

Research Article

Research on the Construction of Evaluation Index System for Chongqing International Marathon in the New Era

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Chongqing International Marathon event is one of the top marathon events in China. Under the background of the new era, constructing a scientific and reasonable marathon evaluation system plays an important role in the development of this event. In this study, literature method, field investigation method, Delphi method, interview method, analytic hierarchy process, and other methods are used. And it includes 5 primary indicators, 13 secondary indicators, and 58 tertiary indicators. What is more, AHP is used to determine the weight of indicators at each level. This evaluation system can help the race-organizing committee more scientifically understand this event and lay a solid foundation for finally building an excellent brand event.

1. Introduction

Statistics from the German Athletics Association show that there are 180 professional marathons and 3,700 mass marathons in Germany every year. Every week, there are thousands of free marathons in Germany. Currently, more than 100 cities in Germany hold New Year's Eve Marathon or New Year's Marathon. The events of the competition range from 800 meters to 20 kilometers. Contestants range from kindergarten children to gray-haired elderly people. After 11 years of development and precipitation, Chongqing International Marathon [1] (P.115), as one of the top marathon events in Chongqing and even in China, has attracted extensive attention from the whole society.

With the development of the economy and society, people pay more and more attention to health, and more people participate in sports. Running is the most and convenient choice. Chongqing International Marathon is

one of the more famous marathon events in China and even in the world. The projects are diverse and distinctive, and the number of participants has doubled year by year. According to statistics, the 2019 Chongqing International Marathon has four events: full course, half course, minimarathon, and parent-child marathon, with a total enrollment of more than 100,000. Runners from more than 50 countries and regions and more than 500 cities all over the world participated in the forecast, with more than 30,000 participants and 220 foreign athletes. However, due to the need for epidemic prevention and control, the scale of the Chongqing International Marathon in 2020 will be adjusted from 30,000 to less than 4,900, including 4,000 full marathons and 900 minimarathons, and the parent-child project will be canceled. It can be seen that the Chongqing International Marathon is deeply loved by people.

The core of the Chongqing International Marathon is a sports competition. Because the event is held in Chongqing,

it has always been a characteristic event of Chongqing mountain city and river since its establishment. Therefore, building such a marathon brand event in line with Chongqing will have a positive impact on the regional politics, economy, culture, society, and environment and will also become a landmark social activity in Chongqing.

As Chongqing has gradually become one of the most popular tourist cities in China, more and more tourists begin to choose sports elements in tourism. "Sports + tourism" is becoming a popular new leisure lifestyle, which also makes the sports development of Chongqing to enter the fast lane. The holding of the Chongqing International Marathon is of positive significance to Chongqing's economic development, cultural development, and sports development. Therefore, more and more tourists also come to Chongqing.

Both the quality of the event and the number of participants showed a geometric growth [2]. Although China's marathon events have rapidly developed in recent years, many problems still occur from time to time, such as the overall growth stage, the imperfect event mechanism, the relatively insufficient operation and management experience of event personnel, and the weak awareness of the organizing committee to scientifically run events. This is because it has not formed a relatively complete event index evaluation system [3] (P.67–76) as a reference standard for the comprehensive evaluation of the event-organizing committee to help the better development of the event. The event index evaluation system can be used as a reference standard to evaluate whether the overall operation mechanism of an event is excellent or not, and it is also a basic evaluation standard for whether an event can become a brand event [4]. At present, there is an extreme lack of relevant research on the evaluation index system of marathon in China. A total of 1,870 articles were retrieved by inputting the keyword "marathon" in CNKI literature retrieval. In the search keyword "sports event evaluation index system," there are only 46 results, but there are only two articles in the further search keyword "marathon event evaluation system." Although the Chongqing International Marathon has achieved certain success after year-on-year development, it still lacks an effective event evaluation index system to guide its future development direction and help the Chongqing International Marathon make experience summary, and the establishment of an event evaluation index can well fill this gap. Based on this, it is urgent to establish a scientific and effective evaluation index system [5] of the Chongqing International Marathon.

In this study, we have built a complete evaluation index system for the Chongqing International Marathon brand event. As an international marathon gold medal event, the event has a very good reputation at home and abroad. As one of China's four municipalities directly under the central government, Chongqing has an important economic and social status, and the development of large-scale mass sports events is also a research hotspot in recent years. On the one hand, the construction of the evaluation index system can comprehensively evaluate the effectiveness of the event and provide important theoretical support for the sustainable development of the event. On the other hand, it also has

universality. On this basis, it can provide reference and reference for other marathon events at home and abroad. The members of the research group personally participated in the preparation and holding of the event in the early stage and successfully applied for the scientific research project of Chongqing Sports Bureau.

Most of the existing marathon competition evaluation systems only use SWOT analysis and literature methods for research. We extend and add the method to design a more detailed evaluation system.

At the same time, the survey objects selected by the Delphi method are also experts and scholars with important influence in Chinese sports academic circles. Their support for the subject makes the results of the whole study more scientific and rigorous.

2. Research Methods

2.1. Documentation Method. According to keywords and research directions, we consulted many books on sports events, sports social humanities, sports management, sports economics, sports event evaluation, and read relevant studies such as sports event evaluation, event evaluation system, event evaluation indicators, event evaluation standards, and event evaluation construction through CNKI. Using academic search engines such as Scirus, Issuu, CNKI, and Google, keywords such as "marathon event evaluation," "marathon event organization and management," "marathon brand event evaluation," and "evaluation index system" are input. On this basis, the primary, secondary, and tertiary evaluation index factors of recelebrating the international marathon brand event are preliminarily screened.

2.2. Investigation Method

2.2.1. Interview Method. By visiting experts and scholars in the fields of domestic sports event organization and management, event evaluation standards, sports event evaluation system research, marathon event operation and management, and visiting relevant leaders and staff of Chongqing Chongma Sports Development Co., Ltd., we learned about the opinions of relevant personnel on the evaluation index system of the Chongqing International Marathon brand events and further improved the scientificity and preciseness of the evaluation index system of the Chongqing International Marathon brand events.

2.2.2. Delphi. We designed the expert interview outline of the Chongqing International Marathon brand event evaluation system, the screening questionnaire for the importance of indicators at all levels and the Chongqing International Marathon brand event evaluation questionnaire (the questionnaire is tested by experts for reliability and validity and meets the statistical requirements, and the experts modify the evaluation indicators and assign the index weight). The overall survey is distributed, recovered, and distributed in two rounds according to the procedure

after sorting out, and the expert opinions basically tend to be consistent.

Following the principles of anonymity, feedback, statistics, and research needs of the Delphi method [6], 15 experts and scholars were selected to conduct the second round of questionnaire survey, screening, and determine the index system, including 4 sports experts; 3 sports management experts; 4 sports sociology experts; 2 government staff; and 2 persons from Chongqing Chongma Sports Development Co., Ltd. (see Table 1 for details).

2.3. Hierarchical Analysis. Analytic hierarchy process [7] (P.148–153) (AHP) decomposes the problem into different constituent factors according to the nature of the problem and the overall goal to be achieved and aggregates and combines the factors according to different levels according to the correlation, influence, and subordinate relationship between the factors to form a multilevel analysis structure model. Thus, the problem is finally attributed to the determination of the relatively important weight of the lowest level (schemes and measures for decision-making) relative to the highest level (overall goal) or the arrangement of the relative advantages and disadvantages. This study establishes a multilevel rating index model of sports events by using the AHP method, then gives a quantitative description of the relative importance of each level of evaluation index according to expert advice, finally, determines the value of the relative importance order of all indicators at each level, and conducts consistency test. If the consistency conditions are not met, the judgment matrix is modified until they are met.

2.4. Logical Analysis Method. On the basis of combining a large number of theoretical data and mathematical data, through logic demonstration and summary, the evaluation index system of the Chongqing International Marathon brand events has been initially established.

2.5. Mathematical Statistics Method. This study obtained the analysis of the expert questionnaire, the factor analysis, and the quantitative calculation. It lays a foundation for the construction of Chongqing International Marathon evaluation index system.

3. Establishment Process of the Evaluation Index System of the Chongqing International Marathon Brand Events

The establishment of the Chongqing International Marathon brand event index system is a complex and detailed process. We need to first establish a basic understanding of the research object, then conduct an overall feature analysis of the research object, then model the research object and conduct in-depth research, then gradually improve the existing research, and finally form a systematic research result [8] (P.9–13). Therefore, the research process of this study is roughly divided into four steps: theoretical preparation,

preliminary selection of index system, test of index factors and determination of weight, and establishment of evaluation system of the Chongqing International Marathon brand event (see Figure 1 for details). In the research method, the analytic hierarchy process is mainly used, because other analysis methods such as principal component analysis are not applicable to this study. Taking principal component analysis as an example, it needs to ensure that the cumulative contribution rate of the first few principal components extracted reaches one, and the high-level and extracted principal components must be able to give explanations that conform to the actual background and meaning.

4. Construction of the Evaluation Index System of the Chongqing International Marathon Brand Events

4.1. Preliminary Construction Process of the Construction of the Index System. Through the field investigation on the overall history, organization and holding, politics, economy, society, humanities, environment, and other factors of the Chongqing International Marathon, and by consulting the studies of China Journal Network on events, marathon, evaluation index system, and so on, and by studying the laws and regulations on sports events such as the 14th five-year plan for sports development [9] of government departments, it can be found that the “system” theory [10] (P.70–78) is a theoretical method suitable for constructing the evaluation index system of the Chongqing International Marathon. The word “system” originated from ancient Greek, meaning that parts constitute a whole. It was not until L. von Bertalanffy founded the “general system theory” [11] (P.5–8) in 1937. L. von Bertalanffy believes that it is inappropriate to limit the general system theory to technology as a mathematical theory, because there are many systemic problems that cannot be expressed by modern mathematical concepts. The term general system theory has a broader content, including a very wide range of research fields and three main aspects: first, the science of system, also known as mathematical system theory. This is to use accurate mathematical language to describe the system and study the fundamental theory applicable to all systems. Second is system technology, also known as system engineering. This is to study complex systems such as engineering system, life system, economic system, and social system with system thought and system method. Third is system philosophy: it studies the nature of the scientific methodology of general system theory and raises it to the status of philosophical methodology. L. Von Bertalanffy tried to extend the general system theory to the category of system science, including almost all three levels of system science. However, the main research contents of modern general system theory are still limited to system thought, system isomorphism, open system, and system philosophy.

The subsystems involved in large-scale sports events such as the Chongqing International Marathon include politics, economy, culture, society, and environment. These

TABLE 1: List of experts ($n = 15$).

Expert category	Professional title (number)	Degree (number)
Sports experts	Professor(1); associate professor (3)	Doctor(3); master(1)
Sociology of sports humanities	Professor(1); associate professor (3)	Doctor(3); master(1)
Sports event management experts	Professor(1); associate professor (3)	Doctor(3); master(1)
Staff of relevant government departments	Deputy director general (1); section chief(1)	Master(1); bachelor (1)
Chongqing Chongma Sports Development Co., Ltd.	Department general manager (1); clerk general (1)	Bachelor (2)
Total number	15	Doctor (9); master (3); bachelor (3)

systems are closely interrelated. For the Chongqing International Marathon, it itself is a huge system engineering. The index evaluation of system engineering needs to be considered from the perspective of system, its operation and development must follow the viewpoint of system theory, and its internal subsystems and internal factors independently interact and develop. Therefore, it is necessary to analyze the political, economic, cultural, social, and environmental systems involved in the event and then systematically analyze each subsystem on the basis of the above analysis to obtain the index factors of each subsystem.

Finally, considering the time and economic cost of the survey, and the factors of reasonable selection of indicators, high evaluability, and high testability, the evaluation index system [12] (Table 2) of the Chongqing International Marathon brand event is preliminarily determined, which is composed of five first-class indicators [13], 13 second-class indicators, and 58 third-class indicators, including politics, economy, culture, society, and environment.

4.2. Selection Process of the Index System

4.2.1. First Round of Expert Consultation. First, this study carried out expert thematic discussion and open-ended questionnaire survey on the rationality of the primary indicators. The result is that the concentration of reservations of the five primary indicators is relatively high, so the primary indicators do not need to be modified. Then, according to the preliminary index system, the questionnaire is made into two sections: secondary index and tertiary index I. The scoring mechanism of the questionnaire adopts the basic idea of the Likert 5 scale method [14] (P.18–23,28), that is, the expert score is graded according to important-unimportant 5. However, considering the traditional the Likert 5 scale is rough for complex systems such as medium and large marathon systems, it is improved to a continuous graduation scale. SPSS 26.0 was used to analyze the questionnaire I. We use Cronbach's α to test the reliability of the scale. If the α coefficient does not exceed 0.6, it is generally considered that the internal consensus reliability is insufficient; when it reaches 0.7-0.8, it means that the scale has considerable reliability, and when it reaches 0.8-0.9, it means that the scale's reliability is very good. The result is that Cronbach's α is 0.81, which indicates that the reliability of the scale is good. Through letters, questionnaires, and face-to-face interviews, questionnaires were collected on the spot, and 15 valid questionnaires were obtained. SPSS 26.0 was used for analysis to determine whether the index was retained or not

according to the importance mean, standard deviation, and coefficient of variation of each index score. Among them, the mean value of importance reflects the unified result of expert opinions. The greater the value, the more the index should be retained. The standard deviation reflects the divergence degree of expert opinions. The smaller the value, the smaller the divergence caused by the index, and the more the index should be retained. The smaller the coefficient of variation of each index score, the higher the coordination of expert opinions, and the more the index should be retained. We eliminated the six tertiary indicators with the smallest mean value, the largest standard deviation, and the largest coefficient of variation and retained 13 secondary indicators and 52 tertiary indicators (see Tables 3 and 4 for the scores and screening results of secondary and tertiary indicators). In Table 3, secondary indicators correspond to each support item under primary indicators in Table 2. The results are discussed with experts after the following revisions: (1) merge C49 into C21; (2) simplify C54 to environmental protection facilities.

4.2.2. Second Round of Expert Consultation. According to the results of the first round of expert consultation, a questionnaire II containing secondary indicators and tertiary indicators is formulated. The scoring mechanism of the questionnaire still adopts the improved Likert 5 scale method II, the Krambaha reliability coefficient is 0.85, indicating that the scale has good reliability. Questionnaire II is issued to experts, and the questionnaire was analyzed according to the same method as in round 1 of II and followed the opinions of experts and imposed more strict restrictions on the mean value of importance. When the mean value of importance is less than 75% (i.e., 3.75) of the full score, it is considered that the index cannot meet the standard. In the second round, one secondary indicator and 14 tertiary indicators were successively deleted, and finally an indicator system with 12 secondary indicators and 37 tertiary indicators was obtained (see Table 5). The expert opinions of the indicator system were highly unified. The complete index construction process is shown in Figure 2.

4.3. Weight Determination of the Index System. Whether the index weight [15] (P.47–55) is reasonable greatly affects the scientificity and correctness of the evaluation. In this study, AHP and probability distribution function are preselected to calculate the weight of each index. The two methods will be discussed with experts. Considering the AHP method,

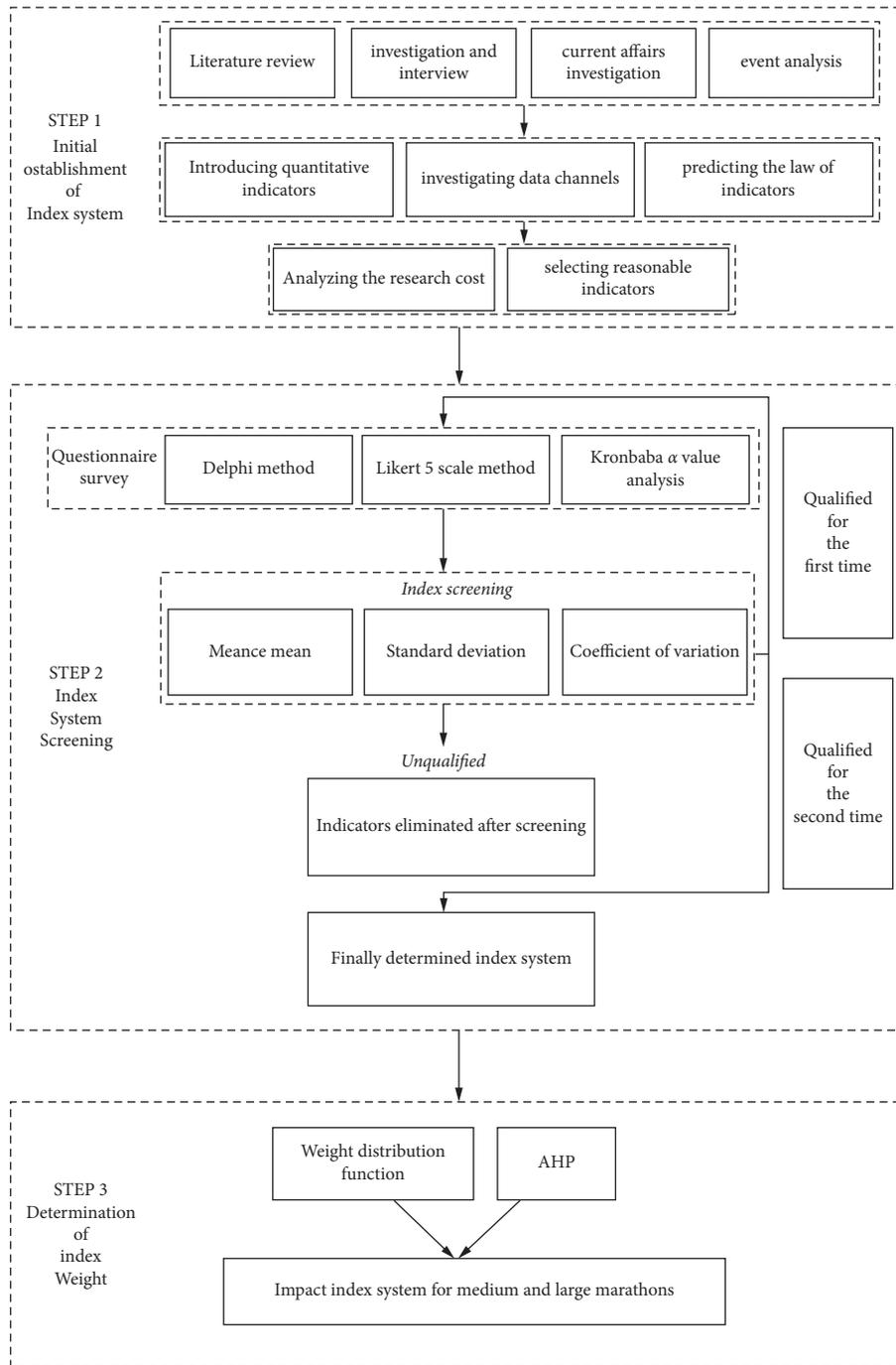


FIGURE 1: The establishment process of the evaluation index system of the Chongqing International Marathon brand competition.

experts need to be reinvited to compare and fill in the form for up to 2,275 times among 5 primary indicators, 12 secondary indicators, and 37 tertiary indicators, which will waste experts' energy cost and research time cost. The improved Likert 5 scale method has good perception and accuracy for quantitative scoring. Therefore, the latter

probability distribution function is used to calculate the weight of each index. Among them, the weight of each three-level indicator is the average value of its importance in the second round of expert consultation. The weight X of level I and level II indicators obeys uniform distribution $X \sim U(a, b)$, and its calculation formula is

TABLE 2: Preliminary index system.

Primary indicators	Secondary indicators	Tertiary indicators
Polity A1	Policy implementation B1	Implementation degree of national fitness C1 The practice degree of the new pattern of the competition C2 The intensity of sports event construction in a strong sports city C3 The construction intensity of strengthening the city with sports talents C4 To welcome the centenary anniversary of the founding of the communist party of China C5
	Regional exchanges B2	Construction along the “one belt, one road” line C6 Regional event exchange C7
Economy A2	Positive economic impact B3	Tourism gain C8 Regional per capita sports GDP C9 Local event organizers C10 Economic benefits of regional characteristic brand C11 Positive impact on the talent market C12 Positive impact on tourism C13 The GDP value C14
	Negative economic impact B4	The event department a loss C15 Foreign goods encroach on the market C16 Negative impact on the talent market C17 Event loss C18 Destruction of commodity market value system C19 Negative impact on the operation of the scenic spots along the way C20
Culture A3	Cultural improvement B5	Carry forward the Chinese spirit of sports C21 Building the socialist core value system C22 Training of local sports stars C23 The development of sports spirit and culture C24 Event-related cultural events C25 Publicity of the featured events C26 Design of characteristic medals C27
	Carry forward the characteristics B6	Design of characteristic competition route C28 Setting of characteristic events C29 Display of regional culture C30
Society A4	Regional prestige B7	Event level C31 Media publicity C32 Athletes’ satisfaction C33 Sponsor Satisfaction C34
	Event visibility B8	Number of contestants level C35 Level of the contestant C36 Media quantity and level C37 Regional marathon participation C38 Regional sports event participation C39
Environment A5	Regional sports popularization B9	Regional citizens pay attention to the ways C40 Regional citizens’ sports literacy training C41 Level of urban sports public service C42 Safety misadventure C43 Traffic interference C44 Life satisfaction of the residents C45 Integration of university marathon courses C46 Research on university marathon topics C47 Number of heavy horse research topics C48
	Resident life B10	The degree of influence on stimulating the students’ will and quality and establishing the lifelong exercise goal C49
Environment A5	Positive environmental impact B12	Implementation of precompetition environmental publicity C50 Environmental remediation caused by the event C51 The implementation of the event in environmental demonstration C52 Promotion of the event to local residents’ awareness of environmental protection C53 Promotion degree of greening design and construction C54 Degree of water damage in the competition C55
	Negative environmental impact B13	Degree of damage of the surrounding living environment C56 Waste cleaning efforts C57 Energy consumption degree of the event C58

TABLE 3: Mean and coefficient of variation of the secondary indicators.

Secondary indicators	Mean of importance	Standard deviation	Coefficient of variation	Result
Policy implementation B1	4.25	0.42	0.10	Retaining
Regional exchanges B2	3.58	1.43	0.40	Retaining
Positive economic impact B3	4.17	0.75	0.18	Retaining
Negative economic impact B4	3.83	0.98	0.26	Retaining
Cultural improvement B5	3.83	0.98	0.26	Retaining
Carry forward the characteristics B6	4.17	0.75	0.18	Retaining
Regional prestige B7	4.08	0.92	0.22	Retaining
Event visibility B8	4.75	0.42	0.09	Retaining
Regional sports popularization B9	4.00	0.63	0.16	Retaining
Resident life B10	4.00	0.89	0.22	Retaining
Educational diffusion effect B11	4.67	0.52	0.11	Retaining
Positive environmental impact B12	3.50	1.22	0.35	Retaining
Negative environmental impact B13	3.83	1.17	0.30	Retaining

TABLE 4: Mean and coefficient of variation of the tertiary indicators.

Tertiary indicators	Meance mean	Standard deviation	Coefficient of variation	Result
Implementation degree of national fitness C1	4.14	0.84	0.20	Retaining
The practice degree of the new pattern of the competition C2	3.96	0.63	0.16	Retaining
The intensity of sports event construction in a strong sports city C3	3.93	0.83	0.21	Retaining
The construction intensity of strengthening the city with sports talents C4	3.13	0.83	0.27	Retaining
To welcome the centenary anniversary of the founding of the communist party of China C5	3.18	1.07	0.34	Retaining
Construction along the “one belt, one road” line C6	3.89	0.96	0.25	Retaining
Regional event exchange C7	4.46	0.50	0.11	Retaining
Tourism gain C8	3.32	0.77	0.23	Retaining
Regional per capita sports GDP C9	4.21	0.67	0.16	Retaining
Local event organizers C10	4.57	0.51	0.11	Retaining
Economic benefits of regional characteristic brand C11	3.25	0.75	0.23	Retaining
Positive impact on the talent market C12	2.39	1.15	0.48	Retaining
Positive impact on tourism C13	2.43	1.02	0.42	Delete
The GDP value C14	2.29	1.20	0.53	Delete
The event department a loss C15	3.25	0.75	0.23	Retaining
Foreign goods encroach on the market C16	3.29	0.80	0.24	Delete
Negative impact on the talent market C17	3.43	1.07	0.31	Retaining
Event loss C18	3.93	0.83	0.21	Delete
Destruction of commodity market value system C19	3.39	0.88	0.26	Retaining
Negative impact on the operation of the scenic spots along the way C20	4.20	0.68	0.16	Retaining
Carry forward the Chinese spirit of sports C21	3.82	1.14	0.30	Retaining
Building the socialist core value system C22	4.21	0.70	0.17	Retaining
Training of local sports stars C23	3.64	1.15	0.32	Retaining
The development of sports spirit and culture C24	3.68	1.10	0.30	Retaining
Event-related cultural events C25	4.07	1.00	0.24	Retaining
Publicity of the featured events C26	4.00	0.76	0.19	Retaining
Design of characteristic medals C27	4.14	0.74	0.18	Retaining
Design of characteristic competition route C28	3.82	1.07	0.28	Retaining
Setting of characteristic events C29	4.14	0.53	0.13	Retaining
Display of regional culture C30	4.32	0.72	0.17	Retaining
Event level C31	4.29	0.73	0.17	Retaining
Media publicity C32	4.27	0.71	0.17	Retaining
Athletes’ satisfaction C33	3.99	0.66	0.17	Retaining
Sponsor satisfaction C34	3.14	0.84	0.27	Retaining
Number of contestants level C35	3.54	0.80	0.23	Retaining
Level of the contestant C36	3.70	0.58	0.16	Retaining
Media quantity and level C37	2.21	1.12	0.51	Retaining
Regional marathon participation C38	2.71	1.33	0.49	Retaining
Regional sports event participation C39	2.86	0.95	0.33	Retaining

TABLE 4: Continued.

Tertiary indicators	Meance mean	Standard deviation	Coefficient of variation	Result
Regional citizens pay attention to the ways C40	3.41	1.07	0.31	Retaining
Regional citizens' sports literacy training C41	3.71	0.91	0.25	Retaining
Level of urban sports public service C42	3.26	0.86	0.26	Retaining
Safety misadventure C43	3.21	1.12	0.35	Retaining
Traffic interference C44	3.47	0.90	0.26	Retaining
Life satisfaction of the residents C45	3.39	0.88	0.26	Retaining
Integration of university marathon courses C46	3.27	1.31	0.40	Retaining
Research on university marathon topics C47	2.99	1.01	0.34	Retaining
Number of heavy horse research topics C48	3.36	1.15	0.34	Retaining
The degree of influence on stimulating the students' will and quality and establishing the lifelong exercise goal C49	1.89	0.84	0.44	Retaining
Implementation of precompetition environmental publicity C50	1.96	0.80	0.41	Retaining
Environmental remediation caused by the event C51	2.36	0.74	0.32	Retaining
The implementation of the event in environmental demonstration C52	2.04	1.25	0.61	Retaining
Promotion of the event to local residents' awareness of environmental protection C53	4.14	0.84	0.20	Retaining
Promotion degree of greening design and construction C54	3.96	0.63	0.16	Retaining
Degree of water damage in the competition C55	3.93	0.83	0.21	Delete
Degree of damage of the surrounding living environment C56	2.96	0.77	0.26	Retaining
Waste cleaning efforts C57	2.79	0.70	0.25	Retaining
Energy consumption degree of the event C58	3.89	0.96	0.25	Delete

TABLE 5: List of influence on index systems and weight of medium and large marathon events.

Primary indicators	Weight	Secondary indicators	Weight	Tertiary indicators	Weight
Polity A1	0.179	Policy implementation B1	0.094	Implementation degree of national fitness C1	0.028
				The practice degree of the new pattern of the competition C2	0.031
		Construction intensity of building a strong city with sports talents C4	0.029		
		Regional exchanges B2	0.085	Regional event exchange C7	0.027
Economy A2	0.176	Positive economic impact B3	0.089	Regional per capita sports GDP C9	0.030
				Local event organizers C10	0.028
		Economic benefits of regional characteristic brand C11	0.026		
		Negative economic impact B4	0.087	Positive impact on tourism C13	0.027
Culture A3	0.185	Cultural improvement B5	0.096	Carry forward the Chinese spirit of sports C21	0.028
				The development of sports spirit and culture C24	0.032
		Carry forward the characteristics B6	0.089	Event-related cultural events C25	0.030
				Publicity of the featured events C26	0.032
				Design of characteristic medals C27	0.027
				Design of characteristic competition route C28	0.026
Setting of characteristic events C29	0.028				
Display of regional culture C30	0.026				
Society A4	0.373	Regional prestige B7	0.090	Event level C31	0.032
				Media publicity C32	0.030
				Athletes' satisfaction C33	0.028
		Event visibility B8	0.090	Sponsor satisfaction C34	0.024
				Number of contestants level C35	0.023
				Level of the contestant C36	0.032
				Media quantity and level C37	0.029
				Regional marathon participation C38	0.032
		Regional sports popularization B9	0.099	Regional sports event participation C39	0.031
				Regional citizens pay attention to the ways C40	0.028
				Regional citizens' sports literacy training C41	0.033
Educational diffusion effect B11	0.094	Level of urban sports public service C42	0.031		
		Research on university marathon topics C47	0.032		
		Number of heavy horse research topics C48	0.027		

TABLE 5: Continued.

Primary indicators	Weight	Secondary indicators	Weight	Tertiary indicators	Weight	
Environment A5	0.087	Positive environmental impact B12	0.071	Implementation of precompetition environmental publicity C50	0.164	
				Environmental remediation caused by the event C51	0.170	
				The implementation of the event in environmental demonstration C52	0.164	
		Negative environmental impact B13	0.016		Promotion of the event to local residents' awareness of environmental protection C53	0.164
					Environmental protection facilities C54	0.152
					Degree of damage of the surrounding living environment C56	0.096
					Waste cleaning efforts C57	0.091

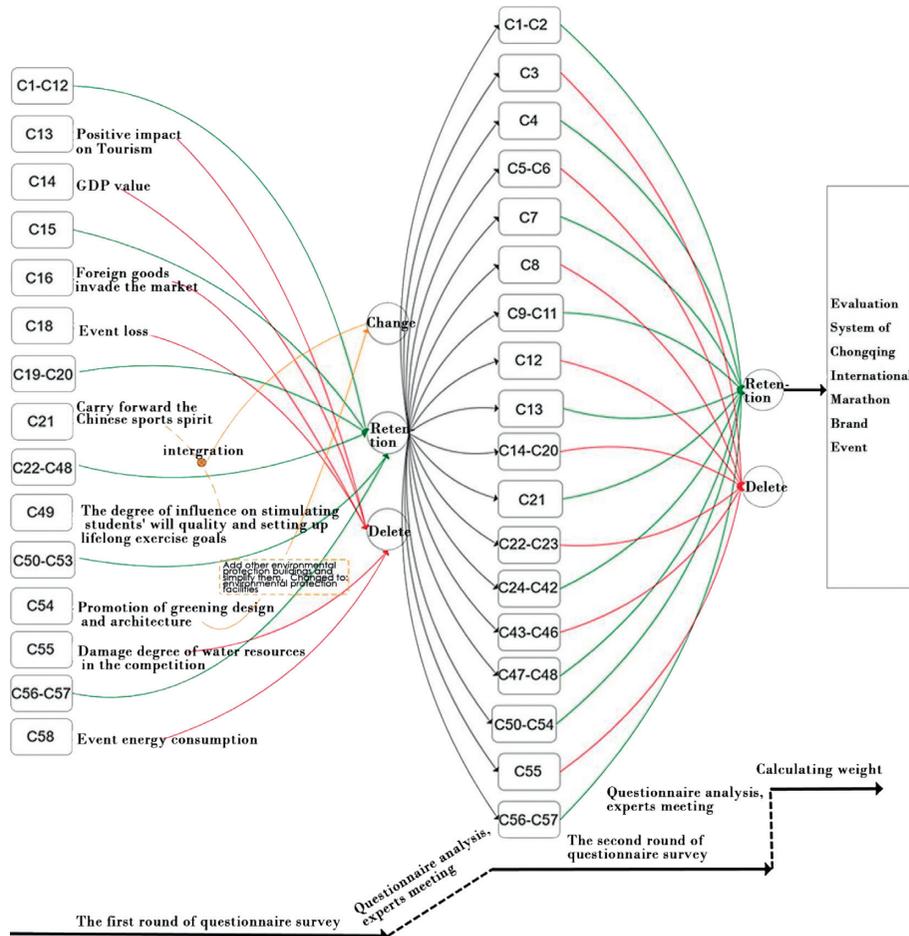


FIGURE 2: Index deletion and establishment of the evaluation system.

$$X = \int x f(x) dx, \quad (1)$$

among them,

$$f(x) = \begin{cases} \frac{1}{b-a}, & 0 < x < a, \\ 0, & \text{others,} \end{cases} \quad (2)$$

$$b = 5, a = 1.$$

The calculation method of the weight coefficient of tertiary indicators is as follows: (1) calculating the sum of expert scoring weights of all tertiary indicators $\sum_{m=1}^{35} X_m$ and (2) weighting coefficient of the m -th tertiary indicators $W_m = (X_m / \sum_{m=1}^{35} X_m)$.

The calculation method of the weight coefficient of secondary indicators is as follows: (1) calculating the expert scoring weight X_i of each secondary indicators, respectively, (2) calculating the sum of all expert weights of all secondary indicators $\sum_{i=1}^{11} X_i$, and (3) weighting coefficient of the i -th secondary indicators $W_i = (X_i / \sum_{i=1}^{11} X_i)$.

The calculation method of the weight coefficient of primary indicators is as follows: (1) calculating the expert scoring weight X_j of each primary indicator, respectively, (2) calculating the sum of expert weights of all primary indicators $\sum_{j=1}^5 X_j$, and (3) weighting coefficient of the j -th primary indicators $W_j = (X_j / \sum_{j=1}^5 X_j)$.

5. Conclusions and Outlooks

5.1. Conclusions. As one of the top marathon brand events in Southwest China and even at home and abroad, the Chongqing International Marathon itself has its unique research value. Therefore, the construction of a complete set of logical, highly scientific, and rigorous index evaluation system for the Chongqing International Marathon brand events is conducive to the comprehensive impact of the event itself on the host region and provides important theoretical support for the development of the Chongqing International Marathon brand events and the practical work of relevant sports departments in the future. It also has more practical significance.

The core of the Chongqing International Marathon is a sports competition, and the event itself is located in Chongqing. Since its establishment, it has always been a characteristic event of Chongqing mountain city and river water. Therefore, building such a marathon brand event in line with Chongqing will have a positive impact on the regional politics, economy, culture, society, and environment and will also become a landmark social activity in Chongqing.

In this study, the evaluation index system of the Chongqing International Marathon brand competition established by using the methods of literature, Delphi, and analytic hierarchy process includes 5 primary indicators, 13 secondary indicators, and 58 tertiary indicators, including politics, economy, culture, society, and environment. Through the evaluation index system of the Chongqing

International Marathon brand event, it can be seen that society (0.523) is the main impact of the event on the host region, indicating that the event itself has a great impact on all levels of society in the host region; then, the event also has a great impact on the regional culture (0.519), indicating that the event plays a positive role in promoting and carrying forward culture; second, the impact of the event on the politics (0.504) and economy (0.496) of the host region is roughly the same; finally, the relatively small impact of the event on the local environment (0.487) shows that with the event held for many years, people have formed a good awareness of environmental protection.

The advantage of the research method adopted in this study is that it combines both subjective research methods (Delphi method) and objective research methods (AHP), because it avoids greater subjectivity compared to only using the Delphi method for research. Compared with the method that only uses survey data, it avoids overanalysis of data.

5.2. Outlook. The brand event evaluation index system constructed in this study takes the Chongqing International Marathon as the research object. The index is relatively detailed and contains strong integrity. However, in the process of consultation and interview, due to limited conditions, only 15 experts and scholars' opinions were collected, and only 15 experts were consulted in the overall study. The number of experts is relatively small. Due to the large scope of the research object, the selection of experts is still not comprehensive. In addition, there is little research on the construction of the marathon brand event evaluation system in China, which has a certain impact on the construction of the Chongqing International Marathon event evaluation system. However, the author of this study will continue this kind of research and will further improve and improve in many deficiencies.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare no conflicts of interest.

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