Advanced Materials Research Vol. 899 (2014) pp 535-538

doi:10.4028/www.scientific.net/AMR.899.535

Assessment and damage for building structures risk analysis methods

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Keywords: Damages, the damages assessment, risk analysis,

Abstract. The paper introduces an alternative method for damage pricing on buildings in consequence of defects, failures and collapses. The method operates with time-independent price of the structure and following damage on the construction. Using risk analysis methods, the price is reduced – depending on technical condition – to proper damage and evaluation of the object, building or structure.

Introduction

Following the risk assessment is usually of experts[2], [3], [4], particularly on judicial experts required expression damage. This is done in the funds, in cash. The valuation of buildings or insurance works with so-called time value, that is the price for "amortization". It takes into account the wear and tear of structures, its condition at the time of assessment. Unlike the award-winning building has this value (the amount of damage - quantification of compensation for damage) nothing to do with the "time value ", the price relative to time (the length of) the existence of structures, building or structure. Time works price of the lifetime of the object (building or structure) and the duration of its existence, ie with age. In the case of determination of damage to the building or building construction this procedure by using prices depend on time is inappropriate.

As a result of the fire was considered property damage. The challenge is to quantify the damage.

Civil law is seen as damage injury caused in the property damaged, which can be objectively expressed in monetary terms. They are divided on the actual damage and loss of profit. The principle is that the damage to the cover indicating the previous state (such as repairing damaged items), and only if this is not possible or advisable, in cash. In determining the amount of damages is based on the price, which was the case in the time of the damage. In criminal law, the amount of damage caused by a crime or offense co-determines the degree of threat to society.

Methodology for quantifying damages

A method of evaluating the damage is only possible in real prices. The actual price is the price of "normal" and it is determined on the basis of construction itemized budget, mostly by “URS” price lists. This price is related to the offering price (which should be in the range of about ± 20%), the price bid is based on the contract price becomes negotiable.

The market price is derived from the price of the appraised price, the market price may be lower or higher than the appraised price and the market price is influenced by many technical and economic factors. An important part of the appraisal and market prices is depreciation, a reduction in price due to old age or a price increase due to rehabilitation, reconstruction or repair.

Price - the amount of damage

Price from an economic perspective, the monetary expression of value of goods. Price is the economic categories of commodity production. Mediated expression creates the possibility of quantitative non-compliance (deviation of prices from values) and qualitative inconsistency (case no value, but may take the form of goods, such as the price of uncultivated land) between the value and price. We distinguish also fixed prices down and changing some official authorities, price limit, either as the prices of the maximum, minimum, or indicative, prices vo1né (also contract), formed by agreement between the supplier and the customer [8], [1].

In the case of construction, then we can talk about market price (usual price for the area), bid price, the contract price, the actual price, estimated cost, and the like.

The amount of damage is possible (and necessary) to determine just as the real price (ie not the market price or appraised).

Fig. 1: The building damaged by fire

The damaged building is necessary to determine the loss suffered. Damage cannot be higher than the total price of the object. The object is very worn. Damaging the old constructions which do not have full value. It is therefore necessary to determine how much of the price for the restoration of the building is damaged and how much appreciation.

The ratio between quantities between the damage suffered and appreciation we can very accurately determined using risk analysis. Also in this case is applicable to universal matrix of risk analysis.

Because we evaluate a building object, the result will be today's only value. It will be a wear and tear, or a degree of preservation [1], [7].

Practical example of evaluation

In order to implement the evaluation of existing structures for the purpose of determining "factor" expresses the state and thus reducing the amount of financial damage caused by fire, was determined by a three-member expert team.

$$Sg_1 \equiv (c_1 \quad c_2 \quad c_3 \quad \cdots c_n) \tag{1}$$

The calculation is made on the principle of vector (1) or matrix (2).

$$M_{Sv} \equiv (c_{i,k}) = \begin{pmatrix} c_{1,1} & c_{1,2} & c_{1,3} & \cdots c_{1,n} \\ c_{2,1} & c_{2,2} & c_{2,3} & \cdots c_{2,n} \\ c_{3,1} & c_{3,2} & c_{3,3} & \cdots c_{3,n} \\ \vdots & & & \\ c_{m,1} & c_{m,2} & c_{m,3} & \cdots c_{m,n} \end{pmatrix} \quad (2)$$

The evaluation is then dependent on the scale used. If the first value is not zero, it is necessary to base the relationship (3) modify (4).

$$Pc_k = \frac{\sum_{ij} Sv_{ijk}^E}{Sv_{\max} \cdot n_{act,k}^E} \quad (3)$$

Characteristic of this method is that the output is an identifier in the form of numbers or percentages rating the design, construction or whole. From equation (4) shows that the variables are linearly dependent on each other and of course here [4], all the rules for these mathematical operations.

$$Pc_k = \frac{\sum_{ij} Sv_{ijk}^E}{(Sv_{\max} + Sv_{\min}) \cdot n_{act,k}^E} \quad (4)$$

In this evaluation is completely indifferent to individual experts assess the design, provided they achieve the same sum of matrix elements. The finding is evident from the example:

Table 1: Test-01

Expert 1	0	0	0	3	3	3
Expert 2	0	0	0	3	3	3
Expert 3	0	0	0	3	3	3
Expert 4	0	0	0	3	3	3

According to (3) we get the result:

$$Pc_k = \frac{\sum_{ij} Sv_{ijk}^E}{Sv_{\max} \cdot n_{act,k}^E} = \frac{36}{3 \cdot 24} = 0{,}5$$

Table 2: Test-02

Expert 1	1	1	1	4	4	4
Expert 2	1	1	1	4	4	4
Expert 3	1	1	1	4	4	4
Expert 4	1	1	1	4	4	4

If 'move beginning ", it means that we use a different scale (Table 2) than that (Table 1), such as $1 \div 4$, we obtain a logically consistent result by equation (4)

$$Pc_k = \frac{\sum_{ij} Sv_{ijk}^E}{(Sv_{\max} + Sv_{\min}) \cdot n_{act,k}^E} = \frac{60}{(4+1) \cdot 24} = \frac{60}{120} = 0{,}5$$

For other data, such as additional objects, we obtain similar, but different evaluation resources, with the same (always the same) overall result $Pc_k = 0.5$.

Summary

It may come to believe that the assessment is not entirely correct. This could lead to the conclusion that it is necessary to use methods using weighting factors evaluated. It is shown that the individual access method is also applicable in such cases [5], [6].

Acknowledgements

The conceptual development of science, research and innovation 2013, awarded by the Ministry of Education, Youth and Sports of the Czech Republic.

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