Research on Operational Risk Assessment of Large - scale Sports Event Venues

Jiangyong Gong[1,2]

[1] *College of Sports Science of Nantong University, Jiangsu, Nantong, China, 226019*

Abstract: China has held many international sports events since it held the Olympics in 2008. When looking back, we can see it's likely to have operational risks of the international sports events and its stadiums. In response to it, the first task is to analyze the operational risks and evaluate it scientifically. Therefore, performance evaluation index system of large scale sports stadiums has been established based on the fishbone diagram analysis model and it's illustrated in a detailed case.

Keywords: Risks evaluations; Large scale sports events; Sports stadiums; Operational management

1. INTRODUCTION

In 2008, Beijing successfully held the twenty-ninth Olympic Games, which attracted worldwide attention. After that, more and more Chinese cities embarked on the international stage, hosted a number of large sports events in Asia and the world. In 2010, Guangzhou hosted the 16th Asian Games. In 2011, Shenzhen held the 26th World University Summer Games. In 2013, Tianjin hosted the 6th East Asian Games. As a venue for large-scale sporting events, the construction of sports venues is more and more beautiful, the shape is also increasingly ingenuity, feast for the eyes, stands above the city carrying the pride and pride of the public. At the same time, history also prompts a large sporting event sports venues may also face a lot of uncertainty and risk dangers. In 1985, England Bradford Valley parade field football field fire (56 people died). In 1989, the England Sheffield Hillsborough stadium fans riot (96 dead). In 2006, the Manila stadium in the Philippines stampede (93 people died) [1]. At the beginning of the 21st century, recognizing the existence and risks of the operation and hosting of large-scale sports events, the theory of risk management began to be introduced into the field of large-scale sporting events in China [2]. Risk management is actually a process of risk identification - risk assessment - risk countermeasure, and in this process, the risk assessment of the entire sporting event venue is the risk management of the sporting event.

Therefore, through the analysis of the operational risk of the large-scale sports venues and the establishment of a scientific risk assessment index system to explore the risk assessment methods of large-scale sports venues, in order to effectively avoid potential risks, the successful operation of sports events to provide scientific basis and constructive suggest.

2. CONCEPT DEFINITION OF RISK OF LARGE - SCALE SPORTS

(1) Large sporting events

There are divergent views on the definition and classification of sporting events. Comprehensive research results at home and abroad [3-4], I believe that large-scale sports events from the characteristics of the tournament itself and social impact to define the two aspects. From their own characteristics, large-scale sporting events large-scale, large investment, competition projects, the number of entries, the game cycle is long, the audience coverage is wide. From the social impact, large-scale sports events with a strong spillover effect, may be on the host city construction, city image and even domestic and foreign status have a huge impact.

(2) Risk concept

What is risk? At present, there are three kinds of perspectives in the research of academic research, namely, uncertainty perspective, loss perspective and expected target difference. In this paper, the author investigates the operational risk of the large-scale sports venues. The third perspective is that the risk is defined as the deviation between the expected target and the actual result under certain conditions in a certain period of time [5].

(3) The large-scale sports venues risk

The primary objective of a large sporting event is to ensure the safe and orderly conduct of the event and to create a harmonious and enjoyable game and viewing environment. According to the author's risk perspective, the risk of defining a large-scale sporting event venue is that the factors that affect and cause the event organizer to anticipate the deviation and difference between the target and the actual result during the event of a large-scale sporting event may cause the event to be lost of the various risks.

3. LARGE - SCALE SPORTS VENUES RISK ASSESSMENT SYSTEM

(1) Risk analysis of large sports venues

(Sports risk), as well as equipment factors (site risk), more specific operational aspects of the factors (operational risk) and the impact of the operation of the large-scale sports venues can be safe and orderly

operation, both human factors (management risk), but also capital factors other accidental factors (force majeure risk).

In this sense, this paper uses the fish bone diagram analysis method, from the management risk, economic risk, site risk, operational risk and force majeure risk five levels, analysis of large-scale sports venues operating risk, the establishment of model

(2) Large-scale sports venues risk assessment index system

According to the operational risk analysis of the stadium operation shown in Fig. 1, this paper sets up the index system and elaborates as follows: management risk, economic risk, site risk, operational risk and force majeure.

1) Management risk (M):
Management system (M1)″
Management talent (M2)″
Management experience (M3)″

2) Economic risk (E):
Own capital investment (E1)″
Event sponsorship (E2)″
Financing channels″

3) Site risk (P):
Equipment quality (P1)″
Equipment combination effect (P2)″
Equipment maintenance (P3)″

4) Operational risk (O):
Security risk (O1)″
Environmental risk (O2)″
Emergency treatment (O3)″

5) Force majeure (N):
Political turmoil (N1)″
Natural disaster (N2)″
Infectious Diseases (N3)″

4. RISK ASSESSMENT METHOD FOR LARGE - SCALE SPORTS VENUES

Comprehensive assessment of the operational risk of large-scale sports venues, the risk decision matrix method can be used [6], the specific steps:

(1) Risk matrix column content

Sports events Venue risk can be divided into five major modules, including management risk, economic risk, site risk, operational risk, force majeure risk, see Figure 1.

(2) Impact column and probability column

The impact of the risk module on the assessment project can be divided into five levels, including: critical, severe, moderate, small, negligible, the corresponding interval set: {(4,5), (3,4), (2,3], (1,2], [0,1]}, see Table 1.

Table 1 Risk impact rating table

Risk Impact Level	range	definition
essential	(4,5]	Once it happened, the whole event failed
serious	(3,4]	In the event of a serious decline in the target
Moderate	(2,3]	In the event of a race, the target is moderately down
small	(1,2]	Once the event occurs, the target is slightly down
Ignorable	[0,1]	In the event of the event, the target is almost unaffected

The probability of occurrence of risk can also be divided into five levels, including: very likely to occur, it is likely to occur, may occur, is unlikely to occur, it cannot happen, the corresponding interval set: {(0.9,1), 0.7,0.9], (0.6,0.7], (0.4,0.6], [0,0.4]}, see Table 2.

Table 2 Risk occurrence probability table

Risk probability	definition
(0.9,1]	Most likely to happen
(0.7,0.9]	It is likely to happen
(0.6,0.7]	May happen
(0.4,0.6]	Is unlikely to happen
[0,0.4]	Cannot happen

(3) Determination of risk level column

(3, 5), (1.5, 3), [0,1.5]}. The number of intervals is as follows: {3, 5], (1.5,3), [0,1.5]}.

(4) Determine the risk module risk level

As shown in Table 3, the risk level table. According to the secondary index j of the risk module, the level quantization value Rj (i = 1, 2, ..., n) is affected, where n is the number of operational risk secondary indexes. (J = 1, 2, ..., n), the final risk level of the j index can be determined according to the degree of membership of the risk level, using the linear interpolation method.

Table 3 Risk level control

Risk probability	Ignorable	small	Moderate	serious	essential
0-0.4	0	0-0.5	0.5-1.0	1.0-1.5	2.0-2.5
0.4-0.6	0	0-0.5	1.0-1.5	1.5-2.0	2.5-3.0
0.6-0.7	0-0.5	0.5-1.0	1.5-2.0	2.0-3.0	3.0-4.0
0.7-0.9	0-0.5	1.0-1.5	2.0-2.5	3.0-3.5	4.0-4.5
0.9-1.0	0.5-1.0	1.5-2.0	2.5-3.0	3.5-4.0	4.5-5.0

(5) Comprehensive evaluation of operational risk of venues

The operational risk assessment of the stadium is calculated as follows:

$$R = \sum_{j=1}^{n} W_j RV_j$$

N is the number of risk indicators for the stage.

(6) Determine the operational risk level of the stadium

According to R and the risk assessment of the affiliation of the set, determine the level of operational risk.

5. APPLICATION EXAMPLES

Assuming a large-scale sporting event venues, the risk of quantifying the risk and the probability of occurrence of the risk is shown in Table 4 (due to the three data financing channels, emergency treatment and infectious diseases) Indicators are not present or

not available, this case fine-tuning the index system):

Table 4 a large-scale event stadium operating risk experts scoring table -1

Risk indicators		Quantitative impact of risk			
First level indicator	Secondary indicators	Expert 1	Expert 2	Expert 3	Mean
Manage risk	Management system	5	4.5	5	4.8
	Management talent	4.5	3	5	4.2
	Management experience	4	3	4	3.7
Economic risk	private capital	3	3	4	3.3
	Tournament sponsorship	3	1	4	2.7
Site risk	Equipment quality	4.5	5	3	4.2
	Equipment combination	2	2	4	2.7
	Equipment maintenance	4	2	3	3.0
Operational risk	Security risk	1	2	3	2.0
	Environmental risk	3	3.5	4	3.5
Irresistible risk	Political turmoil	5	5	5	5.0
	natural disaster	4	5	4.5	4.5

Risk indicators		Risk probability(%)			
First level indicator	Secondary indicators	Expert 1	Expert 2	Expert 3	Mean
Manage risk	Management system	10	50	15	25
	Management talent	30	40	20	30
	Management experience	40	40	30	36.7
Economic risk	private capital	40	40	35	38.3
	Tournament sponsorship	45	40	35	40
Site risk	Equipment quality	15	20	10	15
	Equipment combination	80	20	10	36.7
	Equipment maintenance	5	15	5	8.3
Operational risk	Security risk	90	10	70	56.7
	Environmental risk	95	10	60	55
Irresistible risk	Political turmoil	10	15	5	10
	natural disaster	45	45	30	40

By the risk level of Table 3, you can determine the risk of the secondary indicators of the risk level of quantification range. According to the insert method can be obtained specific data into the risk matrix, see Table 5.

Table 5 a large-scale event stadium operating risk experts scoring table -2

Risk indicators		Impact level		Risk probability
First level indicator	Secondary indicators	Quantization value	grade	
Manage risk	Management system	4.80	essential	25.00
	Management talent	4.20	essential	30.00
	Management experience	3.70	serious	36.70
Economic risk	private capital	3.30	serious	38.30
	Tournament sponsorship	2.70	Moderate	40.00
Site risk	Equipment quality	4.20	essential	15.00
	Equipment combination	2.70	Moderate	36.70
	Equipment maintenance	3.00	Moderate	8.30
Operational risk	Security risk	2.00	small	56.70
	Environmental risk	3.50	serious	55.00
Irresistible risk	Political turmoil	5.00	essential	10.00
	natural disaster	4.50	essential	40.00

Risk indicators		Risk range		Risk value	Weights	Weighted
First level indicator	Secondary indicators	Min	Max			
Manage risk	Management system	2.00	2.50	2.26	11.1	0.25
	Management talent	2.00	2.50	2.06	9.6	0.20
	Management experience	1.00	1.50	1.31	8.4	0.11
Economic risk	private capital	1.00	1.50	1.16	7.7	0.09
	Tournament sponsorship	0.50	1.00	0.83	6.1	0.05
Site risk	Equipment quality	2.00	2.50	2.03	9.6	0.19
	Equipment combination	0.50	1.00	0.81	6.1	0.05
	Equipment maintenance	0.50	1.00	0.60	6.9	0.04
Operational risk	Security risk	0.00	0.50	0.42	4.6	0.02
	Environmental risk	1.50	2.00	1.69	8.0	0.14
Irresistible risk	Political turmoil	2.00	2.50	2.13	11.5	0.24
	natural disaster	2.00	2.50	2.25	10.3	0.23

According to the evaluation of the key degree of the secondary index (the quantification value of the risk impact) of the three experts, the weighted risk value of each index can be obtained by weighting and weighting, and the comprehensive risk assessment value of the stadium is summarized:

$$R = \sum_{j=1}^{n} W_j RV_j = 1.62$$

According to the affiliation with the set of risk assessment, it is determined that the operation of the stadium is intermediate risk level.

CONCLUSION

After the success of the 2008 Beijing Olympic Games, the image of our country is once again in the international arena bloom. We believe that in the future there will be more large-scale international sports events in front of people. And for all sports events, especially some large international sports events have endogenous risk, coupled with these large international sports events involving a wide range of factors such as many factors, as a large-scale sport events held by the venue Sports venues, destined to undertake the risk of these large sports events. Therefore, in the large-scale sports venues before the event, to know the full, identify the possibility of the existence of the venue and the risk of harm, and to be scientific and reasonable evaluation and assessment, while taking effective measures to avoid, control, transfer events Risk, to avoid the occurrence of various accidents to ensure the smooth operation of the event and the venue

healthy operation.

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