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Analysis of the Zhengzhou Olympic Sports Center Project Based on Sustainable Development Environment

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ABSRTACT. *Taking the Zhengzhou Olympic Sports Center project as the research object, this paper analyses it from the perspective of urban symbiosis and the sustainable development of large-scale stadiums and gymnasiums. It is found that there exist problems in the site selection and the follow-up utilization of the project. It is necessary to make secondary planning for the follow-up development of the stadiums and the surrounding supporting facilities so as to turn Zhengzhou Olympic Sports Center into a green service-oriented venue suitable for the health needs of Zhengzhou residents and the sustainable development of the sports industry.*

KEYWORDS: *Sustainable development; Building environment; Zhengzhou olympic sports center*

1. Introduction

Zhengzhou Olympic Sports Center was built for the National Minority Games in 2019. It is located at the two ends of Zhengzhou Public Cultural Service Zone. The south and north sides of it are respectively Zhengzhou Botanical Garden and the greening landscape area of the main canal of the South-to-North Water Transfer Project. The total site area of the project is 322,000 square meters. The project consists of a main stadium with 60,000 seats (50,000 fixed seats, 10,000 movable seats), a gymnasium with 16,000 seats (15,000 fixed seats, 100 movable seats) and a natatorium with 3000 seats. It covers a total floor area of about 584,000 square meters. The total floor area of the Olympic Sports Center Stadium is 221,000 square meters, of which 144,000 square meters are above ground, forming a landmark building in the Western District of Zhengzhou City. The Olympic Sports Center has adopted eight green construction technologies, such as the dust monitoring system and the car wash pool linked with road spraying; reclaimed water treatment system: frequency conversion pressurized automatic water supply system; revolving steel plate pavement and permeable concrete pavement: air energy plus solar energy technology application: time control device, reactive compensation device: optimization of deep foundation pit construction scheme, electric reactive

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compensation system of construction site; water and electric wireless energy-saving monitoring and energy efficiency management system numerical control processing and centralized distribution technology of steel bar: concrete water-saving maintenance technology; environmental monitoring and dust removal and haze diminishing linkage control system; steel plate pavement technology; LED energy-saving technology application, etc. The design of the whole building seeks to look lofty, large and fashionable and emphasizes technological contents, lacking plan for the sustainable development of the supporting facilities and plan for the sustainable development of utilization.

2. Analysis of the Sustainability Policy System of Sports Buildings

Green sports building system is no longer confined to the fact that the construction industry used to consider its own system in isolation and develop itself as it wishes beyond the time and space limitations of the biosphere. Taking the benign cycle of ecosystem (nature and man) as the basic principle and taking comprehensive consideration of the whole process of decision-making, design and implementation, use and management within the load range permitted by the natural environment, it's but a construction system combined with the environment, resources, economic and social development situation in a certain regional scope based on the coordination of development and environment. (Meng Wei, Wang Yujuan, 2006).

The greening of sports buildings regards buildings as a part of the whole city. A sports building is no longer just a single building, but, as a system, its environment should be considered and it should be integrated with the city. It should be considered that green sports buildings must be coordinated with urban landscape, should not destroy the integrity of the city, and should adapt to and coordinate with the transportation, social, cultural and ecological environment of the city. Sports buildings, as the basic construction of a city, should achieve sustainable development. By incorporating sports buildings planning into urban transformation planning, urban functions will be further enhanced and ecological environment will be further improved (Ying Wanqiu, 2006).

According to the national green stadium construction standard, green sports buildings characterized by sustainable development have the following characteristics (Green Olympic Buildings Research Group, 2003):

(1)They are land-saving, energy-saving, water-saving and material-saving green buildings, protecting the environment;

(2) Buildings and environment are in harmony, human environment and natural environment coexist;

(3) The functions of stadiums and gymnasiums are make not only to meet the needs of current use, but also to achieve balance with the future development.

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3. Analysis of Sustainable Development of Zhengzhou Olympic Sports Center

At present, the Navigational Stadium and the Henan Sports Center and many university stadiums have been built in Zhengzhou, where international and national games were held many times. In accordance with the national standard for green development of sports buildings, the green sports building system includes four specific contents, two processes of level control, and two goals expected to be achieved (Wang Zhaohui, 2009). The main problems of the Zhengzhou Olympic Sports Center involved in the buildings compared with the sustainable development policy are as follows:

The selection of location is improper concerning environment. It refers to that the selection of construction sites for construction projects should reduce the impact on the environment; Site selection should conform to the requirements of not affecting the needs of urban planning and future urban transformation and not affecting or reducing the burden of infrastructure such as urban transportation, and protecting the existing natural scenic spots and historical sites. Zhengzhou Olympic Sports Center is built near the Zhengzhou Botanical Garden and the greening landscape area of the main canal of the South-to-North Water Transfer Project, which may cause pollution to the environment and national drinking water projects.

Serious waste of resources. The total floor area of the project is about 584,000 square meters. Considering the sustainable development of stadiums and gymnasiums, the sports facilities center being far away from the city center and the surrounding environment construction not having yet been matched will lead to low utilization rate of gymnasiums with advanced facilities. According to the current development situation of mass sports in Henan, the Olympic Sports Center will become vacant after the competition; Excessive pursuit of scientific and technological contents and landmark buildings are both waste of resources and destruction of the environment. It can't bring the group benefit into full play and achieve the 'symbiotic phenomenon' in the biological world.

3.1 Sustainable Operation Management and Sustainable Development Are Not in Line with Reality.

The sustainability of green sports buildings should have the following characteristics: (1) The main sports buildings should be multifunctional. Room and equipment should be increased to adapt to various sports competitions and training, and various other activities which should be considered; (2) Subsidiary sports facilities should be managed in various ways to achieve economic benefits; (3) Importance should be attached to the flexibility of facilities in sports buildings; (4) Broaden the range of users. In addition to professional athletes, the need of exercises by common people should also be considered (Guo Hongyu, Cai Yunnan, 2004). (5)Commercial value with sustainable development should be achieved. Zhengzhou Olympic Sports Center is located in the fourth ring of Zhengzhou City, with a sparse population, inconvenient traffic and inefficient utilization rate. If there are a large number of residential projects, it will destroy the surrounding ecological

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environment; What's more, the center was built for holding the 2019 Minority Games, and it has very low sustainable utilization efficiency, considering the follow-up usage. These five conditions are not available to it, and the goal of sustainable development should be further argued later.

4. Suggestions on the Sustainable Development of Olympic Sports Center

The Olympic Sports Center should be coordinated with the existing urban sports building resources and make use of one another with other stadiums and gymnasiums in Zhengzhou. A variety of sports facilities and other related urban facilities relatively centralized in the Olympic Sports Center area can be set up with the saved land resources, enabling them to make up for one another and form scale economy. Both the combination of the use of sports buildings in competition and after competition and the sustainable environment issues of future renovation design should be considered. Organic aggregation with urban commercial and financial centers, exhibition facilities, parks, squares or schools and residential areas, etc should be achieved.

The socialization and industrialization of sports require a new type of sports building with sustainable development, which embodies not only attention to the protection of the environment, but also the people-oriented concept and the sustainable utilization of sports buildings. The guiding ideology of sustainable sports buildings is "one guide, two satisfactions", that is, taking the follow-up utilization as a guide and satisfying the needs of the holding Expositions and satisfying the requirements of the long-term development of the city, striving to achieve forward planning, accurate positioning and overall arrangement to reserve space for sustainable development in land, buildings, infrastructure and green environment (Lin Xianpeng, 2005).

Decentralization should be combined with centralization, while relative centralization should be given priority to. As sustainable green stadiums and gymnasiums involve transportation, ancillary facilities such as athletes' lounge and audience's lounge, and even news media like journalists, it is necessary to ensure convenient transportation and evacuation among the stadiums and gymnasiums. Combination of stadiums, gymnasiums, training halls, swimming pools and other facilities to form a scale effect lead to not only compact layout, unique shape and organic integration but also effective economization of investment in land and construction.

Considering its commercial value and maintenance costs, all sports centers in China except Bird's Nest Olympic Sports Center now assume high maintenance costs. Due to the restrictions of regional and local policies, the commercial value of stadiums and gymnasiums is extremely low. Sustainable development is also a major problem that plagues the stadiums. Local governments should fully consider the sustainable utilization and commercial development of stadiums and gymnasiums in the design and construction of stadiums and gymnasiums. Stadiums and gymnasiums in the charge of the government should be transferred to be run and

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managed independently under marketization, strengthening the multi-business development and forming consumption patterns including sports events, commerce, catering and entertainment, etc.

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