

A Comprehensive Risk Assessment Method For Shopping Malls

Alışveriş Merkezleri İçin Kapsamlı Bir Risk Değerlendirme Metodu

ABSTRACT

Shopping malls are structures that pose multidimensional risks in terms of occupational health and safety due to the high density of visitors and the simultaneous execution of many different activities. In this study, a two-step, integrated risk assessment method was developed for shopping malls and applied in a shopping mall located within the borders of Istanbul, serving approximately 50,000 visitors daily. In the first step of the proposed method, a total of 153 requirements were analyzed using a checklist-based pre-assessment approach. As a result of this evaluation, 121 requirements were classified as "yes", 4 requirements as "no" and 29 requirements as "not suitable/incomplete". In the second step, detailed risk analysis was carried out with the FMEA (Failure Modes and Effects Analysis) method only for 33 requirements determined as "no" and "not suitable/missing". Thanks to the proposed two-step approach, the risk assessment process was completed with approximately 79% fewer analysis steps compared to the detailed analysis of all requirements. This method reduces time and labor loss, allowing risks to be managed more effectively and preventive measures to be developed faster.

Keywords: Occupational Health and Safety, Risk Assessment, Shopping Malls, Checklist, FMEA

ÖZET

Alışveriş merkezleri, yüksek ziyaretçi yoğunluğu ve çok sayıda farklı faaliyetin eş zamanlı yürütülmesi nedeniyle iş sağlığı ve güvenliği açısından çok boyutlu riskler barındıran yapılardır. Bu çalışmada, alışveriş merkezleri için iki basamaklı, entegre edilebilir bir risk değerlendirme metodu geliştirilmiş ve İstanbul sınırlarında yer alan, günlük yaklaşık 50.000 ziyaretçiye hizmet veren bir alışveriş merkezinde uygulanmıştır. Önerilen yöntemin ilk basamağında, kontrol listesi temelli bir ön değerlendirme yaklaşımı kullanılarak toplam 153 gereklilik analiz edilmiştir. Bu değerlendirme sonucunda 121 gereklilik "evet", 4 gereklilik "hayır" ve 29 gereklilik "uygun değil/eksik" olarak sınıflandırılmıştır. İkinci basamakta ise yalnızca "hayır" ve "uygun değil/eksik" olarak belirlenen 33 gereklilik için FMEA (Hata Türleri ve Etkileri Analizi) yöntemi ile detaylı risk analizi gerçekleştirilmiştir. Önerilen iki basamaklı yaklaşım sayesinde, tüm gerekliliklerin detaylı analiz edilmesine kıyasla yaklaşık %78 oranında daha az analiz adımıyla risk değerlendirme süreci tamamlanmıştır. Bu yöntem, zaman ve iş gücü kaybını azaltarak risklerin daha etkin şekilde yönetilmesine ve önleyici tedbirlerin daha hızlı geliştirilmesine olanak sağlamaktadır.

Anahtar Kelimeler : İş Sağlığı ve Güvenliği, Risk Değerlendirmesi, Alışveriş Merkezleri, Kontrol Listesi, FMEA

INTRODUCTION

Occupational health and safety (OHS) is a systematic management field that aims to prevent or reduce the health and safety risks that employees may be exposed to during the execution of the work to acceptable levels. The International Labour Organization (ILO) defines OSH as the whole of activities aimed at protecting and improving the physical, mental and social well-being of employees (ILO, 2001). In this context, OHS aims not only to prevent occupational accidents, but also to prevent occupational diseases and to provide a safe working environment in a sustainable manner.

One of the concepts that form the basis of OHS practices is risk. Risk is defined as the combination of the probability of a hazardous event occurring and the severity of the consequences that this event may cause (ISO 31000, 2018). Risk in the context of occupational health and safety; It refers to the possibility of situations that may cause damage to employees, visitors or third parties. For this reason, systematic identification, analysis and control of risks is considered one of the basic elements of OHS management systems.

Ufuk Güler¹
Sezgin Aygün²

How to Cite This Article

Güler, U. & Aygün, S. (2026). A Comprehensive Risk Assessment Method For Shopping Malls. *International Social Sciences Studies Journal*, (e-ISSN:2587-1587) 12(5), 647-668. DOI: <https://doi.org/10.5281/zenodo.20478930>

Arrival: 17 March 2026
Published: 31 May 2026

Social Sciences Studies Journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

¹ PhD Student., Çanakkale Onsekiz Mart University, Graduate School, Department of Occupational Health and Safety, Çanakkale, Türkiye. ORCID: 0000-0002-4045-3608

² Prof. Dr., Çanakkale Onsekiz Mart University, Department of Physics, Faculty of Science, Çanakkale, Türkiye. ORCID: 0000-0002-2969-4195

This article is derived from the doctoral dissertation of Ufuk Güler, supervised by Prof. Dr. Sezgin Aygün.

Risk assessment is defined as the process of determining existing or external hazards in the workplace, analyzing the risks arising from these hazards and deciding on control measures. The ISO 45001 standard is based on a risk-based thinking approach by placing risk assessment at the center of occupational health and safety management systems (ISO 45001, 2018). Risk assessment methods; It can be applied in different types such as checklists, matrix-based analyses, Fine-Kinney, FMEA, HAZOP and similar qualitative or quantitative approaches. The choice of method to be used varies depending on the size of the workplace, the type of activity and the risk profile. Checklists and matrix-based methods are widely used in offices, educational structures, and low-risk service sectors. Fine-Kinney and similar semi-quantitative methods are preferred in sectors with moderate risk such as construction, maintenance-repair and manufacturing, and the Hazard and Operability Analysis (HAZOP) method is preferred for detailed analysis of process-oriented risks, especially in the chemical, petrochemical and process industries.

The Failure Modes and Effects Analysis (FMEA) method is a systematic risk analysis method that aims to analyze the possible types of errors that may occur in a system or process, together with the effects that these errors may cause, and to prioritize the risks. FMEA is widely used in sectors such as automotive, energy, healthcare and maintenance and repair, where there are risks with high consequence severity.

Although shopping malls are not production facilities; They are structures with a complex risk profile due to high human density, simultaneous use of many technical systems and continuity of maintenance and repair activities. These features cause some risks in shopping malls to have high consequences and require detailed analysis. Therefore, in this study, the FMEA method was directed only to the areas found to have risk under a two-step approach instead of being applied to all requirements.

This approach ensures that the prioritization and detailed analysis capabilities of FMEA are used effectively, while increasing the sustainability of the method in terms of time and labor. In this respect, the study is important in terms of showing that the FMEA method can be used selectively and targetedly in complex structures belonging to the service sector such as shopping malls.

It has been clearly demonstrated in the literature that in the absence of an effective risk assessment, the incidence of occupational accidents and occupational diseases increases, and serious injuries and loss of life may occur. In addition, the inadequacy of risk assessment; It can also lead to indirect consequences such as production losses, labor turnover, legal sanctions and loss of corporate reputation (Hughes & Ferrett, 2020). Therefore, risk assessment is not only a legal obligation, but also the main tool of sustainable occupational health and safety management.

Shopping malls are complex structures where many different activities are carried out simultaneously, serving a wide range of users, including employees and visitors. In these structures, there are many sources of risk such as fire safety, electrical and mechanical installations, crowd management, working at height activities and technical studies. For this reason, it is important that risk assessment processes in shopping malls are not only limited to meeting legal requirements, but also structured in a way that ensures the prioritization of risks and the effective use of resources. The International Labour Organization (ILO) reports that a significant portion of occupational accidents in the service sector occur during maintenance and repair activities, working at height, and the use of technical equipment (ILO, 2022). These activities are among the continuous works in shopping malls.

Public reports and inspection results published in Turkey also show that periodic control deficiencies in multifunctional structures such as shopping malls, accidents caused by working at height, and maintenance activities carried out in confined spaces are among the important risk areas (MoLSS, 2021). These findings reveal that risk assessment processes in shopping malls should not only be considered as a legal requirement but also as a proactive tool to prevent risks that could have serious consequences. Accidents that occur in complex structures such as shopping malls in the trade and service sectors require special precautions due to the mechanical, electrical and human interaction intensity they contain.

From the point of view of fire safety, fires occurring in closed and multi-storey commercial buildings; It is emphasized in various reports that it can cause serious loss of life due to smoke spread, evacuation difficulties and crowd density. The U.S. National Fire Protection Association (NFPA) states that a significant portion of fires in shopping malls and retail structures start during electrical installations, kitchen areas, and maintenance work (NFPA, 2021). Similarly, in the European Fire Safety reports, it is stated that the fire risk in large commercial buildings should be managed effectively not only during the design phase but also during the operation process. For example, in 2017, a fire incident caused by faulty electrical wiring caused by malpractices in the renovation of the third floor of a shopping mall resulted in the death of 38 people, and such large-scale incidents provide important warnings for the effectiveness of OHS practices.

Various technical, organizational and managerial measures are implemented in order to control risks in shopping malls. These measures include fire detection and extinguishing systems, emergency lighting, determination of escape routes, periodic maintenance and controls, employee training, and emergency drills. However, in buildings such as shopping malls where many activities are carried out simultaneously, approaches based on analyzing all risks at the same level of detail may lead to loss of time and labor in practice.

Failure to prioritize risks can negatively affect the sustainability of risk assessment processes and make it difficult to use resources effectively. This situation reveals the need for selective and focused risk assessment approaches that distinguish between preliminary assessment and detailed analysis stages. In this context, the aim of this study is to develop a two-step, integrable and practical risk assessment method for shopping malls and to evaluate this method through a real field application.

The management of occupational health and safety risks in shopping malls and similar complex structures is generally discussed in the context of retail and service sectors in the literature. Lingard and Holmes (2001) noted that in such environments, risks involve not only employees but also visitors and subcontractors, and drew attention to the multi-stakeholder nature of risk assessment processes.

The effectiveness of risk assessment processes in complex work environments is directly related to the prioritization of risks. Hollowell and Gambatese (2009) revealed that analyzing all risks at the same level of detail leads to loss of time and resources, which makes risk management processes inefficient. For this reason, it is stated in the literature that multi-stage risk assessment approaches that separate the preliminary assessment and detailed analysis stages give more effective results.

Chow and Chow (2007) stated that high density of people and complex escape routes in shopping malls increase fire risks. Yung and Khoo (1999), on the other hand, emphasized that risks in large shopping complexes should be handled not only with technical measures but also with their organizational and managerial dimensions. These studies show that the risks specific to shopping centers should be evaluated by taking into account the structure and usage characteristics.

International standards on risk management cite prioritization and effective use of resources as fundamental principles in risk assessment processes. ISO 31000 (2018) recommends that risks be evaluated according to their severity in the process of identifying and analyzing them; The ISO 45001 (2018) standard is based on the risk-based thinking approach in occupational health and safety management systems. These standards form the theoretical basis of selective and focused risk assessment approaches.

When risk assessment methods are examined, it is seen that checklist-based approaches are widely used for preliminary assessment and rapid screening purposes. Hale and Glendon (1987) stated that checklists are effective in determining hazards systematically, but they should be supported by detailed analysis methods. Swuste et al. (2010) also revealed that determining the depth of analysis according to the need plays an important role in the prevention of occupational accidents.

Among the detailed risk analysis methods, FMEA is frequently preferred in the literature due to its systematic structure. Stamatis (2003) stated that the FMEA method allows the evaluation of risks in a cause-effect relationship, but it can be time-consuming to apply it to all processes. Bowles and Peláez (1995) and Carbone and Tippett (2004) emphasized that selective and targeted application of the FMEA method increases the efficiency of analysis.

In the post-pandemic period, it has been revealed in the literature that the risk perception and user expectations in shopping malls have changed significantly. In their study comparing shopping mall experiences before and after COVID-19, Mortimer, Andrade, and Fazal-e-Hasan (2024) found that visitors attach more importance to the perception of safety, order, and control after the pandemic; He stated that hygiene, crowd density and spatial arrangements directly affect the shopping experience. This shows that risk assessment processes in shopping malls should include not only employee safety but also visitor behavior and perception.

With the pandemic, indoor air quality (IAQ) and ventilation in closed and heavily used spaces have been reconsidered as a fundamental element in the management of health risks. Morawska et al. (2024) clearly demonstrated the critical role of ventilation in reducing the risk of airborne transmission during the COVID-19 process and emphasized that ventilation strategies in large indoor spaces should become an integral part of risk assessment processes. In another study conducted specifically for shopping malls, Yusoff et al. (2023) discussed the need for hybrid solutions that support higher air exchange rates and the need for existing ventilation approaches in the post-COVID period, especially in shopping malls located in hot and humid climate conditions.

Current studies discuss that security in shopping malls is not limited to technical risks, but also factors such as perceived security and fear of crime affect user behavior. In their study of shopping mall visitors, Iqbal and Nazir (2025) found that building design, spatial visibility, and previous negative experiences were decisive on perceived safety levels. This finding points to the need to consider measures based on physical safety and environmental design in risk assessment processes.

Current field studies on fire safety management also show that practical deficiencies in shopping malls may continue. In their evaluations conducted across different shopping malls, Sholanke, Dimuna, and Olukayode (2025) noted that while fire safety management systems are theoretically present, there are areas for improvement during the implementation and monitoring phases. This situation reveals that fire safety risks should be systematically evaluated not only during the design phase but also during the operational process.

In the context of crowd management and safe operation, technological solutions come to the fore. Prihandoko et al. (2024) demonstrated that real-time crowd counting and monitoring systems in areas with high human density, such as shopping malls, can make significant contributions to security management and operational decision-making. Such approaches allow crowd-related risks to be managed more effectively in shopping malls during the post-pandemic period.

When the studies in the literature are evaluated together, it is seen that risk assessment processes in complex structures such as shopping malls can be managed more effectively with prioritization-based and multi-stage approaches. However, it is noteworthy that applied studies specific to shopping malls, which combine preliminary evaluation and detailed analysis stages in a systematic structure, are limited. This study focuses on the development of a two-step risk assessment method for shopping malls with the aim of filling this gap.

METHOD

The importance of prioritization and the need for selective analysis in risk assessment processes is frequently emphasized in the literature. In order to respond to this need, a two-step risk assessment methodology for shopping malls was developed in this study. The proposed methodology takes risk-free requirements out of the process with the pre-assessment phase and directs detailed analyses only to areas with risk.

In this study, a two-step risk assessment methodology was developed and implemented for use in shopping malls. The method consists of a checklist (pre-assessment) and the FMEA method. The process starts with the first step of setting out all the requirements completely, that is, identifying the hazards. Afterwards, the second step, that is, the FMEA method, will be started.

Initial Assessment: Checklist-Based Pre-Assessment

In the first step of the method, a checklist prepared to cover the occupational health and safety risks that may be encountered in shopping malls was used. The checklist was filled in on site by visiting the work areas and the evaluation process took into account the working environment, activities carried out, work equipment used and organizational structure. This approach aims to identify hazards quickly and systematically.

While preparing the checklist; basic elements such as building and annexes, works carried out, work equipment, organizational structure, education and experience levels of employees, past work accidents and near misses, exposure measurements and emergency plans were taken into consideration. Thus, a holistic evaluation of physical, chemical, biological, ergonomic and organizational hazard sources has been ensured.

Each requirement has been evaluated under three categories: "yes", "no" or "not suitable/incomplete" according to its current status. Thanks to this structure, risk-free areas have been excluded from the process and the scope of evaluation has been narrowed.

Table 1: Primary evaluation and color scale

| Evaluation | Evaluation Result |
|---------------------------|--|
| No | Requirements rated as "no" carry a high potential risk. These requirements will be transferred to the second-line analysis. |
| Not Suitable / Incomplete | Requirements that are considered "inappropriate/incomplete" carry potential risks. These requirements will be transferred to the second-line analysis. |
| Yes | Requirements evaluated as "Yes" indicate that the relevant risk is under control and no additional analysis is made for these requirements. |

Second Step: Detailed Risk Analysis with FMEA Method

In the second step, a detailed risk analysis was carried out using the FMEA method for the requirements determined as "no" and "not suitable/incomplete" as a result of the primary care assessment. Within the scope of

the FMEA method, the possible types of errors, the causes and possible effects of these errors were systematically discussed for each risk.

The probability, severity and detectability criteria used in FMEA analysis and the weighting coefficients of these criteria were determined by taking into account the FMEA applications in the literature and the opinions of field experts. This approach aims to make the analysis process as objective and reproducible as possible.

The FMEA method is a flexible risk analysis tool that can be used in different sectors and application areas, and its sub-parameters can be adapted according to the application context. In this study, the basic structure of FMEA was preserved; however, the definition and evaluation of the parameters have been reinterpreted by taking into account the activity structure, user profile and risk characteristics of shopping malls.

Error probability; It was evaluated on six basic criteria: the frequency of the work, the level of education and knowledge of the personnel, the technological adequacy of the equipment used, the duration of the work, the environmental conditions and the frequency of experience in the past. Each of these criteria affects the risk score in line with the weights determined during the analysis process. Error probability parameters were determined according to the past events in the shopping mall, the training level of the personnel, the condition of the equipment, the frequency and duration of the scored work. Scoring details are given below.

Table 2: Error probability score scale

| | | | | | |
|---|------------------------|------------------|--------------------|------------------------|---------------------|
| Frequency of Work | Every hour | 4 times a day | 2 times a day | Every day | 1 time per week |
| | 10 | 9 | 8 | 7 | 6 |
| | 1 time in 2 weeks | 1 time per month | 1 time in 3 months | 2 times a year | 1 time a year |
| | 5 | 4 | 3 | 2 | 1 |
| Education and Knowledge Level of the Personnel | Very good | Good | Medium | Insufficient | Very inadequate |
| | 2 | 4 | 6 | 8 | 10 |
| Equipment Technology and Proficiency | Very good | Good | Medium | Insufficient | Very inadequate |
| | 2 | 4 | 6 | 8 | 10 |
| Work Time | Full day uninterrupted | 1 h - 5 h | 30 min - 1 hr | Between 5 min - 30 min | Less than 5 minutes |
| | 10 | 8 | 6 | 4 | 2 |
| Environmental Conditions | Very good | Good | Medium | Insufficient | Very inadequate |
| | 2 | 4 | 6 | 8 | 10 |
| Frequency of Occurrence in the Past | 1/1.500.000 | 1/150.000 | 1/15.000 | 1/2.000 | 1/400 |
| | 1 | 2 | 3 | 4 | 5 |
| | 1/80 | 1/20 | 1/8 | 1/3 | 1/2 |
| | 6 | 7 | 8 | 9 | 10 |

Error probability score formula = (Frequency of work x 0.2) + (Level of education and knowledge of personnel x 0.15) + (Equipment technology and competence x 0.15) + (Duration of work x 0.15) + (Ambient conditions x 0.15) + (Frequency of occurrence in the past x 0.20)

| Dimension / Hazard | Likelihood | Frequency of Work | Frequency of Work | Training and Knowledge Level of Personnel | Training and Knowledge Level of Personnel | Equipment Technology and Competence | Equipment Technology and Competence | Duration of Work | Duration of Work | Environmental Conditions | Environmental Conditions | Frequency of Past Experience | Frequency of Past Experience |
|---|------------|-------------------|-------------------|---|---|-------------------------------------|-------------------------------------|-----------------------------|------------------|--------------------------|--------------------------|------------------------------|------------------------------|
| In general, it was seen that orientation trainings were carried out, and the training record of a person from the cleaning company could not be seen. Orientation training has a scope, but its scope is not considered sufficient. | 5 | Every Hour | 10 | Very Good | 2 | Good | 4 | Between 30 Minutes - 1 Hour | 6 | Good | 4 | 1/15.000 | 3 |

Figure 1 : Example error probability calculation table

Source: Author’s own work.

Error severity is; The effects on employees and visitors were evaluated by taking into account environmental impacts, possible damages to buildings and equipment, and effects on corporate reputation. While determining the error severity criteria, factors specific to shopping malls such as visitor density and use of public areas were evaluated. Scoring details are given below.

Table 3: Error severity score scale

| | | | | | | |
|----------------------------------|---------------------|--------------|---------|--------------------|---------------------|------|
| Harm to public | Catastrophe | Mass death | Death | Loss of limbs | Very serious injury | |
| | 10 | 9 | 8 | 7 | 6 | |
| | Very serious injury | Minor injury | Trivial | Very insignificant | Harmless | |
| | 5 | 4 | 3 | 2 | 1 | |
| Harm to employees | Disaster | Mass death | Death | Loss of limbs | Very serious injury | |
| | 10 | 9 | 8 | 7 | 6 | |
| | Very serious injury | Minor injury | Trivial | Very insignificant | Harmless | |
| | 5 | 4 | 3 | 2 | 1 | |
| Damage to the environment | Too much | More | Medium | The | Very little | None |
| | 10 | 8 | 6 | 4 | 2 | 0 |
| Damage to reputation | Too much | More | Medium | Less | Very little | None |
| | 10 | 8 | 6 | 4 | 2 | 0 |

| | | | | | | |
|------------------------|----------|------|--------|------|-------------|------|
| Damage to the building | Too much | More | Medium | Less | Very little | None |
| | 10 | 8 | 6 | 4 | 2 | 0 |
| Damage to equipment | Too much | More | Medium | Less | Very little | None |
| | 10 | 8 | 6 | 4 | 2 | 0 |

Error severity score formula = (Damage to other persons x 0.25) + (Damage to employees x 0.25) + (Damage to the environment x 0.20) + (Damage to the brand x 0.10) + (Damage to the building x 0.10) + (Damage to equipment x

| Dimension / Hazard | Severity | Damage to Other Persons | Damage to Other Persons | Damage to Employees | Damage to Employees | Damage to the Environment | Damage to the Environment | Damage to the Brand | Damage to the Brand | Damage to the Building | Damage to the Building | Damage to the Equipment Used | Damage to the Equipment Used |
|---|----------|---|-------------------------|---|---------------------|---------------------------|---------------------------|---------------------|---------------------|------------------------|------------------------|------------------------------|------------------------------|
| In general, it was seen that orientation trainings were carried out, and the training record of a person from the cleaning company could not be seen. Orientation training has a scope, but its scope is not considered sufficient. | 4.1 | Type of Fault That Can Cause Minor Injuries | 5 | Type of Fault That Can Cause Minor Injuries | 5 | Little impact | 4 | Little | 4 | Very Little | 2 | Very Little | 2 |

0.10)

Figure 2 : Sample error severity calculation table

Source: Author’s own work.

In the noticeability assessment, the extent to which possible errors can be detected with existing control mechanisms is taken into consideration.

Table 4: Noticeability score scale

| Noticeability | |
|------------------------------|---|
| The Possibility of Detection | 1 |
| Difficult to Detect | 2 |

Risk Priority Score (RPP) = error probability (O) x error severity (\$) x noticeability (F) was calculated using the formula.

Risks according to the calculated RPP values; It is classified as acceptable, moderate, high level and unacceptable risk. In addition, situations in which violations of the legislation were detected in the analysis were evaluated as unacceptable risks regardless of the Risk Priority Score.

Table 5: Risk level determination table and color scale

| Risk Value | Risk Assessment Result |
|-------------------|--|
| 400 < RPP <= 1000 | Unacceptable risk (Measures should be taken immediately, the employer or his representative should be informed and the work should be stopped.) |
| 200 < RPP <= 400 | High level of risk (Urgent action should be planned and precautions should be taken in a short time.) |
| 50 < RPP <= 200 | Moderate risk (Action should be planned and precautions should be taken.) |
| 1 < RPP <= 50 | Acceptable risk (Prevention is not a priority.) |

Application of the Method

The proposed two-step risk assessment method was applied in a shopping center located within the borders of Istanbul and serving approximately 50,000 visitors daily. A total of 153 requirements were evaluated in primary care; in the second step, FMEA analysis was performed only for the requirements that were found to have risks.

The checklist used in primary care has been created on the basis of national and international occupational health and safety legislation and standards, taking into account the activities carried out in shopping malls. The 153 requirements included in the checklist are; It has been compiled on the basis of the provisions of the Occupational Health and Safety Risk Assessment Regulation, the Regulation on Health and Safety Conditions in the Use of Work Equipment, the Regulation on the Protection of Buildings from Fire, the Occupational Health and Safety Law No. 6331 and the relevant sub-legislation. In addition, the general principles in the ISO 31000 Risk Management Standard and ISO 45001 Occupational Health and Safety Management System Standard were taken into account in order to strengthen the risk-based approach. The checklist prepared within this framework is structured to cover the physical, chemical, biological, ergonomic and organizational risks commonly encountered in shopping malls.

This application shows that the method can be applied in a practical, effective and sustainable way in complex structures such as shopping malls.

Table 6: Primary evaluation in a shopping mall in Istanbul

| No | For Shopping Mall Requirements | Status | Description | Precautions/Actions to be taken |
|----|---|--------|-------------|---------------------------------|
| 1 | In accordance with the hazard class of the working personnel, | Yes | | |



| | | | | |
|----|--|---------------------------|---|--|
| | employment and periodic health reports are available. | | | |
| 2 | There is an emergency medical response unit in accordance with the legislation and an emergency medical technician has been assigned. | Yes | | |
| 3 | A training presentation covering facility-specific topics has been prepared and at least 2 hours of onboarding orientation training is provided for newly recruited personnel. | Not Suitable / Incomplete | In general, it was seen that orientation trainings were carried out, and the training record of a person from the cleaning company could not be seen. Orientation training has a scope, but its scope is not considered sufficient. | Orientation training should be renewed to include information on all workplace-specific issues. Incomplete orientation training should be completed. |
| 4 | All employees have basic occupational health and safety training. | Yes | | |
| 5 | General information trainings are available for emergency teams. | Yes | | |
| 6 | Emergency / fire extinguishing drills are carried out. | Not Suitable / Incomplete | In 2022, evacuation, fire, and chemical spill drills were conducted. Technical personnel did not participate in the drill. | Technical personnel should be ensured to participate in the spill drill. |
| 7 | Working at height training is given by an "IRATA certified Working at Height Instructor". | Yes | | |
| 8 | Tagout/lockout training recordings are available. | Yes | | |
| 9 | There are basic first aid certified personnel in accordance with the hazard class. | Not Suitable / Incomplete | The number of first aiders among service providers was insufficient. | Service first aid training must be completed. |
| 10 | Boiler operation certified personnel are available. | Yes | | |
| 11 | There are technical personnel certified by Electrical High Current Facilities (EKAT) in the enterprise. | Not Suitable / Incomplete | It was seen that 2 of the technical personnel had EKAT certificates. A person's document is up to date. One person was seen to be expired. | The EKAT certificate of the person whose document is not up-to-date must be renewed. |
| 12 | Employees have a defined national professional qualification. (Mastery Certificate, Professional Qualification Certificate, Engineering Certificate, etc.) | Not Suitable / Incomplete | It has been observed that there are electrical personnel who do not meet the exemption conditions of the Vocational Qualifications Authority (MYK) and personnel who lack vocational training within the scope of vocational training. | It would be appropriate to obtain a Business Electrical Maintainer VQA certificate for electrical personnel. |
| 13 | Personal Protective Equipment (PPE) assignment/delivery records could not be verified | Not Suitable / Incomplete | One of the technical personnel could not be seen embezzling electrician gloves and electrician shoes, and the person who did the welding work was not embezzled from a welder's mask and welder's apron. Seat belts and lanyards were not assigned to the personnel. The person working as a glazier in the cleaning company was not seen to embezzle a double lanyard. | Personal protective equipment deficiencies should be completed. |
| 14 | There is a signed and approved "Annual Training Plan". | Not Suitable / Incomplete | An annual training plan was developed to address training needs, and target realizations were monitored through this plan. For the cleaning company, only the Common Health and Safety Unit training plan was available; however, no technical or general training needs analysis was conducted, and training completion rates were not tracked. | Training needs should be analyzed by the cleaning company, a training plan should be created and followed in this context. A training monitoring/control tracking log should be created to track employee training current status. |
| 15 | Signed and approved "Annual Work Plan" is available. | Yes | | |
| 16 | Signed and approved "Annual Evaluation Report" is available. | Yes | | |
| 17 | The employee representative suitable for the number of | Yes | | |

| | | | | |
|----|--|---------------------------|---|--|
| | employees has been appointed in writing by the employer's representative and there is an employee representative training certificate. | | | |
| 18 | The management and contractor companies have a Risk Assessment Report prepared for the workplace and risk assessment team members have been formed and appointed by the employer's representative. | Yes | | |
| 19 | An Emergency Plan is available and emergency team lists are kept up to date. | Not Suitable / Incomplete | It was seen that there was an emergency plan, but the fire scenario was not defined and the signatures were missing in the plan. | The fire scenario should be defined in the plan and missing signatures should be completed. |
| 20 | An occupational health and safety committee has been established in the workplace, board members have been appointed, the board convenes at appropriate intervals and the decisions of the meetings are recorded and followed. | Yes | | |
| 21 | Work permit forms are used for high-risk work in the workplace and the work is recorded in the work permit book. | Not Suitable / Incomplete | Tenant employee documentation was available; however, the technical team's internal control form was not implemented at the desired level. Additionally, the work permit system for high-risk activities—such as energy isolation (LOTO/EKED), working at height, and confined space work—was not implemented at an adequate level for both technical and cleaning personnel. | The scope of work permit systems and work control forms should be increased and a risk management needs table should be created for the enterprise. |
| 22 | There is an Explosion Protection Document prepared for the workplace and the measures and actions specified in the report are followed. | Not Suitable / Incomplete | The Operation Explosion Protection Document was prepared in 2015. The actions of the document are followed in the general action plan. When the action plan was checked, it was seen that 3 items were still open. | The PKD items in the action plan need to be completed, starting with the high-priority actions. |
| 23 | The management and contractor companies have an Occupational Safety Specialist and Workplace Physician registered in the OHS Clerk system. | Yes | | |
| 24 | There is an Approved Determination and Suggestion Book of the relevant employers and it is followed. | Yes | | |
| 25 | There is a high voltage operation supervisor contract. | Yes | | |
| 26 | Exposure and environment measurements are made throughout the enterprise. | Not Suitable / Incomplete | A business-specific plan has not been created for environment and exposure measurements. The scope of the measurements made in the last 1 year was not considered sufficient. | Measurements need to be reviewed and renewed for the entire area and risks. |
| 27 | Water analyzes and legionella controls are carried out throughout the enterprise. | Not Suitable / Incomplete | Wastewater analyses were regularly conducted by an independent laboratory; however, the results of the most recent analysis report did not comply with discharge limits. | It is necessary to evaluate the existing filtration system, apply additional bacteria, take measures to clean the grease trap more frequently, and evaluate the results of these applications and re-analysis. |
| 28 | Spraying and controls are carried out against rodents, pests and insects throughout the enterprise. | Yes | | |
| 29 | Employees have resting areas. | Yes | | |
| 30 | There are requirements for cleanliness and health (such as sinks, showers and toilets) in the | Yes | | |

| | | | | |
|----|--|---------------------------|--|---|
| | rest areas of the employees. | | | |
| 31 | The measures taken against possible fire in the areas where employees eat and rest in the workplace and in office areas are sufficient. | Yes | | |
| 32 | In the workplace, the action plan is hung in the areas where employees eat and rest, and in office areas in case of possible emergencies. | Yes | | |
| 33 | Personal lockers are provided in the dressing areas of the employees in the workplace. | Yes | | |
| 34 | Clean / dirty distinction has been made in personal lockers in dressing areas. | Yes | | |
| 35 | There are lifelines in accordance with the standard where necessary in the roof areas. | Yes | | |
| 36 | Collective protection measures against falling from a height have been taken in the roof area. | Not Suitable / Incomplete | It has been observed that physical measures have been taken in the roof area in general. There are points where there is a lack of railings in air handling units (ahu). | It was recommended to make an exploration for the points with handrail deficiencies and to complete the deficiencies. |
| 37 | Materials that may be blown by the wind in the roof area have been taken under control. | Yes | | |
| 38 | Emergency escape signs and lighting are available in the roof area. | Yes | | |
| 39 | Fire safety is provided in the roof area. | Yes | | |
| 40 | Measures have been taken against tripping and falling on the floor in the roof area. | Not Suitable / Incomplete | It has been observed that rainwater drains in attics create a risk of getting stuck. | All rainwater drains should be checked and closed in a way that does not create a risk of tripping or falling. |
| 41 | A personal protective equipment station has been established in the roof area. | Yes | | |
| 42 | The materials required from the personal protective equipment station in the roof area are complete and comply with the standards. | Yes | | |
| 43 | Rescue plans are available for work at height. | Not Suitable / Incomplete | A rescue plan has been prepared and instructions have been posted. There are no rescue instructions for the water intervention ladder in the plan. Worn instructions have been seen. Rescue equipment and training of personnel are lacking. | The recovery plan should be revised to cover the entire area. Missing rescue equipment should be completed and rescue training should be taken from height. |
| 44 | Rescue Equipment from Height was provided and necessary trainings were provided. | Yes | | |
| 45 | The connection points of the workplace façade cladding are checked. | Yes | | |
| 46 | Large-surface signage, carriers of lighting equipment, connection point technical controls are carried out through the authorized company. | Yes | | |
| 47 | Measures against impact have been taken at the impact points at head level and below. | Not Suitable / Incomplete | At certain points on the roof, there are areas that are likely to hit right in the head area. | Areas at risk of head impact should be covered with soft protective material. |
| 48 | The area has emergency escape guidance and emergency lighting. | Yes | | |
| 49 | There is a gas detection system in the area. | Yes | | |
| 50 | There is a fire detection system in | Yes | | |

| | | | | |
|----|---|---------------------------|--|---|
| | the area. | | | |
| 51 | Fire passages for electrical and mechanical installations were made in the area. | Yes | | |
| 52 | Measures against impact have been taken at the impact points at head level and below. | Yes | | |
| 53 | A PPE Station has been created for employees. | Yes | | |
| 54 | The use of exproof materials has been complied with where necessary in the area. | Yes | | |
| 55 | Fuel tanks are in a separate area. | Yes | | |
| 56 | There is a flood pool with sufficient capacity. | Yes | | |
| 57 | Fuel tank body grounding is done. | Yes | | |
| 58 | Lighting, emergency lighting, and directions are available. | Yes | | |
| 59 | Fuel tanks are fixed against tipping over. | Yes | | |
| 60 | The body grounding of the generators is made. | Yes | | |
| 61 | There is a fire detection system. | Yes | | |
| 62 | A PPE Station has been created in the area for employees. | Yes | | |
| 63 | The use of exproof materials has been complied with where necessary in the area. | Yes | | |
| 64 | Safe access to the upper points (valves, passages, etc.) is provided. | Yes | | |
| 65 | Lighting, emergency lighting, and directions are available. | Yes | | |
| 66 | There is a fire detection system in the area. | Yes | | |
| 67 | There is a fire extinguishing device/system. | Yes | | |
| 68 | Fire response instructions and signs are hung. | Not Suitable / Incomplete | It was seen that the instructions in the fire pump room were not in Turkish. | It should be ensured that the instructions are in Turkish. |
| 69 | A PPE Station has been established in the area. | Yes | | |
| 70 | There are secure stairs and platforms for access to Water Tanks. | Yes | | |
| 71 | In the use of chemicals in the area, use in accordance with the Material Safety Information Forum has been ensured. | Yes | | |
| 72 | EKED materials and locks were procured in the workplace and embezzled to the employees individually. | Not Suitable / Incomplete | Embezzlement of EKED materials belonging to one person could not be seen. | All employees should be checked again and EKED material deficiencies should be completed. |
| 73 | Employees have been trained and authorized for EKED applications. | Not Suitable / Incomplete | Tagout, Lockout, Securing, and Trial training was provided to technical personnel; however, one employee had not completed the training. | EKED training of personnel with missing training should be completed. |
| 74 | In EKED Applications, it is defined for which operations EKED is applied. | Yes | | |
| 75 | The electrical equipment and panels used are checked and labeled with appropriate color coding. | Yes | | |
| 76 | The contact information of the persons authorized to carry out electrical repair and maintenance is posted in visible places. | Yes | | |
| 77 | The door body is grounded and connected to the ground line. | Yes | | |
| 78 | There is a residual current relay of | Yes | | |

| | | | | |
|-----|--|---------------------------|---|--|
| | appropriate value in the main and secondary panels. | | | |
| 79 | There is an insulating mat in front of the panel. | Yes | | |
| 80 | There is a fire detection system in the areas. | Yes | | |
| 81 | There is a fire extinguishing device/system. | Yes | | |
| 82 | Fire response instructions and signs are hung. | Yes | | |
| 83 | All electrical areas are closed to access other than authorized personnel. | Yes | | |
| 84 | In the high voltage room, there is a test device for ready-made insulating PPE (34.5 kW gloves, cuts, maneuvering stands) and insulating gloves. | Yes | | |
| 85 | Insulating personal protective equipment is available. | Yes | | |
| 86 | There is an insulating mat in front of the electrical panel. | Yes | | |
| 87 | There is emergency lighting in the rooms. | Yes | | |
| 88 | Is there an emergency escape button? (Areas with FM200 gas etc.) | Yes | | |
| 89 | There is a rodent control point in the area and regular checks are carried out. | Yes | | |
| 90 | Vehicle direction signs, emergency exit signs, emergency lighting and pedestrian usage areas have been marked. | Yes | | |
| 91 | In the parking garages, vehicle parking is prevented in front of the technical volume, fire cabinets and emergency escape points. | Yes | | |
| 92 | There is a carbon monoxide detection and evacuation system in the parking garages. | Yes | | |
| 93 | There are fire cabinets and extinguishers in the parking garage area. | Yes | | |
| 94 | Fire response instructions and signs are hung. | Yes | | |
| 95 | There is a smoke detector and an automatic extinguishing system. | Yes | | |
| 96 | Rodent control points have been established in the parking garage area. | Yes | | |
| 97 | In the indoor and outdoor parking areas, vehicle parking is prevented in front of fire cabinets and hydrants. | Yes | | |
| 98 | Working platforms with railings are used for works such as landscaping, maintenance and repair, lighting repair / maintenance at height in the open parking area. | Yes | | |
| 99 | Health and safety markings are available in the Parking Garage and Vehicle parking areas to protect personnel and guests. (Such as speed limit, steering, maximum height.) | Yes | | |
| 100 | There are no technical volumes open to unauthorized intervention. | Not Suitable / Incomplete | It was seen that the natural gas installation in the parking garage area was open to unauthorized intervention. | The intervention hatch must be installed and locked. |

| | | | | |
|-----|--|---------------------------|--|--|
| 101 | A safe working platform is used for work at height throughout the enterprise. | No | There is no safe working platform for work at height throughout the enterprise. Works are generally carried out with type A access stairs. | Working platforms in accordance with standards should be provided. |
| 102 | In the common areas of the workplace, there are no flower pots, billboards, hanging materials, equipment, etc. that can be overturned or damaged. | Yes | | |
| 103 | Protection measures have been taken against risks such as slipping, tripping, spikes and sharp edges. | Yes | | |
| 104 | The connection points of the suspended materials are checked. | Yes | | |
| 105 | Emergency lighting and emergency exit signs, access to the safe area in case of emergency are sufficient. | Yes | | |
| 106 | Emergency evacuation plans are posted at the relevant points. | Yes | | |
| 107 | There is an automatic fire extinguishing system and fire extinguishing devices and they are checked. | Not Suitable / Incomplete | Fire cabinets and other extinguishing devices were installed in the required areas, and monthly inspections were conducted. However, the number of fire extinguishers in the goods reception area was insufficient, access to a fire cabinet was obstructed due to material stacking, and a fire extinguisher in the third-floor corridor was found unsecured from its fixation. | The fire extinguisher in the 3rd floor corridor should be fixed. |
| 108 | Safe access to areas such as cat paths has been provided and authorized entrances have been blocked. | Yes | | |
| 109 | Measures have been taken against materials and people falling to the lower level on the terraces and common dining areas. | Yes | | |
| 110 | Precautions have been taken against cleaning machines hitting the glass railings in the common areas of the facility. | Yes | | |
| 111 | The technical team is not allowed to work alone during night work. | Yes | | |
| 112 | There is a lifeline in glass porches. | Not Suitable / Incomplete | There is no lifeline on the glass porch at the main entrance (where the eaves are cleaned) and on the porch on the side of the pharmacy entrance. | A lifeline should be applied in order to ensure the 100% bonding rule in the work at height during porch cleaning. |
| 113 | Monitoring and controls (color coding) are carried out for scaffolding equipment and stairs. | Yes | | |
| 114 | Emergency requirements are provided in disabled toilets. | Yes | | |
| 115 | There are electrical inconveniences in the common areas of the facility. | Yes | | |
| 116 | Storages are not made outside the defined storage area. | Yes | | |
| 117 | Mechanical shafts are kept locked and have warning/warning signs on them. | Not Suitable / Incomplete | Mechanical shafts were kept locked; however, no warning signs were present. | Warning/warning signs should be hung on mechanical shaft entrances. |
| 118 | The inspection of tenant warehouses etc. within the facility, which contain risks affecting the general, is carried out and recorded within the scope of passive fire inspections. | Yes | | |
| 119 | Elevator and other transmission equipment maintenance is carried out. | Yes | | |
| 120 | Improper use of escalator belts is | Yes | | |

| | | | | |
|-----|--|---------------------------|---|---|
| | prevented. | | | |
| 121 | There is an emergency button on the escalators/walkways. | Yes | | |
| 122 | There is a fire extinguishing device/system. | Yes | | |
| 123 | Fire response instructions and signs are hung. | Yes | | |
| 124 | Measures have been taken regarding lighting and emergency lighting, rotating components. | Yes | | |
| 125 | Appropriate fire extinguishing measures have been taken under raised floors and in other areas. | Yes | | |
| 126 | Pest and rodent control work has been carried out. | Yes | | |
| 127 | Ergonomic seating system is provided for employees. | Yes | | |
| 128 | Periodic eye examinations are performed for those working with screened vehicles. | No | The eye examinations of the employees working in CCTV could not be seen. | It is recommended to have an eye examination 1 time a year for CCTV personnel. |
| 129 | There are no factors that may fall, cause slipping, tripping and damaged toys in children's playgrounds. | Yes | | |
| 130 | Electrical measures are sufficient. | Not Suitable / Incomplete | In the children's playground, it has been observed that measures are generally taken in electrical cables at the point where children can reach. There are open cable trays, sockets and additional cable applications. | In the Playland children's playground, cable duct, socket and additional cable should be made suitable. |
| 131 | The hand tools used comply with the standards and are checked periodically. | Not Suitable / Incomplete | The tip of the welding machine tongs in the mechanical workshop is broken. It was seen that the benchtop grinding machine was plugged in on the chair. | The tongs of the welding machine must be replaced. The grinder must be fixed to the workbench. Safe handling instructions should be posted for the equipment used. |
| 132 | Works such as fixing shelves, preventing materials from falling, hanging equipment such as ladders, etc. were carried out. | Yes | | |
| 133 | The instructions for use of the machinery-equipment and power tools used are available and posted. | Yes | | |
| 134 | Chemicals in the workshop are stored properly. | Yes | | |
| 135 | Necessary precautions have been taken in the storage, transportation and use of pressurized gas cylinders. | Yes | | |
| 136 | There are maintenance contracts for fire pumps, fire detection system, elevator, escalator and staircase, which are critical work equipment. | Yes | | |
| 137 | All work equipment that is required to be periodically controlled is checked. | Not Suitable / Incomplete | A follow-up log for identifying, monitoring, and controlling equipment requiring periodic inspection had not been established. Periodic inspections of sectional doors, accumulators, and generators were not conducted, and the scope of fire system inspections was insufficient. | Equipment that needs periodic control should be monitored through a separate log. All equipment that requires periodic control should be checked to the desired scope and standard. |
| 138 | Personnel who do not meet the legal requirements are prevented from using construction machinery / equipment. | Yes | | |
| 139 | The charging points of the charged work machinery / equipment are located at a separate and safe point. | Yes | | |
| 140 | Emergency assembly points have | Not Suitable / | Assembly areas were identified and | The suitability of the assembly |

| | | | | |
|-----|---|---------------------------|---|---|
| | been identified, marked and announced. | Incomplete | marked; however, one assembly point sign was damaged, and another was obstructed by vehicle parking. | area for the ACK exit should be re-evaluated against the vehicle park and the visibility of the sign should be increased in case of emergencies. |
| 141 | There is no practice that causes all emergency escape routes to be closed instantly or continuously in the workplace. | Yes | | |
| 142 | All emergency escape routes are identified and visibly marked at the workplace. | Yes | | |
| 143 | Conditions such as adequate lighting, easy opening of doors, taking precautions against slipping, and no smoking are provided in emergency escape stairs. | Yes | | |
| 144 | Emergency escape stairs provide access to a safe area. | Yes | | |
| 145 | In the goods reception area, necessary measures have been taken for vehicle maneuvers, etc., instructions and warnings have been posted. | No | No damping material was installed in the vehicle approach area of the goods receiving section. Vehicle contact with the wall occurred, and warning signage was insufficient. | In the goods reception area, it is necessary to install damping materials and floor barriers that prevent contact with the wall at the points where vehicles approach. Warning/warning signs against the danger of entrapment should be increased. |
| 146 | Regular removal of easily flammable waste materials has been carried out. | Yes | | |
| 147 | There are fire safety measures in the area. | Not Suitable / Incomplete | The number of fire extinguishers in the goods reception area was insufficient, and access to the fire cabinet was obstructed due to material stacking. | It is necessary to increase the fire extinguisher in the goods reception area and remove the material in front of the fire cabinet. |
| 148 | Storage of chemicals is carried out in accordance with the Material Safety Data Sheet. | No | The cleaning chemical warehouse lacked an eyewash station, fire extinguisher, chemical storage matrix, and up-to-date MSDSs. | Storage should be provided by considering the interactions of chemicals with each other. An eye shower and fire extinguisher should be provided in the area. Up-to-date MSDSs should be posted. |
| 149 | Safe shelving height is observed. | Yes | | |
| 150 | Measures have been taken against the collapse of the shelves and the falling of materials from the shelves. | Yes | | |
| 151 | Adequate ventilation and lighting are provided. | Yes | | |
| 152 | Appropriate response materials / equipment are provided against chemical leakage and overflows. | Yes | | |
| 153 | The "closed areas" in the enterprise are adequately defined, and measures are applied for closed areas. | Not Suitable / Incomplete | The "closed areas" in the enterprise are not adequately defined. Indoor work permits prepared for these areas are not applied. Specific measures for confined spaces (spotters, rescue equipment, etc.) are not defined. There is a gas measuring device. | Areas that fall into the closed area classification should be identified and properly defined. Training for technical personnel and process managers (cleaning and security shift supervisors) on entry to closed areas and guard training and work permit applications in closed areas should be repeated. |

Note: RC is the abbreviation of the words "Regulatory compliance", P is "Probability", S is "Severity", N is "Noticeability", RS is "Risk Score" and DR is "Definition of Risk" in the table.

Table 7: Risk Analysis with FMEA Method

| FMEA RISK ANALYSIS FORM (SECOND STEP) | | | | | | | | | | |
|---------------------------------------|---|----------------------------------|---|-----|---|---|---|-------|-----------------|--|
| INITIAL EVALUATION | | | | | | | | | | |
| No | Size / Hazard | Impact / Risk | Legal Requirement | RC | P | S | N | RS | DR | Action to be taken |
| 1 | In general, it was seen that orientation trainings were carried out, and the training record of a person from the cleaning company could not be seen. Orientation training has a scope, but its scope is not considered sufficient. | Employee safety breach | Regulation on the Procedures and Principles of Occupational Health and Safety Training of Employees | Yes | 5 | 4 | 1 | 20,5 | Acceptable Risk | Orientation training should be renewed to include information on all workplace-specific issues. Incomplete orientation training should be completed. |
| 2 | An annual training plan was developed to address training needs, and target realizations were monitored accordingly. For the cleaning company, only the OSGB training plan was available; however, no technical or general training needs analysis was conducted, and training completion rates were not tracked. | Employee safety breach | Regulation on the Procedures and Principles of Occupational Health and Safety Training of Employees | Yes | 5 | 4 | 1 | 20,5 | Acceptable Risk | Training needs should be analyzed by the cleaning company, a training plan should be created and followed in this context. A training monitoring/control tracking log should be created to track employee training current status. |
| 3 | It was seen that the instructions in the fire pump room were not in Turkish. | Employee/Visitor security breach | Regulation on Fire Protection of Buildings | Yes | 5 | 4 | 1 | 20,5 | Acceptable Risk | It should be ensured that the instructions are in Turkish. |
| 4 | In 2022, evacuation, fire, and chemical spill drills were conducted; however, technical personnel did not participate in the drill. | Employee/Visitor security breach | Regulation on Emergencies in Workplaces | Yes | 4 | 5 | 1 | 20,58 | Acceptable Risk | Technical personnel should be ensured to participate in the spill drill. |
| 5 | A business-specific plan has not been created for environment and exposure measurements. The scope of the measurements made in the last 1 year was not considered sufficient. | Employee safety breach | Regulation on Occupational Hygiene Measurement, Testing and Analysis | Yes | 4 | 5 | 1 | 20,58 | Acceptable Risk | Measurements need to be reviewed and renewed for the entire area and risks. |
| 6 | Fire cabinets and other extinguishing devices are placed in the necessary areas. Monthly checks are made. In the 3rd floor corridor, it was seen that the fire extinguisher was freed from its fixation. | Employee/Visitor security breach | Regulation on Fire Protection of Buildings | Yes | 4 | 5 | 1 | 20,58 | Acceptable Risk | The fire extinguisher in the 3rd floor corridor should be fixed. |
| 7 | Wastewater analyses were regularly conducted by an independent laboratory; however, the results of the most recent analysis report did not comply with discharge limits. | Employee/Visitor security breach | Regulation on Water Intended for Human Consumption | Yes | 6 | 6 | 1 | 32,45 | Acceptable Risk | It is necessary to evaluate the existing filtration system, apply additional bacteria, take measures to clean the grease trap more frequently, and evaluate the results of these applications and re-analysis. |
| 8 | It was seen that 2 of the technical personnel had EKAT certificates. A person's document is up to date. One person was seen to be expired. | Employee safety breach | Regulation on Electrical High Current Facilities | Yes | 5 | 7 | 1 | 33,3 | Acceptable Risk | The EKAT certificate of the person whose document is not up-to-date must be renewed. |

| | | | | | | | | | | |
|----|--|----------------------------------|---|-----|---|---|---|-------|-----------------|--|
| 9 | It has been observed that there are electrical personnel who do not meet the VQA exemption conditions and personnel who lack vocational training within the scope of vocational training. | Employee safety breach | Occupational Health and Safety Law No. 6331 | Yes | 5 | 7 | 1 | 33,3 | Acceptable Risk | It would be appropriate to obtain a Business Electrical Maintainer VQA certificate for electrical personnel. |
| 10 | Technical personnel received Tagout, Lockout, Securing, and Trial training; however, one employee had not completed the training. | Employee safety breach | Regulation on Health and Safety Conditions in the Use of Work Equipment | Yes | 5 | 7 | 1 | 33,3 | Acceptable Risk | EKED training of personnel with missing training should be completed. |
| 11 | The number of first aiders among service providers was insufficient. | Employee safety breach | First Aid Regulation | Yes | 6 | 5 | 1 | 33,39 | Acceptable Risk | Service first aid training must be completed. |
| 12 | The Operation Explosion Protection Document was prepared in 2015. The actions of the document are followed in the general action plan. When the action plan was checked, it was seen that 3 items were still open. | Employee/Visitor security breach | Regulation on the Protection of Employees from the Dangers of Explosive Atmospheres | Yes | 6 | 6 | 1 | 33,63 | Acceptable Risk | The PKD items in the action plan need to be completed, starting with the high-priority actions. |
| 13 | It has been observed that rainwater drains in attics create a risk of getting stuck. | Employee safety breach | Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes | Yes | 5 | 4 | 2 | 39 | Acceptable Risk | All rainwater drains should be checked and closed in a way that does not create a risk of tripping or falling. |
| 14 | One of the technical personnel could not be seen embezzling electrician gloves and electrician shoes, and the person who did the welding work was not embezzled from a welder's mask and welder's apron. Seat belts and double lanyard embezzlements are missing. The person working as a glazier in the cleaning company was not seen to embezzle a double lanyard. | Employee safety breach | Regulation on the Use of Personal Protective Equipment in Workplaces | Yes | 8 | 5 | 1 | 42,66 | Acceptable Risk | Personal protective equipment deficiencies should be completed. |
| 15 | It was seen that there was an emergency plan, but the fire scenario was not defined and the signatures were missing in the plan. | Employee/Visitor security breach | Regulation on Emergencies in Workplaces | Yes | 8 | 5 | 1 | 42,66 | Acceptable Risk | The fire scenario should be defined in the plan and missing signatures should be completed. |
| 16 | Embezzlement of EKED materials belonging to one person could not be seen. | Employee safety breach | Regulation on Health and Safety Conditions in the Use of Work Equipment | Yes | 8 | 5 | 1 | 42,66 | Acceptable Risk | All employees should be checked again and EKED material deficiencies should be completed. |

| | | | | | | | | | | |
|----|---|----------------------------------|---|-----|---|---|---|-------|-----------------|--|
| 17 | In the children's playground, it has been observed that measures are generally taken in electrical cables at the point where children can reach. There are open cable trays, sockets and additional cable applications. | Visitor security breach | Electrical Internal Facilities Regulation | Yes | 7 | 6 | 1 | 43,4 | Acceptable Risk | In the Playland children's playground, cable duct, socket and additional cable should be made suitable. |
| 18 | The tip of the welding machine tongs in the mechanical workshop is broken. It was seen that the benchtop grinding machine was plugged in on the chair. | Employee safety breach | Occupational Health and Safety Law No. 6331 | Yes | 7 | 6 | 1 | 43,4 | Acceptable Risk | The tongs of the welding machine must be replaced. The grinder must be fixed to the workbench. Safe handling instructions should be posted for the equipment used. |
| 19 | It was seen that the natural gas installation in the parking garage area was open to unauthorized intervention. | Employee/Visitor security breach | Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes | Yes | 6 | 8 | 1 | 43,89 | Acceptable Risk | The intervention hatch must be installed and locked. |
| 20 | Mechanical shafts were kept locked; however, no warning signage was in place. | Employee/Visitor security breach | Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes | Yes | 6 | 8 | 1 | 43,89 | Acceptable Risk | Warning/warning signs should be hung on mechanical shaft entrances. |
| 21 | Assembly areas were identified and marked; however, one assembly point sign was damaged, and another was obstructed by vehicle parking. | Employee/Visitor security breach | Regulation on Emergencies in Workplaces | Yes | 6 | 8 | 1 | 43,89 | Acceptable Risk | The suitability of the assembly area for the ACK exit should be re-evaluated against the vehicle park and the visibility of the sign should be increased in case of emergencies. |
| 22 | At certain points on the roof, there are areas that are likely to hit right in the head area. | Employee safety breach | Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes | Yes | 5 | 5 | 2 | 54,08 | Moderate Risk | Areas at risk of head impact should be covered with soft protective material. |
| 23 | It has been observed that physical measures have been taken in the roof area in general. There are points where there is a lack of railings in air handling units (ahu). | Employee safety breach | Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes | Yes | 5 | 6 | 2 | 60,32 | Moderate Risk | It was recommended to make an exploration for the points with handrail deficiencies and to complete the deficiencies. |
| 24 | There is no lifeline on the glass porch at the main entrance (where the eaves are cleaned) and on the porch on the side of the pharmacy entrance. | Employee safety breach | Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes | Yes | 6 | 5 | 2 | 62,64 | Moderate Risk | A lifeline should be applied in order to ensure the 100% bonding rule in the work at height during porch cleaning. |

| | | | | | | | | | | |
|----|---|------------------------|---|-----|---|---|---|--------|-------------------|---|
| 25 | A rescue plan has been prepared and instructions have been posted. There are no rescue instructions for the water intervention ladder in the plan. Worn instructions have been seen. Rescue equipment and training of personnel are lacking. | Employee safety breach | Regulation on Emergencies in Workplaces | Yes | 5 | 6 | 2 | 63, 24 | Moderate Risk | The recovery plan should be revised to cover the entire area. Missing rescue equipment should be completed and rescue training should be taken from height. |
| 26 | Tenant employee documentation was available; however, the technical team's internal control form was not implemented at the desired level. In addition, the work permit system for high-risk activities—such as energy isolation (EKED), working at height, and confined space work—was not implemented at an adequate level for both technical and cleaning personnel. | Employee safety breach | Occupational Health and Safety Law No. 6331 | Yes | 7 | 8 | 2 | 109, 6 | Moderate Risk | The scope of work permit systems and work control forms should be increased and a risk management needs table should be created for the enterprise. |
| 27 | The "closed areas" in the enterprise are not adequately defined. Indoor work permits prepared for these areas are not applied. Specific measures for confined spaces (spotters, rescue equipment, etc.) are not defined. There is a gas measuring device. | Employee safety breach | Occupational Health and Safety Law No. 6331 | Yes | 7 | 8 | 2 | 109, 6 | Moderate Risk | Areas that fall into the closed area classification should be identified and properly defined. Training for technical personnel and process managers (cleaning and security shift supervisors) on entry to closed areas and guard training and work permit applications in closed areas should be repeated. |
| 28 | The number of fire extinguishers in the goods reception area was insufficient, and access to the fire cabinet was obstructed due to material stacking. | Employee safety breach | Regulation on Fire Protection of Buildings | Yes | 7 | 8 | 2 | 113, 8 | Moderate Risk | It is necessary to increase the fire extinguisher in the goods reception area and remove the material in front of the fire cabinet. |
| 29 | A follow-up log for identifying, monitoring, and controlling equipment requiring periodic inspection had not been established. Periodic inspections of sectional doors, accumulators, and generators were not conducted, and the scope of fire system inspections was insufficient.. | Employee safety breach | Regulation on Health and Safety Conditions in the Use of Work Equipment | No | 8 | 7 | 2 | 100, 0 | Unacceptable Risk | Equipment that needs periodic control should be monitored through a separate log. All equipment that requires periodic control should be checked to the desired scope and standard. |

The visuals included in this study were used to concretize the application results of the proposed risk assessment method and to show the equivalents of the evaluation process in the field. The visuals provide examples of field applications of the specific requirements included in the checklist used in primary care.

Images presented as examples of good practice (Figure 3, Figure 4, and Figure 5); It has been selected to show that the relevant requirement is met in the field completely and in accordance with the legislation. These images correspond to the requirements evaluated as 'yes'.

Images of the applications that need improvement (Figure 6, Figure 7 and Figure) represent the requirements classified as 'not suitable/missing' in the checklist and are presented to reveal the appearance of potential risks on the ground. These images are directly related to the requirements included in the detailed analysis with the FMEA method in the second step.



Figure 3. An inspected retractable fall arrester (sample application)
Source: Author's own work.



Figure 4. An inspected fire fighting equipment (sample application)
Source: Author's own work.



Figure 5. A secure access road on a rooftop area (sample application)
Source: Author's own work.



Figure 6. A glass porch without a lifeline
Source: Author's own work.



Figure 7. Technical area with a risk of head collision on the roof
Source: Author's own work.



Figure 8. Damaged welding tongs
Source: Author's own work.

DISCUSS AND CONCLUSION

The findings obtained in this study show that risk assessment processes can be managed more effectively with prioritization-based approaches in complex and multidimensional structures such as shopping malls. The checklist-based pre-assessment used in primary care enabled the rapid elimination of risk-free areas and allowed detailed analyses to be directed only to the necessary areas.

In the literature, it is frequently emphasized that approaches based on analyzing all risks at the same level of detail are not sustainable in terms of time and labor. The two-step method applied in this study offers a practical solution to these limitations mentioned in the literature and optimizes the use of resources in risk assessment processes. In particular, the application of the FMEA method only to risky requirements stands out as an important factor that increases the applicability and effectiveness of the method.

The findings showed that although some risks have a low Risk Priority Score, they should be considered in the unacceptable risk class if they violate the legislation. This approach reveals that not only numerical scores but also legal requirements should be decisive in risk assessment processes. In this respect, the study contributes to the consideration of legislative compliance as a priority criterion in risk assessment applications.

In addition, the structural setup of the method is adaptable to different sectors and fields of study. The fact that the content of the checklist can be restructured according to the type of activity and integrated with different detailed analysis methods in the second step increases the generalizability of the method.

In this study, a two-step integrated risk assessment method, which is created by integrating existing risk assessment tools in a prioritization-based and selective flow, is proposed and implemented. The originality of the method stems from the integration of these tools in a selective and systematic structure, rather than the tools used.

Thanks to the proposed two-step approach, the risk assessment process was completed with approximately 79% fewer analysis steps compared to the detailed analysis of all requirements. This rate was calculated in comparison with a hypothetical scenario in which all requirements were analyzed in detail in the second step and represents an approximate gain based on field application.

This method reduces time and labor loss, allowing risks to be managed more effectively and preventive measures to be developed faster. Time and labor savings were calculated based on the number of requirements that require detailed analysis. It was assumed that if all the requirements were analyzed by the FMEA method, an equal level of detailed study would be required for the 153 requirements. In the proposed method, only 33 requirements that were determined to have risks were included in the detailed analysis. Focusing only on areas with risks instead of analyzing all requirements in detail allows risks to be analyzed more effectively and priority measures to be developed more quickly.

The findings obtained within the scope of the study revealed that the risks of periodic control systems, working at height activities and confined space applications in shopping malls should be addressed as a priority. The fact that it is concentrated around periodic control systems, working at height activities and confined space applications shows that the risks seen in shopping center management are not limited to in-house applications; It shows that it points to areas that are widespread and systemic throughout the sector.

Shopping malls; Since it includes a large number of work equipment such as elevators, escalators, moving walks, pressure vessels, electrical installations, lifting and conveying equipment, the planning, monitoring and management of records of periodic controls becomes a critical "managerial control" area. As a matter of fact, current studies show that safety, especially in human transport systems such as elevators and escalators; It emphasizes that it is based not only on design, but also on maintenance, monitoring, fault diagnosis and continuous control mechanisms. In this context, the fact that periodic control systems stand out as a risk that should be addressed as a priority in the study shows that technical system security in shopping malls is directly related to operation period management.

In terms of working at height activities, national and international statistics report that falling from height is still one of the most critical causes of deaths caused by occupational accidents in many countries. It is emphasized in public publications that deaths caused by falling from height have a significant share in Turkey, especially in maintenance, repair and construction-like activities, and that preventive strategies focus on this type of risk. Since working at height is continuous due to activities such as maintenance, repair, advertising and panel installation, installation interventions and cleaning in shopping malls, the fact that this topic stands out as a risk that should be addressed as a priority in the study is consistent with the high risk pattern throughout the sector.

Confined space applications (e.g., technical volumes, water tanks, manholes, and areas with limited entrances and exits) are in line with the emphasis in the literature that confined space work has a high potential for lethality. OSHA stated that confined space work carries a serious risk of injury/death and especially within the scope of "permitted confined space"; It clearly defines that critical hazards such as hazardous atmosphere, dent/suffocation, entrapment and similar require management. For this reason, the lack of control measures such as indoor work permit processes, gas measurement, ventilation, surveillance and rescue plan in shopping malls should be evaluated in the risk class that should be addressed as a priority. The fact that indoor applications are included in this class in the study shows that risk management in shopping malls is not limited to "visible areas"; technical areas should also be handled systematically.

When these findings are evaluated together, it is seen that there are dangers and risks in shopping malls that are common in the sector and can have serious consequences. Therefore, directing FMEA to such critical areas in the second phase of the proposed two-step approach offers a strong methodological advantage in terms of both effective use of resources and the production of a more detailed control plan for risks with high consequence severity.

As a result, this study was applied specifically for medium and large-scale shopping malls and the findings should be evaluated within the framework of this scale. The size, visitor capacity, functional diversity, and organizational structure of shopping centers can directly affect their risk profiles and, consequently, the scope of the risk assessment process. Therefore, in smaller-scale shopping malls, the number of requirements in the first step of the method may need to be reduced and the checklist content may need to be simplified. Similarly, in very large-scale and complex shopping malls or commercial complexes consisting of more than one building, it may be more appropriate to subdivide the detailed analyzes used in the second step of the method. In such buildings, evaluating different usage areas (food and beverage, entertainment, technical volumes, parking lots, etc.) separately will contribute to a more accurate prioritization of risks.

If the method is applied in different sectors, the checklist used in primary care should be restructured by taking into account the types of activities, legal requirements and specific risks of the relevant sector. However, the separation of the preliminary evaluation and detailed analysis stages, which is the basic setup of the method, provides a framework that can be applied regardless of the sector. Especially in complex structures such as production facilities, healthcare institutions, educational buildings, and office buildings, it is possible to integrate detailed analysis methods that are more suitable for the sector instead of FMEA in secondary care.

In future studies, a comparative evaluation of the effectiveness of the method with the applications to be carried out in shopping malls of different sizes and in different sectors will contribute to the development and validation of the method. In addition, applications to be integrated with digital inspection tools and automation systems are considered as potential development areas that can increase the applicability and sustainability of the method.

REFERENCES

- Bowles, J. B., & Peláez, C. E. (1995). Fuzzy logic prioritization of failures in a system failure mode, effects and criticality analysis. *Reliability Engineering & System Safety*, 50(2), 203–213.
- Carbone, T. A., & Tippett, D. D. (2004). Project risk management using the project risk FMEA. *Engineering Management Journal*, 16(4), 28–35.
- Chow, W. K., & Chow, C. L. (2007). Fire safety aspects of shopping malls. *Journal of Fire Sciences*, 25(1), 35–56.
- European Fire Safety Alliance (2020–2022). *Fire Safety in Commercial Buildings*.
- Hale, A., & Glendon, A. I. (1987). *Individual Behaviour in the Control of Danger*. Elsevier.
- Hallowell, M. R., & Gambatese, J. A. (2009). Construction safety risk mitigation. *Journal of Construction Engineering and Management*, 135(12), 1316–1323.
- Hughes, P., & Ferrett, E. (2020). *Introduction to Health and Safety at Work*. Routledge.
- Iqbal, A., & Nazir, H. (2025). Perceived Safety and Fear of Crime of Visitors in a Shopping Mall in Karachi, Pakistan. *Journal of Contemporary Criminal Justice*.
- ILO (2001). *Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001)*.
- ILO (2022). *Safety and Health at the Heart of the Future of Work*
- ISO 31000:2018. *Risk management — Guidelines*. International Organization for Standardization.
- ISO 45001:2018. *Occupational health and safety management systems — Requirements with guidance for use*.
- Lingard, H., & Holmes, N. (2001). Understanding of occupational health and safety risk control in retail environments. *Safety Science*, 37(2–3), 141–159.
- Manuele, F. A. (2014). *Advanced Safety Management: Focusing on Z10 and Serious Injury Prevention*. John Wiley & Sons
- Ministry of Labor and Social Security (2021). *Occupational Accidents and Occupational Diseases Statistics*
- Morawska, L., Li, Y., & Salthammer, T. (2024). Lessons from the COVID-19 pandemic for ventilation and indoor air quality.
- Mortimer, G., Andrade, M. L. O., & Fazal-e-Hasan, S. M. (2024). From traditional to transformed: Examining the pre- and post-COVID consumers' shopping mall experiences. *Journal of Retailing and Consumer Services*.
- NFPA (2021). *Structure Fires in Mercantile Properties*.
- Occupational Health and Safety Law No. 6331 (2012). T.C. Official Gazette.
- Occupational Health and Safety Risk Assessment Regulation (2012). T.C. Official Gazette.
- Prihandoko, P., et al. (2024). Implementation of Convolutional Neural Networks (CNN) for real-time crowd counting in shopping mall. *IJISTECH*
- Rausand, M. (2013). *Risk Assessment: Theory, Methods, and Applications*. Wiley.
- Sholanke, A. B., Dimuna, K. O., & Olukayode, B. G. (2025). Evaluation of Fire Safety Management Strategies in Selected Shopping Malls in Abuja, Nigeria. *F1000Research*.
- Stamatis, D. H. (2003). *Failure Mode and Effect Analysis: FMEA from Theory to Execution*. ASQ Quality Press.

Swuste, P., et al. (2010). Occupational accidents, risk analysis and safety management. *Safety Science*, 48(4), 474–482

Yasufuku, K., et al. (2024). Development of a Real-Time Crowd Flow Prediction and Visualization Platform... *Journal of Disaster Research*.

Yung, P., & Khoo, K. C. (1999). Fire safety provisions for large shopping complexes. *Fire Safety Journal*, 33(1), 13–50.

Yusoff, W. F. M., et al. (2023). Post-Covid-19 Ventilation Strategies for Shopping Malls in Hot Humid Climate. *CIC 2023 (Qatar University)*