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## The Use of Certified Methodologies of environmental risk assessment

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**Abstract.** In accordance with savings in all areas of life, we always try to search for new methods. It is also possible to use existing methods. Such use may be in the areas in which these methods were originally designed. This applies to the use of risk analysis methods for the evaluation of existing areas, buildings, structures and components of structures. Assessment methods of risk analysis allow the use existing certified methodology.

### Introduction

In all spheres of human activity is evident in the effort to improve procedures used on humans, but also to simplify these procedures. If we don't have this kind of effort, the world would not progress. It will miss the driving force that pushes us on.

In the area of risk management and risk analysis is developed a considerable amount of methods. Individual methods are suitable for different areas of human activity. The dominant areas are activities in the areas of insurance, banking and the management of companies or processes [1]. In the construction industry in the Czech Republic is the use of risk analysis relatively new and not common.

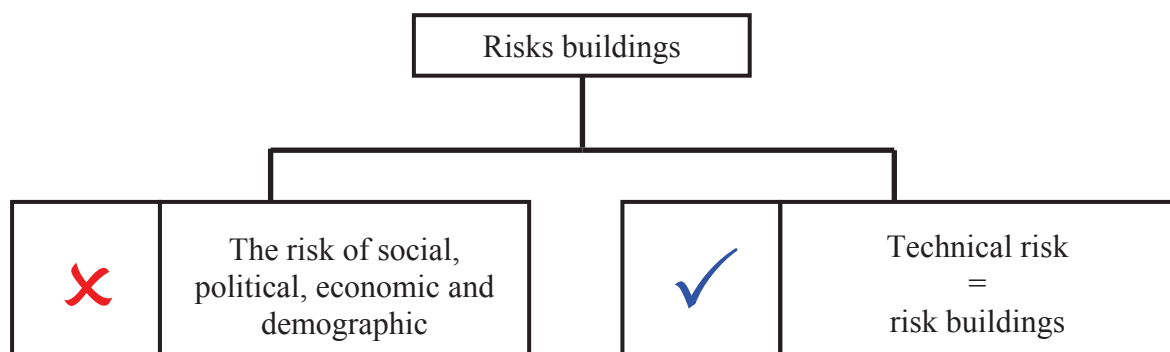


Fig. 1: Basic risk sharing

Given that there are many ways and methods which can assess risks, is important to select an appropriate method, an appropriate approach, given the situation, purpose and context in which the assessment is conducted. Each approach and each risk assessment method has its advantages and its drawbacks. Selecting the right approach and appropriate method is dependent on the purpose of the evaluation, the nature of the data that are available, funding and often the socially political context. The biggest obstacle in risk assessment is usually a lack of data and information.

This is such. Data on equipment failure, human error factors including characteristics of the consequences of those failures.

The effort to simplify and speed up procedures have led the author [2] to the idea to apply the General methods of risk analysis in an area where has not yet been used [3, 4].

This is the only application in the technical area, when the target group is the construction industry. The new application is only in narrow areas of the construction process. It is not, therefore, assessed the social, political or geographical and the effects (the effects of) to this area (Figure 1) but only and only the technical area, including economic aspects of construction. Economic aspects currently play in the construction of a very important role. Many builders are trying to reduce the price paid construction work at the expense of the quality of the materials used. Not always is build inexpensive means well, just as well mean build dearly.

**Area of Use**

The first areas where risk analysis methods were successfully applied were areas of forensic sciences. Successfully for the taking of evidence before the Court uses the UMRA method.

Analysis of UMRA [*Universal Matrix of Risk Analysis*] is mixed verbal and logical-numeric expert method, in which the first identify vulnerable segments of the project, sources of danger affecting the project, and joint action resources, segments, these joint action are then rated based on their severity. The method can handle the answers of experts with varying degrees of knowledge about the project and with different levels of perception of danger. The principle of this method is similar to the FMEA method.

Usage is different [5]. Generally comes from guest experts summarized in the matrix (1, 2), which is then evaluated [6].

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

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

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

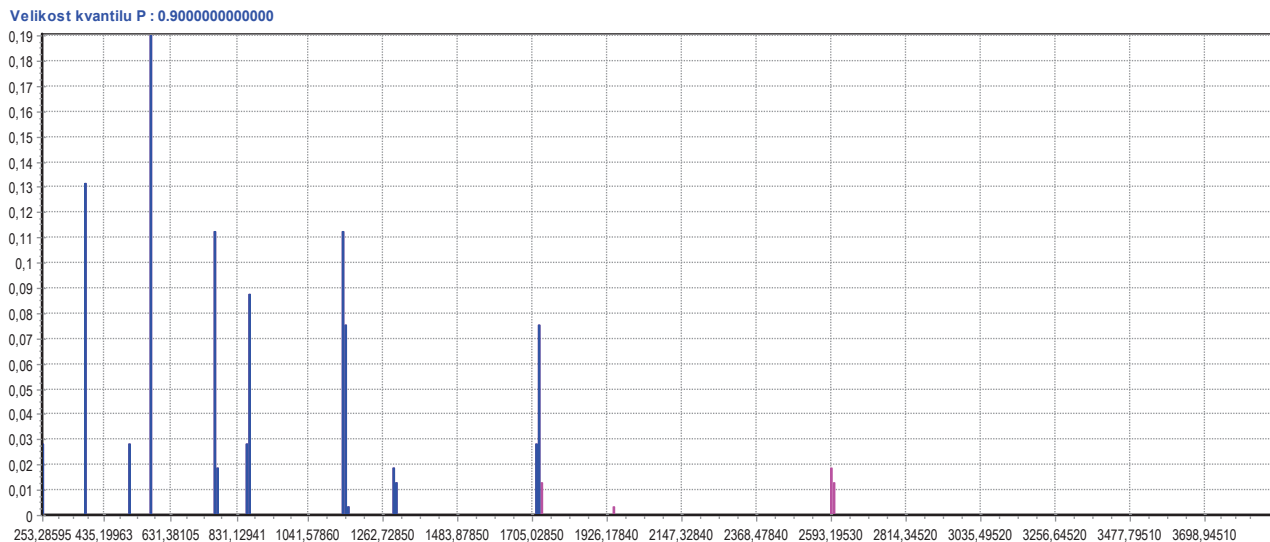


Figure 2. Histogram. [7]

This evaluation method we can choose according to the purpose for which this assessment to serve (3). The most commonly used classical analytical evaluation. It is also possible to use the evaluation using histograms (Figure 2). [7]

Method and its application, i.e., application was also included in the instruction on VSB-Technical University of Ostrava and at the Faculty of Civil Engineering and the Faculty of Safety Engineering.

Because this method of UMRA is a universal method, it is possible to use it in all fields of the construction industry, but also in all spheres of human activity.

The method of universal matrix of risk analysis (UMRA) is based upon the comparative logic-numerical analysis of risk severity level for the given problem being resolved (project or its part) by an expert team.

The method of universal matrix of risk analysis has two stages:

- word phase – it is focussed on identification of project segment exposed to danger, sources of dangers endangering the segments. This phase is realised by an expert team. A matrix form which is further worked with in the numerical phase is the result.
- The numerical phase includes:
  - o estimation of risk severity level using the UMRA matrix;
  - o qualification of the risk according to estimated severity levels. [6]

### Other Variants and Options

The paper presents a universal method applicable in the field of environment and its forensic evaluation. [8, 9] Method of UMRA works with constant sizes rated factors. With this method it is necessary to evaluate comparable structures or processes. In practice, this restriction is not a negative consideration for using this method.

If we badly needed work processes or structures of different importance, we must use the RPN index [*Risk priority number*] or use a completely different method - such as FMEA method [*Failure Mode and Effect Analysis*].

As it turned out it is very interesting to use in the evaluation of the technical areas for the construction of buildings or to determine the suitability of foundations SWOT method. This method was previously used exclusively in the field of management to assess the status and condition of the company. This method is for use in construction suitable for relatively large range of data that is able to evaluate and also for the ability to interact with different aspects of importance evaluated.

## Summary

Using of risk analysis methods is useful as an alternative method for forensic engineering field. Practice has proved that the methods which are designed for management or designed for the others non-technical field can be used also in forensic field very effectively. The risk analysis methods provide additional decision-making forensic tool in the area where doesn't exist any other relevant instrument.

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