

Optimization Path of the Safety Assurance System for Urban Marathon Events

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Abstract: Urban marathon events are public activities that mix competitive sports, mass fitness and urban cultural communication. They tie closely to participant life and health, event brand reputation and how people see city governance. Urban marathon events in China grow fast. Event scale keeps expanding and participant diversity rises. Safety assurance now faces more complex risk factors. Current safety assurance system cannot fully meet needs of high quality event development. This paper looks at the core meaning and structure of urban marathon safety systems and digs into big issues in today's safety efforts. Risk identification and assessment often fall short. Departments struggle to work together smoothly. Emergency medical support lacks strength. Based on this, core principles of system optimization become clear. Practical ways to optimize are put forward across three areas: risk prevention and control, collaborative coordination, and intelligent empowerment. This study tries to give some theory backing and real world help for making city marathons safer and keeping these events going strong over time.

Keywords: Urban Marathon; Safety Assurance System; Interdepartmental Coordination; Intelligent Security

1. Introduction

Urban marathons bring more to public sports and cultural life, boost cultural tourism spending and city visibility, yet demand a lot from city services, emergency response and how different groups work together. Safety assurance is the most basic prerequisite and lowest requirement for hosting urban marathons successfully, running through preparation, implementation and closing of the event. It covers people, facilities, environment and management. Safety assurance system integrity ties straight to how good and how strong event

safety assurance is.

2. Connotation and Basic Composition of the Safety Assurance System for Urban Marathon Events

2.1 Concept Definition of the Urban Marathon Safety Assurance System

The safety assurance system of urban marathon events refers to a systematic guarantee mechanism jointly established by event organizers, contractors, co-organizers, and relevant functional departments. Its core objective is to prevent safety risks throughout the entire process, safeguard the life and property safety of all stakeholders, and maintain the normal order of the event. The system covers all stages including risk identification, assessment, early warning, response, and post-event management, involving multiple elements such as personnel, materials, technology, and institutional arrangements [1].

Follow the guideline of "priority to safety, prevention first and combination of all measures", running throughout the process of event prior preparation, middle implementation and later termination, it is an dynamic system including various entities and multiple links.

Due to the long course, large scale and broad space of urban marathons, it is necessary to coordinate different risks such as individual events, crowd events and public security events for cross-regional and cross-departmental entities. Therefore, the systematicness, coordination ability and flexibility of the system have higher requirements.

2.2 Major Components of the Event Safety Assurance System

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Risk prevention and control form core content of system. It covers three big stages: risk identification, risk assessment and risk early warning. Risks tied to participants race routes event operations and natural environments get looked into checked and watched closely so accidents don't happen in the first place [2].

Resource support is the material foundation of system covering human resource supply and venue support. This includes medical personnel security staff emergency equipment supply material race route planning and facility maintenance.

Technical support works as an important tool that makes things happen. Using smart monitoring systems, emergency command platforms and communication tech, the system boosts how accurate and fast safety assurance works and helps event safety management become smarter and more precise.

2.3 Role of the Safety Assurance System in Event Management

The safety assurance system is the core of urban marathon event management. It runs throughout the entire process and directly affects event quality, brand image, and sustainable development.

Its primary function is to prevent and mitigate safety risks, reduce the probability of accidents, and ensure the safety of participants, staff, and spectators. This forms the fundamental prerequisite for the successful organization of the event and represents the core responsibility of organizers in fulfilling social obligations [3].

Secondly, the system helps maintain normal event operation and order. Through scientific route planning, strict traffic control, and standardized on-site management, it ensures the fairness and professionalism of the competition.

High-level safety assurance provides credibility and influence for the brand of event activities, enhances the experience of participants, displays the ability of the city in terms of public service and governance. We can summarize experience and perfect mechanisms in order to establish a

system with adjustable and replicable models for application, promoting the transformation from a rapid increase in quantity to a focus on quality of the marathon event and positive interaction between the development of the event and the city.

3. Major Problems in the Current Safety Assurance of Urban Marathon Events

3.1 Insufficient Identification and Assessment of Event Safety Risks

In some cities, there are obvious shortcomings in safety risk identification and assessment, which restrict the effectiveness and scientific nature of risk prevention and control.

At the level of risk identification, the scope is often narrow and the content incomplete. Attention is mainly focused on explicit risks such as sudden illness of participants or crowd trampling incidents, while hidden and cross risks—including traffic congestion, facility failures, extreme weather, and food safety issues—are insufficiently investigated. Traditional manual inspection methods are still widely used, and the application of technologies such as big data and artificial intelligence remains limited, resulting in non-standardized processes and potential omissions of risk points [4].

At the level of risk assessment, the system is not scientific and reasonable. The indicator system is incomplete, and we do not consider indicators related to the scale of the event, the characteristics of the race route, and the carrying capacity of the city. Our methods are relatively simple, and the classification of risks is inaccurate, making it unclear what level each risk reaches and what range it affects.

In addition, the application of assessment results is disconnected with practical safety assurance work. Many evaluation reports are formalistic and do not lead to targeted preventive actions, and thus cannot provide effective scientific references for safety management.

3.2 Inefficient Interdepartmental Coordination and Information Linkage

Weak interdepartmental coordination and information linkage greatly hinder the level of event safety assurance.

Looking at how things are coordinated, there's no real system pulling everything together. The organizing committee brings together and

coordinates different departments but there's no clear way to do that coordination. Departments often act alone causing problems like overlapping responsibilities or lack of responsibility. Some department plays passive role and lacks initiative in performing duty which results in scattered safety assurance work. Looking at how info connects, systems in different departments don't talk to each other. Weather warnings medical rescue and security alerts aren't shared between departments so responses to risks might get delayed.

Resource allocation has its issues too. Some important department might be short on resources while an auxiliary one ends up with extra. The way resources get handed out doesn't fit what's actually happening on site, so departments can't shift things around as needed. This problem stands out more in small and medium sized cities where coordination capacity is relatively weak.

3.3 Insufficient Emergency Response and Medical Support Capacity

Emergency response and medical support ability is still relatively weak in face of different sudden incidents during an event.

Emergency response: The completeness of emergency response contingency plan is poor. Most of the plans are just templates and lack of practical operability. When facing complex emergency situations like extreme weather, crowd stampede and extreme medical incidents, the plans are not comprehensive enough. The process, role and operation are also not clear enough.

Emergency teams are usually randomly assembled by personnel assignments and not trained professionally or drilled in realistic situations. Therefore, the emergency collaboration response capability is weak, reaction speed is slow and the operation is not standardized.

Medical support: Clear deficiencies can also be seen in medical support. The medical stations are far apart from each other and the medical support coverage in dangerous sections of the race route is insufficient. Medical supplies and equipment are also insufficient in some situations.

Professional medical personnel are also insufficient. The number of medical volunteers and physician runners are also limited. As a result, the response time of rescue is prolonged

and the "golden four minutes" of lifesaving treatment cannot always be covered.

Medical rescue and hospital transfer system are not well coordinated and dedicated transfer routes are often not available. This leads to the delayed treatment of critically ill patients.

4. Principles for Optimizing the Safety Assurance System of Urban Marathon Events

4.1 Adhering to the Principle of Risk Prevention and Whole-Process Management

The principle of risk prevention and whole-process management is a basic principle for perfecting the safety assurance system of urban marathons. That is, risk prevention and control should run through the process of event preparation, implementation and closure.

Event organizers should have the concept of "place safety first". They should abandon the mentality of placing scale before safety and should fully consider risk prevention in event planning, course design, athlete recruitment and material preparation.

Whole-process management not only breaks through the separation between different stages of event organization, but also requires event organizers to form a whole-process system of risk assessment and emergency preparation before the event, on-site monitoring and risk response during the event, and event evaluation and experience summary after the event.

The principle of whole-process management also requires that risk prevention be carried out in a dynamic manner. That is, the event organizer should make corresponding preparations in terms of prevention according to the actual situation during the event.

4.2 Strengthening Multi-Stakeholder Coordination and Information Sharing

The principle of strengthening multi-stakeholder coordination and information sharing is crucial for improving the efficiency of event safety assurance.

It needs clear definition of responsibilities for every participating entity and setting up coordination that works well along with ways to share information. Local government leads organizing committee to work with sports, public security, health authorities, event operating companies and volunteer groups.

At the same time a unified information sharing platform should be set up to break down

departmental information barriers and allow real time sharing of meteorological warnings medical rescue information security alerts and race route conditions.

Regular coordination meetings should happen to sort out collaboration problems and build a governance setup that links vertically and coordinates horizontally.

4.3 Emphasizing Technological Empowerment and Intelligent Safety Assurance

Empowerment of technology: An important concept in improving overall efficiency and accuracy of event safety assurance.

Apply big data, artificial intelligence, Internet of Things and other technologies to build intelligent monitoring, early warning and emergency command centers.

These technologies can realize full-process real-time monitoring of the race route, participants and on-site order, and quickly and accurately identify risks.

Based on analysis of historical event data, participants' health data and risk records, provide scientific support for risk assessment, emergency planning and resource scheduling.

Apply technology as an empowerment tool, and combine it with human wisdom. Train personnel in the use of technology to apply intelligent systems to safety management.

5. Optimization Paths for the Safety Assurance System of Urban Marathon Events

5.1 Improving the Event Risk Assessment and Early Warning Mechanism

Comprehensive risk identification system should be established, including participant's health risk, race route environment risk, event operation management risk, climate factors risk, public health risk and food safety risk. The investigation ways and evaluation rules should be standardized and all the risks should be covered.

Promote the combination of manual inspection and big data and AI to establish risk identification database combining historical event data, participant's health data and geographic information of race route.

Differentiated risk assessment index system should be established according to the scale of events, terrain, urban carrying capacity and participants' characteristics. Quantification and

qualification methods should be used to determine the risk level and transmission path of risk.

Establish cross-department early warning platform to integrate meteorological, medical and public security warning information. The warning information can be notified to participants through SMS, mobile terminal and on-site broadcasting system.

5.2 Establishing a Multi-Department Collaborative Safety Assurance System

An overall coordination framework needs to be headed by local governments. A city-level organizing committee led by deputy city chiefs should define responsibilities at the levels of making decisions, executing plans and supervision.

Specific lists of responsibilities for the committee should distinguish the roles of departments including sports administration, public security, health commission, transportation and urban management during the preparation, operation and closing periods.

A unified safety database should ensure timely sharing of information on weather warnings, medical support, race course conditions and traffic control.

Frameworks for dynamic allocation of human resources, supplies and equipment based on real-time conditions during the event should also be established.

Joint drills should be held on a regular basis to enhance emergency response.

5.3 Enhancing Medical Rescue and Intelligent Safety Assurance Capacity

Emergency weather scenario-based contingency plans need to be formulated in case of extreme weather, crowd stampede, sudden cardiac death and the failure of the facilities.

Organize police, medical and fire emergency response teams, and regularly train and test them in practice.

Based on the grid, build medical stations along the route of the race. According to the distance of the race and the density of the accident-prone population, select appropriate locations for medical stations. Install AED devices and medical emergency supplies in key locations.

Build a three-dimensional rescue system of fixed medical stations and rescue teams. Increase the number of medical volunteers and physician runners.

Establish medical transfer routes and rapid transfer mechanisms to hospitals for the quick admission of seriously ill participants.

Develop intelligent technology in terms of video surveillance systems, wearable devices for monitoring the physical parameters of participants, and intelligent dispatching platforms.

6. Conclusion

Safety assurance system for urban marathon events is basic foundation for orderly event organization and high quality development. Marathon events grow fast and risk factors get more complicated. Current safety assurance systems struggle with weak risk identification and assessment, poor coordination between departments, and not enough emergency medical support.

System optimization needs to follow three core principles and put practical measures into action across risk assessment and early warning, multi departmental coordination, and medical rescue with intelligent safety assurance. With these efforts, risk prevention gets sharper, collaborative assurance runs smoother, and safety management powered by intelligence steps ahead.

In the end these upgrades will cut down safety

risks keep participants safe hold events smoothly boost how people see the event brand and help marathons and city growth work well together while giving a push to national fitness and sports business.

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