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# Occupational Health and Safety in Sports: Risk Analyses and Consumer's Point of View for a Sports Center

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## ABSTRACT

The occupational health and safety law in Turkey was enacted in 2012. Work areas are classified as very dangerous, dangerous, and less dangerous in the context of labor law. Sports centers in the less dangerous class have the obligation to act according to the law until July 2023. This study aims to determine how the application of the law for a public university sports center is. The situation of the sports center was examined both from the users' point of view with the application of a questionnaire and by using the risk analysis method with expert evaluation. In the light of the results obtained, the precautions to be taken within the framework of the accepted risk levels in the facilities and the harmful effects of these measures are not taken are emphasized.



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## INTRODUCTION

Occupational Health and Safety (OHS) emerges as an important area in all sectors today. OHS activities have become a systematic structure that aims to protect both workers and the environment. The fact that the developed countries such as Canada, the U.K., Germany, America, etc., have adopted the practices in their working environments has proved the low number of occupational accidents and diseases. The practices in the industrial area are going on afterward with developing OHS culture at workplaces with all kinds of employees such as private and public sector, office areas, personal working and living areas. Unfortunately, approximately 77,000 occupational accidents occur every year in Turkey, more than 1000 workers lose their lives, and more than 5,000 workers become permanently disabled. Employers who are rule-makers in workplaces are mainly responsible for occupational accidents and diseases (Yürük, 2012). Considering the developments in Turkey, it seems the applications for OHS were seriously inadequate until the law was prepared. Indicators of OHS also represent the state of fundamental human rights, working life, and the development of countries (Karadeniz, 2012).

Due to these important issues and a need for the European Union's harmonization process, the Occupational Health and Safety Law number 6331 was adopted for the first time in 2012 in Turkey, which aimed at protecting both employees and the environment. This law began to be implemented in 2014, and nowadays, it is adopted in very dangerous, dangerous, and less dangerous workplaces. All areas in the public sector and single-employee workplaces must be under this law by 2023. But OHS applications conducted outside the industrial area (Kılkış, 2013) are still insufficient in Turkey.

During the European Union harmonization process, adopting new and current practices in all areas also includes the sports sector, which is rapidly growing. Sports halls have been more preferred than outdoor sports (Kuburlu, 2014). So, the increase in per capita income at sports centers (Kuburlu, 2015) is a driving force for new sports centers. In this case, the country's sports economy is also affected. However, it is not fully known that these new centres' designs, equipment, and processes are under the OHS law. There are no studies on OHS for sports facilities in Turkey yet. This study is a preliminary study that evaluates people's awareness and perceptions of using sports facilities.

Many people have been at work during their most productive period of daily life. The environmental conditions we encounter while working brings significant challenges and hazardston the work areas. Systematic solutions for hazardous behaviors and hazardous

environments are essential to ensuring a safe working area. Work safety training for employees and binding sanctions for employers should be applied based on safe conditions. Therefore, each country must establish Occupational Health and Safety legislation to establish a safe working structure for its production and work areas. Occupational accidents caused by unfavorable working conditions cause occupational health and safety concepts to occur more frequently. Measures on occupational health and safety are for taking form; government, non-governmental organizations, employers, and employees need to work together (Durdu, 2014).

Looking at occupational health and safety studies, it can be seen that the biggest issue is primarily in small and medium-sized enterprises. This definition describes workplaces with fifty or fewer employees (Kılkış, 2014). Sports facilities and complexes can often be evaluated within this group regarding many employees and physical capacity.

The Ministry of Youth and Sports (MYS), a government agency responsible for sports activities and investments, built 25 big stadiums still 2020 in Turkey (MYS, 2014). According to a Ministry of Youth and Sports report, local (cross-street) sports facilities reached 1000. At the same time number of sports halls and swimming pools is increasing. Another important point is the number of facilities, especially in the fitness sector, which is the majority of the private sector's investment in sports, has exceeded 1500, according to 2019 data. Members of those facilities have reached two million, and the trade volume increased to 850 million Turkish Liras (Kuburlu, 2014). These figures concern our concept, which is an important economy in terms of the construction and operation of sports facilities and the human communities. The absence of standards in the construction, use, and inspection of facilities leads to very risky environments, especially for occupational health and safety. In the light of this view, stadiums, gyms, sports centers (fitness and wellness), etc. show the status of the facilities in terms of healthy and safe environments for athletes and users and offer solutions.

Sports facilities and businesses are areas that enable individuals to exercise in various sports and help shape their social lives. Nowadays, many sports centers are operated by the public and private sectors, and they enable watching competitions live and provide healthy living and recreational activities.

Considering social security sports athletes should be divided into two categories such as professionals and amateurs (Öztuna, 2015). Federations, clubs, and employees can be grouped depending on this classification. But it is different for the sports facilities because amateurs and professionals may use the facilities simultaneously. Due to the nature of the sports, no matter who risks using the facilities, there are some risks (Corbett, 2002). Sports-related risk factors are grouped into for (Çobanoğlu, 2013).

- Finance-related risk factors: problems are related to the financial support such as; audience revenue, broadcasting sales revenue, sponsorship revenue, transfer revenue, and other income (Dorukkaya et al., 1998).
- Insurance-related risk factors: In sports clubs, a liability insurance policy is generally applied. Sports clubs transfer important risks that they do not want to take over to others through insurance or contracts (Gök, 2006).
- Health-related risk factors: Training, trainer, and general health-related problems.
- Facility related risk factors: Competition security problems, failure to take measures against natural disasters, indoor and outdoor heating and/or cooling problems, inadequate lighting of the field or hall, hygiene problems, game field ground problems, basic security problems, lack of experts in the facilities (Miller, 1997).

When the literature is examined, the risk studies related to sports, are mostly associated with sports injuries (Steinbrück, 1999; Conn et al., 2003). In the UK, more than 29 million sports injuries per year in professional and recreational activities result in a loss of 9.8 million working days and spending of £ 590 million (Conn et al., 2003). This indicates the importance and priority of sports injuries in public health.

One of the significant shortcomings of sports facilities and complexes is the lack of consciousness about the health and safety of employees and users. At this point, the trainers' awareness is also important in raising the understanding of the consumers. People who have not been trained and have not gained sufficient experience in work can cause insecure behaviors and work accidents (Erdoğan, 2004). The training's planning, completion, delivery, and control should be done within the study areas. The machinery and equipment used in the sports areas should be the property that can be adjusted according to the person's usage. Ergonomics, one of the critical areas of work health and safety, must be considered at this stage. Regulations that will provide optimum benefits in sports should also be recommended from an ergonomic point of view (İşler, 2013). Ergonomics explores human compatibility with the equipment used and the relationship between employees' work, work tools, and work environment. The goal is to get the highest yield from the human body by lowering the risk of injury. Learning to make simple adjustments to the working environment and habits will significantly increase the comfort and productivity of the person (Atalay et al., 2014). In sports activities, the controlled operation of the targeted muscle group under suitable conditions is important to prevent health problems that may occur. Both active and productive working conditions in sporting activities are discussed today. Therefore, ergonomic regulation should be given importance in every area of sport to ensure the performance of the person connected

to it and the security of the equipment. Especially those working in sports facilities may face occupational diseases due to the risks associated with the lack of ergonomic regulations. Occupational diseases caused by working conditions are regulated by law depending on the performance exhibited. In Turkey, occupational diseases have identified the No. 6331 Occupational Health and Safety legislation with the 5510 Social Security and General Health Insurance Law (Şen, 2019).

Considering the studies carried out for sports facilities, insufficient numerical data are obtained regarding work accidents. The main reason for the lack of sufficient data is that in Turkey many sports facilities do not have the obligation to work in the context of occupational health and safety laws yet.

False and prolonged physical work in the sport can cause a musculoskeletal disease due to permanent deformation. It is usually easy to detect the occurrence of work accidents. In addition, the fact that the assessment criteria are not known in the case of occupational accident conditions and the causes of work accidents that may occur in the facilities is also a negative result for the data. It should also be noted that if the working environment and working conditions are physically, chemically, and biologically insufficient, the employees are at the same risk.

## METHODS

In examining the facility's compliance with the occupational health and safety law, the L-type matrix analysis method (one of the risk analysis methods) was used. This method is a quantitative technique and applied by an academician occupational health and safety expert and one of the authors of this study.

*Study Groups*

The sample of the study is Pamukkale University Sports Center. Pamukkale University Sport Center was established in 2007 and it has an Olympic pool, gymnastic court, two fitness halls, Pilates zone, spinning cardio zone, squash court, climbing wall, and SPA. It has more than 10.000 members and approximately every month more than 1000 children take the course in several sports branches.

*Study Design*

This study was conducted in a quantitative descriptive research design. Data were collected in two different ways. Gender, job, age, physical and mental differences, and other demographical features of people may also create differences in their occupational health and

safety culture (Ahn and Jaeouk, 2019). Therefore, in this study, firstly users' evaluations were obtained through a questionnaire as a quantitative data collection technique, and frequency analysis was performed with the results. The results also summarize the awareness of the user's occupational health and safety culture. The questionnaire was arranged in line with the checklist published by the Ministry of Labor and Social Security (2018) to monitor the compliance of sports centers and swimming pools with occupational health and safety measures. Based on the checklist, 30 questions were determined under four main headings (Conformity/Suitability, Warning and Informing, Safety Measure, Occupational Hygiene). Responses were received as "yes", "no" and "no idea".

Risk analysis was carried out to determine the current danger based on analytical-numerical data. Analytical system; use algorithms and normative rules such as probability calculation, formal logic, and risk assessment. This system, which is relatively slow and laborious, requires conscious control (Slovic et al., 2004). The risk analysis method, a hazard assessment criterion for Occupational Health and Safety, was used to determine the precautions in the sports center where the research was conducted.

*Risk Analysis Methods*

Risk analysis generally provides information about the dangers facing management in any business environment. Continuous analysis and control of the unstable situation encountered may result in reductions in the uncertain state. The risk analyst can recommend additional data collection methods to achieve the desired level of sensitivity. Within the scope of this study, research has been made within the framework of the information that the user has. Following the risk analysis, the acceptability of the situations in which the existing hazards turned into risks was examined. Numerical data and this information are clarified.

Risk analysis can provide clear information about the exact level of risk that the hazard in a working environment can turn into. Risk assessment can be done quantitatively and qualitatively. In quantitative risk analysis, the risk value is calculated using mathematical theorems when calculating risk. In qualitative risk analysis, numerical values are given to values such as the probability of the threat, effect of threat, and these values are processed by mathematical and logical methods and the risk value is found.

The risk value is reactive in occupational health and safety and compensatory. It has to be proactive in occupational health and safety and include measurable preventive activities. It is necessary to be proactive and not reactive in occupational health and safety. There is no risk analysis method to suit all workplaces.

The occupational health and safety specialist should decide which method to apply according to the characteristics of the current workplace and apply it. The experience of the occupational safety specialist during the risk assessment will affect the risk assessment results. In this study, definite results were obtained with numerical data for risk values using L Type Matrix Analysis Method.

There are different application methods for risk analysis (Nilgün, 2019).

- L-Type Matrix Analysis Method.
- X Type Matrix Analysis
- Fine-Kinley Method.
- Failure Mode and Effect Analysis (FMEA)
- Preliminary Hazard Analysis (PHA)
- Fault Tree Analysis (FTA)
- Hazard and Operability Analysis (HAZOP)
- Event Tree Analysis (ETA)
- Cause and Effect Analysis
- What if Analysis
- Preliminary Hazard Analysis (PHA)
- Job Safety Analysis (JSA)

*L-Type Matrix Analysis Method*

The L-type matrix is used to evaluate cause-effect relationships. This method is ideal for analysts who have to perform simple, stand-alone risk analysis. The success rate of the method varies according to the analyst's accumulation. This method should be used to detect the dangers which require urgency and measures should be taken as soon as possible.

Risk = Violence X Probability (1-6: Low risk / 8-12: Moderate risk / 12-25: High risk)

*X Type Matrix Analysis*

It is not suitable for an analyst to do it alone. Five years of past accident research is needed. It requires disciplined teamwork led by an experienced team leader. The likelihood of a recurrence of a previous accident or related event is also evaluated. As a result of the evaluation, the cost analysis of the measures to be taken to eliminate the risk is performed and the cost of the risk is compared with the two costs if it is possible to transfer the risk.

*Fine-Kinley Method*

The results of possible risks are graded with this method. In case of danger, the severity of the damage or damage to humans, the workplace, and the environment is evaluated. It is

an easy-to-use and widely used method. It allows the use of workplace statistics. The urgency of the measures to be taken according to the high-risk value is determined, and importance ranking is made according to the risk level.

*Failure Mode and Effect Analysis (FMEA)*

It is one of the most widely used methods. The basis of the method depends on parts of any system; which can be affected by failures that may occur in parts, tools, and components.

*Preliminary Hazard Analysis (PHA)*

Its purpose is to identify and assess potentially hazardous parts of the system or process and to determine the probability of more or fewer accidents for each identified potential hazard. An analyst conducting a preliminary hazard analysis relies on checklists that show dangerous parts and situations. These lists are organized according to the technology used and the need. The hazards identified in these lists are evaluated in the risk assessment form. This method is not designed to provide comprehensive details. Preliminary hazard analysis is a qualitative risk assessment analysis that can be used in the final design stage of the plant or as a model for more detailed studies and can be prepared quickly. It is formulated with possible corrections and preventive measurements for each adverse event or hazard. This analysis determines which types of hazards occur frequently and which analysis methods should be applied.

*Fault Tree Analysis (FTA)*

As a quantitative technique, examines the error by sub-components. The purpose of FTA is to identify the mechanisms of errors which can be the mechanical, physical, chemical, or human origin. The FTA schematizes possible sub-events with a logical diagram; reliability and probability theorems.

*Hazard and Operability Analysis (HAZOP)*

It is applied in processes and critical systems in the chemical sector. It has been developed by the chemical industry, considering the specific hazard potentials of this industry. It is applied by a multidisciplinary team to detect, analyze and eliminate accidents. It is a systematic brainstorming study using specific guidewords. The participants are asked questions in a specific structure and they are asked what consequences would arise in the event of these events or not.

*Event Tree Analysis (ETA)*

The event analysis method is selected to see where an accident will proceed with operator errors and system failures. It is a quantitative analysis system. Logic calculation system is used. It is the main technique used in the result analysis because it shows pre-accident and post-accident situations. The left side of the diagram is connected with the initial event, the right side is connected with the damage state in operation and the top defines the system. If the system is successful, the path goes up and if it fails, it goes down.

*Cause and Effect Analysis*

This technique was created in the Danish RISO laboratories for use in the risk analysis of nuclear power plants. It can also be adapted to determine the security level of the systems of other industries. Cause and Effect Analysis is a blend of Error Tree Analysis and Event Tree Analysis. The purpose of Cause-and-Effect Analysis is to identify the undesired consequences when defining the chain between events. A detailed cause-and-effect diagram is in the form of a fishbone, so it is also called Fishbone Diagram. The reasons for drawing the diagram are generated by brainstorming or by using simple control charts prepared by team members.

*What if Analysis*

This method is useful during factory visits and reviews of procedures. It increases the detection rate of the inevitable potential hazards that already exist. This method can be applied at any stage of the process and may be carried out by less experienced risk analysts. It starts with the general question, "What if it happens?" and is based on the answers to these questions. Possible consequences of failures are identified and recommendations for each situation are identified by the responsible persons. The downside of the system is that the attention of the risk analyst focuses only on one point or that the analyst's experience does not allow him to see the danger at that point.

*Preliminary Hazard Analysis (PHA)*

Its purpose is to identify and assess potentially hazardous parts of the system or process and to determine the probability of more or fewer accidents for each identified potential hazard. An analyst conducting a preliminary hazard analysis relies on checklists that show dangerous parts and situations. These lists are organized according to the technology used and the need. The hazards identified in these lists are evaluated in the risk assessment form. This method is not designed to provide comprehensive details. Preliminary hazard analysis is a rapid qualitative risk assessment analysis that can be used at the final design stage of the plant or as a model for more detailed studies. It is formulated with possible corrections

and preventive measurements for each adverse event or hazard. The result of the analysis determines which types of hazards occur frequently and which analysis methods should be applied.

*Job Safety Analysis (JSA)*

It focuses on work tasks performed by individuals or groups. This methodology is appropriate if jobs and tasks in a business or factory are well defined. The analysis directly examines the nature of the hazards arising from a job assignment.

Occupational Safety Analysis consists of four stages; 1) Structure, 2) Hazards identification, 3) Assessing risks, 4) Security measure analysis.

There are two important concepts in determining risk. First of all, the possibility of an existing accident is evaluated. The effect of the probability according to the occurrence of the situation also indicates the severity of the hazard to calculate the risk. Accordingly, for the analysis of the situation in the environment, the risk occurrence is calculated by multiplying the probability of the occupational accident with the severity.

There are many methods for risk analysis that can be used with or without numerical data. The risk analysis and the level of danger caused by the situation are observed in the environment (Vose, 2008).

As can be seen, many risk analysis methods are available. Less dangerous when the features of risk assessment methods are examined L type matrix and Fine Kinney that can be used in workplaces in the classroom. By comparing the methods, the risks that may be encountered in a public institution part of it has been evaluated. (Tok et al.,2018). In this study, since the analyst performing the risk analysis has to work alone and it is aimed to obtain more simple information with clear numerical data, risk analysis has been performed with L type matrix method.

## RESULTS

*Results of Questionnaire*

Implementing the OHS law of the high-capacity sports complex of a public university, which has about 5500 members and trainees, serving in many different sports has been examined. The complex has units such as swimming pools, changing rooms, fitness areas, and a spa. A 30-item questionnaire was developed in the framework of the law describing four sub-scales; conformity (suitability), warning and informing, safety measure, and occupational hygiene (Table 2). To make the items understandable to consumers the views of two OHS

experts and two sports experts have been consulted. This questionnaire has been implemented for four weeks and has reached 321 persons (Table 1). According to the data obtained; the users are generally aware of the center's conformity. But 71 respondents (51,1%) startlingly indicate having "no idea" about the fire escape. One-third of the respondents don't have an idea about the warning and informing. A considerable majority of the responses show the users don't have ideas about the safety measure issues. After all, most users indicate that the center is good at occupational hygiene.

**Table 1.** Demographics of Participants

| **Age** | | **Membership Duration** | |
|---|---|---|---|
| 18 | 3 (%1) | 1 year | 154 (%47.9) |
| 19-22 | 108 (%33.6) | 2 years | 111 (%34.7) |
| 23-30 | 108 (%33.6) | 3 years | 33 (%10.3) |
| 30+ | 102 (%31.8) | 4 years | 23 (%7.1) |
| **Total** | **321** | | **321** |

**Table 2.** Questionnaire Items

| **Sub-dimension** | **Item No** | **Questionnaire Items** | **Yes** | **No Idea** | **No** |
|---|---|---|---|---|---|
| **Conformity (Suitability)** | 1 | Suitability and safety of the floor | 263 | | |
| | 2 | Suitability and safety of glass surface | 274 | | |
| | 3 | Suitability of stairs | 296 | | |
| | 5 | Availability of water | 144 | | |
| | 6 | Suitability of utilization of materials | 224 | | |
| | 7 | Taking the precaution of using materials | 225 | | |
| | 10 | Leakage of water | | | 183 |
| | 14 | Availability of fire escape | | 155 | |
| | 19 | Hygienic measures of the pool | 220 | | |
| | 25 | Sufficiency of changing room. restroom. air conditioning etc. | 237 | | |
| | 26 | Conveying through the pool | 204 | | |
| | 29 | Noise pollution | | | 214 |
| **Warning and Information** | 4 | Precaution of wet floor | 230 | | |
| | 11 | Availability and apparency of emergency plan | 118 | 137 | |
| | 12 | Availability and apparency of emergency telephone numbers | 105 | 125 | |
| | 18 | Apparency of the temperature control system of the spa | 156 | 127 | |
| | 21 | Sufficiency of caution signs | 216 | | |
| | 27 | Sufficiency of informing about the pool depth | 227 | | |
| | 28 | Informing employees and customers about safety machine utilization | 172 | | |

**Table 2.** (Continued)

| Sub-dimension | Item No | Questionnaire Items | Yes | No Idea | No |
|---|---|---|---|---|---|
| Safety Measure | 13 | Availability of lifeguard | 269 | | |
| | 15 | Suitability of fire escape and emergency exit for use | | 191 | |
| | 16 | Availability of extinguisher | 140 | 141 | |
| | 17 | Broken or/and damaged cables. sockets etc. | | | 196 |
| | 20 | Availability of safety mechanism to entire the pool | 237 | | |
| Occupational Hygiene | 8 | Providing hygiene requirements | 286 | | |
| | 9 | Collecting trashes and waste regularly | 287 | | |
| | 22 | Availability of shower and foot disinfection at the pool | 263 | | |
| | 23 | Cleaning of changing rooms. restrooms etc. regularly | 291 | | |
| | 24 | Availability of hygienic lockers in changing rooms | 253 | | |
| | 30 | Complying hygiene requirements by carrying trashes | 240 | | |

The users are generally aware of the center's conformity. But 155 respondents (48.3%) startlingly indicate having "no idea" about the fire escape. One-third of the respondents don't have an idea about the matter of the warning and informing. A considerable majority of the responses show the users don't have ideas about the safety measure issues. After all most users indicate that the center is good at occupational hygiene.

In addition, the government must be committed to the full implementation of the law. To reach more accurate data informal employment should be prevented. At the beginning version of this study, the aim was to improve the scale for OHS implementations at sports centers. But the questions have to be determined from the regulation and so the subjects are already definite. During the analyzing process, the answers were not parametric. For example, most of the items are about the same subject, and differentiating them from each other is not efficient.

Moreover, the questions are not suitable to measure a behavior or an attitude. They are only suitable to present the situation. When the workplaces are classified, the service sectors are especially important for the consumer.

*Results of Risk Analysis*

For the risk analysis, the fitness center shower room, dressing room, other areas of the facility, and the halls used as course areas were examined under the supervision of an expert. The regions where risk analysis is conducted have been selected especially considering the areas where sports facility users are dense at the end of the study. It is aimed to reach the numerical data of the risk analysis of the facility and to obtain a simple result.

Because of this reason, risk analysis was performed using an L type 5X5 matrix. Results of the analysis are given in Figure 1. In the hazard classification used for analysis, the risk analysis assessment in Table 3 and Table 4 was used. Looking at the details of the study, it is seen that the wall-mounted climatic cabins used in two different fitness rooms are placed above a certain height. None of the climatic cabins are fixed to the wall. There are seven climatic cabins used in two very spacious fitness areas. Each cabin poses a high risk in seven separate areas, 22 electric treadmills, six bicycles, and all other equipment are used in fitness, and cables are scattered. There is equally low risk in all areas where these devices are located. A storage area was created for some hand, body working equipment, and weights used in the hall. However, after users have completed their sporting activities scattered for and dangerous areas are created because this equipment is not placed in the right place.

Although the dressing rooms have a large capacity, the humidity in the environment is above the optimum moisture level due to intensive use. In addition, high-temperature formation with humidity prevents the user in the comfort zone. Ventilation systems in locker areas are insufficient. Due to the hygiene conditions in the dressing areas, measures should be taken to prevent the formation of bacteria. Chemical cleaners and cleaning cloths and sponges are stored in open-air areas. The present situation poses a high risk for hygiene conditions.

This sporting facility features lounges for sports courses. In the risk analysis process, it was seen that the open-end electrical cables were removed in the electrical connection part of the card reader of the spinning area. Especially in a sports facility with a high concentration of child users an area left in such a way next to the dressing halls poses a serious risk. It is necessary to take urgent measures in this area and use the necessary warning signs in such areas. The measures to be taken at this sports facility are indicated in the risk analysis. The results of the study were shared with the managers of the sports facilities and the information about the determination and risk levels were given. In this study, it is emphasized that the regulation of high-risk areas should be a priority.

**Figure 1.** Risk Management Matrix Template for Sport Center

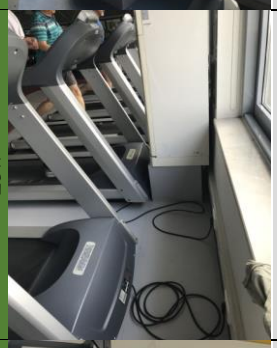
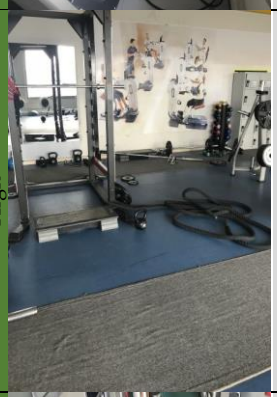
| Risks For User And Personnel | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Pamukkale University Sport Center** | **Likehood** | **Severity** | **Risk Factor** | **Risk Rating** | **Photo** | **Precautions To Take** | **Activities To Reduce Risk** |
| Climatic cabin systems in the fitness room are placed on a high step without being fixed. | 3 | 4 | 12 | High |  | In such a facility. there is continuous human circulation. Depending on any emergency (earthquake. vibration. etc.) or human error. there is a possibility that the climatic cabinet. which is not fixed and raised by stepping. may fall on the person. | Climatic cabinets should be fixed to the stair and wall where they are placed. Instead of such systems ceiling air-conditioned cabins can be recommended as more convenient and safer. |
| All electrical sports equipment cables are tangled in front of the glass. | 3 | 3 | 9 | Low |  | Regarding the safe environment in the work areas the risk of falling due to the danger of falling should be reduced. The danger arising from the environment prepares the environment for the occupants to encounter an occupational accident. | All cables in the environment must be safely collected. If possible creating invisible lines and passing them under the ground will reduce the risk level. |
| There should be storage areas reserved for all equipment used in the facility. After the equipment is used it is not placed in a place reserved for that equipment. No such area has been created for the equipment and is not indicated by visual warnings. | 3 | 4 | 12 | High |  | The lack of instructions for machinery and equipment used in the work area is an important hazard. especially for new students. Instructions for using the systems must be written in clear and understandable language. Also. during use around parts. sawdust. and so on. For machines with high disposal potential. transparent protective covers must be created. | The operating instructions of all machinery and equipment shall be prepared in a clear and understandable manner and hung in areas where users can easily see. The machine will be assembled by making appropriate protection covers considering the chip disposal situation. |
| The equipment used in the fitness room is located in a mixed area. Also, no instructions for use are available. | 2 | 4 | 8 | Low |  | The equipment used in the work areas should have a proper storage area. In addition, understandable instructions for its use must be in the stock space reserved for each product. | The operating instructions of all machinery and equipment shall be prepared in a clear and understandable manner and hung in areas where users can easily see them. The machine will be assembled by making appropriate protection covers considering the chip disposal situation. |

**Figure 1.** (Continued)

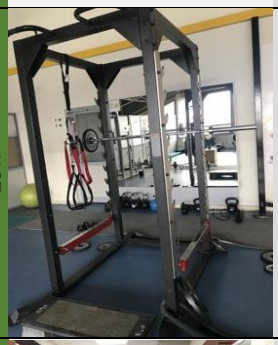
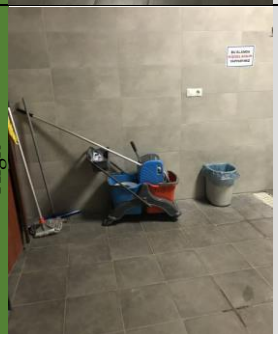
| Pamukkale University Sport Center | Risks For User And Personnel | | | | Photos | Precautions To Take | Activities To Reduce Risk |
|---|---|---|---|---|---|---|---|
| | Likehood | Severity | Risk Factor | Risk Rating | | | |
| The equipment used in the fitness room is located in a mixed area. Also, no instructions for use are available. | 3 | 3 | 9 | Low |  | Due to the narrow usage area. scattered equipment such as weight that is not related to the equipment etc. there are hazards such as the collision of the users during operation and falling into the weights. | The location of the equipment will be changed. In addition the necessary arrangement for the weight. etc. equipment that is located around and creates clutter will be provided. |
| The arrival of the closet doors in the used locker rooms is left open beautifully. There is a danger of injury to persons by hitting the edges and corners of the cupboard due to the narrow distances between the cupboards during opening and closing. | 3 | 3 | 9 | Low |  | Intermediate spacing of cabinets and locker cabinets should be adjusted more accurately. In addition, people should be informed of the instructions they should use for the use of lockers. | Necessary instructions will be prepared and technical controls will be carried out to increase the distance. |
| The doors used in the shower areas are made of glass. Too intense use can cause glass doors to close quickly and break doors. The user is in danger if the glass breaks. In addition, due to the intensity of the shower there is a lot of moisture in the interior. Ventilation is insufficient. | 3 | 4 | 12 | High |  | The use of glass doors creates a situation of harm to the user due to the danger of breakage where intensive use occurs. Instructions for careful use of the user must be prepared and posted. The technical controls of the ventilation systems for what is occurring in the environment must be carried out at appropriate time intervals. | Necessary instructions will be prepared. Appropriate technical controls shall be carried out. |
| All cleaning materials used in the dressing areas remain open. In terms of work and environmental hygiene there is an area open to bacterial distribution. | 4 | 3 | 12 | High |  | If the hygiene of the environment is not ensured. bacterial growth and epidemics occur in areas with intensive use. | The cleaning tools and equipment used. and cleaning materials will be placed in appropriate cabinets. It will be kept in locked areas so that no one other than the personnel who uses it can reach this vehicle and the reason. |

**Figure 1. (Continued)**

| Pamukkale University Sport Center | Risks For User And Personnel | | | | Photos | Precautions To Take | Activities To Reduce Risk |
|---|---|---|---|---|---|---|---|
| | Likehood | Severity | Risk Factor | Risk Rating | | | |
| The entrance card reading area of the spinning hall was dismantled and electrical cables were hanging out. | 4 | 5 | 20 | Extreme |  | Electrical tools and equipment should be kept away from areas where there may be possible water (dirty-clean) floods. In case of malfunctions in electrical devices the relevant company employees/installation workshop should be informed by the department responsible and the malfunctions must be corrected as soon as possible. It must be identified with the warning letter 'DO NOT USE CAUTION'. Electrical safety precautions must be observed. | Regular maintenance and calibration of electrical appliances shall be ensured. Technical personnel will receive electrical safety training. |

**Table 3.** Risk Analyses Assessment Matrix

| | | Severity | | | | |
|---|---|---|---|---|---|---|
| | | **Acceptable** | **Tolerable** | **Undesirable** | **Unacceptable** | **Intolerable** |
| | | Minor injury. Insignificant property or equipment damage | Non-reportable injury. Minor loss of process or slight property damage | Reportable injury. Moderate loss of process. Limited property damage | Major injury. Single fatality. Critical process loss. Critical property damage | Multiple facilities. Catastrophic business loss |
| **Likehood** | 1 Remote | None 1 | None 2 | None 3 | None 4 | None 5 |
| | 2 Unlikely | None 2 | None 4 | Low 6 | Low 8 | Low 10 |
| | 3 Possible | None 3 | Low 6 | Low 9 | High 12 | High 15 |
| | 4 Probable | None 4 | Low 8 | High 12 | Extreme 16 | Extreme 20 |
| | 5 New Certain | None 5 | Low 10 | High 15 | Extreme 20 | Extreme 25 |

**Table 4.** Risk Assessment Matrix Template (Modarres. 2016)

| | None | Low | Moderate | High | Extreme | 0-5 None Risk |
|---|---|---|---|---|---|---|
| **Risk Rating Key** | **1** | **2** | **3** | **4** | **5** | 6-10 Low Risk |
| | Acceptable | Partially Applicable | Mostly Unacceptable | Unacceptable | Intolerable | 11-15 High Risk |
| | Ok To Proceed | | Take Mitigration Efforts | Seek Support | Place Event On Hold | 16-25 Extreme |

## DISCUSSION

Occupational health and safety studies in European countries have been ongoing for many years. Especially countries such as England, Germany, and Italy work primarily in industrial areas within the framework of important laws and rules. In addition, technical measures had a positive effect on social life. Thus, the concept of a safety culture was created. When the technical accidents in Europe are examined, the rates of occupational accidents resulting in the least death are first in England that 0.6 people after 100 thousand work accidents, then in Germany and Italy, after 100 thousand work accidents, 2 and 3 people lose their lives, respectively. In Turkey, this value is 7 people after 100 thousand occupational accidents, according to the latest statistical data. In terms of the number of work accidents and fatal work accidents in European countries, Turkey has the highest loss (Kaner, 2017). For these reasons, in this study, the situation of sports centers, which are required to make occupational health and safety practices ready according to the law, has been tried to be evaluated from both the perspective of the customer and the expert.

At first user, comments were collected and examined. Then risk analysis was made. Finally, risk analysis and user comments were compared. According to the tables of the user evaluation results, it is stated that the activity materials used during sports are appropriate and the necessary precautions are sufficient. However, in the risk analysis, especially the clutter of the equipment used in the fitness room poses a risk.

In addition, the lack of safe installation of climatic cabin systems in the work area, and the clutter in the electrical connection areas of the equipment used pose a risk in the environment. However, users are unaware that these situations cannot be considered by the expert. Therefore, pieces of training should be carried out to increase the user's safety awareness (Doğan, 2007).

Another issue asked to the user is the fire escape and its exits. The user has not commented on this topic. Because the facility does not have a fire escape designed for emergency use. In emergency situations, users and employees at the facility are at high risk. Necessary arrangements should be made by the management quickly.

There was positive feedback on the user's questions about dressing areas and ventilation. However, in the risk analysis, high humidity and temperature were determined in the locker rooms.

This causes the user to be away from the comfort zone under unfavorable climatic conditions. Furthermore, the fact that cleaning materials are not stored in hygienic conditions creates a dirty atmosphere that will cause bacteria formation. This was evaluated in the risk analysis. The user's comments at this stage also indicate that he is not aware of the danger.

Emergency action schedules, which should be in the facility, are posted in the appropriate places. However, 42% of the users (n = 137) answered that they had “no idea”. Fire-fighting equipment is also installed in the facility. However, 44% (n = 141) of the users responded that they had “no idea”. For this reason, awareness studies should be carried out on emergency and equipment issues. At this stage, the visibility of plans and devices should be increased.

In this process, information about the dangers that may be encountered in the working environment should be given to the new members of the sports centers through informative brochures and information meetings. In addition, the dangers and risks they will encounter in the working environment should be explained to the sports center employees within the planned training processes to be determined. Pieces of training on solution methods for dangerous situations should also be defined. The most important concept in the work to be done on behalf of Occupational Health and Safety should be to eliminate the dangerous behaviors of people and to intervene in time against dangerous situations that will occur.

## CONCLUSION

As a result, it has been observed that the sports facility is not suitable and ready yet in terms of OHS law. Occupational Health and Safety Culture will take time to be feasible and acceptable, because of the Turkish nation’s fatalistic structure.

It is a matter to be investigated from this point of view that the service is expected to be in a secure environment. To detect that the concept of security is adequate, methods including prevention and protection policy should be used. Among these methods, risk analysis is the most effective solution. Risk analyses will ensure efficient data for a safe and

comfortable service. On the other hand, user evaluations should always be considered from a customer relationship management perspective. Therefore, in this study, in addition to user comments, risk analysis was performed by the expert.

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**Authors' contributions**

The authors have designed the research together. The third and the corresponding author collected data from consumers. The second author collected data for risk analyses and made the risk analyses. The first author made the demographic analyses and analyzed the data and interpreted the results. All authors contributed equally to the introduction and discussion sections. The authors read and approved the final manuscript.

**Declaration of conflict interest**

The authors declare that there is no conflict of interest with any financial or non-financial organization regarding the subject matter or materials discussed in the manuscript.

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