

Natalia Poczta\*

## The Cost Approach for the Valuation of Grounds in Ukraine

### 1. Legal Basis

To carry out the valuation of the grounds the following approaches are applied:

- cost approach;
- revenue approach;
- comparative approach.

The determination of the market value for the valuated object is possible with the application of all the approaches, provided we have all the necessary information.

The rest value of replacement (restoration) – is the value of replacement (restoration) of the valuated object, regarding all the types of wear (for the real estate – regarding the market value of the plot with its present type of usage or rights connected with the plot). The rest value of replacement (restoration) as the basis for the valuation is defined by applying the cost approach and used in the valuation of a special property, including accountancy inventory to determine its real value. If the conditions refer to the agreements of the special property, for which the valuation meets the requirements applied to determine the market value, the rest value of replacement (restoration) can equal their market value.

Cost approach assumes the definition of the current value of the costs to restore or replace the valuated object with later corrections due to the general wear.

The application of the cost approach in the valuation of plots with ground improvements and ground improvements alone, involves the determination of the rest value of the replacement (restoration) of the valuated object. The rest value of replacement (restoration) of the valuated object consists of the rest value of the replacement (restoration) of ground improvements and the market value of the plot (the rights connected to the plot) during its present use.

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\* Faculty of Mining Surveying and Environmental Engineering (Ph.D. Studies), AGH University of Science and Technology, Krakow.

Thus the value of the ground, determined based on the cost approach, includes two components: the value of the plot (or the value of the rights to use it) and the value of ground improvements.

While applying the cost approach, the information used in the valuation procedures should comply with the market data on the costs of making this real estate or a similar real estate in contemporary conditions, adding the profit for the subcontractor. Apart from the profit for the subcontractor one can take into account the profit for the investor, if the possibility of obtaining such a profit was confirmed by the information on the price of selling by the investors having built similar objects. The amount of the mentioned profit is determined based on the analysis of respective information from the market. Besides, the prices of sale (offer) by the investors having built similar objects can be used in calculating the market value of the valued object, according to the comparative approach with the application of proper corrections.

In the valuation of plots containing ground improvements, or the valuation of ground improvements applying the method of cost approach the following order of evaluated procedures is accepted:

- defining the market value of the plot (rights linked to the plot) at its present use,
- defining the value of restoration of value of replacement for ground improvements,
- calculating the degree of the wear of ground improvements,
- defining the rest value of replacement (restoration) of ground improvements,
- defining the value of the valued object as the sum of the rest value of replacement (restoration) of ground improvements and the market value of the plot (rights linked to the plot) at its present use.

Why determining the market value of the ground at its present use, the ground plot is conventionally treated as if it was without ground improvements.

## 2. Cost Approach Methods

The main methods of cost approach are:

- simple restoration method,
- replacement method.

The value of restoration – is a determined for the date of the valuation of the current value of the costs of making in present conditions a new object, identical to the one that is being valued. The method of simple restoration is usually applied

in the valuation of an object that is impossible to be replaced, as well as in the case when present use of the valuated object corresponds its most effective use.

The value of replacement is a defined for the date of valuation current value of the costs of making a new object, similar to the valuated object and of equal value. The method of replacement is usually applied for the value of the replacement of the object built according to a typical project, or if it is economically pointless to renew the valuated object to its initial form.

### **3. Defining the Reproduced Value of Ground Improvements (Restoration Value or Replacement Value)**

While defining the value of ground improvements it is necessary to define on what the attention should be paid during the valuation of the object – restoration value or replacement value. These two kinds of value can be called reproduced value.

The methods of determining the reproduced value are the following:

- according to the value given in the project cost estimating documents,
- according to the value of the unit index,
- according to the initial value,
- based on quantitative analysis,
- according to the merged elements of construction or according to the type of works done.

Other methods can also be applied, but the most popular in the practical valuation are the valuation method according to the value of the unit index and the method according to the value given in the project cost estimating documents.

#### **3.1. The Method According to the Value Given in the Project Cost Estimating Documents**

The reproduced value is defined by the cost-estimate building value for separate parts of the construction work. The value is defined based on the market prices for materials and services.

The cost-estimate building (renovation) value makes the means the sum of which is based on the project data. The cost-estimate value makes base for the defining the amount of the capital investment, financing the construction, bills for the work done (building and assembling). Collective cost-estimating of the value of building industrial objects, houses, facilities or stages of their construction makes a cost-estimating document, defining the full cost-estimating value of all the objects included into the project or its blueprint, including the cost-estimating value of construction and assembly works, costs of acquiring the equipment, furniture and inventory, as well as all the accompanying costs. Cost-estimating value

for each object is divided according to the sections, defining the value of: “construction work”, “assembly work”, “equipment, furniture and inventory”; “other costs”; “general value of cost-estimating”.

### 3.2. Valuation Method According to the Value of the Unit Index

In this method the base for defining the value of improvements is using a unified unit index of the valuated object (1 cubic metre of the volume of the building, 1 square metre of the surface of the shed, 1 bed – place in hospital, 100 metres of engineering connections and others). According to the relevant documents (in Ukraine such documents are *Sets of the Merged Indexes of the Reproduced Value* for buildings and facilities) is defined as the value of the unit index for the object ( $C_{jed}$ ) equivalent to the one estimated, regarding the construction scheme, used materials and other factors.

The majority data from the *Sets...* contain the value of unit indexes, calculated according to the prices of 1969. In this case the reproduced value is calculated according to the formula (1):

$$C_{odt} = C_{jed} \times W_1 \times W_2 \times W_3 \times W_4 \times N \quad (1)$$

where:

- $C_{odt}$  – the reproduced value of the object (ground improvements), hrn;
- $C_{jed}$  – the value of the unit index (defined according to *Sets of the Merged Indexes of the Reproduced Value* buildings and facilities for a so-called second territorial belt);
- $W_1$  – coefficient taking into account the influence of construction differences between the estimated object and the selected equivalent;
- $W_2$  – index of the change in the cost-estimating value of building and assembly works, according to the branches of national economy, industry branches and trends of changes in the composition of branches from 1969 to 1984 (Enactment of the State Committee for Building of USSR №94 of 11th May 1983); it consists of two coefficients: the first is the index of the change in the value of the cost-estimated building and assembly work in subsequent branches of national economy, industry branches and trends of changes in the composition of branches, the second in the territorial coefficient;
- $W_3$  – index of the increase in the building value, in the territory of Ukraine from 1984 to the date established by the Ministry of Regional Development of Ukraine (this index is regularly published in the information sets of a respective ministry *The Formation of Prices in Building Industry*);

$W_4$  – inflation index (in the period between the date of valuation and the date of defining the amount of coefficient  $W_3$ ), published in “The Governmental Courier”;

$N$  – amount of calculated units in the object of valuation.

Nowadays making the respective information sets started, regarding the peculiarities of the formation of prices in building objects under market conditions. In 2005 *The Set of Merged Indexes of the Restoration Value of the Functional Objects – Equivalents for the Valuation of Low-Storey Buildings and Facilities* was issued.

### **3.3. Valuation Method According to the Initial Value**

It is based on the initial (historic) value of the object, adjusted to obtain the current value (for the date of valuation).

### **3.4. The Method of Quantitative Analysis**

This method requires detail calculation of all the costs of building or assembling the components of the new object, regarding indirect costs (permit for building, topographic map, allocation of the plot, administrative costs including insurance and taxes, etc).

### **3.5. The Method Determining the Value According to the Merged Construction Elements or the Type of Work**

This method is a variety of cost-estimating. It is based on the use of characteristic indicators as the unit of measurement is based on the use as the unit for the measurement of characteristic indexes of the merged values of the volumes of individual types of works (1 cubic metre of bricks laid, 1 square metre of painted surface and others). This reduces the accuracy of this method compared to the traditional cost estimate, but is much less time consuming.

## **4. Regarding the Profit for the Investor**

The State Standard № 2 *On the Valuation of Grounds* presents the need to regard in the cost approach the profit of the subcontractor and investor. The profit of the subcontracting organization is taken into account in individual lists of unit prices using the *Sets of Merged Indexes of Reproduced Values of Buildings and Facilities* (SWOW) and in cost-estimate calculations. Having enough information the expert can correct the amount of this profit within the range of proper calculations.

The amount of the investor's profit is not defined in any documenters. The amount of this revenue is defined based on the analysis of information market. Assuming that the investor in the process of construction does not receive the revenue from the money invested in the construction, the compensation of these losses in the form of the profit for the investor can contain within 10–30% of the construction's value. However, for some objects, the amount of this profit can be significantly higher.

## 5. Defining the Degree of Wear for the Valuated Object

Wear is the decrease of the value caused by different factors. Calculating the degree of wear for the ground improvements can be done by the application of:

- the method of division,
- the method of the period of existence.

The application of other procedures in determining the different kinds of wear, is possible, provided that the calculations and their course are presented separately in the estimating operate.

### 5.1. Method of Division

The method of division predicts the determination of the degree of each kind of wear occurring within the valuation. The determination of the degree of all the kinds of wear occurring in the object of valuation is carried out by calculating coefficients.

The coefficients of physical, functional and economical wear of ground improvements is determined according to the formula (2):

$$K_z = 1 - \frac{Z}{100} \quad (2)$$

where:

- $K_z$  – coefficient of physical, functional and economical wear of ground improvements,
- $Z$  – the degree of the respective kind of wear occurring in the object of valuation, in %.

Coefficient of a general wear (usefulness) is determined as the product of respective coefficients, for the valuated object according to the formula (3):

$$K_{zo} = K_f \times K_{fun} \times K_e = \left(1 - \frac{Z_f}{100}\right) \times \left(1 - \frac{Z_{fun}}{100}\right) \times \left(1 - \frac{Z_e}{100}\right) \quad (3)$$

where:

$K_{zo}$  – the coefficient of general wear (usefulness),

$K_f$  – the coefficient of physical wear,

$K_{fun}$  – the coefficient of functional wear,

$K_e$  – the coefficient of economical wear,

$Z_f$  – physical wear of ground improvements, in %,

$Z_{fun}$  – functional wear of ground improvements, in %,

$Z_e$  – economical wear of ground improvements, in %.

If one of the coefficients of wear of the valuated object does not occur, the coefficient of general wear (usefulness) is determined as the product of the coefficients of respective kinds of wear, occurring in this object.

Generally the influence of the following kinds of wear is taken into account:

- physical,
- functional,
- economical.

Physical wear of the constructions, technical devices, the whole objects is defined as losing by the object its initial technical and economic indexes (endurance, durability, reliability etc.) as a result of natural, climatic or technological factors and human activities.

Traditional approach in defining the degree of physical wear of the ground objects is regulated by the documents: the Enactment of the Board of the State Committee of Ukraine for Apartment and Municipal Development of 2nd July 1993 №52 *On approving the rules of the valuation of physical wear of apartment buildings* and a compatible document: *Ministerial Construction Standards 53–86*, confirmed by the enactment by the State Committee for Building Industry of the Union of Socialist Soviet Republics of 24th December 1986, N446. Although these regulations, according to the initial plans referred only to real estate with apartments, it is easy to adjust the valuation to other types of real estates.

A specific degree of wear as a separate element can be defined following proper tables from the document *Rules of the Valuation of Physical Wear of Apartment Buildings* and document *Ministerial Construction Standards 53–86*, in which for each element a set of different types of damage is given and a respective scale is defined for the physical wear of the elements.

At the valuation of the physical wear of the construction, elements and systems not listed in *The Rules of the Valuation of Physical Wear of Apartment Buildings*, the data closest to the respective object or merged scale of physical wear of the elements of buildings should be used.

Physical wear of the object is calculated from the formula (4):

$$Z_f = \sum \frac{Z_{f(ei)} \times L_{ei}}{100} \quad (4)$$

where:

- $Z_f$  – physical wear of the object on the ground, in %,
- $Z_{f(ei)}$  – physical wear of  $i$ th element of the object, in % (is defined based on the results of the field studies),
- $L_{ei}$  – specific weight of  $i$ th element in the reproduced value of the object (usually defined based on the data from respective tables from the *Sets of Merged Indexes of Reproduced Values of Buildings and Facilities*).

Physical wear of buildings and facilities can be divided into removable wear and irremovable wear.

In case of removable physical wear it is assumed that the costs of renovation related to the liquidation of this wear are smaller than the added value of the object. Thus the existing failures in the object can be removed and the costs of repairing do not exceed the obtained benefits. Physical wear is regarded irremovable if the costs of removing the damage exceed the added value of the object. In case of irremovable physical wear, real money loss is valued based on putting together the cost-estimates for respective renovation work of the elements of the valued object. Thus, in this case, in the calculations, the wear is expressed in money, which does not comply with the degree of diminishing the value determined according to the percentage of the wear of a given construction element.

Functional wear is the wear connected with the lack of compliance between functional characteristics of ground improvements in the plot and contemporary market requirements for the improvements of this kind. Among the factors connected with the functional wear, one can list: volume-planning situation of buildings, the way of their management and furnishing, the quality of materials, comfort and others. The degree of functional wear is calculated from the known symptoms of the discrepancy between the usefulness-related characteristics of the valued object and contemporary requirements referring to a similar real estate on the market (lack of certain usefulness-related characteristics or presence of the excess of usefulness-related characteristics for ground improvements).

Functional wear can also be removable or irremovable.

In case of the removable wear it is possible and reasonable to remove it. Then the functional wear can be defined by calculating costs necessary for the removal of the functional wear symptoms. The presence of irremovable wear means that it is not reasonable to remove it. In such a case, the way of calculating functional wear can be defining the value of the replacement of the valued object using the information on the value of the functional equivalent, which does not show func-



tional wear symptoms. Calculating of the necessary costs of removing the signs of physical and/or functional wear can be carried out by determining the costs of the replacement of elements showing the signs of wear. In the costs both physical and/or functional wear, which can be removed.

Economic (external) wear – is the loss in the value of the real estate caused by the impacts of social and economic factors of external environment (change in the situation on the real estate market, change in judicial conditions, wrong location), which contribute to the diminishing of its potential usefulness. While physical wear and functional wear can be removed by renovation (repairing), reconstruction or modernization of the object, economic (external) wear is usually irremovable.

The degree of economic wear is calculated based on comparing the forecasted revenue of the most effective use of a similar real estate on the date of valuation, regarding the part of ground improvements; forecasted charge of the object of valuation, assuming the most effective use, with its designing power; sale prices (offer prices) of the equivalent ground, not showing the signs of such a wear, but equivalent in terms of other significant attributes.

While determining economic wear, the plot with the ground improvements is seen as an improved plot bringing revenue, consisting from the revenue from the plot and revenue from ground improvements. Taking into account that economic wear refers only to ground improvements, during determining the amount of the forecasted revenue, in general value the part of ground improvements of similar ground objects is taken into account. The valuation of the direct influence of environment on the value of the object is a rather complicated task, because this influence can only be revealed based on the analysis of the market data.

## 5.2. The Method of the Period of Existence

The method of the period of existence is based on the assumption about the remaining period of the economic existence of the object. Applying this method all the types of wear, occurring in the object of valuation are considered taken into account completely.

The term “economic existence of ground improvements” means the period when the revenue obtained or probably obtained from these improvements exceeds the operational costs related to getting this revenue.

The beginning of the exploitation is determined according to the information on the year when the object of valuation was built. The remaining period of the economic existence of ground improvements is a period starting from the date of valuation to the time of the expiration of the term of the economic existence of ground improvements. The actual age of ground improvements is a period from the beginning of exploitation of ground improvements to the date of valuation.

While applying the method of the period of existence, general wear is determined according to the formula (5):

$$Z_o = \frac{FW}{FW + POIE} \quad (5)$$

where:

$FW$  – actual age of ground improvements,  
 $POIE$  – the remaining period of economic existence,  
 $Z_o$  – general wear.

The coefficient of general wear, determined with the method of the period of existence, is determined according to the formula (6):

$$K_{z_o} = 1 - Z_o \quad (6)$$

where:

$K_{z_o}$  – the coefficient of general wear,  
 $Z_o$  – general wear.

## 6. Defining the Rest Value of Replacement (Restoration) of Ground Improvements

The amount of the value of replacement (restoration) of ground improvements, obtained after regarding all the kinds of wear, is called the rest value of replacement (restoration) of ground improvements.

The rest value of replacement (restoration) of ground improvements is calculated according to the formula (7):

$$C_r = C_o \times K_{z_o} \quad (7)$$

where:

$C_r$  – the rest value of replacement (restoration) of ground improvements,  
 $C_o$  – the value of restoration or value of the replacement of ground improvements (reproduced value),  
 $K_{z_o}$  – coefficient of general wear (coefficient of usefulness).

## 7. The Value of the Object

The value of the ground, determined based on the cost approach, contains two components: value plot (or value of the usufruct rights) and the value of ground improvements.

The value of the object of its valuation with the application of cost approach is calculated according to the formula (8):

$$C_{ob} = C_r + C_d \quad (8)$$

where:

$C_{ob}$  – the value of the object,

$C_r$  – rest value of replacement (restoration) of ground improvements,

$C_d$  – the value of the plot (market value of the plot at present way of the use or the value of the rights connected with the plot).

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