



Identifying Professional Football Crowd Crisis Management Solutions: The Best-Worst Method

Nasrin Biglari¹ | Seyed Reza Hosseini Nia² | Hadi Bagheri³ | William Timothy Coombs⁴

1. Sports management Department, Physical Education Faculty, Shahrood University of Technology, Shahrood, Iran.

Email: n.biglari1368@gmail.com

2. Corresponding author, Sports management Department, Physical Education Faculty, Shahrood University of Technology, Shahrood, Iran. Email: rhosseiniia@gmail.com

3. Sports management Department, Physical Education Faculty, Shahrood University of Technology, Shahrood, Iran.

Email: bagherihadi25@yahoo.com

4. Department of Communication, Texas A&M University, Texas, USA.

Email: timothy.coombs@tamu.edu

ARTICLE INFO

Article type:
Original article

Article history:

Received: 12 October 2022

Received in revised form: 14
December 2022

Accepted: 2 January 2023

Publish online: 5 February
2023

Keywords:

Crisis Classification
Crisis Combat
Crisis Preparation
Crowd Crisis
Safety and Security

ABSTRACT

Spectators are the main element of football. Football, as a popular sport, has the capacity for the intimate involvement and intense emotional experiences of the spectators. But the large presence of spectators in one place increases the probability of critical situations. Therefore, the purpose of this study is to identify crowd crisis management (CCM) solutions in professional football and to select the best solutions in terms of functional priority with mix-method. In the qualitative part, the approach based on thematic analysis was used to identify the crowd crisis management solutions and in the quantitative part, the best-worst method (BWM) was used to determine the importance and weight of the identified factors. A semi-structured interviews with 21 experts and the implementation of the best-worst method, demonstrated that among the five categories of solutions related to CCM inside the stadium, control, and guide of spectators as the most important, and emergency medical services as the least important of solutions. Also, among the solutions for managing the crowd crisis outside the stadium, the staff training of the stadium is illustrated to be the most important and financial discipline the least important solution effective for controlling the crowd crisis. Therefore, it is suggested that organizers of the matches focus on solutions that lead to the accurate implementation of the roles and tasks of the groups involved in holding the match and the development of programs, policies and effective security measures to control the spectators.

Introduction

Football as a socio-cultural phenomenon is the most popular sport in the world, which is followed by more than 40% of people over the age of 15 and attracts millions of spectators to the stadiums every year (Biscaia et al., 2012; Leite et al., 2020). Spectators are one of the most important supporters of

How to Cite: Biglari, N., Hosseini Nia, S. R., Bagheri, H., & Coombs, W. (2023). Identifying Professional Football Crowd Crisis Management Solutions: The Best-Worst Method. *Journal of New Studies in Sport Management*, 4(1), 654-675. doi: 10.22103/jnssm.2023.20356.1133



the clubs, and the economic growth of football depends on their attention and presence (Cho et al., 2019). Their presence in the stadium, directly and indirectly, affects the revenues from television broadcasts, sponsors, commercial transactions, and match-day payments (Birkhäuser et al., 2019), thus, very important for the football industry and related industries.

Despite the positive functions of the presence of spectators in the stadium economically and socially, there are gloomy and dark aspects as well. The dark aspects include violence, protest rallies, deaths and injuries due to poor infrastructure, clashes with police officers, racism, homophobia, street crime, and hooliganism. All of these are part of the threatening realities of football today (Ludvigsen & Millward, 2020; Wong & Chadwick, 2017). Unfortunate incidents and their negative experiences can cause spectators indifference, their absence from the stadium, negative word-of-mouth advertising, and other negative consequences at the micro and macro level of society (Coombs, 2007; Faraji et al., 2018; Ludvigsen & Millward, 2020). Roy Hodgson, the coach of the English national team, said: 'the spectators' scaremongering would keep them from coming to the stadium and less support for the team' (Rek-Woźniak & Woźniak, 2020, p. 13). permanent optimization of stadium attendance conditions is vital for organizations arranging sports events. Because spectators expect a safe and secure environment in exchange for spending time and money attending stadiums (Ludvigsen, 2020a). The lack of safe infrastructure and disruptive spectator behavior are among the reasons some people do not want to participate in live sports events. In the match of two Persepolis and Shamsushak teams in Sari Stadium of Iran, 7 spectators died due to the crowding of spectators and weakness of the stadium infrastructure. In the matches between the two big teams of Iran (Persepolis-Sepahan) in 2019 in Azadi Stadium, due to the intense clashes between spectators of the two teams, 295 spectators were hospitalized in serious condition, and one spectator lost her life. Therefore, it should not be assumed that the importance of sports crises is inherently less than crises in other fields (Koerber & Zabara, 2017). Based on objective evidence, incidents and crises in Iranian stadiums are major football challenges for this country and no satisfactory solution has yet been offered (Faraji et al., 2018).

Brown-Devlin and Brown (2020) stated that individual or organizational actions can cause sports crises (p. 53). In their studies, Biglari et al. (2020) concluded that the fan crises in the Iranian football pro league are due to three factors: content, structure, and context. Influential factors in the content branch includes situation refereeing, corruption in football, fanatical behavior; The structural branch includes competition management, safety, security, stadium health; The context branch includes cultural-social, media function, the performance of the security council (p. 1248). In this regard, Faraji et al. (2018), introduced the most effective factors on stadium security, infrastructure, stadium physical protection and personnel and game management. Naderiyan Jahromi et al. (2013), in a study, introduced control of outer environment of stadiums, training of competition officials, crisis management, support systems, severely control and prevent the entrance of explosive materials to the sport environment and effective communication with spectator's factors as the most important safety indicators and standards of sport facilities. Abdali et al. (2021), in explaining the Iranian football stadiums security with emphasis on the role of match organizers, showed that the physical protection of the stadium and human resource competence are important factors to ensure the football stadiums' security. Taheri et al. (2020), in the investigation of the disciplinary model of managing the behavior of football spectators in Iran, introduced management factors, situational factors, legal factors, behavioral factors- functional and cultural-social factors as antecedents. Kabiri et al. (2014) in investigating the performance of the police force in in management of soccer spectators' behavior, showed that their performance was satisfactory and there was a significant correlation between the performance of the police force, satisfaction the facilities of the stadium and the spectators aggression Based on the background of the research, efforts have been made in the academic field to control incidents in Iranian stadiums; But, while the crowd crisis occurs for a variety of reasons, most of the researches have focused on identifying the factors affecting the security of sports events, and less researches have paid attention to the safety, security and management factors in a comprehensively. In addition, as Doroudian et al. (2022) also stated, the issue is that these incidents in stadiums have gone beyond normal conditions and reached a critical situation, and less research has looked at this

problem as a crisis and examined the solutions from this point of view. Reid and Ritchie (2011) have stated, the way of dealing with risk and crises in events is affected by the type of attitude and beliefs of officials and managers; In case of accepting the existence of risk and crisis and having a positive attitude towards its planning, experiencing social pressures to manage it and understanding a wide range of social reference group demands and requirements, as well as contractual and legal obligations and finally believing in the existence of the necessary tools and opportunities for management, It will strengthen the behavioral intentions of managers and event officials to deal with risk and crisis (Reid & Ritchie, 2011). Therefore, it seems that identifying solutions for crowd management in normal and critical conditions can have different results.

Research Doroudian et al. (2022) is one of the limited domestic researches that have investigated the factors affecting the crisis management of the stadium (case study: Azadi stadium) and reached the conclusion that the most important factors include, changing and revising the existing laws, providing the required financial resources, using expert staff, holding training courses and existence of health and safety resources, and using standard equipment and facilities. Although the research done to manage the crisis of sports stadiums is worthy of attention, but considering the unequal conditions of many Iranian stadiums and their difference with Azadi stadium as the best stadium, it seems necessary to conduct more research from different angles and considering more clubs in the premier league. In order to manage the crowd in foreign research, Dinesh Jackson et al. (2019) in their studies to prevent and control violence and destructive behavior of spectators in the football stadium, designed a real time violence detection system to monitor the behavior of the crowd, which also has the power to detect non-intentional or intentional attacks. Zargar and Alaghmandan (2019), to increase the safety and security of spectators in the football stadium based on mathematical algorithms, provided models and instructions for designing the stadium, spectator platform, stairs, corridors and the best angle of view of the spectators. In their research, Glenesk et al. (2018) designed a 3D software to simulate and predict the number of spectators, walking speed and movement paths of spectators in the stadium environment, that to be able to control their violent and anti-social behavior in Qatar World Cup. Scottish football, according to own government legislation solely, to ensure the safety of spectators, has used strong police surveillance technologies in football, such as powerful hand-held cameras and body worn video (bv), the use of which has had a detrimental impact on police-spectator relationships, interactions and dialogue (Hamilton-Smith et al., 2019).

Because the clashes and severe injuries of spectators, the blindness of spectators due to throwing explosive materials, death due to reasons such as aggressive behavior of spectators, the collapse of the stadium roof, crowds, self-immolation, and electrocution are examples of crises in Iranian football with various causes that have been going on for more than three decades and despite advances in science and technology, there are still fears that such a situation could happen in football. As Rek-Woźniak and Woźniak (2020) have pointed out that these crises are related to event organizers' management. Sports managers often lack a background in sports security and safety management (Hall et al., 2008). Those involved in strategic communication often have some crisis management training, but that is different from sports security and safety management. It is essential for sports managers to understand crisis management/communication and how it relates to sports security and safety management. The benefit becomes a better understanding of these two areas will help sport managers to cope more effectively with such crises resulting in better outcomes for spectators and the organization.

The study of crises in Iranian football shows that in many cases, methods and approaches to combat the crisis have been more accidental, reactionary, and unstable. Efforts to deal with the crisis with a quick response and limited coordination time have not been accomplished. Although there is a crowd crisis in other countries, such as the Querétaro Stadium in Mexican in 2022, and many spectators lose their lives, however, it must be said that Iranian football is unique because all Iranian football spectators are in the men's stadium and the presence of women is not taken advantage of to make the atmosphere of the stadium more tender, and this is while the violence in Iran's stadiums is increasing

like in other countries (Faraji et al., 2018). While in other countries used women in the stadium not only to eliminate gender discrimination and economic profits of the club, but also used as an instrument to deal with anti-social behaviors of spectators, and often as "unofficial police" in events are recognized football (Antonowicz et al., 2021). Also, most of the Iranian teams are composed of different ethnicities. These ethnic differences have increased the importance of the game between the teams and the spectators come to the stadium with fanatical and high-risk behaviors increasing the risk of a crowd crisis (Taheri, 2020).

To reduce the crowd crises, Ludvigsen and Millward (2020) recommended that future research should continuously review the safety and security issues of spectators at events and pay full attention to their safety and security before accidents occur (p. 18). The lack of comprehensive scientific studies in this field can be one of the reasons for failing to deal with the crowd crisis of professional football in Iran. Professional football leagues, especially in countries with developing football have been neglected, and most past studies on the part of spectators' safety and security have focused on significant events such as the World Cup (Lee Ludvigsen, 2018; Ludvigsen, 2020b; Wong & Chadwick, 2017).

Therefore, the first step is to review the key concepts of crisis, the classification of crises, and the definition of crisis crowd, and crisis management will be examined. Then we will answer the research questions "What are the solutions for managing an Iranian professional football crowd crisis?" and "What is the functional priority of CCM solutions?"

Theoretical Framework

Definition and Classification of Crisis

In recent years, numerous crises of a considerable scope have led the general public and researchers to focus on the concepts of crisis. The scope of crises, their complexity, and ambiguity, create new and greater challenges to the way researchers and decision-makers think and organize (Björck, 2016). Therefore, more precise knowledge of the concept of crisis can affect the plans and decisions of officials and researchers.

Coombs (2007) and Moerschell and Novak (2020) consider the crisis an unexpected, negative, and unusual situation that is often catastrophic. Elsewhere, Coombs (2002) defines crisis as an unnatural and unstable situation that threatens the strategic goals of the organization, the reputation, or the viability of the people. Taylor and Perry (2005) describe a crisis as a significant disruption to a business, social environment, or organization. Bundy et al. (2017) examine the crisis from an organizational perspective and define it as a potentially disruptive and unexpected event that can threaten its goals and have profound effects on relationships with its stakeholders. According to From a pragmatic approach, it is important to correctly understand the classification of crises (Björck, 2016; Wilson et al., 2010) Crises are generally classified into two categories: natural and man-made. Natural crises, such as hurricanes and fires, are caused by natural factors. Financial, social, security, human, and organizational crises are man-made crises caused by human intervention (Jaques, 2010). In the field of sports, Wilson et al. (2010) classify sports crises drawing upon Coombs and Holladay's (1996) four types of crises: (1) accidents: internal and unintentional; (2) transgressions: internal and intentional; (3) faux pas: externally and unintentional; and (4) terrorism: externally and intentionally divided. Internal refers to a crisis caused by something the organization itself did while external refers to crises caused by some factors outside the organization. Intentional crises refer to some actors who have a critical act purposefully while unintentional crisis is a purposeless critical event. Based on the above explanations, the Issue of sports terrorism can be more certainty considered an externally and intentionally crisis based on the goals, motivational factors and the people or group that created it; But due to the fact that various factors such as mismanagement, non-observance of safety indicators and standards, not paying attention to the cultures and prejudices of the audience, spectators violence, lack of safety instructions, weakness of security force equipment, and neglecting past crises have caused sports crises and especially sports in Iran (Shah Mansouri & Mozaffari, 2006), placing the crowd crisis in football in one or two category are difficult; Because based on the classification of the

factors that cause the crowd crisis, it can be placed in different classify. For example, based on the human intervention, organizational, social and economic challenges in creating the crisis, the crowd crisis can be introduced as an unnatural and man-made crisis; But by considering the behavior and performance of beneficiaries such as spectators, security forces, managers and tournament officials who play a role in creating crises in the stadium, it can be consider an internal crisis and based on the role of hardware factors such as infrastructural problems and technical equipment defects, consider it an unintentional crisis in this field.

To assess and properly manage sporting crises, Brown-Devlin and Brown (2020) divided 12 types of sporting crises into three groups: environmental/individual, rules and norms violations, and organizational mismanagement. According to the researchers, environmental/individual crises are the result of the actions of a particular individual or an environmental event that is beyond the control of the organization. Crises in rules and norms violations cluster are crises caused by violations of norms that the organization has moderate control over, which creates a moderate level of responsibility for each crisis for the organization. Organizational mismanagement crises include issues that are under the organization's complete control and the organization has a high level of responsibility for them. Zhang's (2018) analysis of types of crises mentioned the salient feature of the crisis of sports events, mainly broad and sudden and based on the role of humans in creating them Crises were divided into two categories: internal and external crises. Seymour and Moore (2000) classified crises into two types based on the emergence process: cobra and python. The first type of crisis occurs suddenly, but the second type of crisis occurs gradually. Parsons (1996) classification is based on the period of crisis gestation including immediate crises where crises start without warning, emerging crises which are slow to develop and maybe stopped or limited by organizational action, and ongoing crises which may last for weeks, months, or years. According to De Sausmarez (2007), a crisis can simultaneously result from internal and external stimuli. Björck (2016) believes that a single classification of crises cannot show the complexity and interdisciplinary nature of a crisis. However, accepting this fact, the bulk of the research holds that definition of crisis and understanding the crisis type helps to facilitate effective crisis management.

Therefore, in the present research, according to the factors causing the sports crisis, the classification and definitions presented of the crisis, the crowd crisis in football refers to an unexpected and unplanned event that can be due to individual factors (such as the behavior of spectators, key player's behavior, impressive referee's decisions), organizational factors (such as infrastructure problems, security forces action), and hardware factors (infrastructural problems) that cause instability and uncertainty and as a result of losing life, injury and severe psychological damage.

Crisis and Crisis Management of Professional Football Spectators

In professional football, there are many crises and serious injuries by hooliganism, violence, and clashes of spectators, overcrowding of spectators, weak safety and security of stadiums, and unexpected events (Doroudian et al., 2022; Wong & Chadwick, 2017). The championship match between Moscow Dynamo and Torpedo in 2012 is an example in which the spectators caused injuries and created critical conditions with insulting slogans, offensive banners, and arsons (Wong & Chadwick, 2017). In the 2001 Accra football stadium incident, about 127 spectators lost their lives, and many were injured. Ghana officials blamed the police for the disaster (Muponde & Muchemwa, 2011, p. 287). In fact, crises are no longer considered an unusual, rare, or accidental issue for the international community, rather, they have penetrated into different parts and areas of modern societies (Doroudian et al., 2022). But it should not be forgotten that most of the crises that have faced the life of organizations and events with serious dangers, did not happen by accident, rather, managers and officials have played a role in the occurrence of those crises unintentionally (Claeys, 2017). However, the incidents that have occurred in football in developed countries have been the beginning of many structural changes in football management and crises in it (Wong & Chadwick, 2017).

Crisis management is a set of factors designed to combat the crisis, prevent and reduce the negative consequences and real damage caused by the crisis thus protecting the industry, organization, and stakeholders (Coombs & Laufer, 2018). According to the definition De Sausmarez (2007), crisis

management involves intervention in the unfolding of a crisis to prevent the situation deteriorating further or, if this is not possible, to minimize the damage caused and assist recovery.

Crisis management operations enable organizations to eliminate some of the crises with planned, regular and rational activities, manage others crises effectively, and provide the necessary tools to quickly learn from the crises that have occurred and then make appropriate and new decisions (Çakmak & Büyükerğün, 2018)

According to Taheri (2020), advanced and famous football countries have been able to adapt to the challenges caused by changing forms of crimes and the emergence of complex behaviors and the continuous evolution of social, cultural and economic environments and advanced information and communication technologies, use the world's best technologies in the field of football and stadium infrastructure, their latest achievements (such as CCTV systems, video checks, systems that detect the ball crossing the goal line) and the results of university researchers in the field of sports management (Hamilton-Smith et al., 2019; Dinesh Jackson et al., 2019), each of which can somehow be effective in crisis management of sports events. But a brief look at the incidents that happened in Iran's stadiums shows that the problem that currently exists in the country's sports and threatens it, is the lack of attention to the factors causing the crisis, partial and temporary performances and weakness in the effective management of the crowd crisis in football. It should be noted that the crowd crisis in the Iranian Football is more serious because its semi-governmental structure has been an obstacle to commercialization and infrastructure and spectator-oriented developments. But it is important to mention that the occurrence of such incidents in sports is not only due to the weakness of its semi-governmental structure, but sports crises usually occur as a result of a combination of psychological, political, social, structural, and technological elements (Taheri, 2020).

The final match of the Asian Champions League between Persepolis Iran and Kashima Japan in 2018 is an example. Despite the astringency of the Asian Football Confederation (AFC) and its emphasis on necessity solving the infrastructure problems in Azadi Stadium as the host of the game, about 738 spectators were injured due to crowding. The self-immolation of a female spectator due to a court conviction for entering the stadium unlawfully in the match between Esteghlal Iran and the Al Ain Emirates in the 2018 Asian Champions League and the death of an eight-year-old boy in the game between Persepolis and Sanat Naft Abadan in the Iranian Football Premier League in 2019, are examples that disrupted normal situation and each of them became a crisis. These incidents have long inflamed the football atmosphere and affected the presence of spectators in the stadium. In confirming the neglect of crisis factors and its management, Taheri (2020) has stated that the duties of each of the organizations involved in holding a sports event in Iran are specified in the upstream documents and instructions issued by the Ministry of Interior, but in practice, many organizations do not pay attention to the assigned tasks in the direction of crisis control and do not deal with their implementation seriously.

Although valuable studies in order to reduce the scope of the football crowd crisis in the country have investigated issues such as safety standard indicators (Naderiyan Jahromi et al., 2013), security factors and the role of security forces (Abdali et al., 2021; Taheri et al., 2020b; Faraji et al., 2018), and conducting research from various angles will help to achieve this important goal; But it seems that the effective management of crowd crisis requires a more comprehensive approach and it is necessary to accurately identify crisis management strategies, considering the critical situation of crowd football and in accordance with these conditions, so that, while completing the researches, the solutions should be removed from the framework of the speeches and the organizers of the competitions should take a more serious step in their operation and implementation.

Methodology

The present study seeks to obtain effective solutions for CCM in the case of Iranian professional football games. In this study, the Mixed Methods (in both qualitative and quantitative) are used to strengthen the process of analyzing quantitative data derived from the components of the qualitative component of the study (Anguera et al., 2017) thereby developing a research perspective and increasing its validity (Hartmann-Tews et al., 2020). According to Teddlie and Tashakkori (2003), the combination of two methods, qualitative and quantitative, provides a suitable basis for the

integration of data collection techniques and the analysis of data collected from both ways. The Mixed Methods provides a better understanding of research issues compared with using only either a qualitative or quantitative method. In the first part of the study, a qualitative approach based on thematic analysis is used to identify crowd crisis management solutions. Also, in the quantitative part of the research, the multi-criteria decision-making (MCDM) method, i.e., the best-worst method (BWM), was used to determine the importance and weight of identified factors. This method was developed by Rezaei in 2015.

Qualitative Interviews and Data Analysis

The qualitative part of the research began with semi-structured interviews. Using a semi-structured interview format for direct interviewing enables the interviewer to ask a set of pre-planned questions to achieve the research goals, also allows her to follow the conversation, and allows interviewees to express their opinions and experiences (Sparks & Smith, 2013).

Interviews began with ethical tips (e.g., anonymity and confidentiality, right of withdrawal) for participants and their informed consent. All interviews except two that the interviewees did not allow recording were digitally recorded. The interviews lasted between 45 and 90 min. The interviews continued until the themes reached theoretical saturation. Data saturation was achieved after 21 interviews as the same ideas were being repeated by interviewees, with no new themes emerging (Bowen, 2008).

Participants were selected using a purposive method (N = 21). All participants in this study were male, which reflects the dominant position of men in Iranian football. The minimum professional record for interviewees was 5 years to ensure that the interviewees have sufficient experience and a specific time perspective on the challenges and developments of Iranian football clubs in recent years. Table 1 summarizes demographic information related to the descriptive research questions of the interviewees.

Table 1. Overview Over the Demographic Characteristics of the Participants

Job Title	Field of Study	Degree of Education	Work Experience	Age	Interview Code
Members of the Security Council	Financial Management	Doctoral	12	44	P1
Members of the Security Council	Sport Management	Doctoral	5	37	P2
Club CEO	Physical Education and Sports Science	Masters	14	52	P3
Club CEO	Physical Education and Sports Science/ Strategic Management	Masters	20	61	P4
Club CEO	Telecommunication Engineering	Masters	35	69	P5
Vice President of the Football Board	Sport Management	Doctoral	9	39	P6
Vice President of the Football Board	Human Resources Management	Masters	15	56	P7
Security Force	Disciplinary Prevention	Masters	16	53	P8
Security Force	Political Science	Doctoral	17	57	P9
Security Force	Traffic Engineering	Doctoral	13	49	P10
Stadium Manager	Electrical Engineering	Masters	10	47	P11
Stadium Manager	Telecommunication Engineering,	Doctoral	15	53	P12
President of the Fans' Clubs	Physical Education and Sports Science	Bachelor	6	35	P13
President of the Fans' Clubs	Political Science	Bachelor	5	39	P14
President of the Fans' Clubs	Financial Management	Masters	9	43	P15
Fan-Leader	Political Science	Bachelor	7	25	P16
President of Tournament Holding	Sport Management	Doctoral	10	42	P17
President of Tournament Holding	Public Relations	Doctoral	12	48	P18

President of Tournament Holding	Sport Management	Masters	9	44	P19
Academic Experts	Sport Management	Doctoral	11	45	P20
Academic Experts	Sport Management	Doctoral	15	48	P21

In this study, the qualitative method of thematic analysis (theme) and to implement the process it, the six-step proposed by Braun and Clarke's (2006) was used to extract the themes in a structured manner and form the initial extraction codes and the main and sub-themes. Thematic analysis is a method of identifying, analyzing and reporting patterns of themes. This method, while organizing information, describes and interprets data sets with (rich) details (Braun & Clarke, 2006). The reason for using the thematic analysis method in this research is identify and collect primary and deep ideas through interviews, so that based on the qualitative findings, it is possible to develop a theoretical model for crowd crisis management in future research. According to Thomas (2017), to credibility the coding, a member checking process was performed by participants, and a completed transcript was sent to them to verify its accuracy. No participants questioned the legitimacy of their transcripts, and therefore, the transcripts were accepted as accurate reflections of the interview process. The interviews started with some demographic background questions. Then, three general questions were asked, that is: 'How do you evaluate the situation of the spectators in the stadium and their safety and security?', 'How have clubs and organizations involved in safety and security issues responded to incidents and crowd crises in football?', 'What are the effective solutions for managing events and crowd crisis in football?'

Quantitative Method and Data Analysis

Rezaei (2015) believes that the BWM method provides more reliable results than other MCDM methods AHP, ANP, and SWARA by performing fewer pairwise comparisons and higher compatibility coefficients. On the other hand, the growth and complexity of issues in social environments have not made it possible for one person to evaluate all aspects of the problem. Therefore, Hafezalkotob and Hafezalkotob (2017), with the development of the BWM method, proposed a group mode for this method. Therefore, the statistical samples in the quantitative section were 21 participants in the qualitative section.

In the BWM method, the criteria (n criteria) for a research goal are compared based on the Saaty scale, and the matrix of paired comparisons would be:

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}, \quad (1)$$

Where a_{ij} shows the relative preference of criterion i to criterion j , in fact; $a_{ij} = 1$ shows that i and j are of the same importance.

The steps of the BWM method analysis process are as follows:

Step 1: Determine a set of decision criteria and the number of decision-makers.

Step 2: Determine the importance degree of the opinions of each expert.

Step 3: Determine the best criterion and the worst criterion.

At this step, decision-makers generally identified S_B as the best and S_W as the worst. No comparison is made at this stage.

Step 4: Determine the preference of the best criterion overall.

At this stage, the relative importance of each pairwise comparison between the best criterion and other criteria was determined using the Saaty scale.

The resulting Best-to-Others vector would be:

$$\tilde{A}_B = (\tilde{a}_{B1}, \tilde{a}_{B2}, \dots, \tilde{a}_{Bn}) \tag{2}$$

Step 5: Determine the preference of all the criteria over the worst criterion.

At this step, the relative importance of each criterion than the worst criterion determined using Comparisons in this stage are the opposite of the fourth stage. The resulting Worst-to-Others vector would be:

$$\tilde{A}_w = (\tilde{a}_{1w}, \tilde{a}_{2w}, \dots, \tilde{a}_{3w}). \tag{3}$$

Step 6: Find the optimal weight of each criterion based on experts' opinions.

At this step, according to the use of the opinions of a group of experts to evaluate the weight of the criteria, the group mode of the best-worst method and as follows algorithm was used.

$$\begin{aligned} & \text{Min} \left\{ \Omega \max \left\{ \left| \frac{W_B}{W_j} - a_{Bj} \right|, \left| \frac{W_j}{W_w} - a_{jw} \right| \right\} + (1 - \Omega) \sum_j \max \left\{ \left| \frac{W_B}{W_j} - a_{Bj}^i \right|, \left| \frac{W_j}{W_w} - a_{jw}^i \right| \right\} \right\} \\ & \text{s.t.} \\ & \sum_j W_j = 1 \\ & W_j \geq 0, \text{ for all } j. \end{aligned} \tag{4}$$

The importance of expert opinions is considered the same, so the value of Ω is zero.

In this algorithm, the value of a_{Bj}^i represents pairwise comparisons of the best criterion compared to other criteria, and the amount of a_{jw}^i represent the pairwise comparison of the criteria to the worst criterion based on the opinions of each expert (i). By solving the algorithm, the optimal weight of each criterion was calculated.

Results

The findings are presented in two separate sections. In the first part, the solutions for managing the crowd crisis in professional football are identified based on semi-structured interviews. In the second part, the results of calculating the optimal weight for each of the identified solutions are presented.

Identify CCM Solutions (Themes)

The qualitative research process is non-linear, so the coding process was executed repeatedly. Finally, crowd crisis management solutions were categorized into 138 code, 15 sub-themes, and two main-themes. Tables 2 and 3 present the primary codes and sub-themes belonging to each main theme obtained from the interviews.

Table 2. Primary Codes and Sub-Themes Related to the Main Theme Inside the Stadium

Code	Sub-Themes
Locating facilities properly; Renovation of old stadiums in observance with safety and security standards; Installing of surge arresters in stations; Numbering of seats in all stadiums; Create separate entrances and exits; Renovation, repair, and update of stadium equipment; Remove fixed fences; Use of doors with double hinges; Installing of earth wells; Use of ramps with a slope and in a suitable place to transport spectators into the ground; Applying ISO standards in the field of equipment quality and occupational health; Equipped with emergency electricity system; Repair of the engine room (daily, weekly, and monthly schedule).	Equipping and renovating public infrastructure of the stadium
Design of comfortable seats with sufficient physical space; Improving the hygiene and cleanliness of the stands; Internal convenient access routes; Possibility of establishment in purchased seats based on seat number; Protecting terraces with balustrade; Observance of the standard of ancillary services about the stadium population; Informing the parking capacity and preventing the entry of surplus vehicles;	Spectators' convenience

Elimination of optimal viewing barriers; Providing fun and educational programs before, during, and after the game.	
Building a trained crisis management team in clubs and periodically evaluating their performance; Identifying and evaluating present risks; Establishment and implement standard risk management programs; Inspecting the venue on a seasonal basis and before each match; Having a trained plan for emergency evacuation; Preparation of pre-determined instructions and programs for the initial response to the critical situation in the stadium; Preparing communication devices for emergency conditions (alarm, public notification system, recorded messages); Implement the orders of the Security Council and prevent personal opinions; Implement the demands of the Security Council and prevent personal opinions; Establishment of a security control and command center; Cooperation between clubs and National Disaster Management Organization; Signing a bilateral agreement with organizations involved in emergency conditions.	Incidents response framework
Considering a medical team special for injured spectators; Planning medical emergency response focusing on supportive care center and infrastructure at the venue; Providing special access for ambulances and emergency vehicles; Observance with medical service standards (such as the number of ambulances relative to the population); Providing and Upgrading emergency care equipment (such as AED, CPR).	Emergency medical services
Coordination in opening and closing the entrances and exits of the stadium; Careful physical inspection of spectators before the gates to reduce crowding and crowd pressure; Prevention illegal entry of spectators; Identifying character of spectator groups for better management; Using of high-quality image monitoring system in and around the stadium; Equipping all stadiums with adequate and safe electronic gates; Appointing guides and establishing information centers; Enforcing the 90 to 10 rule in allocating stadium seats to hosts and guests; Using of guide maps and signs and signals; Accurate communication of tournament staff and security police with spectators.	Control and guide the spectators

According to Table 2, five sub-themes related to the inside of the stadium were extracted and used in a quantitative step.

Table 3. Primary Codes and Sub-Themes Related to the Main Theme Outside the Stadium

Primary Concepts	Sub-Themes
Constant effective communication with spectators in virtual and real space; Gaining trust and creating a positive attitude to the efforts made in and out pitch; Transparency of technical and financial decisions for spectators and creating reasonable expectations; Appreciation of the positive and worthy behavior; Responsiveness and honest behavior of the club officials; Contributing spectators in the management structure of the club to apply their opinions; Pay attention to the cost-benefit logic in dealing with spectators.	Spectators relationship management
Coordinating executive plans before the match with the emphasis on the specific roles and tasks of the groups involved; Justifying security forces and police through practicing duties; Creating a mutual understanding of the expectations of different members of the event command team and Security Council through inter-organizational meetings; Teaching security forces, special forces, and cheerleaders how to behave to different spectators groups; Sensitizing stadium staff to important security issues that may occur before, during, and after the game; Clarifying how to command team members communicate in different command hierarchies; Using incentive and punishment systems to reinforcing the appropriate behavior of security forces and police; Justifying the cheerleaders and spectator representative about important security issues; Real-time control to implementation of security instructions and procedures.	Staff training
Informing about criminal behaviors and individual and team punishments through spectators' communities in virtual and real media; Introducing the stadium environment and its subdivisions, entrances, exits, and emergency routes through animation in the ticket sales websites; Constructive and adequate interactions between organizations involved in holding competitions (football board, police force, judicial authorities, emergency, etc.); Improving the data collection, ordering, and reporting systems of event management; Coordinating management messages and announcements with all media by the public relations manager or unit.	Public relations

<p>Strictness in the pre-season evaluations of referees; Increasing the referees' salaries and strengthen the professional prestige; Supporting referees when they enforce the law properly; Providing the possibility of knowledge-increasing and international promotion conditions; Establishment of command unity (elimination of tensions between the referees' committee and the referees' department); Utilization of advanced technologies (such as VAR); Preventing and combating with bribery and unhealthy relationships.</p>	<p>Improving the status of refereeing</p>
<p>Production of advertising and educational teasers with the presence of famous players; Reinforcing public responsibility through multimedia advertising (such as animation); Holding specialized roundtables by the league organization on the causes of crowd crisis (corruption, refereeing status, spectator misbehavior, stadium infrastructure, media function, etc.); Empowering spectators by involving them in club programs; Creating code of conduct document for spectators; Providing conditions for the presence of all family members together in the stadium; Condemnation of sabotage and lawlessness behaviors; Increasing the sensitivity of clubs to identify the causes of behavioral abnormalities; Eliminating discrimination between the capital and county teams to eliminate the spectators' pessimism; Emphasis on the fair play and professional out-pitch behavior; The presence of clubs and their members in social responsibility programs.</p>	<p>Grounding positive behaviors</p>
<p>Stability and unity of procedure in holding the league; Eliminate conflicts in law enforcement to establish justice; Using of specialists in all sectors; Accurate ticket sales; Efficient schedule of league matches; Reinforcing the internet platform of clubs; building a scale for assessing the competence of chief executive officer; Commitment to the provisions of Football Federation Statute; International relations to improve the level of clubs and leagues; Training opportunities for specialized personnel; Strict supervision of the implementation of FIFA rules and regulations.</p>	<p>League management professionalism</p>
<p>Publishing news and views solely by the league or club media unit; Using modern and traditional media to reduce violent behaviors; Reinforcing the media relations between the federation and the clubs; Do not monopolize the presence of news media; Encouraging chivalrous and documented revelations; Media literacy as eligibility for chief executive officers; Monitoring of media and press reports by the legal unit of the club and the league organization; Prosecution of baseless media controversies; Joint meetings of league officials with mass media programmers; Providing media with transparent and accurate financial information; Allowing the media to report on stadium conditions; Content production on the elimination of ethnic and racial sensitivities in derbies.</p>	<p>Media performance</p>
<p>Preventing politicians from entering key football roles; Parliament legislation to solve the ownership and governance issues of sport; Parliament legislation to solve the problems of TV, copy, and name rights; Allowing women to attend the stadium; Government support schemes (such as long-term loans, land transfers, multi-year tax exemptions, etc.) to accelerate the privatization of clubs; Independency of the Football Federation and its components from the government; Preventing any political, religious, and racial ideas into football; Involvement of the national inspection organization and judicial system in macro-corruption cases in football; Social policies to reduce cultural and economic class gap; Employment opportunities for young people by the country's governments.</p>	<p>Governance proceedings</p>
<p>Flexible and transparent financial structures; Forcing clubs to pay players and coaches on time according to contracts; Accurate control and supervision on the financial sector of clubs; Applying AFC financial indicators for permission to participate in the professional league; Publication of figures and transparency of investment processes in football; Determination the percentage of club revenue (for example, 60%) to pay the salaries of players and coaches (instead of the salary cap); Activation of new and usual sources of income in world football; Eliminating financial cases in international and national assemblies with legitimate transfers; A player rating system that has efficient and accurate indicators; Proper allocation of league incomes to clubs based on position (encouraging top teams and supporting relegated teams).</p>	<p>Financial discipline</p>
<p>Compilation disciplinary regulations based on international football law, not based on personal or group interests; The disciplinary committee's decisive dealing against the violations of the official members of the clubs and leagues (coaches, players, referees, managers, etc.); Ensure that disciplinary rulings are enforced; Personal punishment and deprivation of delinquent spectators, not group deprivation; Dealing seriously with the deliberate mistakes of the referees; Establishment of independent regulatory bodies to combat corruption in semi-government football; Prevention of the activities of unofficial brokers.</p>	<p>Disciplinary actions</p>

In Table 3, ten sub-themes related to outside the stadium were identified, which were used in the quantitative section.

Figure 1 illustrates the sub-themes of the two sections inside and outside the stadium in a more understandable manner.



Figure 1. Solutions for CCM

Most Important and Least Important Solutions for CCM

After identifying the CCM solutions in the two parts inside and outside the stadium, it was time to determine the importance degree of each solution. Table 4 shows the results of the most important and least important solutions inside the stadium by experts and pairwise comparisons based on them.

Table 4. Pairwise Comparisons of Solutions Inside the Stadium

Decision Makers	Best & Worst Solution		P	Pairwise Comparisons					
	Best	Worst		S ₁	S ₂	S ₃	S ₄	S ₅	
Expert Panel	Expert 1	S ₁	S ₅	P_{B}^1	1	2	3	4	5
				P_{W}^5	5	3	2	1	1
	Expert 2	S ₁	S ₅	P_{B}^1	1	2	3	5	6
				P_{W}^5	6	4	3	1	1
	Expert 3	S ₁	S ₅	P_{B}^1	1	2	2	1	1
				P_{W}^5	4	2	2	1	1
	Expert 4	S ₁	S ₅	P_{B}^1	1	2	3	3	6
				P_{W}^5	6	3	2	2	1
	Expert 5	S ₁	S ₅	P_{B}^1	1	1	1	2	5
				P_{W}^5	5	4	3	2	1
	Expert 6	S ₂	S ₄	P_{B}^2	1	1	1	4	3
				P_{W}^4	3	4	2	1	1
	Expert 7	S ₂	S ₅	P_{B}^2	1	1	2	3	5
				P_{W}^5	3	5	2	1	1
	Expert 8	S ₂	S ₄	P_{B}^2	2	1	1	4	3
				P_{W}^4	3	4	2	1	1
	Expert 9	S ₁	S ₅	P_{B}^5	1	3	5	6	7
				P_{W}^1	7	3	2	2	1
	Expert 10	S ₁	S ₅	P_{B}^5	1	2	3	4	6
				P_{W}^1	6	4	3	2	1
	Expert 11	S ₁	S ₅	P_{B}^1	1	1	2	2	7
P_{W}^5				7	3	3	2	1	
Expert 12	S ₃	S ₄	P_{B}^3	1	2	1	4	3	
			P_{W}^4	3	2	4	1	1	
Expert 13	S ₁	S ₅	P_{B}^1	1	1	2	3	7	
			P_{W}^5	7	3	2	1	1	
Expert 14	S ₁	S ₅	P_{B}^1	1	3	4	5	7	
			P_{W}^5	7	4	3	2	1	
Expert 15	S ₁	S ₅	P_{B}^1	1	3	4	5	6	
			P_{W}^5	6	4	3	2	1	
Expert 16	S ₁	S ₅	P_{B}^1	1	3	4	6	7	
			P_{W}^5	7	3	2	1	1	
Expert 17	S ₂	S ₅	P_{B}^2	1	1	1	3	4	
			P_{W}^5	3	4	3	2	1	
Expert 18	S ₂	S ₅	P_{B}^2	1	1	1	3	4	
			P_{W}^5	3	4	2	1	1	
Expert 19	S ₃	S ₅	P_{B}^2	1	1	1	2	4	
			P_{W}^5	3	2	4	1	1	
Expert 20	S ₃	S ₅	P_{B}^2	1	1	1	2	5	
			P_{W}^5	3	2	5	1	1	
Expert 21	S ₁	S ₅	P_{B}^1	1	1	2	3	4	
			P_{W}^5	4	4	3	1	1	

According to Table 4, the weight of each solution was calculated using the proposed algorithm. After solving the equation in Lingo software, optimal weights for each solution were obtained. Figure 2 shows the calculated weights for effective solutions to manage the crowd crisis inside the stadium.

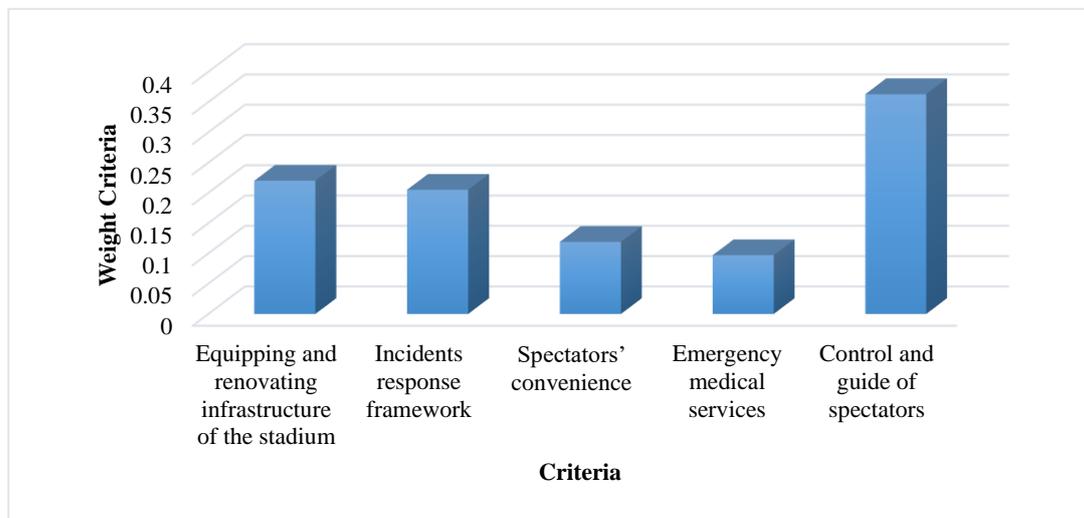


Figure 2. Weight of Effective Solutions in Managing the Crowd Crisis Inside the

According to Figure 2, control and guide of spectators with weight (0.363) was recognized as the most important and emergency medical services with weight (0.097) as the least important solution.

Equipping and renovating infrastructure of the stadium (0.220), the incidents response framework (0.205), and spectators' convenience (0.119) were also introduced as the second to fourth effective solutions in managing the crowd crisis inside the stadium.

The results of pairwise comparisons of experts to identify the most important and least important solutions outside the stadium are presented in Table 5.

Table 5. Pairwise Comparisons of Solutions Outside the Stadium

Decision Makers	Best & Worst Solution			Pairwise Comparisons										
	Best	Worst	P	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀	
Expert Panel	Expert 1	S ₂	S ₁₀	P_B^2	4	1	3	5	5	5	6	6	6	9
				P_W^{10}	3	9	4	2	2	2	3	2	1	
	Expert 2	S ₂	S ₈	P_B^2	3	1	3	3	4	4	5	7	5	6
				P_W^8	3	7	2	2	2	2	1	1	1	1
	Expert 3	S ₃	S ₁₀	P_B^2	1	1	1	2	2	3	3	3	3	6
				P_W^{10}	3	5	6	3	3	2	2	2	1	1
	Expert 4	S ₂	S ₁₀	P_B^2	2	1	1	3	3	4	4	5	5	8
				P_W^{10}	5	8	7	4	4	3	3	1	2	1
	Expert 5	S ₂	S ₁₀	P_B^2	1	1	1	2	3	3	4	4	5	7
				P_W^{10}	5	7	6	4	3	3	2	2	1	1
	Expert 6	S ₂	S ₁₀	P_B^2	1	1	1	2	3	3	4	5	6	7
				P_W^{10}	4	7	5	4	4	3	3	2	1	1
	Expert 7	S ₂	S ₁₀	P_B^2	1	1	1	2	2	2	4	5	6	7
				P_W^{10}	4	7	5	4	5	4	3	1	1	1
	Expert 8	S ₂	S ₁₀	P_B^2	1	1	1	2	3	4	5	6	7	8
				P_W^{10}	6	8	7	5	4	3	3	1	2	1
	Expert 9	S ₁	S ₉	P_B^1	1	1	1	2	2	3	4	5	7	6
				P_W^9	7	5	4	3	3	2	1	1	1	1
	Expert 10	S ₂	S ₁₀	P_B^2	2	1	1	3	4	5	6	8	7	9
				P_W^{10}	5	6	6	4	3	2	2	1	2	1
	Expert 11	S ₂	S ₁₀	P_B^2	2	1	1	2	3	4	5	7	6	8
			P_W^{10}	5	8	6	5	4	3	3	2	2	1	
Expert 12	S ₁	S ₁₀	P_B^1	1	1	2	2	3	3	3	4	4	5	
			P_W^{10}	5	4	3	3	3	2	1	2	1	1	
Expert 13	S ₂	S ₁₀	P_B^2	1	1	1	2	2	2	3	4	3	5	
			P_W^{10}	3	5	4	3	3	2	2	1	1	1	
Expert 14	S ₄	S ₁₀	P_B^4	3	1	2	1	3	4	4	4	5	4	
			P_W^{10}	2	4	3	5	3	2	2	1	1	1	
Expert 15	S ₂	S ₁₀	P_B^2	2	1	1	2	3	3	4	5	5	6	
			P_W^{10}	4	6	4	3	3	2	2	1	1	1	
Expert 16	S ₂	S ₁₀	P_B^2	1	1	1	2	3	4	4	4	4	5	
			P_W^{10}	5	5	4	4	3	2	1	1	1	1	
Expert 17	S ₂	S ₁₀	P_B^2	1	1	1	1	2	2	2	3	3	4	
			P_W^{10}	3	4	3	3	2	2	2	1	1	1	
Expert 18	S ₃	S ₁₀	P_B^3	1	1	1	1	2	2	3	4	4	5	
			P_W^{10}	3	4	5	3	3	2	2	1	1	1	
Expert 19	S ₂	S ₁₀	P_B^2	1	1	1	2	2	3	4	5	4	6	
			P_W^{10}	4	6	5	4	3	3	2	1	2	1	
Expert 20	S ₂	S ₁₀	P_B^2	2	1	1	2	3	4	5	6	5	7	
			P_W^{10}	5	7	6	5	4	3	2	1	2	1	
Expert 21	S ₂	S ₁₀	P_B^2	1	1	1	2	2	3	3	4	3	5	
			P_W^{10}	3	5	4	3	2	2	1	2	1	1	

Based on Table 5, the weight of each solution was estimated using the proposed algorithm. Figure 3 shows the calculated weights for outside the stadium solutions.

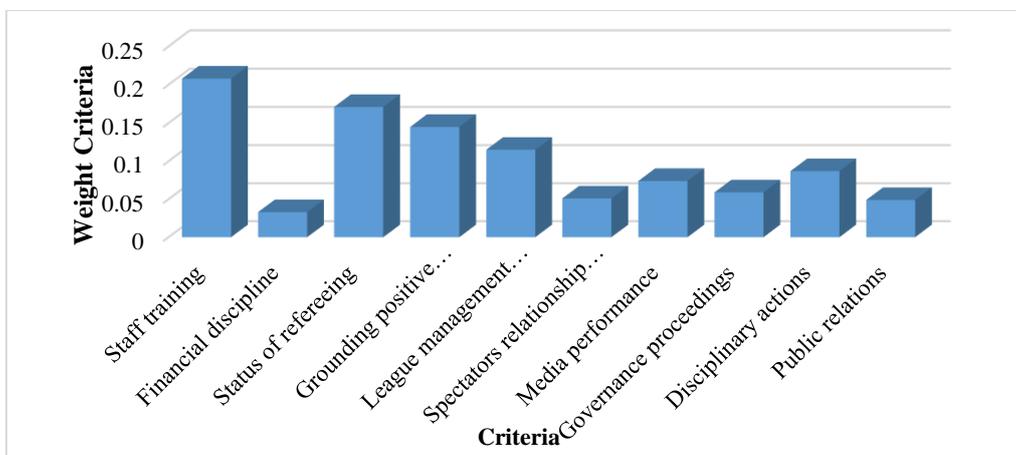


Figure 3. Weight of Effective Solutions in Managing the Crowd Crisis Outside the Stadium

As depicted in Figure 3, staff training (0.208) and financial discipline (0.033) were introduced as the most important and the least important solution affecting crowd crisis management outside the stadium, respectively. Improving the status of refereeing (0.171), grounding positive behaviors (0.145), league management professionalism (0.115), disciplinary actions (0.087), media performance (0.074), governance proceedings (0.059), spectator's relationship management (0.051) and public relations (0.049) were recognized as the second to ninth important solution in CCM, respectively.

Discussion and Conclusion

Spectators, as a large and vital stratum of the football community, may always be exposed to threats and risks that could lead to a crisis. The present study aimed to identify and prioritize CCM solutions in professional football.

According to Coombs and Laufer (2018), we can categorize crisis management activities into three stages: pre-crisis phase (prevention and preparation), the crisis phase (response), and the post-crisis phase (learning and review). Most of the solutions we identified in the qualitative section for the inside of the stadium are related to the pre-crisis step. For instance, most of the codes related to "control and guide the spectators" as the most important solution inside the stadium, and other solutions to equipping and renovating infrastructure, the incidents response framework, and the spectators' convenience are related to prevention and preparation activities (pre-crisis phase). "emergency medical services" are the last priority of crowd crisis management and are related to the response and revision phase (crisis and post-crisis phase). This finding does not mean denying the importance of emergency medical services but rather based on Coombs and Holladay (2012), the best way to manage a crisis is to prevent a crisis. If the crisis is prevented, the organization and its stakeholders will not be harmed.

Ludvigsen (2020a) analysis of as the Hillsborough disaster (a safety incident) found the cause to be the crowd of spectators and the inappropriate decision of the police to open the entrance and exit doors (p. 8). Also Gould and Williams (2011) points out that the cause of the Heysel (1985) incident was an incorrect arrangement of the seats among spectators of the two teams and the inexperience of the senior police officer and key officers inside the stadium in controlling the population (p. 587). Both crisis cases show the importance of the factor of "control and guides the spectator" as the most important solution has been. Generally, every game in the football league involves significant security and police measures taken by the club, the league organization, and the football federation in cooperation with the police and local security institutions (Stott et al., 2008). Despite this, stadiums are still not considered very safe places for spectators (Cleland & Cashmore, 2018; Ludvigsen, 2020a). Based on this, this research showed that to manage the population crisis, the 90 to 10 rule in allocating stadium seats to hosts and guests must be seriously and accurately implemented; careful physical inspection of the spectators should be done before the gates to reduce crowding and crowd pressure; the character of spectators groups should be identified for better management and illegal entry of spectators should be prevented; a high-quality image monitoring system should be used inside and around the stadium, all stadiums should be equipped with adequate and safe electronic gates, and there should be accurate communication between the tournament staff and the security police with the spectators.

Based on the results of prioritizing crowd crisis management solutions, equipping and renovating public infrastructure of the stadium was ranked second among the solutions inside the stadium.

In fact, the management of sports facilities and equipment is an integral part of the overall management of a sports organization, and responsible organization must make sure that it understands the essential elements of managing the facilities and equipment of a club and sports event, is aware of the standards of care for people, and for Providing their security uses appropriate management methods (Adiele & Morgan, 2018). Based on the results of this research, it can be said that in order to prevent the crowd crisis, it is necessary to renovate the old stadiums in observance with safety and security standards indicators, stadium equipment should be repaired and updated, seats in all stadiums should be numbered, fixed fences should be removed and doors with double hinges should be used.

Adiele and Morgan (2018) stated in their research that in order to ensure safety and prevent incidents, regular inspection and supervision of club facilities and facilities should be done and a disciplinary committee should be established to investigate misuse of facilities and facilities.

The third rank of football crowd crisis management solutions was assigned to the incident response framework factor.

These results focus on the principle of prevention in crisis management. Pre-crisis activities include a set of measures that lead to preventing incidents or reducing their harmful effects and increasing the ability of responsible organizations to implement activities in different stages of crisis management (Ebrahimi, 2018). Therefore, it is necessary for the managers and officials of the competitions, create a trained crisis management team in the clubs and evaluate their performance periodically, identify and evaluate crisis factors, prepare pre-determined instructions and programs for initial responding to crises, and conclude bilateral agreements with organizations involved in emergency situations. In this regard, Taheri (2020) expresses that in for prevent unexpected incidents and surprises, the organizers of the competitions should form intelligence committees in cooperation with the police officers, identify the existing threats and the main disruptors of the security and peace of the spectators, create operational committees and make the necessary arrangements, so that they can intelligently implement their preventive activities in the field of crowd management.

The prioritization of crowd crisis management solutions showed that the spectators' convenience is in the fourth rank.

Based on the frustration-aggression theory, limitation acts as a stimulant for aggressive behaviors; limitations in services at the stadiums induce spectator's aggressive and violent behaviors (Faraji et al., 2018). The results of this research also confirm that by designing comfortable seats and sufficient physical space for each spectator, improving the hygiene status of the stadium, the possibility of establishment spectators in purchased seats based on their seat numbers, observance to the standard of ancillary services regarding the stadium crowd, providing fun and educational programs to positively release the emotions of the spectators and informing the parking capacity, can be more effective in managing the behavior of the spectators. Andam and Salimi (2016) showed in their research that not paying attention to the comfort and peace of the spectators makes them unable to overcome the pressures in the stadium and may be forced to be aggressive and violent. In fact, this finding means that in order to manage the crowd crisis, it is better to adopt approaches by the organizers in which the enjoyment, dignity and peace of the spectators are preserved, so that as a result, risky behaviors are reduced and the spectator's safety reach to maximize.

According to the findings of this research, the last rank of crisis management solutions is related to emergency and medical services.

The stage of response with the crisis includes a set of measures that are taken before the crisis, during or immediately after the crisis to minimize the damage to people's finance and lives and increase the effectiveness of reconstruction operations (Ebrahimi, 2018). Therefore, to prevent and respond appropriately to the crowd crisis, emergency care equipment such as AED, CPR should be providing and upgrade in the stadium; the medical emergency response plan should be taken into consideration with an emphasis on supportive care center and infrastructure at the venue; special access for ambulances and emergency service vehicles should be provided inside the stadium and a special medical team should be formed for injured spectators in the stadium. In this regard, Naderiyan Jahromi et al, (2013) introduced the creation of an emergency medical facility and the training of relief methods in the minimum time as standard indicators of stadium and event safety.

The results also showed that among the categories outside the stadium, the sub-theme of "staff training" was introduced as the most important and "financial discipline" as the least important solution influencing crowd crisis management.

Choosing the "staff training" solution by experts indicates that better understanding the responsibilities and the duties of the executive and security forces is the most effective crisis management approach. We can conclude that many crises are not sudden but are the result of wrongdoing and adverse current incidents that could be mitigated. Depending on how organizations manage adverse incidents in the pre-crisis phase, they can prevent the crisis from occurring and reduce its damages (Lee & Lee, 2020). Therefore, the present study recommends that for the management of crowd crisis, it is necessary to train their own personnel about sensitive issues, threats, the crowds,

specific groups, and specific tasks and roles to take on. The Police Command of the Islamic Republic of Iran as a government institution is responsible for maintaining the security of the spectators without any specialized training, but this organization is reluctant to cooperate due to the weakness of the infrastructure. Participants in the study believe that most crises are due to poor spectators' control, as security forces have not received the necessary training and are even shirking on this responsibility. The results of studies Taheri et al. (2020) are also consistent with this finding.

The results of the prioritization of the solutions showed that among the solutions outside the stadium, the refereeing situation is in the second rank.

Referees must perform more than one task during a stressful match to avoid possible mistakes, they must analyze and audit the events of a match, make quick decisions, judge the match, consider various aspects of the match, maintain order and resolve disputes under unfavorable conditions and pressure, these complexities lead to their many mistakes, and as a result of these mistakes, not only the clubs, players and coaches suffer economically and psychologically, but the spectators are also affected by the intense inflammation of the match and may behave irreparably. Based on this, the results of this study showed that in order to prevent the crisis caused by the refereeing situation, it is necessary to seriously evaluate the referees pre-season, increase the conditions for knowledge-increasing and international promotion; prevent corruption and bribery, the referees' salaries should be increased and their professional prestige should be strengthened, and advanced arbitration technologies should be used. This finding is in line with the research results of Taheri (2020) and Samuel et al. (2020).

The third rank of football crowd management solutions outside the stadium was dedicated to the grounding positive behaviors.

The widespread presence of people, the sensitivity and excitement of the competitions, may put coaches, players and spectators in situations where the conditions, rules and norms governing the sports event are easily violated, and professional and social ethics are neglected, and some situations, behaviors and crisis-causing actions occur (Taheri, 2020). Therefore, it is necessary for the clubs and officials of the competitions to pay attention to the anti-crisis approach and active strategies instead of passive and reactive strategies. Andam and Salimi, (2016) also showed in their studies that to order to hold event in the best conditions, to positively discharge the excitement of the spectators and to enjoy watching the competition in a safe and secure environment, it is necessary to teach appropriate behaviors, encourage compliance ethical principles should be taken into consideration by popular players and the conditions for the presence of families in the stadium should be provided.

The prioritization of crowd management solutions outside the stadium showed that the league management professionalism ranked fourth.

While the prestigious world leagues try to improve the professional standards of their leagues to maintain their growing path towards becoming professionals, the current situation of the Iranian Premier League is far from the professional standards of the AFC; Based non-compliance with the league's professional criteria such as standardization of stadiums, monitoring and evaluation, management and organization of league matches, stadiums cannot be considered a safe and secure place for spectators (Hosseini et al., 2015). In this regard, the results of this study show that the professional management of the league is one of the ways that often indirectly helps to manage the crowd crisis. Therefore, the understanding of justice should be strengthened by eliminating conflicts in law implement, compiled the competency evaluation scale of executive managers who are considered one of the most important groups in crisis management, committed to the provisions of the federation's constitution, there was stability and unity in holding the football league, facilitate and increase international relations to promote the level of clubs and leagues; strictly supervised the implementation of FIFA rules and regulations and provided training opportunities for specialized personnel. This finding is in line with the research results of Doroudian et al. (2022) and Faraji et al, (2018).

The fifth rank of football crowd management solutions outside the stadium was dedicated to the disciplinary actions.

Based on the theory of rational choice, Taheri (2020) considered the main cause of people's deviant behavior in football, which in some way cause the crisis, to be their free will, which is done after evaluation of positive and negative consequences of a deviant behavior. Therefore, based on the

findings of this research, it is necessary to compiled disciplinary regulations based on international football rules, the disciplinary committee should deal decisively with the violations of the members of the clubs and leagues, the disciplinary rulings should be seriously implemented, instead of punishing spectators as a group, personal punishment and deprivation of violator spectators should be considered, deliberate mistakes of referees should be dealt with seriously, independent regulatory bodies should be formed to fight corruption in football. Also, the results of research Taheri et al. (2020) showed that the cause of the deviant behavior of stakeholders in Iranian football is the weakness of deterrence of criminal law, the lack of proportionality of the type of punishment with the violations, weakness of deterrence of disciplinary regulations, lack of transparency of regulations, instructions and statutes, and Interference of duties of disciplinary, and ethics committees.

The results of the prioritization of population crisis management solutions showed that media performance, governance proceedings, spectators relationship management, public relations and financial discipline are in the sixth to tenth priority.

In fact, the lack of attention to these factors and the weakness in their implementation can be considered as a potential stimulus for the crowd crisis. The effect of these factors is often indirect, and their role will be similar to creeping and gradual crises, that is, if that are ignored, it has the potential to create and spread a crisis, as well as the ability to transfer and influence from one field to another (Ebrahimi, 2018). Accordingly, for the effective management of the crowd crisis in football, it is necessary to pay serious attention to the dual role of the media in creating crisis and de-crisis and to use its exceptional capacity and positive functions to prevent and control the population crisis, prevent politicians from entering key football roles; at the macro level, pay attention to the cultural and economic class gap; creating job opportunities for young people should be on the agenda of the government, the parliament should legislate to solve the ownership and governance issues of sports, clubs should be responsiveness to the spectators and behave honestly, in the management structure of the club, the spectators should be involved to apply their opinions, informed about the crimes and punishments of guilty spectators, before the match, the entire stadium environment and entry and exit doors should be introduced in the virtual space, constructive and sufficient interactions should be established between the organizations involved in holding competitions; activate new sources of income for club, AFC's financial indicators should be applied to get permission to participate in the professional league, financial structures should be flexible and transparent, and clubs should be Forced to pay players and coaches on time according to their contracts. In line with these results, Taheri (2020) reached the conclusion in his studies that by preventing the publication of unfair and biased media news, analyzes and reports, intra-organizational and extra-organizational interactions of different institutions of holding competitions, introducing examples of criminal behavior to the spectators, providing financial resources to clubs through privatization, informing the spectators of punishments, controlling and monitoring the content provided by the media and meritocracy in the appointment of managers, can prevent the occurrence of dangerous and crisis-causing behavior of the spectators.

In general, the application and success in implementing these solutions will make the organizers of the competitions not face the crisis situation and its consequences, and the next steps, response and reconstruction, will be done with more ease and less cost. Therefore, being low-cost, having a strong influence on the process of crisis management and deterrence are the specifications that induce the officials of the event to observe the identified solutions for managing the crowd crisis.

Future Research

During the analysis and coding, the researcher found that for the effective manage the crowd crisis, in addition to the identified solutions, some prerequisites, processes and different institutions should be considered and investigated; In addition, limited researches have investigated the topic of crowd crisis management, and most researches have focused on spectator's aggression and security; Therefore, in order to examine the issue more accurate and make the solutions more executive, it is suggested that the next researches design the crowd crisis management model.

According to officials and researchers analyzes, disasters in stadiums in Iran and other countries, such as the incident at Azadi Stadium in Iran in 2018, disasters at Port Said Stadium in Egypt in 2012,

Accra Stadium in Ghana in 2001, Heysel Stadium in Belgium in 1985, Hillsborough in England in 1989, Stade de France in Paris in 2015 and Querétaro Stadium disaster in Mexican in 2022, have often been due to poor pre-crisis and crisis measures. Therefore, although these findings can be helpful for CCM in other countries, given the special conditions of Iranian stadiums such as government ownership of the stadium, the generalization of these findings should be done with great caution; Therefore, it is suggested that the researchers of other countries review the solutions of crowd crisis management based on the phases of crisis management.

Acknowledgment

We would like to thank the participants and interviewees in this research.

References

- Abdali, T., Esmaeili, M. R., & Nikaeen, Z. (2021). Explaining the Iranian Football Stadiums Security with Emphasis on the Role of Match Organizers. *Journal of Sport Management*, 13(3), 979-1000. <https://doi.org/10.22059/JSM.2021.312665.2612>.
- Adiele, D., & Morgan, G. D. P. (2018). Assessing management practices of sport facilities and equipment by the municipality council. *International Journal of Science and Healthcare Research*, 2(3), 44–49.
- Andam, R., & Salimi, M. (2016). Model for Factors Influencing Positive Behavior of Iran Handball Premier League Competitions Fans. *Sport Management Studies*, 8(38), 51–68.
- Anguera, M. T., Camerino, O., Castañer, M., Sánchez-Algarra, P., & Onwuegbuzie, A. J. (2017). The Specificity of Observational Studies in Physical Activity and Sports Sciences: Moving Forward in Mixed Methods Research and Proposals for Achieving Quantitative and Qualitative Symmetry. *Frontiers in Psychology*, 8, 2196. <https://doi.org/10.3389/fpsyg.2017.02196>
- Antonowicz, D., Kossakowski, R., & Jakubowska, H. (2020). A bittersweet welcome: attitudes of Polish ultra-fans toward female fans entering football stadiums. *Sport in Society*, 24(7), 1183–1199. <https://doi.org/10.1080/17430437.2020.1737018>
- Biglari, N., Hosseininia, S.R., Bagheri, H., Coombs, W. T. (2020). Identifying and prioritizing factors affecting the fan crisis in the Iranian Football Premier League based on the three-point model. 13(14), 1235-1262. *Journal of Sport Management*. <https://doi.org/10.22059/JSM.2020.305178.2510>
- Birkhäuser, S., Kaserer, C., & Urban, D. (2019). Did UEFA's financial fair play harm competition in European football leagues? In *Review of Managerial Science*, 13(1), 113-145. <https://doi.org/10.1007/s11846-017-0246-z>.
- Biscaia, R., Correia, A., Rosado, A., Maroco, J., & Ross, S. (2012). The effects of emotions on football spectators' satisfaction and behavioural intentions. *European Sport Management Quarterly*, 12(3), 227–242. <https://doi.org/10.1080/16184742.2012.679949>
- Björck, A. (2016). Crisis Typologies Revisited: An Interdisciplinary Approach. *Central European Business Review*, 5(3), 25–37. <https://doi.org/10.18267/j.cebr.156>
- Bowen, G. A. (2008). Naturalistic inquiry and the saturation concept: a research note. *Qualitative Research*, 8(1), 137–152. <https://doi.org/10.1177/1468794107085301>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Brown-Devlin, Natalie, & Brown, K. (2020). When Crises Change the Game: Establishing a Typology of Sports-Related Crises. *Journal of International Crisis and Risk Communication Research*, 3(1), 49–70. <https://doi.org/10.30658/jicrcr.3.1.3>
- Bundy, J., Pfarrer, M. D., Short, C. E., & Coombs, W. T. (2017). Crises and Crisis Management: Integration, Interpretation, and Research Development. *Journal of Management*, 43(6), 1661–1692. <https://doi.org/10.1177/0149206316680030>
- Çakmak, Ö., & Büyükerğün, A. (2018). Crisis Management in Sport Clubs. *European Journal of Education Studies*, 5(3), 100–110.
- Cho, H., Joo, D., & Chi, C. G. (2019). Examining nostalgia in sport tourism: The case of US college football fans. *Tourism Management Perspectives*, 29, 97–104. <https://doi.org/10.1016/j.tmp.2018.11.002>
- Claeys, A. S. (2017). Better safe than sorry: Why organizations in crisis should never hesitate to steal thunder. *Business Horizons*, 60(3), 305–311.
- Cleland, J., & Cashmore, E. (2018). Nothing Will Be the Same Again After the Stade de France Attack: Reflections of Association Football Fans on Terrorism, Security and Surveillance. *Journal of Sport and*

- Social Issues*, 42(6), 454–469. <https://doi.org/10.1177/0193723518797028>
- Coombs, W. T. (2002). Deep and surface threats: Conceptual and practical implications for “crisis” vs. “problem.” *Public Relations Review*, 28(5), 339–345. [https://doi.org/10.1016/s0363-8111\(02\)00167-4](https://doi.org/10.1016/s0363-8111(02)00167-4)
- Coombs, W. T. (2007). Attribution Theory as a guide for post-crisis communication research. *Public Relations Review*, 33(2), 135–139. <https://doi.org/10.1016/j.pubrev.2006.11.016>
- Coombs, W. T., & Holladay, J. S. (2012). The paracrisis: The challenges created by publicly managing crisis prevention. *Public Relations Review*, 38(3), 408–415. <https://doi.org/10.1016/j.pubrev.2012.04.004>
- Coombs, W. T., & Holladay, S. J. (1996). Communication and Attributions in a Crisis: An Experimental Study in Crisis Communication. *Journal of Public Relations Research*, 8(4), 279–295. https://doi.org/10.1207/s1532754xjpr0804_04
- Coombs, W. T., & Laufer, D. (2018). Global Crisis Management – Current Research and Future Directions. *Journal of International Management*, 24(3), 199–203. <https://doi.org/10.1016/j.intman.2017.12.003>
- De Sausmarez, N. (2007). Crisis management, tourism and sustainability: The role of indicators. *Journal of Sustainable Tourism*, 15(6), 700–714. <https://doi.org/10.2167/jost653.0>
- Dinesh Jackson, S. R., Fenil, E., Gunasekaran, M., Vivekananda, G. N., Thanjaiivadivel, T., Jeeva, S., & Ahilan, A. (2019). Real time violence detection framework for football stadium comprising of big data analysis and deep learning through bidirectional LSTM. *Computer Networks*, 151, 191–200. <https://doi.org/10.1016/j.comnet.2019.01.028>
- Doroudian, A. A.; Shahbazi, M; Akbari, M. (2022). Identify and prioritize the factors affecting crisis management in sport venues (Case Study: 100,000 Azadi Sports Stadium). *Strategic Studies on Youth and Sports*, 21(55), 257–272. <https://doi.org/10.22034/SSYS.2022.1556.2080>
- Ebrahimi, M. (2018). *Crisis Management*. Publisher: Shahid Bahonar University of Kerman. First Edition, Kerman.
- Faraji, R., Hemmatinezhad, M., & Taylor, T. (2018). Critical Factors Affecting Stadiums Security. *Journal of Applied Security Research*, 13(4), 473–488. <https://doi.org/10.1080/19361610.2018.1498264>
- Glenesk, J., Strang, L., & Disley, E. (2018). How can crowd behaviour modelling be used to prevent and respond to violence and antisocial behaviour at Qatar 2022? *RAND*, 1–15.
- Gould, D., & Williams, J. (2011). After Heysel: How Italy lost the football “peace.” *Soccer and Society*, 12(5), 586–601. <https://doi.org/10.1080/14660970.2011.599580>
- Hafezalkotob, A., & Hafezalkotob, A. (2017). A novel approach for combination of individual and group decisions based on fuzzy best-worst method. *Applied Soft Computing*, 59, 316–325. <https://doi.org/10.1016/j.asoc.2017.05.036>
- Hall, S., Ward, R., Cunningham, T., & Marciani, L. (2008). Developing a New Curriculum in Sport Security Management. *Journal of Homeland Security and Emergency Management*, 5(1), 1-10. <https://doi.org/10.2202/1547-7355.1439/HTML>
- Hamilton-Smith, N., McBride, M., & Atkinson, C. (2019). Lights, camera, provocation? Exploring experiences of surveillance in the policing of Scottish football. *Policing and Society*. 31(2), 179-194. <https://doi.org/10.1080/10439463.2019.1696800>
- Hartmann-Tews, I., Bartsch, F., Wagner, I., & Rulofs, B. (2020). Managing prevention of sexual violence and the role of commissioners in national sport federations in Germany. *Sport Management Review*, 23(1), 155–169. <https://doi.org/10.1016/j.smr.2019.09.006>
- Hosseini, S.A., Hosin Razavi, S.M., Yamini Firouz, M., Hashemi Kochaksarai, S. . (2015). Examining the current and desired situation of the Iranian premier football league based on AFC professional standards. *Sport Management as Development*, 4(1), 49–63.
- Jaques, T. (2010). Reshaping crisis management: The challenge for organizational design. *Organization Development Journal*, 28(1), 9–17.
- Kabiri, S., Rahmati, M. M., & Rezaei, H. (2014). Study on the performance of police (NAJA) in management of Soccer fans’ behavior Case study: Fans of Damash and Malavan Clubs. *Journal of Social Problems of Iran*, 5(2), 391-414. [10.22059/IJSP.2014.55555](https://doi.org/10.22059/IJSP.2014.55555).
- Koerber, D., & Zabara, N. (2017). Preventing damage: The psychology of crisis communication buffers in organized sports. *Public Relations Review*, 43(1), 193–200. <https://doi.org/10.1016/j.pubrev.2016.12.002>
- Lee Ludvigsen, J. A. (2018). Sport mega-events and security: the 2018 World Cup as an extraordinarily securitized event. *Soccer and Society*, 19(7), 1058–1071. <https://doi.org/10.1080/14660970.2018.1487841>
- Lee, S. Y., & Lee, J. Y. (2020). Fixing the barn door before the horse bolts: Effects of pre-crisis engagement and stealing thunder in crisis communication. *Public Relations Review*, 47(1), 1-8. <https://doi.org/10.1016/j.pubrev.2020.101930>
- Leite, Â., Ramires, A., Costa, R., Castro, F., Pedrosa e Sousa, H. F., Vidal, D. G., & Pimenta Dinis, M. A.

- (2020). Comparing psychopathological symptoms in Portuguese football fans and non-fans. *Behavioral Sciences*, 10(5), 85. <https://doi.org/10.3390/bs10050085>
- Ludvigsen, J. A. (2020a). 'Safety first': towards a security legacy and fan-oriented research agenda in the English Premier League. *Sport in Society*, 23(5), 880–900. <https://doi.org/10.1080/17430437.2019.1590339>
- Ludvigsen, J. A. L. (2020b). The 'troika of security': merging retrospective and futuristic 'risk' and 'security' assessments before Euro 2020. *Leisure Studies*, 39(6), 844–858. <https://doi.org/10.1080/02614367.2020.1775872>
- Ludvigsen, J. A. L., & Millward, P. (2020). A Security Theater of Dreams: Supporters' Responses to "Safety" and "Security" Following the Old Trafford "Fake Bomb" Evacuation. *Journal of Sport and Social Issues*, 44(1), 3–21. <https://doi.org/10.1177/0193723519881202>
- Moerschell, L., & Novak, S. S. (2020). Managing crisis in a university setting: The challenge of alignment. *Journal of Contingencies and Crisis Management*, 28(1), 30–40. <https://doi.org/10.1111/1468-5973.12266>
- Muponde, R., & Muchemwa, K. (2011). Dictatorships, disasters, and African soccer: Reflections on a moment in Zimbabwean soccer. *African Identities*, 9(3), 279–290. <https://doi.org/10.1080/14725843.2011.591227>
- Naderiyan Jahromi, M., Poorsoltanzarandi, H., & Rohani, E. (2013). Recognizing Security Indicators and Standards of Sport Facilities. *Sport Management Journal*, 5(3), 21–36.
- Parsons, W. (1996). Crisis management. *Career Development International*, 1(5), 26–28. <https://doi.org/10.1108/13620439610130614>
- Reid, S., & Ritchie, B. (2011). Risk management: Event managers' attitudes, beliefs, and perceived constraints. *Event Management*, 15(4), 329–341.
- Rek-Woźniak, M., & Woźniak, W. (2020). BBC's Documentary "Stadiums of Hate" and Manufacturing of the News: Case Study in Moral Panics and Media Manipulation. *Journal of Sport and Social Issues*, 44(6), 515–533. <https://doi.org/10.1177/0193723519899244>
- Rezaei, J. (2015). Best-worst multi-criteria decision-making method. *Omega (United Kingdom)*, 53, 49–57. <https://doi.org/10.1016/j.omega.2014.11.009>
- Rezaei, J. (2016). Best-worst multi-criteria decision-making method: Some properties and a linear model. *Omega (United Kingdom)*, 64, 126–130. <https://doi.org/10.1016/j.omega.2015.12.001>
- Samuel, R. D., Tenenbaum, G., & Galily, Y. (2020). An integrated conceptual framework of decision-making in soccer refereeing. *International Journal of Sport and Exercise Psychology*, 19(5), 1–23.
- Seymour, Mike. Moore, S. (2000). *No Title Effective crisis management: Worldwide principles and practice*. Cassell.
- Shah Mansouri E, M. S. (2006). Factors that cause sports crises and how to prevent them in the fields of software and hardware, software and media. *Research in Sports Science*, 14(12), 87–106.
- Sparks, A. ., & Smith, B. (2013). *Qualitative Research Methods in Sport, Exercise and Health: From Process to ... - Andrew C. Sparkes, Brett Smith - Google Books*. Routledge.
- Stott, C., Livingstone, A., & Hoggett, J. (2008). Policing football crowds in England and Wales: a model of 'good practice'? *Policing and Society*, 18(3), 258–281. <https://doi.org/10.1080/10439460802091641>
- Taheri, H., Andam, R., Bahrololoum, H., & Salehi, K. (2020). Antecedents of the disciplinary model of managing the behavior of football spectators in Iran. *Quarterly Journal of Police Management Research*, 15(1), 149–170.
- Taheri, H. (2020). *Designing a police model of managing football spectators' behaviors in Iran*. Shahrood University of technology, Iran.
- Taylor, M., & Perry, D. C. (2005). Diffusion of traditional and new media tactics in crisis communication. *Public Relations Review*, 31(2), 209–217. <https://doi.org/10.1016/j.pubrev.2005.02.018>
- Teddlie, C., & Tashakkori, A. (2003). Major Issues and Controversies in the Use of Mixed Methods in the Social and Behavioral Sciences. *Handbook of Mixed Methods in Social and Behavioural Research*, 1, 3–50.
- Thomas, D. R. (2017). Feedback from research participants: are member checks useful in qualitative research? *Qualitative Research in Psychology*, 14(1), 23–41. <https://doi.org/10.1080/14780887.2016.1219435>
- Wilson, B., Stavros, C., & Westberg, K. (2010). A sport crisis typology: Establishing a pathway for future research. *International Journal of Sport Management and Marketing*, 7(1–2), 21–32. <https://doi.org/10.1504/IJSMM.2010.029709>
- Wong, D., & Chadwick, S. (2017). Risk and (in)security of FIFA football World Cups – outlook for Russia 2018. *Sport in Society*, 20(5–6), 583–598. <https://doi.org/10.1080/17430437.2016.1159362>
- Zargar, S. H., & Alaghmandan, M. (2019). CORAL: introducing a fully computational plug-in for stadium

design and optimization; a case study of finding optimal spectators' viewing angle. *Architectural Science Review*, 62(2), 160–170. <https://doi.org/10.1080/00038628.2018.1559133>

Zhang, J. (2018). New Characteristics of Crisis Communication in the Sports Events under the Era of Media Convergence. *Proceedings of the 2018 International Conference on Management and Education, Humanities and Social Sciences (MEHSS 2018)*, 41–44. <https://doi.org/10.2991/mehss-18.2018.10>