

# Execution Dilemmas and Optimization Strategies for Circuit Breaker in Sports Events

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**Abstract:** *As the scale of sports events in our country continues to expand, the risks and potential hazards have also increased sharply. Establishing a sports event circuit breaker mechanism as a core system to ensure the safety of participants is necessary. However, this mechanism faces practical challenges such as ambiguous execution standards, frequent public opinion crises, and insufficient institutional coordination during its implementation. It urgently requires systematic optimization. This paper takes the safety supervision process of marathon and cycling events as the research object, analyzes the contradictions and challenges in the implementation, aiming to provide theoretical support and practical references for improving the risk governance system of sports events and enhancing the standardization of the circuit breaker mechanism.*

**Keywords:** *circuit breaker; sports events; execution dilemmas; optimization*

## 1. Introduction

As an important public activity and cultural product in modern society, sports events are competitive, exciting, commercial and public-oriented, featuring a wide range of participants, high social attention and complex on-site organization. Ranging from urban marathons and mass road running, to mountain cross-country, ice and snow sports, water sports, as well as professional leagues and international competitions, various events not only promote national fitness, boost sports consumption and enhance urban image, but also face multiple unexpected problems. To safeguard personal and property safety, for sports events with a large number of participants, high personal risks or strong professional and technical requirements, when natural disasters, accidents, public health incidents, social security incidents or other circumstances that render the event unfeasible occur, the person in charge of competition organization or technical delegate shall, in light of actual conditions, immediately decide whether to suspend the competition. As an emergency measure to respond to unexpected incidents, the circuit breaker for sports events is necessary for ensuring safety and controlling risks, yet its defects in implementation are prominent and often fail to achieve ideal effects. This paper aims to explore the execution dilemmas and optimization strategies of the circuit breaker in sports events.

## 2. Definition of the Circuit Breaker in Sports Events

The circuit breaker for sports events can be regarded as an "invisible referee" for each major competition. The term draws its analogy from the fuse in a circuit system, which automatically blows under over-voltage current to protect the circuit. The concept of circuit breaker is mostly seen in the securities market, and the circuit breaker first originated in the modern financial trading system.<sup>[1]</sup> After the "Black Monday" stock market crash in the United States on October 27, 1987, which triggered a sharp index plunge and panic selling, U.S. regulators formally introduced the circuit breaker system, stipulating that trading markets would automatically pause when stock index fluctuations reached a preset ratio, providing a cooling-off period for market participants and preventing systemic collapses caused by irrational selling. Since then, the circuit breaker has been widely adopted by major financial markets worldwide and become a landmark system for risk prevention and control. The stock market crash triggered turmoil in global financial markets, exposing risks and challenges faced by investors in cross-market trading, and the circuit breaker was proposed to curb excessive market volatility, with the original intention of protecting investors and maintaining market stability.

The circuit breaker for sports events refers to a complete set of institutional norms and operational procedures formulated by organizers, hosts, co-organizers and relevant safety management responsible

entities of sports events. During the preparation and holding of events, hierarchical early warning indicators and trigger conditions are established for various preset unexpected risks. When actual risks reach or exceed safety thresholds, and continuing the event will seriously endanger the safety of participants, spectators, staff and the public, the event shall be partially suspended, fully terminated or even permanently canceled in accordance with laws and regulations, while emergency measures such as personnel evacuation, medical rescue, order maintenance and public opinion response shall be launched simultaneously. Its core objectives are to block the spread of risks, avoid casualties and major property losses, and uphold the inviolable safety bottom line of sports events with minimal social costs and the fastest response speed. The implementation of the circuit breaker mechanism is not subject to the commercial interests, competition progress or public opinion impact of the event, and is statutory, mandatory and prioritized.

### **3. Execution Dilemmas of the Circuit Breaker in Sports Events**

#### ***3.1 Ambiguous Execution Standards for Circuit Breakers***

The standardization of circuit breaker implementation in sports events is low, affected by multiple factors including the complexity and diversity of events themselves, as well as policy implementation, technical standards and environmental differences, as detailed below:

##### ***3.1.1 Differences in Event Types***

Events requiring the circuit breaker are mostly sports relying on the natural environment as a condition for holding, such as gliding, skydiving, diving, mountaineering, rock climbing, ice climbing, skiing, mountain cross-country running, mountain biking, surfing, open water swimming and their derivative sports. Different sports events have distinct physical activity characteristics and varying degrees of environmental dependence, leading to significant differences in risk types. For example, road cycling is a racing sport relying on bicycles, with high requirements for road surfaces. Excessively slippery roads pose huge potential safety hazards, making road cycling races more vulnerable to rainfall. Skydiving requires judging the parachute opening time based on wind speed and altitude, so skydiving competitions are more susceptible to wind conditions. Mountain running may face track collapses due to heavy rain, while marathons are more vulnerable to high temperatures. Different event types result in different focuses of circuit breaker execution standards.

##### ***3.1.2 Differences in Event Environments***

Even for the same type of sports events, specific circuit breaker execution standards vary with environmental factors such as altitude, climatic conditions and track types. For instance, for marathons held in plateau areas with thin air, the human body has lower heat dissipation efficiency at the same temperature, leading to higher risks of heat exhaustion and heatstroke. Thus, circuit breakers are usually triggered when the temperature reaches 28°C or above, whereas the temperature threshold for circuit breakers in plain areas is relatively lenient, requiring a temperature of 35°C or above. Moreover, in hot and humid environments, lower sweat evaporation efficiency widens the gap between apparent temperature and actual temperature, making heat exhaustion more likely to occur. Marathons in coastal areas trigger the circuit breaker mechanism when the Wet Bulb Globe Temperature (WBGT) exceeds 32°C, while inland areas have higher humidity tolerance, generally activating circuit breakers only at temperatures of 35°C or above.<sup>[2]</sup>

##### ***3.1.3 Differences in Event Scales***

Marathons are classified into Grade A, B, C and characteristic events. Grade A1 events meet international standards in tracks and organization, while Grade C events feature simplified organization, low participation thresholds and focus on experience rather than competitiveness. Large-scale events with sufficient resources can respond quickly to unexpected risks and have higher circuit breaker thresholds. Small-scale events, limited by resources, need to avoid potential risks in advance and adopt more conservative circuit breaker standards.<sup>[3]</sup> For example, major international marathons equipped with real-time meteorological monitoring devices and medical helicopters usually terminate races only when rainfall exceeds 5mm/min, while local small-scale marathons may suspend races in moderate rain.

### ***3.2 High Risks of Public Opinion Disputes***

#### ***3.2.1 Economic and Public Opinion Disputes***

To ensure the personal safety of participants, standardized outdoor sports events usually specify circuit breaker provisions in their regulations. The 2024 Colorful Yunnan International Granfondo Cycling Festival stipulated in its competition rules that "in case of unforeseeable or special circumstances that may endanger the safety of the event or participants, the race director shall have the right to alter the race route, shorten the race distance or directly cancel the race with the authorization of the event organizing committee and arbitration panel", but failed to specify the attribution of registration fees after circuit breaker activation. In addition, consumption related to outdoor sports events involves catering, accommodation, transportation and other fields. Once a circuit breaker is triggered, disputes remain over whether participants or the organizing committee shall bear high direct and indirect costs. Without unified official refund rules for outdoor event circuit breakers, different events maintain disparate refund policies. Even if an event clearly stipulates that participants bear travel costs independently, participants may still question the event and organizing committee by citing other events with full refunds as benchmarks. Once a public opinion crisis occurs, it completely deviates from the original intention of urban brand marketing and instead causes negative impacts. From the perspective of stakeholder theory, event organization involves multiple entities such as organizers, hosts and sponsors, and circuit breaker decisions may trigger complex interest games and weaken implementation effectiveness.

#### ***3.2.2 Public Opinion Disputes over Circuit Breaker Activation***

The circuit breaker is a crucial measure to protect participants' personal safety and mitigate risks.<sup>[4]</sup> However, ambiguous execution standards may lead organizers to over-rely on the mechanism for fear of accountability, resulting in frequent event cancellations. Overly conservative circuit breakers become an excuse for organizing committees to shift responsibilities, but for event hosts and operators, any circuit breaker trigger means varying degrees of direct economic losses and superimposed social costs, even a substantial waste of social resources.

### ***3.3 Absence of Supporting Insurance Clauses***

Relevant staff of insurance companies stated that due to the low maturity of the circuit breaker mechanism for sports events, no insurance products targeting sports event circuit breakers have been developed. Circuit breakers in sports events are usually low-probability incidents, but may lead to huge indemnities once triggered. Insurance companies require sufficient historical data for modeling and pricing, yet insufficient data accumulation of such incidents makes actuarial calculation difficult. Meanwhile, diverse causes of circuit breakers and large risk differences across event types often necessitate customized clauses, further increasing design costs. In addition, the decision-making power of sports event circuit breakers is usually held by organizing committees and ambiguous decision-making standards easily trigger disputes over indemnity scope. After purchasing insurance, organizers may reduce investment in risk management, increasing the probability of circuit breaker activation. Insurance companies need to balance risk, market demand and profit margins, resulting in low enthusiasm for underwriting circuit breaker incidents, and thus no mature business model for sports event circuit breaker insurance has been formed.

## **4. Optimization Paths for the Circuit Breaker in Sports Events**

### ***4.1 Clarifying Circuit Breaker Execution Standards from Multiple Dimensions and Levels***

Given differences in event types, environments and scales, fixed indicators cannot be adopted for circuit breaker execution standards in sports events, otherwise risks and unnecessary economic losses will arise from misaligned standards. Meanwhile, the excessively diverse event types, environments and scales make the cost of formulating "customized" circuit breaker standards for organizing committees and local governments too high and infeasible. Therefore, dynamic thresholds can be set based on similarities among events, combined with threshold ranges stipulated for hidden dangers such as extreme weather and safety accidents.

Introduce the WBGT index to refine risk assessment standards. WBGT (Wet Bulb Globe Temperature) is a comprehensive indicator for assessing human thermal load in high-temperature

environments. This index integrates four factors: air temperature, wind speed, air humidity and radiant heat. Combined with the characteristics of outdoor sports events, it comprehensively predicts and evaluates the relationship between human thermal load and heat dissipation in the environment, indicating the suitability for sports and corresponding preventive measures. In the climate risk early warning system of the Western States 100-Mile Endurance Run in the United States, athletes may stop racing when the WBGT exceeds 32.2°C.

Leverage technological means to enhance the accuracy, precision and refinement of safety risk prevention and control during races. Drawing on the successful experience of the 2023 Xiamen International Marathon, monitoring data from new equipment such as wind profile radars and X-band phased array radars shall be integrated into forecast services, providing the organizing committee with timely risk assessment reports on major meteorological disasters such as thunderstorms, gales, heavy rain, precipitation, fog and haze.<sup>[5]</sup> Meanwhile, electronic trackers shall be used to monitor athletes' physical conditions in real time for timely individual circuit breakers. Artificial big data shall be applied to analyze historical data, predict the probability of circuit breaker triggers and reduce human misjudgment.

The regulatory authority should classify risk levels according to the activity characteristics of outdoor sports events to adopt graded "circuit breaker" measures. It establishes multi-level circuit breaker measures that escalate gradually based on the severity of risks, such as postponement, neutralization, suspension and termination. Extension: extending the race cut-off time. Neutralization: proceeding with the race normally but not counting results. Suspension: pausing the race and resuming after risks subside. Termination: activating the event circuit breaker and forcibly ending the race. At the Pu'er Stage of the 2024 Colorful Yunnan International Granfondo Cycling Festival, considering light rain in local sections, the recreational (rather than purely competitive) nature of the race, the relatively high skill level of participants and their enthusiasm, the organizing committee adopted a neutral race measure instead of a circuit breaker. After the race, participants highly praised the committee's practice.

#### ***4.2 Enhancing Decision Making Ability by Fully Utilizing Multiple Resources***

The regulatory authority needs to encourage the participation of expert teams from multiple fields to improve the professionalism of decision-making teams. The event organizing committee shall form an independent safety committee with medical, meteorological and safety experts to conduct real-time risk assessment and rapid decision-making. Meanwhile, expand regulatory resources, encourage industry associations to participate in the supervision of sports events, clarify their rights and responsibilities, and absorb their professional opinions. The government shall take the lead in establishing a regulatory conference with industry associations during event preparation and form a regular consultation platform.

The organizing committee has to communicate with participants in real time through online media to ensure transparent decision-making and communication mechanisms. It also needs to timely synchronize circuit breaker causes, explain the necessity of circuit breakers, and update progress and follow-up arrangements through official channels to avoid public opinion fermentation and rumor spreading.

The organizing committee should negotiate with event stakeholders before races to clarify the economic risks of outdoor events. The event organizing committee shall inform official sponsors, title sponsors and insurance companies of the particularity of outdoor event risks through briefings.

The regulatory authority should analyze and collect feedback from athletes, sponsors and organizers of other events after circuit breaker activation, evaluate the rationality of circuit breaker decisions and identify areas for improvement. It also needs to encourage government and event associations to participate in establishing a historical circuit breaker case library, so as to optimize trigger thresholds and response procedures and form a dynamically updated "circuit breaker rule database".

#### ***4.3 Strengthening Prevention and Early Warning Capabilities***

The organizing committee should intensify analysis and early warning of major sensitive issues and potential risks, formulate special emergency plans for disastrous weather (e.g., heavy rain, gales) and unexpected accidents (e.g., track collapses, sudden illnesses of participants), and conduct risk drills and simulations. The organizing committee also needs to Conduct pressure tests through rigorous race drills to simulate circuit breaker scenarios and optimize emergency plans, such as simulating participant

evacuation and medical first aid. Meanwhile, the regulatory authority should encourage eligible organizing committees to adopt intelligent early warning systems, deploy Internet of Things equipment, drones, WBGT sensors and monitoring cameras for real-time early warning of potential risks.

The organizing committee should design flexible schedules and circuit breaker notification timelines. For multi-day events, the organizing committee should reserve buffer time windows or adopt alternative stages and routes to reduce the impact of circuit breakers. Meanwhile, it should balance the timing of circuit breaker notifications to avoid low weather forecast accuracy due to premature notification and increased potential risks due to delayed notification.

#### ***4.4 Improving Detailed Rules for Post-Circuit-Breaker Disposal***

The organizing committee should formulate corresponding emergency disposal procedures based on four circuit breaker levels: extension, neutralization, suspension and termination. Meanwhile, it should protect the rights and interests of participants to the greatest extent, clarify detailed rules for refunds, compensation and insurance claims, and minimize losses for participants and sponsors. In addition, the organizing committee should formulate recovery procedures according to different causes of circuit breakers.

The organizing committee should develop insurance products to transfer circuit breaker risks. First, it should clarify the coverage scope to determine indemnity scope, including natural disasters, extreme weather and public health incidents, while establishing exemption clauses to exclude circuit breakers caused by technical and management negligence of organizing committees and organizers from indemnity. Second, it should specify trigger conditions for insurance liabilities in official documents, such as WBGT, rainfall and wind speed. Third, it should set reasonable pricing based on the nature, type, scale, exposure and risk level of events to ensure that the insured amount can cover organizers' losses as much as possible. Meanwhile, it should increase premiums appropriately according to actual conditions to stimulate insurance companies' enthusiasm for developing new products. Fourth, it should introduce third-party assessment institutions for arbitration, such as event associations and meteorological departments.

### **5. Conclusion**

With the continuous rise of sports events and the constant innovation of event categories and rule forms, while meeting the people's growing needs for a better life, great challenges have also been brought to the supervision of sports events. The event circuit breaker mechanism further improves the safety supervision level of sports events, and establishing such a mechanism serves as a core system to protect participants' safety. However, in practice, the mechanism faces practical dilemmas including ambiguous execution standards, frequent public opinion crises and insufficient institutional coordination, calling for systematic optimization. Therefore, to better utilize the circuit breaker for safety risk prevention and control in sports events, we should base on national conditions, uphold the people-centered core values, adopt a similarity threshold model, introduce the WBGT index, implement a graded circuit breaker mechanism, and clarify execution standards from multiple dimensions and levels with technological support. We should encourage the participation of multi-disciplinary expert teams, ensure transparent decision-making and communication mechanisms, and fully utilize various resources to enhance decision-making ability. We should intensify analysis and early warning of major sensitive issues and potential risks, design flexible schedules and circuit breaker notification timelines, and strengthen prevention and early warning capabilities. We should formulate graded emergency disposal procedures, develop insurance products to transfer circuit breaker risks, refine refund and compensation rules, balance the safety bottom line and event benefits, improve detailed rules for post-circuit-breaker disposal. Through institutional innovation and technological empowerment, we will promote the transformation of sports event governance from passive emergency response to active prevention and control, continuously improve the practicality of the circuit breaker for sports events, construct a modern supervision system for sports events, and promote the high-quality development of sports events.

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