METHOD FOR ASSESSING THE RISK OF ACCIDENTS AND OCCUPATIONAL DISEASES FOR CULTURAL EVENTS (EVAREC)

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ABSTRACT: The paper presents a new method for assessing occupational risks for the field of cultural events – EVAREC (Evaluation of Occupational Accident and Illness Risks for Cultural Events). The need to develop the method arose from the complexity and diversity of activities carried out in the cultural sector, where technical, ergonomic, psychosocial and organizational risks are difficult to quantify using traditional tools. The EVAREC method is based on a hybrid model, which integrates elements from the established INCDPM , MEVA and OiRA methods , offering a quantitative and contextualized approach. The proposed calculation formula includes three main variables – the severity of the consequence (G), the probability of manifestation (P) and the exposure time (E) – to which are added weighting coefficients (W_i), specific to each type of risk. The results of applying the method in a case study on the organization of an outdoor concert, demonstrated the practical relevance and scientific robustness of the model. EVAREC allows an assessment of occupational risks in the field of cultural events, providing decision-making support for the implementation of preventive measures. Through its adaptability, the method can become a reference tool for the management of occupational risks in the cultural sector and other creative fields.

KEYWORDS: Occupational safety, Risk assessment Method, Risk management, Preventive measures.

1. INTRODUCTION

Occupational safety and health (OSH) in the field of cultural events is a topical issue, given the dynamic, complex and often unpredictable nature of the activities carried out in this sector. Cultural events such as concerts, festivals, theatre performances, exhibitions or outdoor artistic events involve a combination of technical, artistic and logistical activities, which expose workers to a wide range of occupational risk factors. These include ergonomic, psychosocial, mechanical, electrical and environmental risks, different from those encountered in traditional industries[1-5].

Although there are currently several risk assessment methods applied in Romania and at European level, none of them fully covers the particularities of activities specific to the field of cultural events. This gap led to the need to develop a dedicated tool, which would allow a quantitative and qualitative assessment of occupational risks specific to this context. Within the proposed research, for the second level of the conceptual

framework, a new risk assessment method is introduced: the Occupational Injury and Illness Risk Assessment Method for Cultural Events (EVAREC) .
The EVAREC method was developed out of the need to respond to the complexity of the activities and occupational risks encountered within cultural events. It is conceptually based on a combination of two established risk assessment methods used in Romania and in the European space: the INCDPM Method , developed by the National Institute for Research and Development for Occupational Protection, and the OiRA Method (Online Interactive Risk Assessment) , developed by the European Agency for Safety and Health at Work – EU-OSHA .
The authors' contribution consists in proposing a model that integrates the advantages of the aforementioned methods, adapted to the operational environment specific to cultural events. The EVAREC method allows the quantification of the occupational risk level for each workplace or area of activity by taking into account three main parameters:

1. Severity (G) of the potential consequence;
2. Probability (P) of the risk occurring;
3. Exposure time (E) of workers to the identified risk factor.

The risk level (R) is determined according to the general relationship:

$$R=G\times P\times E$$

This formula allows a more realistic representation of the actual exposure of workers to the hazards specific to cultural activities, where the risks depend on the duration, the nature of the activity and the conditions of its performance. The entire process is illustrated in **Figure 1** , which presents the flow chart of the application stage of the EVAREC method – from the identification and classification of risk factors, to their evaluation and quantification, to the formulation of recommendations for reducing the level of risk.

2. METHODOLOGY

The EVAREC method (Evaluation of Occupational Injury and Illness Risks for Cultural Events) was designed as an integrated tool for analyzing, evaluating and ranking occupational risks associated with activities carried out in the field of cultural events. The methodological structure of EVAREC is based on the fundamental principles of occupational risk assessment, adapted to the specifics of cultural activities, which are characterized by a high degree of mobility, operational diversity, limited periods of exposure and the presence of a variable number of workers.

2.1. Steps of the EVAREC method

The EVAREC evaluation method involves the following main steps (fig. 1):

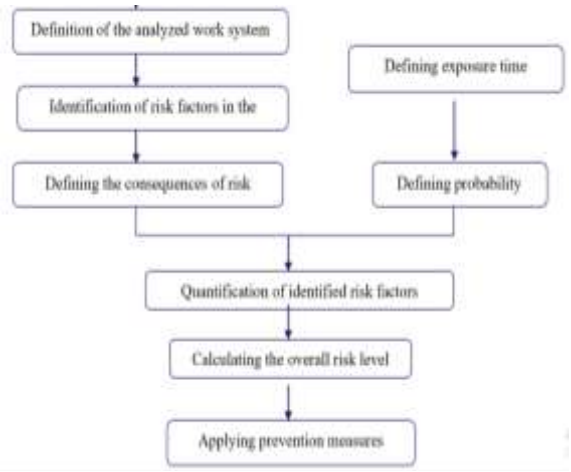

Fig. 1. Flowchart of the EVAREC risk assessment method steps

1. **Identification of workplaces and specific activities** – the activity areas within the event are clearly delineated (stage, backstage, assembly/disassembly, logistics, electricity, sound, lights, transportation, etc.).
2. **Identification of risk factors** – is carried out based on checklists developed for each activity category, with the risks classified into the following groups:
   - technical and mechanical risks;
   - physical and environmental risks;
   - ergonomic risks;
   - psychosocial and organizational risks;
   - electrical and fire risks;
   - risks related to contact with the public or the stress of the event.
3. **Assessment of the severity of consequences (G)** – a score is given on a scale of 1 to 5, depending on the severity of the potential event (from minor injuries to fatal accident or severe occupational disease).
4. **Estimation of the probability of occurrence (P)** – a score between 1 and 5 is given, taking into account the frequency of exposure, working conditions and history of similar incidents.
5. **Determination of exposure time (E)** – is established based on the duration and frequency of exposure to the risk factor during the activity (scale 1–5).
6. **Application of weighting coefficients (W)** – to reflect the relative importance of different types of risks (technical, ergonomic, psychosocial, etc.), the method introduces weighting factors specific to each category.
7. **Calculation of the total risk level (R_t)** – is performed based on the extended formula presented below.
8. **Risk classification** – risks are ranked on five levels (low, moderate, significant, high, critical) depending on the value obtained.
9. **Establishing prevention and protection measures** – depending on the level of risk, corrective actions, organizational and technical measures, specific training and periodic reassessment are proposed.
10.

2.2. General calculation formula

The basic formula used in the EVAREC method is:

R=G×P×E where:
R - the risk level for the analyzed factor;
G - severity of the consequence;
P - probability of manifestation;
E - exposure time.
To increase the accuracy of the assessment and its relevance to the cultural field, the EVAREC method introduces weighting factors (W_i) that reflect the importance and impact of each type of risk in the analyzed activity. The total risk level for a job or activity is calculated according to the extended formula:

$$R_t = \sum_{i=1}^{n} (W_i \times G_i \times P_i \times E_i) \quad \textbf{(1)}$$

where:
R_t – total risk level at the workplace;
W_i – weighting coefficient for risk category *i* ;
G_i, P_i, E_i – severity, probability and exposure values for factor *i* ;
n – the total number of risk factors identified.

2.3. Establishing weighting coefficients

The weighting coefficients (W_i) are determined based on an expert system (analysis of OSH specialists, technical managers, event organizers, occupational medicine doctors, etc.), to reflect the relative contribution of each type of risk to the overall safety of the activity (table 1).

Table 1. Weighting coefficients used in the EVAREC method

Risk type	Symbol	Weighting coefficient (W_i)
Technical and mechanical	W_1	1.0
Physical and environmental	W_2	0.9
Electrical and fire	W_3	1.1
ergonomics	W_4	0.8
Psychosocial and organizational	W_5	0.7
Logistics and public interaction	W_6	0.6

Thus, risks with lethal potential or immediate impact (electrical, mechanical) receive a higher weight, while psychosocial or ergonomic risks, although relevant in the long term, have slightly lower weights.

2.4. Risk level classification

After calculating the values, the risks are classified into five levels, according to the EVAREC interpretation grid (table 2):

Table 2. EVAREC interpretation grid

Risk level	R-value range	Category	Recommended action
1	R < 20	Low	Periodic monitoring
2	20 ≤ R < 40	Moderate	Implementation of preventive measures
3	40 ≤ R < 70	Significant	Corrective measures and additional training
4	70 ≤ R < 100	High	Technical interventions and reorganization of activity
5	R ≥ 100	Critical	Stopping the activity until the risk is eliminated

The EVAREC method thus allows for a complex and adaptable numerical assessment that realistically reflects the conditions in the cultural events sector. By including weighting factors and exposure duration, it ensures a more precise approach to the intermittent risks characteristic of temporary and multitasking activities in this field.

3. CASE STUDY

To validate the applicability of the EVAREC method (Assessment of Occupational Injury and Illness Risks for Cultural Events), a representative real situation was analyzed: the organization and holding of an outdoor concert . The activities analyzed included: setting up the stage, installing electrical and sound equipment, handling heavy equipment, the activities of technicians, artists and logistics personnel.

3.1. General description of the activity

The analyzed event was a pop-rock music concert held in an open space (urban park), with the participation of approximately 2,000 spectators. The technical equipment (modular stage, sound and light installations, electric generators, temporary metal structures) was installed and operated by a team of 18 workers, divided by activity areas. The activity was structured in three main phases:

1. Stage and equipment setup (duration: 8 hours);
2. Event duration (duration: 5 hours);
3. Dismantling and transportation of equipment (duration: 6 hours).

3.2. Identification and assessment of risk factors

Based on the field-specific checklists, the main risk factors for workers involved in the stage assembly and operation activity were identified. The assessment was carried out according to the EVAREC method, using a scale from 1 to 5 for severity (G), probability (P) and exposure (E), as well as the weighting coefficients (W_i) corresponding to each type of risk.

Table 3. Risk factors identification and risk evaluation results

No. of doc.	Risk factor	Risk type	G	P	It_{is}	W_i	$R = G \times P \times E \times W_i$
1	Fall from height during scene editing	Mechanical	5	4	3	1.0	60
2	Electrocution through direct contact with damaged cables	Electric	5	3	2	1.1	33
3	Exposure to noise above 85 dB (high-power audio system)	Physical	3	4	4	0.9	43.2
4	Repetitive movements, forced positions when handling equipment	ergonomics	3	4	4	0.8	38.4
5	Operational stress due to limited time and artistic pressure	Psychosocial	2	5	3	0.7	21
6	Traveling in crowded spaces, contact with the public	logistic	2	3	4	0.6	14.4

Calculation of the total risk level (R_t):

$$Rt=\sum Ri=60+33+43.2+38.4+21+14.4=210$$

3.3. Interpretation of results

To obtain the average value of the overall risk at the workplace, the sum of the values is reported to the total number of factors analyzed:
R_{avg} =Rt/n=210/6=35

According to the EVAREC interpretation grid (Table 4), the value R_{med} = 35 falls into the "moderate risk" category , which indicates the need to implement specific preventive measures and training procedures before starting the activity.

The main directions of action resulting from the analysis are:

- use of personal protective equipment for working at height (harnesses, ropes, anchors);
- checking the integrity of electrical cables and sockets before connecting;
- noise level measurement and use of earplugs;
- alternating physical tasks and ergonomic training for handling equipment;
- Psychological and logistical briefing before the event to reduce operational stress.

3.4. Discussions

The results demonstrate that the EVAREC method provides a realistic and quantifiable picture of specific risks in the field of cultural events. The introduction of weighting factors (W_i) contributes to a clear differentiation between risks with immediate impact (technical, electrical) and those with cumulative or long-term effect (ergonomic, psychosocial)[8,10] .

An additional advantage of the method is the possibility of quickly updating scores according to organizational changes, the number of participants or the duration of the exhibition, which makes it suitable for temporary and variable activities, characteristic of the cultural industry.

In the future, the EVAREC method can be extended to other related fields – film productions, exhibitions, educational events or artistic activities in unconventional spaces – by adapting the weights and checklists.

3.5 Future research directions

Although the EVAREC method represents a significant advance in the field of occupational risk assessment for the cultural events sector, there are numerous areas for improvement and expansion that can contribute to strengthening the applicability and increasing the accuracy of the assessments. One of the most important areas is the digitalization of the method , by developing an interactive application, available on web and mobile platforms, that would allow for the completion of checklists, the entry of data directly from the field and the automatic calculation of the risk level in real time [13]. Such an application would simplify the assessment process, increase the efficiency of prevention activities and allow for faster management of information in dynamic situations specific to cultural events [8, 21].

A second development direction is represented by the extensive empirical validation of the EVAREC method, by applying it to a diverse range of events: festivals, exhibitions, cinematographic productions or educational events. This process would allow the calibration of parameters and weighting coefficients according to the particularities of each type of activity, thus ensuring the robustness and versatility of the method.

Also, an important step is to correlate the EVAREC method with performance indicators in the field of occupational safety and health , such as the number of reported incidents, the average reaction time to hazards, the level of training of workers or the costs associated with occupational accidents and diseases. This

integration would allow a holistic assessment of organizational performance in risk management [18].

In addition, future research may aim to integrate artificial intelligence and data analysis algorithms to automatically identify risk factors. By using visual recognition and video analysis systems, environmental sensors or data collected by wearable devices, real-time monitoring of working conditions and predictive risk assessment would become possible.

Therefore, future research directions aim to transform the EVAREC method into an intelligent, digitalized and collaborative system, capable of actively contributing to increasing the level of occupational safety and health in the cultural field, but also to provide a replicable model for other creative and educational sectors.

4. CONCLUSIONS

The aim of this paper was to develop, present and validate a new occupational risk assessment method – EVAREC (Evaluation of Occupational Risks of Injury and Illness for Cultural Events) – for activities carried out within cultural events. In a context where the safety and health of workers in the artistic and cultural field are often neglected in relation to traditional industries, the EVAREC method responds to a real need for tools adapted to this complex, temporary and dynamic sector.

Through its structure, the EVAREC method integrates the most representative existing models in Romania and at European level INCDPM, MEVA and OiRA in a hybrid, quantitative and contextualized framework . The basic formula R=G×P×E (severity, probability, exposure) has been extended by introducing weighting coefficients (W_i) , which allow the differentiation of the importance of each type of risk: technical, physical, ergonomic, psychosocial or organizational. This multiplicative structure provides a more realistic picture of the interdependence between the severity of the consequence, the frequency of occurrence and the duration of exposure, reflecting the way in which risks accumulate in time and space within cultural activities.

The application of the EVAREC method in a concrete case study – the organization of an open-air concert – confirmed the theoretical validity and practical applicability of the model. The values obtained demonstrated that the method generates balanced results, positioned between the classical quantitative assessments (INCDPM, MEVA) and the qualitative ones (OiRA), which underlines its integrative character [13, 15]. Furthermore, the analysis showed that the inclusion of exposure time and W_i weights allows for a more precise prioritization of risks and an efficient allocation of preventive measures, adapted to the particularities of each activity: stage assembly, equipment handling, work with electrical voltage, contact with the audience or operational stress.

Beyond its practical utility, EVAREC provides a solid scientific basis for future research on occupational safety in emerging and interdisciplinary fields [17]. The method is distinguished by its flexibility to be adapted to other creative contexts – film, theatre, exhibitions, educational activities – by adjusting the weighting coefficients and checklists. At the same time, by integrating risk management principles (ISO 31000, ISO 45001) and modern approaches to psychosocial risks , EVAREC contributes to the consolidation of an organizational culture oriented towards prevention, responsibility and sustainable occupational health.

The research results confirm that the EVAREC method has the potential to become a standardized reference tool for risk assessment in the cultural sector. It

facilitates data-based decision-making, allows monitoring of risk evolution over time, and provides an effective training framework for workers and organizers [16, 18]. Furthermore, future integration of the method into an interactive digital application could transform EVAREC into an intelligent decision support system , capable of generating automatic reports, flagging emerging risks, and providing recommendations in real time.

In conclusion, the EVAREC method is not only a methodological innovation, but also a strategic contribution to the development of a culture of occupational safety and health in the cultural events sector. It promotes a modern, participatory and scientifically based approach to prevention, with a direct impact on the quality of professional life, the sustainability of cultural organizations and the protection of the physical and psychological integrity of those involved in the artistic act.

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