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**MITIGATING OCCUPATIONAL RISKS IN THE CONTEXT OF CULTURAL EVENTS: A MULTI-LEVEL RISK MANAGEMENT FRAMEWORK**

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***Abstract:** Cultural events such as festivals, concerts, exhibitions, parades, involve a complex and dynamic work environment that poses significant occupational risks for technical staff, performers, security personnel, and support workers. These events are frequently characterized by temporary infrastructure, time-constrained setups, high crowd densities, and environmental variability - all of which contribute to an elevated risk of incidents and accidents. This paper reviews current literature on occupational safety in event management and identifies critical gaps in the field. The findings reveal a lack of standardized approaches for addressing complex risk interdependencies unique to cultural events. Based on this review, the paper proposes a structured, multi-level risk management framework for identifying, assessing, and reducing occupational risks, emphasizing proactive safety planning, worker training, and the integration of emerging monitoring technologies. The study contributes to better comprehension of how occupational safety principles can be adapted and applied in the context of cultural events, supporting both preventive measures and the improvement of organizational safety culture..*

***Keywords:** Occupational safety, Risk assessment, Risk management, Preventive measures.*

**1. INTRODUCTION**

In the last ten years, both in Romania and in Europe, there has been an impressive increase number of cultural events - festivals with thousands of participants, such as Untold, Neversea, Beach Please.

These kinds of events (especially big music festivals) can raise many considerable health and safety risks, not only for the people attending, but also for workers involved in those events [1].

Over time, there have been a series of unfortunate incidents in the world of cultural events, which have caused immense suffering, great material damage, and, most seriously, cost human lives [2] (table 1).

Following these unfortunate events, a multitude of studies have been conducted, and prevention and control measures have been taken [3].

Table 1

Tragic events.			
Event	Number of deceased people	Number of injured people	Known cause
The Colectiv Club fire in Bucharest, Romania (2015)	64 people died, including club staff members	Over 150 were injured, including club staff members	During a concert, a pyrotechnic display sparked a quick fire involving flammable materials used for soundproofing.
The Kiss club fire, Santa Maria, Brazil, (2013)	Over 200 people died	Hundreds of people were injured	The soundproofing foam on the ceiling caught fire and emitted toxic gases

However, very little has been done in terms of occupational safety and health for the employees who organize and work in these cultural events (CE). Also, risk management and occupational safety are relatively new concepts for cultural events. This study aims to contribute to filling these gaps.

## 2. LITERATURE REVIEW

### 2.1 Literature review methodology

For the systematic review, it was used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [4]. The research involved a comprehensive English-language literature search across the Web of Science and Scopus databases [5]. It was used a combination of the primary search terms „health and safety”, „occupational safety”, „cultural events”, and „festivals”. The time interval in which the search was conducted was the last 10 years (between 2015 and 2025). Our systematic review from well-established literature explored one key question: What are the occupational risks to which workers in the cultural events industry are exposed?

Initially, 133 studies were identified, and after a rigorous screening process, narrowed the focus to 16 studies, offering critical insights on occupational risks to which workers in the cultural events industry are exposed.

Titles and abstracts of articles identified through the search strategy were independently assessed by all authors. Any discrepancies regarding study eligibility were reviewed through discussion and resolved by consensus. Articles were selected for the full-text review stage when the title and/or abstract explicitly referred to occupational risks associated with workers in the cultural events industry.

The full texts of eligible studies were reviewed by all authors to determine final inclusion in the systematic review. Any disagreements that arose during this stage were resolved by joint deliberation. Only papers that directly reported occupational risks relevant to workers in the cultural events industry were included in the final analysis.

Exclusions applied to studies outside the research scope, such as studies approaching

economic risks, risks related to crowd control, and drug and alcohol use at festivals.

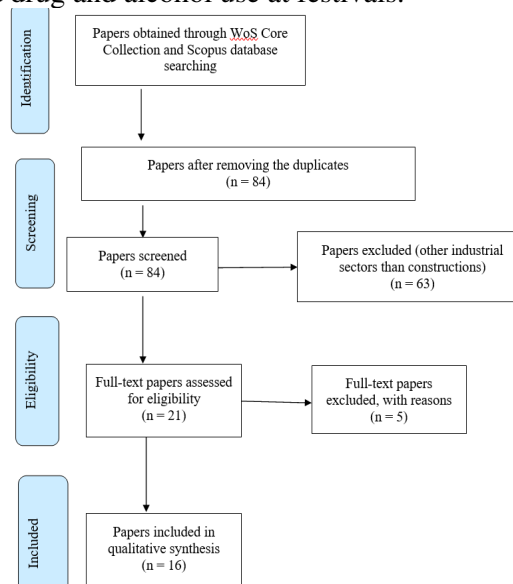


Fig. 1. PRISMA flow diagram

### 2.2 Literature review key findings

The literature review shows that there has been growing academic interest in the last ten years in cultural events, which reflects their importance and significance socially, culturally, politically, environmentally, and economically. The findings reveal a lack of standardized approaches for addressing complex risk interdependencies unique to cultural events.

Although there is a substantial increase in the literature on security at major cultural events, the focus is on the risks posed by drug and alcohol use [6], [7].

Also, a lot of the articles published regarding cultural event risks in the last ten years address economic risks and risks related to crowd control [8].

The literature review has identified a number of occupational risks affecting employees of cultural events. The identified risks were grouped into 3 categories: (i) „before the event”, (ii) „during the event”, (iii) „after the event”.

(i) Before the event. Before the show, during the construction of the stage and the preparation of the festival area, the identified risks are related to: transport (site vehicles and traffic from vehicles bringing materials to build the stage, scaffolding) [21][22], fire hazards (stage-related operations such as welding, painting, using solvents and spray equipment) [23],

exposure to hazardous waste (including the use of paints, oil, chemicals, flammables, make-up) [24]; exhaustion from irregular working hours, working in shifts, electrical lighting equipment; temperature; fall from scaffoldings, slips and trips; cuts or ejection of materials from carpentry and woodwork operations [25].

(ii) during the event. During the show: harmful sound and noise exposures; electrical lighting equipment; confined areas backstage, below stage, in the orchestra pit; violent and aggressive behavior from the spectators drunk or high on drugs; risk of assault in the case of staff handling money in the live performance sector; hazardous dust, vapour, smoke, fume, mist or gas; lack of adequate ventilations; temperature; working in confined spaces (musicians working in an orchestra pit, and staff working below stage); slips and trips; revolving stages; risk of fire from pyrotechnics and live flame [26].

(iii) after the event. The risks are similar to those before the show: transport (vehicles that come to carry the materials used to build the stage, decorations, scaffolding), exhaustion from irregular working hours, working in shifts, electrical lighting equipment; temperature; weather conditions - heat/ cold stress; electric shock from electrical equipment [27].

Optimizing planning processes has been identified as a central factor in the effective management of occupational risks in the field of cultural events. Quality planning supports a more rigorous and coherent risk management. This allows for the anticipation of hazards, the appropriate allocation of resources and the timely implementation of preventive measures. Consequently, planning and risk management must be treated as integrated processes in the organization of cultural events. [9].

### **3. MULTI-LEVEL RISK MANAGEMENT FRAMEWORK**

This conceptual framework is proposed by the authors for describing, coordinating and planning integrated occupational health and safety, security and emergency response services for cultural events. This framework is based on the standardized risk assessment steps provided by ISO 45001:2018 on occupational

health and safety management systems. The standard defines clear requirements for OSH policy, objective setting, planning, implementation, operation, audit and review.

The essential elements of the system include management involvement, worker participation, hazard identification, risk assessment, compliance with the legislative framework, emergency preparedness, incident investigation and continuous improvement. ISO 45001 applies the Plan-Do-Check-Act cycle as a systematic risk control mechanism. The standard is applicable to organizations of any size and allows integration with other ISO management systems.

The developing of this framework in this paper started from the results of a thorough literature review and also on discussions with experts and workers in the field [10]. The structured discussions between 3 safety experts and 32 employees (with a minimum of 5 years' experience in the cultural events field) took place in a two-hour preparatory meeting for one of the biggest Romanian festivals and highlighted several key challenges in occupational safety for cultural events.

The proposed framework has a proactive, collaborative, and integrated approach as it links all the major „players” in the field: health and safety experts, event planners, managers, and workers from start to end [11]. The framework is composed of 3 layers: First Layer – Risk Identification, Second Layer – Risk Assessment, and Third Layer – Mitigation.

#### **3.1 First Layer – Risk Identification**

Risk identification is a rather complicated process in the case of cultural events. It must be taken into account that are practically “three workplaces in one”. A large-scale cultural event, such as an open-air music festival, which is presented as an example in this paper, has three parts: before the show, during the show, and after the show [12].

A particularity of this type of cultural event is that in a very short time, some risks appear, increase in intensity, then disappear to be replaced by new ones [13]. Other risks, such as psychosocial ones (stress due to time pressure - a lot to do in a short time) persist throughout the

entire event [14]. For example, the risks that arise during the stage construction phase (common risks to construction sites generated by site vehicles and traffic, temporary demountable structures, working at height), disappear in the during-show phase, only to reappear again in the after-show phase [15]. Table 2 presents, a part of the risks identified throughout three stages of a cultural event.

*Table 2*  
**Example of risks identified throughout the three stages**

Identified risk	Before-show	During-show	After-show
Being hit by a site vehicle	Yes	No	Yes
Harmful sound and noise exposure	No	Yes	No
Fire hazard	Yes	Yes	Yes
Fall from scaffolding	Yes	No	Yes

### 3.2 Second layer – Risk Assessment

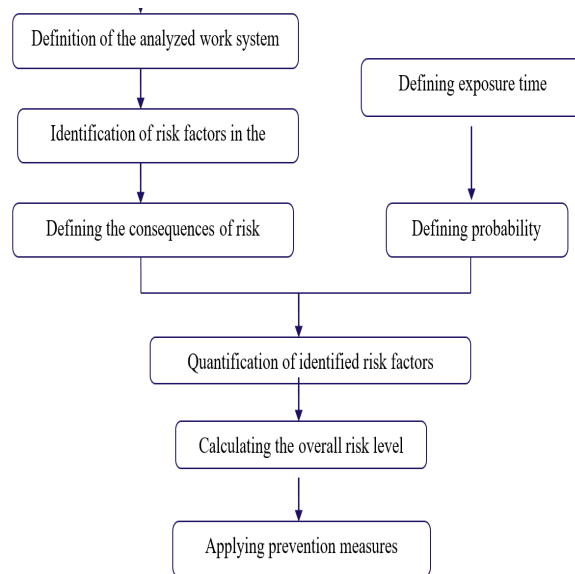
For the second layer of the framework, it is proposed the use of a risk assessment method created specifically for the field of cultural events, Risk Assessment for Cultural Events (RACE).

The RACE method came as a necessity due to the complexity of the activities and occupational risks encountered in workplaces in the cultural events industry. The RACE occupational risk assessment method for cultural events is based on a combination of three of the most well-known and used risk assessment methods in Romania: the INCDPM method, the MEVA method [16] and the OIRA method of the European Agency for Safety and Health at Work [17].

Authors' contribution to the framework is the proposed method that aims to quantitatively determine the risk level for the workplaces in the field of cultural events based on the assessment of occupational accident and illness risks. The principle of this method is based on the systematic identification of all risk factors in the analyzed system, at the workplace and job level.

The process uses standardized checklists. The size of the risk is determined by correlating the severity of the consequences with the probability of occurrence.

In addition to these elements, the RACE method also includes the duration of exposure of workers to the identified risks. The integration of the exposure time allows a more realistic assessment of the level of occupational risk. This approach contributes to a more accurate hierarchy of hazards and the substantiation of prevention measures. (fig.2).



**Fig. 2.** Flowchart of the RACE assessment risk method steps

### 3.3 Third Layer - Mitigation

Layer three of the framework, the mitigation level, contains the prevention and protection measures necessary to reduce risks at work [18] (table 3). Among the prevention and protection measures, worker training is one of the most important [19]. Receiving adequate and sufficient information on occupational safety, provided both at regular intervals and in circumstances such as hiring new personnel, changing work tasks, and introducing new elements in production, will contribute to achieving the goal of zero accidents at work [20].

## 4. RESULTS AND DISCUSSION

The structured discussion between researchers, safety experts, and employees offered key insights as well as validation for the proposed framework.

Approximately 65% of the participants identified site vehicles, working at height, and

special effects as being major sources of work accidents. 35% of the respondents complained about working prolonged hours in high-noise zones, leading to fatigue and reduced productivity.

- safe facilities must also be provided for the assembly, handling and preparation of explosive effects before use
- prepare emergency exits.

Table 3

**Example of prevention and control measures.**

Identified risk	Prevention and control measures
The risk of being injured by site vehicles	<ul style="list-style-type: none"> <li>- traffic management plan for internal traffic control</li> <li>- segregate pedestrians and vehicles if it is reasonably practicable</li> <li>- verify that all drivers have the necessary authorizations. They must be trained in the use of specific vehicles.</li> <li>- it is mandatory for drivers to be familiar with the traffic protocols applicable on site.</li> </ul>
Working at height	<ul style="list-style-type: none"> <li>- employers must ensure that all work at height under their control is well planned and organized.</li> <li>-potentially hazardous weather conditions must be systematically assessed.</li> <li>- measures must be taken to avoid, prevent or reduce the risk of falls.</li> <li>- access equipment must be selected according to the specific nature of the activity.</li> <li>-risks from fragile surfaces and falling objects must be controlled.</li> <li>- an emergency rescue procedure must also be in place. This must allow for the rapid recovery of a fallen and suspended person, including when using a harness and lanyard system.</li> </ul>
Fire Safety	<ul style="list-style-type: none"> <li>- a fire risk assessment is carried out.</li> <li>-consultation and cooperation with the local fire services is ensured from the planning stage.</li> <li>- fire management plan must be drawn up.</li> <li>- functional evacuation plan is established.</li> <li>- adequate means of alarm are provided. - evacuation routes must be sufficient and properly signposted.</li> <li>- appropriate fire-fighting equipment must also be made available in sufficient numbers.</li> </ul>
Special effects	<ul style="list-style-type: none"> <li>- the use of special and visual effects must be carefully planned.</li> <li>- sufficient time and resources must be allocated for preparation and rehearsal.</li> </ul>

Additionally, 55% of the respondents indicated gaps in training and communication, inconsistencies in task rotation schedules, insufficient access to personal protective equipment (PPE) or issues related to availability, fit, and comfort of PPE received.

The participants also provided feedback on framework, especially on what the present framework brings new, namely the introduction of “safety breaks” into the training process – short, quick, concise sessions to inform workers about new risks arising from changes in the workplace.

While 70% considered that the presentation of occupational risks and the necessary prevention and protection measures to be taken during these breaks would be beneficial, 30% expressed concerns about their consistency and overall effectiveness.

Suggestions included analyzing a case study as a preliminary application of the framework and integrating OSH and process safety proposed in this work, with a focus on some scenarios that occurred (and still occur) in the cultural events industry.

**5. CONCLUSION**

Cultural events can raise many considerable health and safety risks not only for the people attending but also for workers involved in those events. Risk assessment is a rather complicated process in the case of cultural events. It must be taken into account that there are practically “three workplaces in one”. We refer to the fact that a large-scale cultural event, such as an open-air music festival, has three parts: before the show, during the show, and after the show. A particularity of this type of cultural event is that in a very short time, some risks appear, increase in intensity, then disappear to be replaced by new ones. Other risks, such as psychosocial ones (stress due to time pressure - a lot to do in a short time), persist throughout the entire event.

Whether it is technical or artistic staff, full-time employees, or freelancers, it is vital for risk

prevention to take into account both the expertise of employees in their own field and the needs and problems related to occupational safety that they observe.

The framework proposed in this study has a proactive, collaborative, and integrated approach as it links all the major „players” in the field: health and safety experts, event planners, managers, workers, from start to end. Also, the framework introduces a series of novelties, such as “safety breaks” and a new risk assessment method created especially for the cultural events field.

In the last ten years, there have been a series of unfortunate incidents in the world of cultural events, which have caused immense suffering, great material damage, and, most seriously, cost human lives. Huge tragedies like the one at the Collective could have been prevented if there had been implemented a risk management framework like the one proposed in this paper.

Limitation. The literature search was limited to only two databases. Also, it must be noted that the framework was only partially validated. Systematic usability testing of the framework could help further develop its validity.

Future research – developing a software tool based on this multi-level framework, that will take into consideration the differences between a construction site for a cultural event and a usual construction site for a building, and also the significant differences between various cultural events.

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### **Mitigarea riscurilor ocupaționale în contextul evenimentelor culturale: un cadru structurat pe mai multe niveluri pentru managementul acestor riscuri.**

Evenimentele culturale precum festivaluri, concerte, expoziții, parade implică un mediu de lucru complex și dinamic, care prezintă riscuri ocupaționale semnificative pentru personalul tehnic, artiști, personal de securitate și lucrătorii de sprijin. Aceste evenimente sunt frecvent caracterizate de infrastructură temporară, configurații cu constrângeri de timp, densități mari de mulțime și variabilitate a mediului - toate acestea contribuind la un risc crescut de incidente și accidente. Această lucrare analizează literatura actuală privind securitatea ocupațională în managementul evenimentelor și identifică lacune critice în domeniu. Constatările relevă o lipsă de abordări standardizate pentru abordarea interdependențelor complexe de risc specifice evenimentelor culturale. Pe baza acestei analize, lucrarea propune un cadru structurat, pe mai multe niveluri, de gestionare a riscurilor pentru identificarea, evaluarea și reducerea riscurilor ocupaționale, punând accent pe planificarea proactivă a securității, instruirea lucrătorilor și integrarea tehnologiilor emergente de monitorizare. Studiul

contribuie la o înțelegere mai cuprinzătoare a modului în care principiile securității ocupaționale pot fi adaptate și aplicate în contextul evenimentelor culturale, sprijinind atât măsurile preventive, cât și îmbunătățirea culturii de siguranță organizațională.

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