction method. No method can be said to be the magic box for finding market depreciation, each has its own uniqueness and limitations. Finding enough comparables is one of the limitation in the market extraction method especially in Thailand where all sales information are not made public.

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