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APPLICATION OF RISK ANALYSIS FOR BUILDING EVALUATION

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Abstract. For evaluation of technical condition of the buildings their constructions, you can use the methods of risk analysis. These methods may be used for pricing building and construction, depending on their condition, age and use During the subsequent design of the reconstruction or rehabilitation must always consider the scope and extent of the selected type of reconstruction in relation to the potential of harm (physical and financial). In the paper is applied to building assessment the method of universal matrix of risk analysis (UMRA).

Introduction

The construction industry is confronted by a series of difficulties which can be caused by the technical characters (risk of injury, the damage, the emergence of disorders) or due to human failure and negligence. At present, the construction industry gets a bad habit. It is an effort to skimp on the cost of construction. In previous years, there was no pressure on the low cost so high, which has recently changed. The main role is played by the current financial crisis. The current situation leads to the escalation of pressure to a construction company to reduce prices paid for construction work at the expense of the quality of work and quality of construction as a whole. Simultaneously, the requirements of thermal properties and airtightness of external walls are constantly increased. [3, 4]

Application of risk analysis for constructions

The universal matrix of risk analysis [1, 2] will be used to assess the condition of the peripheral supporting structures from ceramic bricks. The ceramic bricks are disrupted and damaged by a overloading in some places. The risk analysis was performed by a team of four experts (working group). The working group was managed by an analytical expert. The structures were evaluated by according to the following table. The table shows the degrees of severity of the damage state of the structure depending on the actual situation.

The determination of damages is expressed by using a linear function, which, depending on the values of the degrees of severity reducing the financial value of Ci.

The Scale is perceived in the range of from 0% to 100% as the structure completely safe or fully dangerous. [1, 2] In case of multiple experts, we get the final value of the arithmetic mean.

The following example shows a sample calculation of the coefficient of risk perception by a member of the working group (expert).

Table 1: Scale of severity of the hazard

Evaluation of the state construction	**Characterisation of the structure and design of wear**	**Severity *S*v**
Excellent Condition	Structure is in excellent condition with no signs of any significant wear	1
Preserved	Preserved structure with visible signs of aging, but fulfilling its function	2
Damaged	Structure with obviously signs of damage repairable, requiring increased maintenance	3
Necessary repairs	design requiring necessarily in the short term radial intervention	4

Table 2: Form for evaluation of the property

Project	**Structural damage**		
Segments of the project	**Sources of danger**		
	Mechanical wear	**Material**	**Cracks**
Expert No.1			
Vertical structures	2	3	4
Wreaths	3	3	3
Expert No.2			
Vertical structures	3	4	3
Wreaths	3	2	-
Expert No.3			
Vertical structures	3	3	3
Wreaths	3	4	2
Expert No.2			
Vertical structures	4	4	3
Wreaths	3	3	4

Sample calculation of the coefficient of risk perception expert No.1

Σ_{ijCijk}=20; n_{act} = 6; => Ø 20/6= 3.33

S_{vmax}= 4;

Σ_{ijCijk} is the sum of the active windows;

n_{act} is the number of the active windows;

S_{max} is the maximum degrease of risk.

$$P_{ck} = \frac{\sum S_v}{S_{v\max} \times n_{act}} \times 100 \quad (1)$$

Where: P_{ck} is an individual perception of the risk factor;

ΣS_v is the sum of the active windows;

$S_{vma\,x}$ is the maximum degrease of risk;

n_{act} is the number of the active windows.

Figure 1: Damaged bearing structure of the building, which are assessed in tab. 2

Table 3: Factors of risk perception

Magnitude	Team	Expert			
		1	2	3	4
Total Sv^E	74	20	15	18	21
The number of active cells	23	6	5	6	6
P_{ck}	80.21%	83.33%	75%	75%	87.5%

Individual perception of the risk factors obtained by substituting in the formula (1):

$$P_{ck} = \frac{20}{4 \times 6} \times 100 \Rightarrow \underline{\underline{P_{ck} = 83{,}33\%}}$$

The average value of an individual perception of the risk factors is calculated as the arithmetic average of the individual values of the coefficient of risk perception of individual expert of team experts.

$$P_{ck,t\acute{y}m} = \frac{83{,}33 + 75 + 75 + 87{,}5}{4} \Rightarrow P_{ck,t\acute{y}m} = \underline{\underline{80{,}21\%}}$$

Price assessment

Application of risk analysis methods (UMRA) [1, 2] can be determined conclusion by working group members (experts). The peripheral supporting structures (is potentially dangerous and therefore it is necessary calculate to back the cost of resolving the situation. Price of reconstruction can be determined by budget indicators. The economic burden for that object (Fig. 1) was set at 3 800 CZK per m^3. It is necessary to take into account the addition of a space equipment site. In this case, the location of the object in the gap is considerably problematic and the price is set at 350 CZK per m^3. In total, it is possible to determine the total overall cost per unit at 4 150 CZK per m^3. In the case, the economic performance of the chosen method of reconstruction of the object can be determined by of volumes and volume of each structures by according to the project documentation.

Summary

The team of experts evaluates of the condition of property using by universal matrix of risk analysis as very inconvenient, requiring the repairs. The coefficient of risk perception on the team (working group) is 80.21%. In this case, it is primarily necessary repair of vertical and horizontal bearing structures. The results can be disruptions or damage to the property of its individual parts. In extreme cases, its destruction and threats to human life without reconstruction or without improve the condition of the property.

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