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## The Historical Evolution and Regeneration Of The Athletics Stadium In Modern China

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### Abstract

Based on the comprehensive analysis about the main stadium of the national games in china which is held from 1949-2010, the research objective is to analyse the historical and transformation of the athletics stadium in china. The athletics stadium in china changes from the traditional style to modern style, from temporary site to professional standard venues, from single stadium to the sports center, from cantilever truss to the membrane structure, from domestic design to international design. It also makes exploration on the regeneration motivation of the stadium and point out the three objects of the regeneration of the athletics stadium in modern china: the athletics stadium is transformed into national fitness court or a comprehensive sports culture center, or upgraded to a more professional sports stadium. In the end it suggests several regeneration strategy of the athletics in modern china. These strategies include strengthening the composition and elasticity of the internal function space, transforming the auxiliary service space and optimizing the operation model of the sports venue and adjusting the grandstand in the athletics stadium.

**Keywords:** Chinese Athletics stadium、 historical evolution、 multi-functional、 regeneration.

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### 1. Introduction

The purpose of the paper is to clarify the history of the development of the athletics stadium in china and point out the three objectives of the regeneration of the stadium and elaborate several strategies to revive the stadiums in china. In the paper it analyzes the necessity, content, method and precautions of the athletics stadiums in china with other sports architecture based on the design experience with document information method.

In china the scholars focus mainly on the design method of the athletics stadiums which are driven by china's competitive sports system. Hu Zhenyu(2006) makes a exploration of the development process of the sports architecture in china in order to benefit the construction practice. Zhong Xuan(2008) makes a research on the adaptive method of the campus sports facilities and adopts the adaptive design method to guide the practical operation. Mei Jikui (1998) makes a brief introduction of the brilliant achievements of the sports architecture in china and explores the basic outline of the development of the sports architecture from three aspects: the evolution of the function, the technological developments, the sublimation of art. Ma Guoxin (2010) published an article named "sixty years process of sports architectural research in china" in the journal urban architecture. He reviews chronologically the advance of china's sports architecture during this 60 years

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from its founding and provides a figure in the timeline.

### 1.1 The definition of the athletics stadium in china

The modern stadium in china can be traced back to U stadium in the ancient Greek and the arena in the ancient Roma which is the architecture archetype of the modern stadium. The main research object in the paper is basically the multifunctional stadium in china. They are Beijing workers' stadium, Shanghai Jiangwan Stadium, Guangzhou Tianhe Stadium, Shanghai Stadium, Guangdong Olympic sports Center, Nanjing Olympic Sports Center, Jinan Olympic sports center in which the national games of china are held during the period of 1959-2010. It also suggests the regeneration strategies of the stadiums which optimizes the function space and balances the architecture and the historical context of the city.

### 1.2 The historical evolution process of the athletics stadium in modern china

The China's athletics stadium was going through three main period (1) the ancient stadium, (2) the modern stadium, (3) the contemporary stadium. It reflects the import of the western culture and it is endowed with the epitome of the Chinese politics, economy and culture. The stadiums are the physical embodiment of the modern sports culture and building type.

In ancient Greece the architecture stereotype of the stadium was formed whose prototype is enclosure ground with grandstand seating. But in ancient china there was no fixed type of stadiums while the main sports venue is the open space in front of the palace. There are three main characteristics of ancient Chinese sports architecture: (1) the main site is the palace. (2) the natural open space is auxiliary. (3) there is no fixed type such as the track, grandstand seating and so on. There are two main transmission methods during the period of 1912-1949: (1) the sports field in the foreign settlement, (2) the stadium built by the church school. The playground in the church school of china can be regarded as the prototype of the athletics stadium. The first public stadium in china is the Shanghai public stadium built in 1917 which could be regarded as the first modern stadium in china.

### 1.3 The main stadium of the national games in china during the period of 1949-2010

#### (1) From the traditional style to the modern style--- the Beijing workers' stadium

The Beijing workers' stadium was completed in 1959 which hosted the 1st, 2nd, 3rd, 4th, 7th national games of china. It is one of the "Ten Great Constructions", a typical representative and milestone of the modernism practice, one of the largest comprehensive stadium. After the completion of the project, the stadium in china is separated from the national style. It embodies the highest level of structure at that time---the concrete frame structure. The building plan of the stadium is oval and the building façade reflects the modern construction logic of the material and structure. The elevation of the stadium is adhered by a circle of columns while the upper part of the façade is suspension board. It is coordinated with big glass windows and stone walls decorated with light green, milky white, light grey, etc. Since then the athletic stadium in china adopts the brief and smooth modernism architectural style to express the characteristics of the stadium with concise façade and single shape. The architectural plane shape changes from a single rectangle, round to oval, polygons, and some stadium's roof appears the irregularly curved surface (fig1).



Fig.1. This is the external appearance of the Beijing workers' stadium

#### (2) From temporary site to professional standard venues--- Shanghai Jiangwan Stadium

The Shanghai Jiangwan stadium was completed in October, 1935, built by Mr. Dong in which the fifth national games of china was held in September 1983. Together with the Nanjing central stadium it means that it is improved from temporary site to professional standard venues. The Shanghai Jiangwan stadium is

composed of three buildings----the stadium, the gymnasium and the swimming pool which covers an area of 300 mu. It was dominant at that time in the far east. The Stadium is consisted of the field and the grandstand. The sports venue is consisted of straight and circular tracks. The total length of the track is 500 meters which are divided into 8 lanes. The inside of the track is the throwing zone and the high jump area and the middle area is a football field. The north side of the football field is the tennis court and the south side is a martial arts field (fig2, 3) .

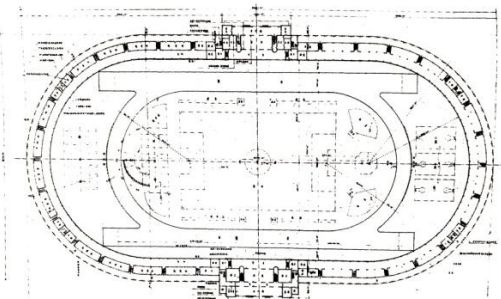


Fig.2. The architectural plane of the Shanghai Jiangwan Stadium

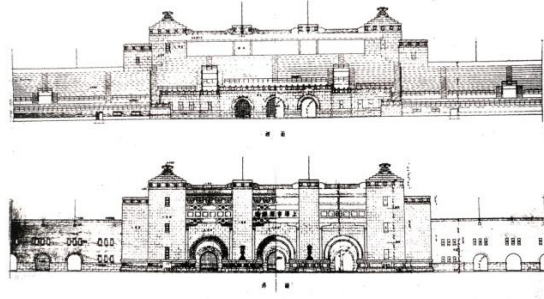


Fig.3. The facade of the Shanghai Jiangwan Stadium

### (3)From the single stadium to the sports center---- Guangzhou Tianhe Stadium

The completion of the Guangzhou Tianhe Stadium means that the stadium in china has changed from single building to a combination of complex function system. Since 1978 the design of the athletics stadium is more mature and the design method is more diversified and complex. The main stadium of the sixth national games - guangzhou tianhe stadium is a model for the construction of sports venues in the 1980s.It creates many firsts: the first layout pattern of one stadium ,one gymnasium and sports swimming pool, the first combination of the sports center and urban development strategy which promotes the expansion of new urban area and prosperity of the economy, the first stadium equipped with colorful screen and scoring equipment (fig4, 5, 6) .

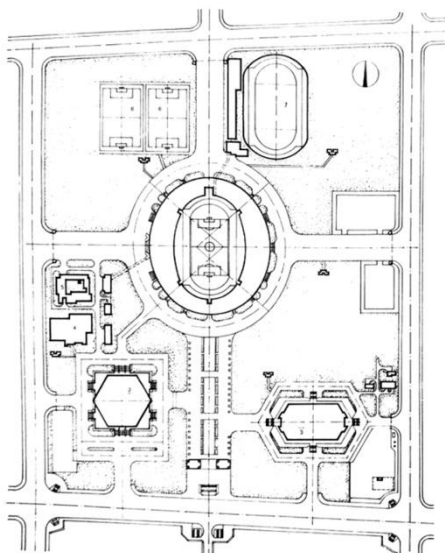


Fig.4. The general layout of the Guangzhou Tianhe Stadium

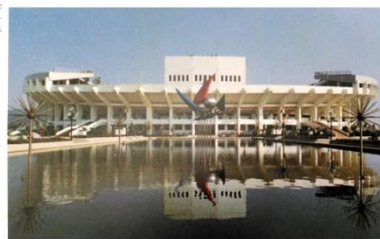


Fig.5. The Guangzhou Tianhe Stadium and its gymnasium



Fig.6. The external appearance of the Guangzhou Tianhe Stadium



### (4)From the cantilever truss to the membrane structure----Shanghai stadium

In October 1997, the 8th national games held in Shanghai at the Shanghai stadium which represented the highest level of the shape and scale of new China's sports buildings. The Shanghai stadium can accommodate 80,000 people as the main venue for the 8th national games. Its size is 170000 square meters and it covers an area of 36000 square meter. It is currently the largest sports center in Shanghai whose plane

is circle with a diameter of 273 meter. The glass façade of the stadium is in contrast to the surrounding structure. The white saddle membrane structure manifests the vigor of the sports architecture (fig7) .



Fig.7. The Shanghai Stadium

**(5)From domestic design to international design--- Guangdong Olympic sports Center, Nanjing Olympic Sports Center, Jinan Olympic sports center**

Guangdong Olympic sports Center is designed by the company NEB while the Nanjing Olympic sports center is designed by the company HOK .It makes breakthrough that the stadium design is not limited to domestic design. Guangdong Olympic sports Center built in September 2001 created “six most in china : “fastest ,largest and best”. The“ribbon roof ”is original and the electronic scoring system is most advanced (fig8) .

Nanjing Olympic sports center completed in 2004 was the main venue of the 10<sup>th</sup> national games in 2005 which is a multi-functional stadium. It is composed of four venues and two buildings including the stadium , gymnasium , tennis court and technology center for entrepreneurship. It is the first Chinese stadium to win the golden medal of the 11<sup>th</sup> international excellent sports facilities. The roof is constructed of the diagonal span arch whose span is over 360 meters and arch is 45 degree .It is also the first stadium in the world to have such a prominent structure (fig9) .

Jinan Olympic sports center adopts suspension space truss structure system composed of 64 common radial main truss and 9 secondary truss. The span of the roof suspends to 53 meters. The structure and the stadium works well and matches the willow and lotus in jinan (fig10) .



Fig.8. The Guangdong Olympic sports Center

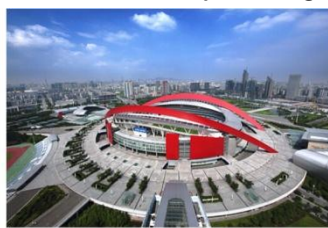


Fig.9.The Nanjing Olympic Sports Center

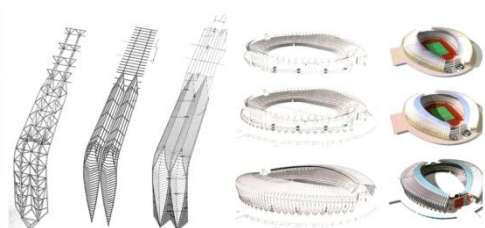


Fig.10.The Jinan Olympic sports center

**2.The regeneration motivation of the modern stadium in china**

The stadium is an important landmark in the city which could affect the city image and improve the exercise enthusiasm in the neighborhood. In recent years it is met with an awkward situation that the function of the stadium and the community fitness needs does not match because of the development of economy and society, resulting in the abandonment and demolition in the region. It is a waste of urban resource and an injury to the regional environment.

The main stadium of the national games is given priority to mega sports event. After the game It cannot meet the daily use because the operation cost after the game is high .It is the question concerned by investors ,designers and operation companies. So if they want to attain the object of high efficiency and fully usable of the stadium, it would be transformed after the game.

As part of the city, the stadium cannot meet the needs of urban residents. It cannot adapt to national fitness function and social development. The commercial function cannot operates sufficiently. In order to achieve the purpose of serving the city, the function need to be transformed.

The stadium a part of the city's resources and it is vital to improve efficiency in order to avoid wasting social

resources. The repetitive function and lack of comprehensive function in the stadium cannot meet the citizens. In china the officer enjoys building large scale athletics stadium to promote their career achievement leading to lack of community sports facilities. The transformation of the athletics stadium in modern china after the big event is a feasible method for the regeneration of the stadium.

### 3.The three objects of the regeneration of the athletics stadium in modern china

#### 3.1The athletics stadium is transformed into national fitness court

The utilization model of the stadium after the national game would influence the utilization ratios of the stadium. If it does not make full use of the auditorium ,the rostrum and other facilities of the stadium, the stadium can not make benefits and it would cost much for the maintenance and development of it. The construction of the athletics stadium in china may bring heavy financial burden to the organizers and the utility and maintenance becomes an unavoidable issues after the game. The key design after the game is how the athletics function and fitness function are integrated in the stadium and transformed as a site of the national fitness .It would be regenerated as more flexible , openness and entertaining national fitness court. The Shanghai jiangwan stadium which was built in 1935 was one of the first stadiums in China to host the national games, and its equipment quality standard was high. It is still used as the venue for the national games after the founding of the people's Republic of China. It was converted to the first sports park in China. The walls of the gate, the stands, the arch, the circular corridor are still old, but the function is different. It is a garden style pavilion in which there are a small bridge, running water, and a gymnasium of tennis, skateboarding, rock climbing ( fig11, 12) .

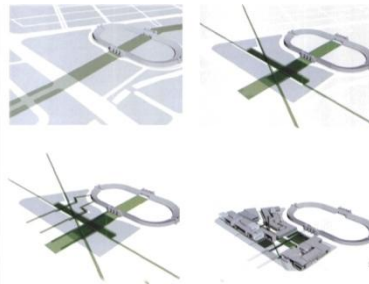


Fig.11.The regeneration of the shanghai jiangwan stadium in the region

Fig.12.The plaza in front of the shanghai jiangwan stadium

#### 3.2The athletics stadium is upgraded to more professional sports stadium

With the promotion of the sports competition and the reinforcement of the professional competition ,it shows the mismatch between the stadium and the sports event. Although the stadium itself is in good condition, it needs to be retrofitted to meet the professional demand of the big international major sports competition. Although the Beijing workers' stadium has successively held the national games for many times, the stadium itself still needs the renewal and reconstruction in order to meet the 2008 Olympic Games as a football pitch. In order to satisfy the functional requirements of the Olympic football match, the stadium needs to be transformed according to the requirements of FIFA. The sports technology, the audience facilities, the internal space ,the equipment, the communication facilities of the stadium is reconstructed in accordance with the international norms and standards of the football stadium.

#### 3.3The stadium is transformed into a comprehensive sports culture center

Guangzhou Tianhe Stadium in which the sixth national games was held has been put into use for over 20 years. The most recent large-scale reconstruction of the Guangzhou Tianhe Stadium is for football preliminaries and finals in 2001. It faces adverse conditions of the heavy transportation pressure ,lack of parking lot, the chaotic environment .In order to meet the needs of the Guangzhou Asian games in 2010, the stadium will open a new set of scattered roads to evacuate the surrounding traffic and improve the parking facilities to improve the environment. Guangzhou Tianhe Stadium would meet the requirement of the Asian games and regenerates as a large recreational, cultural, comprehensive sports center.

## **4.The regeneration strategy of the athletics stadium in modern china**

### **4.1 It strengthens the composition and elasticity of the internal function space in the athletics stadium**

The elasticity of the stadium space can determine the service time limit and intensity in the future. It is necessary to increase the openness of the internal space to serve the citizens and promote the national fitness campaign. The stadium combines the leisure, entertainment, dining and business functions to attract a far more diverse circle of people and the frequency of use of the stadium has increased to promote the stadium space quality.

The regeneration of the stadium does not happen overnight. The internal space of stadium is transformed in batches and the flexibility of the stadium's functional space can determine its future social services. After 70 years of use the Shanghai jiangwan stadium built in 1933 was repaired by the shanghai municipal government in 2005.The architect ensures sufficient space in 1933 : “only half of the space under fixed seats is occupied in order to save cost according to the plan and the other half is reserved for the building of the store room”。 Mr Dong's flexible design for the space under the building stands is worth learning.

### **4.2 It transforms auxiliary service space in the athletics stadium**

The stadium's auxiliary service space is under the stands. In order to promote value the architect improve service function during the game-time and self-sufficiency function in post-match function. The athletics function has gradually weakened and replaced by new buildings. After the game-time its affiliated function for the service of the competition is no longer needed and the multi-functional utilization is strengthened .It produces economic benefits as the basis of independent operation. Since 1980s the traditional model is finally replaced as the model of self-sufficiency.

### **4.3 It optimizes the operation model of the sports venue and adjust the grandstand**

In order to make the Beijing workers' stadium can regenerate as the Olympic football field in 2008,the 8000 square meters area of football field lawn is replaced. The plastic seats in the stand is replaced by new seat. It transforms 150 seats ,ramps and toilets for disabled person of the lower part in the south grandstand. It built a new 400- seat press box on the top of the rostrum with communication network line and table in the west side stand. It renovates the rostrum and enlarge the original observation room and change it to different size of box.

## **5.conclusion**

Through reviewing the development of the athletics stadium in china we can summarize the following characteristics:(1)The development of economy and technology has promoted and improved the quality of the stadiums in china (2)The interaction between the theoretical research and the practice continuously improves the level of the planning and design method .The design code about the sports architecture published in 2003 has made technical standards for the planning and design for the sports architecture in china.(3)The tendency to make the athletics stadiums in china a catalyst for urban renewal becomes apparent.

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