

The Intersection of National Image, Urban Development, and Civic Life: A Study on the 70-Year Evolution of Large-Scale Sports Architecture Heritage in Beijing

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Abstract

Under the guidance of Sustainable Development Goals, Olympic legacy is defined as the long-term benefits of major sporting events for residents and cities. As a key component of event legacies, large-scale sports architecture(stadium) has become a significant urban research topic. Capital sports architecture serves as a carrier of national identity, embodying symbolic urban imagery and enriching urban cultural landscapes. This study employs longitudinal and comparative analyses to examine the evolution of Beijing's stadiums over the past 70 years, systematically exploring their construction context, design concepts, architectural features and public activities. The findings aim to summarise trends, provide insights for stadium development, and promote sustainable growth. These outcomes ensure that these iconic venues continue to represent national identity and connect the past, present, and future.

Keywords: Beijing; Sports architecture heritage; national image; urban development; comparative study

Under the guidance of the goal of Sustainable Development Goals, Olympic legacy is defined as the long-term benefits that the Olympic Games or major sports events bring to residents and cities(Han & Xie, 2020). Effective reuse of 'Olympic legacy' has become a critical focus for modern Olympic Games. Therefore, the construction, development and reuse of 'Olympic legacy' represented by large-scale sports buildings has become an important research topic in global academic circles and planning practices. Stadiums are the most important type of sports buildings and a key urban landmark. Stadiums are one of the places where national and city sports events and activities are held. National and world-class high-level games and events, such as the Olympic Games, National Games, World Cup, etc., have great international influence and are the medium for the country to enhance its international image. Because of its natural functionality, agglomeration and openness, the stadium is not only the venue for these competitive sports, but also the venue for the opening ceremony and other events, and more importantly, the venue for some commemorative meetings, cultural performances and other national celebrations. The capital stadium, more important, as a national and international activities held in the place, is to show the strength of the country, reflecting the dignity of the country's important window, excellent stadiums on the development of the city has a positive role in promoting. The stadium architecture is also the expression of the image of the capital and the image of the country, so it is of great research value to analyze the architectural development changes, style concept changes, and urban spatial relations of the capital stadium.

1. Status of research and scope of content

1.1 Status of research

Currently, the research on Beijing stadiums focuses on the construction and use of stadiums: function and utilization, building structure and construction, building form and external spatial relationship, energy consumption analysis and optimization; and the cultural level: protection of sports heritage buildings, sports buildings and humanities analysis, most of which are focused on the consideration of single buildings or stadiums, and less on the study of 'capital city' within the scope of the stadiums. There are few studies on the stadiums within the scope of 'capital city', and there are few comparisons of the changes of the capital city stadiums in both vertical and horizontal dimensions, and fewer of them focus on the correlation between the stadiums and the image of the country.

1.2 Content and scope of the study

Stadium for all kinds of games sports buildings, according to the 'Architectural Design Sourcebook 6 (third edition)' interpretation, the stadium is able to outdoor track and field and soccer and other sports buildings, can also be called track and field or integrated stadium, which is mainly by the field area (including track and field and soccer field), grandstand area, auxiliary rooms and facilities and other parts of the composition(Architectural Society of China, 2017). According to the China provisions of the 'Sports Building Design Code' (JGJ 31-2003), the stadium's official competition venues should include a 400m perimeter of the standard circular track for track and field events, a standard soccer field and various field events. Specialised soccer stadiums can also have only standard soccer fields without a loop track and field events. According to the code, stadiums with more than 60,000 seats

are considered mega, 40,000 to 60,000 seats are considered large, and 30,000 to 40,000 seats are considered medium.

As the capital stadium with a certain influence that can show the dignity of the country is inevitably large, high level and wide range of services, so the important stadiums in Beijing involved in the study are the Xiannongtan Stadium, Workers Stadium, Olympic Sports Centre Stadium, National Stadium and the new Workers Stadium (a professional soccer stadium). Small stadiums such as college stadiums or non-special grade and Grade A stadiums are not included in the scope of this study.

2. Reviewing the 70-Year evolution of stadiums in Beijing

Modern sports architecture and culture originated from the Greek Olympic, and the prototypes of modern sports stadiums also came from the stadiums and colosseums of ancient Greece and Rome. Modern sports in China began with the sports of Westerners in the concession and trading ports, and Western sports buildings under the colonial regime began to be constructed in China(Hou, 2020). Under the passive importation of the West and the active fusion of the local community, modern stadiums modeled on Western modern venues were gradually built.

The earliest formal stadiums in Beijing were the Huiwen Shuyuan Stadium and the Xiehe Shuyuan Stadium(Hui, 2023). According to the time division, the construction of major stadiums in Beijing can be roughly divided into 5 Stages, corresponding to the background characteristics and urban development needs of different eras, namely, the Early Development stage (EDS)(1936-1958), the Construction Start-up stage (CSS) (1959-1978), the Asian Games stage (AGS) (1979-1990), the Olympic Games stage (OGS) (1991-2008), and the Post-Summer Olympics Stage (PSOS) (2009-present). which has lasted for more than 70 years since Beijing became the capital of new China.



Figure 1: Study cases and location relationships

2.1 Early Development stage (1936-1958)

The main stadium of this Stage was the Xiannongtan Stadium, built in 1937 and originally called the 'Peking Public Stadium'. In 1936, in preparation for the 19th North China Games (not held), the design of the Xiannongtan Stadium in Beijing was completed by Guan Songsheng of the Kwan, Chu and Yang Architects & Engineers (KCYAE). Since there was no precedent to follow from the traditional building activities in China, domestic sports buildings of this stage were often modeled directly on modern Western venues. Before taking over the public stadium in Peking, KCYAE had already had experience in building stadiums, therefore, the design is inherited from the Nanjing Central Stadium, under the core of the 'Western Stadium', set up the enclosed grandstand, the long axis of the stadium conforms to the axis of the Xiannongtan (Agricultural god temple), set up an end gate tower as the entrance on the north side, and the exterior design is integrated into the palace form, so as to achieve the integration of the traditional Chinese architectural style.

Stadium was equipped with a 400m runway, with a capacity of 4,000 spectators, and is the only large-scale public stadium in Beijing before and after the liberation. After the peaceful liberation of Peking, Stadium took over many political and cultural events. The 28th anniversary of the founding of the Communist Party of China and the Beijing Municipal People's Sports Congress were held here. In the 1950s, Stadium was expanded twice, increasing the number of spectators to nearly 30,000(Shaoyi, 2004). Prior to the construction of the Workers Stadium, almost all of China's major competitions were held at the Xiannongtan Stadium, which was nominally the 'National Stadium'.



Figure 2: Xiannongtan Stadium Design



Figure 3: Aerial view of the stadium

2.2 Construction Start-up Stage (1959-1978)

The main stadiums built during this stage were the Workers Stadium and the renovation of the Xiannongtan Stadium. The main construction opportunity was the First National Games (1959).

In the early years of the founding of the PRC, Beijing was very short of stadiums, and there were no large stadiums except for the Xiannongtan Stadium mentioned above. As the capital city, Beijing often hosted visits by foreign athletes, and due to the lack of relevant facilities, the venues for various competitions were very simple, which did not match the temperament of the capital city of new China. Taking the opportunity of the 10th anniversary of the founding of the People's Republic of China and the first National Games in 1959, one of the '10 major projects of the National Day', the Workers Stadium, was completed in the eastern suburb. The Workers Stadium has a geometrically regular group layout, with the stadium at its core. The Workers Stadium north-south length of 282m, east-west length of 208m. ring depth of 40m for the grandstand, the ring for the competition venue. The grandstand is divided into two levels, the highest place in the ground above 22m(Youming, 1959). The total area is 80,000 m² and can accommodate 80,000 spectators. The whole building adopts the whole cast reinforced concrete frame orange structure.

The facade of the building is treated under the guidance of the architectural policy of 'applicable, economical, and pay attention to the aesthetics under the possible conditions', with generous, open and bright large glass windows together with the light and powerful columns(Beijing Municipal Planning Bureau Design Institute Sports Farm Design Team, 1959), the design is simple, with the practical characteristics of socialist architecture, and the window patterns on the outer wall of the stadium are the traditional Chinese style. 13 sculptures of workers and athletes are arranged around the building, which is very characteristic of the times. The Workers Stadium became the de facto national stadium, taking over from the Xiannongtan Stadium, which hosted the first National Games in the year of its completion, and later hosted many important competitions; in the 1960s it became a 'political stadium'(Dongming, 2008), with more functions such as parades and rallies.



Figure 4: Opening Ceremony of the First National Games

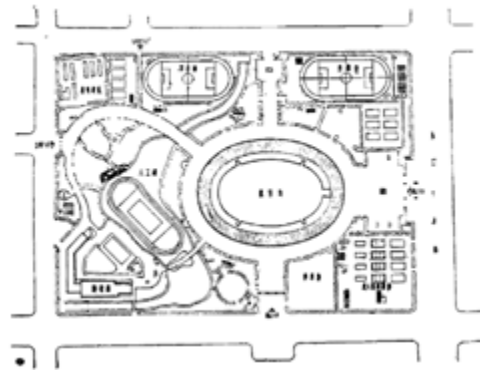


Figure 5: Site-plan of Workers Stadium

2.3 Asian Games Stage (1979-1990)

The main stadiums built during this Stage were the Olympic Sports Centre Stadium, as well as the reconstruction of the Workers Stadium and the restoration of the original site of the Xiannongtan Stadium. The construction opportunity of this Stage was the 11th Asian Games (1990).

The Asian Games was the first large-scale comprehensive international games held in China, and it was also an important opportunity for China to show its dignity and image to the outside world. To host the Games, a new National Olympic Sports Centre was chosen to be built in the northern suburbs of Beijing. The National Olympic Sports Centre was planned and designed as an integrated whole, with a total of three large sports buildings, 'one stadium and two gymnasiums', for which Ma Guoxin was the chief architect. In this area, the northern part of the building is used as the first phase of the venue to serve the Asian Games, and the overall planning takes grid and curve as the design elements, and draws on the group combination treatment of Beijing's traditional city to form the overall design, and the centre is planned to open to the public as a sports park after the games. The centre is planned to be opened as a sports park for all after the games. The stadium of the Olympic Sports Centre is located on the main east-west axis, with a floor area of 30,000 m², a design capacity of 20,000 people, and reserves in the north and south, and is planned to be converted into a football stadium with a capacity of 40,000 people in the later stage. The podium is located in the West Stand and has a technical special box. The top of the west stand has a 20m wide, 100m long overhanging translucent canopy (Ma, 1990).

Since 1986, the first large-scale renovation of the Workers Stadium was carried out in preparation for the 1990 Asian Games. The Workers Stadium had been damaged by 30 years of wind and rain. The stadium was reinforced, a torch platform was added, the comfort of the seats in the stands was improved (reduced in number), and the top was covered with a large canopy, with the canopies of the east and west stands cantilevering inwards by up to 18 m. The restored Workers Stadium successfully hosted the opening ceremony and matches of the 11th Asian Games, and celebrations for the return of Hong Kong to China and other festivities. At the same time, in order to meet the Asian Games, Xiannongtan Stadium was demolished and rebuilt in 1986, and the new Xiannongtan Stadium became a 30,000-seat modern stadium in line with the modern track and field and football stadiums (Beijing No.2 Municipal Engineering Company, No.1 Team of No.2 Work Area, 1985).

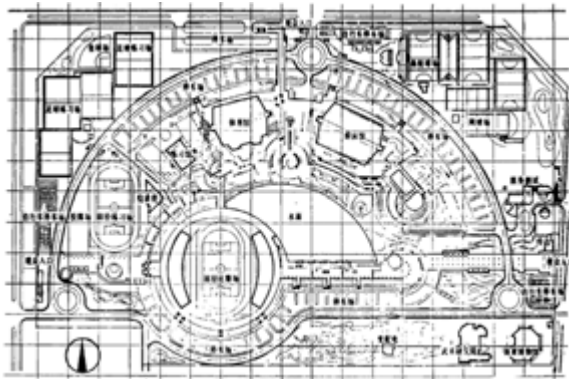


Figure 6: Site-plan of Beijing Olympic Sports Centre



Figure 7: Beijing Olympic Sports Centre Stadium

2.4 Olympic Games Stage (1991-2008)

The main stadiums built during this Stage were the National Stadium and the renovation of the Olympic Sports Centre Stadium and the Workers Stadium. The opportunities for construction were the 21st World University Games (2001) and the 29th Beijing Olympics (2008). Since Beijing lost the bid for the 2000 Olympics, it retreated to bid for the Universiade, but the main target event for this stage was the Olympics, so this stage is categorised as the Olympics phase.

The China National Stadium (Bird's Nest), designed by the China Academy of Architectural Design Institute (CAADI) in conjunction with Herzog & de Meuron, was the main venue for the 2008 Beijing Olympic Games. After the completion of the stadium, it officially succeeded the Workers Stadium as the National Stadium. The shape of the stadium is an ellipse with a north-south length of 333 m and an east-west width of 298 m, with a maximum height of 69 m and a minimum height of 40 m; the middle opening has a north-south length of 182 m and an east-west width of 124 m. The main steel structure forms an integral giant large-span, crosswise rotating braided structure, and the stadium grandstand is a bowl-shaped structure supported by a reinforced concrete frame (Li, 2008). The National Stadium is a design from the inside out, where the structure is the appearance, forming a woven structure like the 'Bird's Nest', a perfect unity of structure and appearance due to function.



Figure 8: Floor plan of the China National Stadium

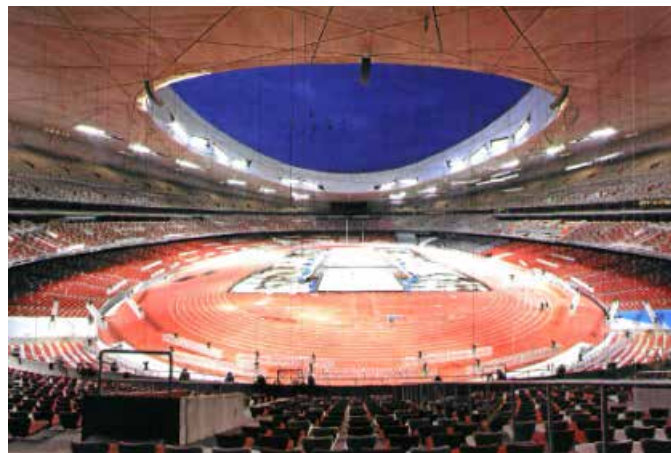


Figure 9: Inside China National Stadium



Figure 10: Site-plan of the
China National Stadium

Meanwhile, the Workers Stadium also saw two important renovations during this stage. In 2000, the Stadium was renovated for the second time to meet the Universiade. The stadium was partially reinforced, with the construction of high-standard lounges and a press centre. In 2006, the third renovation of the Workers Stadium was carried out. The most significant change in its appearance was the installation of the overhead light frame cable structure. After a comprehensive renovation of the Workers Stadium, can accommodate 62,000 spectators, the field facilities fully meet the technical standards of the Olympic Games football match requirements. The Olympic Sports Centre Stadium has also undergone related alterations, removing the ring road, reconstructing the east and west awnings and expanding its capacity to 40,000 while reinforcing the structure to meet the requirements of the Olympic Games.

2.5 Post-Summer Olympics Stage (2009-present)

The main stadiums built during this stage were the restoration of the Workers Stadium (New Workers Stadium) and the renovation of the National Stadium. The construction opportunities are diverse, mainly for the Beijing 2022 Winter Olympics and the AFC Asian Cup.

The Workers Stadium has undergone four renovations, reaching its design life of 50 years after the Olympics, and was partially renovated in 2010, transforming it from a comprehensive stadium into a professional football stadium. However, as an important stadium building in Beijing, its external environment as a whole presents a messy and disordered, therefore, in order to make effective use of the stadium, coinciding with China's opportunity to host the 2023 Asian Cup (Stadium was originally scheduled to serve as the main venue for the Asian Cup, but was abandoned due to an epidemic), under the basic principle of 'three constant' -- the elliptical shape remains unchanged, the facade form remains basically unchanged, and the style remains basically unchanged, the way of dismantling and reconstructing was finally determined, and the concept of 'traditional appearance, modern arena' was put forward. Workers Stadium ushered in the opportunity of nirvana rebirth(Du song & Wang, 2023).



Figure 11: New Workers Stadium



Figure 12: Inside New Workers Stadium

With a floor area of 380,500 m² and 68,000 seats, the new stadium meets the highest standards of FIFA, with the pitch sunk to 11m below ground to form a sunken professional football stadium. The 4-tier grandstand is designed and integrated into 2 tiers on the north side to create a 15,000-seat super grandstand for home fans. The first row of spectator seats is only 8.5m away from the lawn to enhance the sense of intimacy. The sports reconstruction retains the original architectural style as much as possible (Sheng et al., 2021), such as restoring the original eaves and ring bands and other architectural features. For special historical memory construction, such as the old gymnasium outer wall window patterns, reliefs and peripheral sculptures, etc., three-dimensional laser scanning technology and 3D printing technology are also used to repair and reproduce (Wang et al., 2023). Up to now, the new Workers stadium has been put into use for more than two years, as the home stadium of Beijing Guoan in the Chinese Football Super League.

In the design of the space around the stadium, the sparse urban space form of 1959 is restored, a large area of greenery is added, and the water space is upgraded and improved to provide the public with a high-standard space for sports activities. The underground space introduces the concept of integrated operation of underground and business, and actively creates the Greater Sanlitun Business Circle in the form of 'TOD+Block+Mall', providing the city with a new integrated space for sports, culture and business (Du S. et al., 2023).

In the post-summer Olympic Stage, the National Stadium also hosted the 2015 World Athletics Championships, and in 2019, for the opening and closing ceremonies of the Beijing Winter Olympic Games, the National Stadium followed the 'green, sharing, open, clean' concept of running the Olympic Games, the main energy-saving performance of the building to regulate the transformation to meet the sustainable development needs. After the renovation, the 'Bird's Nest' officially opened a new mode of energy saving, low carbon and intelligent service. After the renovation, a large-scale cultural performance to celebrate the 100th anniversary of the founding of the Communist Party of China was held in the National Stadium.



Figure 13 Opening Ceremony of the Beijing Winter Olympics



Figure 14 Large-scale Cultural Performance to Celebrate the 100th Anniversary of the Founding of the Communist Party of China

Table 1: Summary of Beijing Stadiums by Stage

Name	Year	Location	Seating Capacity	Purpose	Architectural Features	Main Activities
Early Development Stage						
Xiannongtan Stadium	1938	Urban South (Xiannongtan)	4,000	The 19th North China Games*	Traditional Chinese Style	Celebrations for the 28th Anniversary of the Founding of the Communist Party of China, etc.
Construction Start-up Stage						
Workers Stadium	1959	Eastern Suburb (Sanlitun)	80,000	The 1st National Games	Socialist Characteristics, Simple and Plain	The 1st to 4th National Games, Mass Political Gatherings, etc.
Asian Games Stage						
Olympic Sports Centre Stadium	1989	Northern Suburb (Beitu Cheng)	20,000	The 11th Asian Games	Modernist Architecture	The 11th Asian Games
Workers Stadium (Renovated)	1986	-	70,000	The 11th Asian Games	Reinforcement, Modern Renovation, Addition of Torch	Main Venue for the 11th Asian Games, Celebration of Hong Kong's Return, etc.
Xian Nong Tan Stadium (Reconstructed)	1986	-	30,000	The 11th Asian Games	Modernist Architecture	Asian Games Events, Jia-A League Matches
Olympics Games Stage						
National Stadium	2008	Urban Nouth (Olympic Park)	80,000 (11,000 temporary)	The 29th Summer Olympics	Technology, Oriental Aesthetics, Olympic Spirit	Opening and Closing Ceremonies of Beijing Olympics and Competitions
Workers Stadium (2nd Renovation)	2000	-	70,000	The 21st Universiade	Reinforcement, Addition of Restrooms and Press Centers	Opening and Closing Ceremonies of Beijing Universiade and Competitions.
Workers Stadium (3rd Renovation)	2006	-	62,000	The 29th Summer Olympics	Reinforcement, Meeting Requirements for Olympic Football Matches	Football Matches of Beijing Olympics, CSL Matches, etc.
Olympic Sports Centre Stadium (Renovated)	2007	-	40,000	The 29th Summer Olympics	Addition of Stands, Renovation of Canopies, etc.	Related Competitions of Beijing Olympics
Post-Summer Olympics Stage						
New Workers Stadium	2023	Original Site	68,000	2023 AFC Asian Cup*	three constant Principles, Integration of Technology and Culture	Opening Ceremony of the 2023 CSL, Chinese Football Super League
National Stadium (Renovated)	2021	-	-	The 2022 Winter Olympics	Green and Low Carbon Sustainable Development	Opening and Closing Ceremonies of the Winter Olympics, etc.

Note: * indicates not held

3. The wave of stadium construction orientated to tournament celebrations: from the region to the world

The development of the stadiums in the capital of China was orientated towards celebrations, with the construction and renewal of the stadiums being associated with major sporting events. After 1978, the stage of stadium construction was even divided on the basis of the dates of sports events. The construction of stadiums in most foreign capitals is also similar to this, with the Olympic Games, the World Cup and other opportunities for stadium construction. China's special characteristics are: the level of the event is gradually increased, the scope of influence of the event is gradually increased, and the importance of the event is gradually enhanced. We have experienced a progressive trajectory in stadium development, evolving from domestic regional games to national-level competitions, followed by Asian-level multisport events, and ultimately culminating in world-class comprehensive games. This progression has also expanded to encompass a wide range of global-scale sporting and cultural activities.

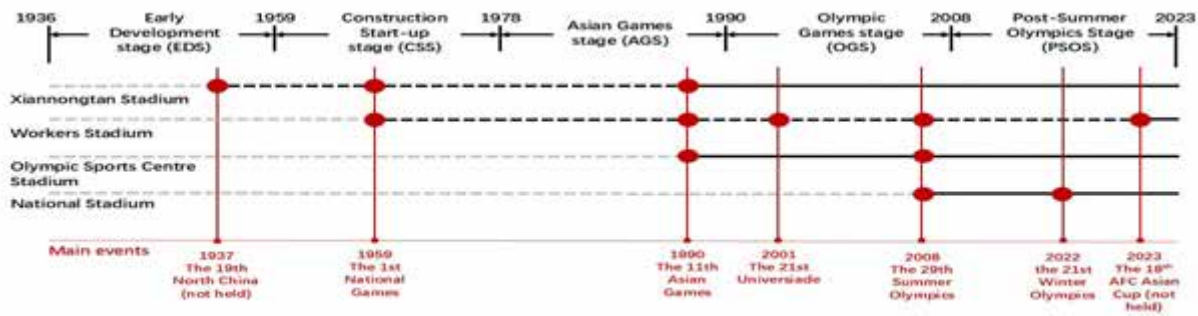


Figure 15: The Development of Capital Stadium Construction under the Orientation of Tournament Celebration

Before the founding of new China, China's social instability, economic foundation is weak, but also unable to hold international events, so this Stage of the country's cities in the construction of the opportunity are all the local games, such as the North China Games. North China Games is also China's modern sports history of the greatest influence, the longest duration of the regional games, held a total of 18 sessions, and then cancelled due to the outbreak of the WWII. For a period of time after the founding of New China, the construction of sports buildings in the capital city was also dominated by simple venues, with a number of simple stadiums built in urban areas in combination with parks and green spaces, and the main events were held in the Xiannongtan Stadium. 1952, after participating in the Finnish Olympic Games for the first time, decision-makers realised that sports performance was related to international status, and therefore vigorously promoted sports during the 'First Five-Year Plan'. During the 'First Five-Year Plan', the construction of sports buildings was vigorously promoted, and after the Great Leap Forward, the Workers Stadium was built to celebrate the 10th anniversary of the National Day of New China and to welcome the first National Games. At this time the country has been on track after ten years of construction, the overall national strength has been improved, the construction of stadiums, held the National Games is a new China's national strength show. There were 24 friendly countries participating in the National Games, which was an expression of the image of the new China and a manifestation of the dignity of the country.

After the reform and opening up in 1978, China sought to organise comprehensive international sports competitions to reflect China's new image and provide new opportunities for international exchanges and economic development. In 1984, Beijing started to organise the 11th Asian Games in 1990, with 'based on the Asian Games, with an eye on the Olympics' as the main construction goal for this Stage, and through this organisation, the Workers Stadium reached the level of advanced stadiums at that time, and new buildings such as the Olympic Sports Centre were built with an eye on the Olympics. Through this preparation, the Workers Stadium Stadium also reached the level of advanced stadiums at that time, and the Olympic Sports Centre and other buildings were newly built 'with an eye to the Olympics', which made the number and level of Beijing's sports facilities greatly improved. After the Asian Games, Beijing declared for the 2000 Olympic Games, but unfortunately failed. In order to gain practical experience in organising international high-level sports events, and to lay a good foundation for further bidding for the Olympic Games(Hou, 2020), Beijing hosted the 21st Universiade, which was the first time that China held a world-class comprehensive sports event, and took this opportunity to upgrade and update the sports buildings in Beijing.

In 2001, Beijing's bid for the Olympic Games was successful, and the related sports stadiums were gradually put on the agenda. By 2008, China had been reforming and opening up for 30 years, and its comprehensive national power had been greatly enhanced. The Bird's Nest, as a unique and unprecedented landmark building, was a renewal of China's image and a demonstration of its national power in the new millennium. After the Olympic Games, Beijing stepped into the Stage of transformation and operation to protect and make use of the Olympic legacy. After the Olympic Games, in addition to hosting the Winter Olympics, the country is seeking the comprehensive development of all kinds of sports events, and hopes to host major events such as the Asian Cup and the World Cup, etc. At this time, the renewal of the capital city's sports buildings is to take these

activities as an opportunity for the balanced, dynamic, highly efficient use of the construction and management of sustainable development.

4. Changes in Architectural Style and Philosophy in the Context of the Times: From Western Learning to Parallel Development

Since the beginning of the last century, the capital stadium has been influenced by the sports, styles, concepts and cultures of different eras in the course of a century, showing colourful and varied changes. Similarly, the social background of China as well as sports and architectural undertakings have gone through different stages of development since the modern times, which have also shaped the soil of the development of the capital stadium. From the background of different Stages, we compare the architecture of the capital stadium with that of foreign countries in the same Stage, and explore the causes of the changes in the architectural style and concept of the capital stadium.

4.1 Early Development Stage: Study of the West and Formal Collage

In this stage, China was in a stage of transformation of the social system under the external war and internal revolution, and the main sports and architectural undertakings were also dominated by the activities of Westerners. Therefore, the stadium construction in China was still in the process of learning from the West and imitating the Western sports architecture, and after absorbing a certain amount of Western experience, it was gradually tracing the traditional Chinese form from the style. A stadium from the same Stage as the Xiannongtan Stadium was the Olympiastadion (Reichssportfeld) in Berlin, Germany, in 1936.

Berlin was again awarded the right to host the Olympic Games in 1931, and the German government decided to remodel the stadium in Charlottenburg, west of Berlin, as the main venue. The Olympiastadion was completed in 1936 with an east-west layout and a double-decker grandstand that could accommodate 110,000 spectators. The stadium was built in expensive materials such as granite, and its form is predominantly Fascist, with a symmetrical layout, soaring vertical rows, and dehumanising superscales to create a solemn atmosphere. The two stadiums are similar in form, controlled by axes and ceremonial at the ends, but the Xiannongtan Stadium is too small, with a capacity of only 4,000 spectators in the early days. Considering the social turmoil and weak industrial economy at that time, the stadiums were out of reach of the West in terms of both the scale of the stadium buildings and the creation of spatial order, and were in the position of learners.



Figure 16: Olympiastadion

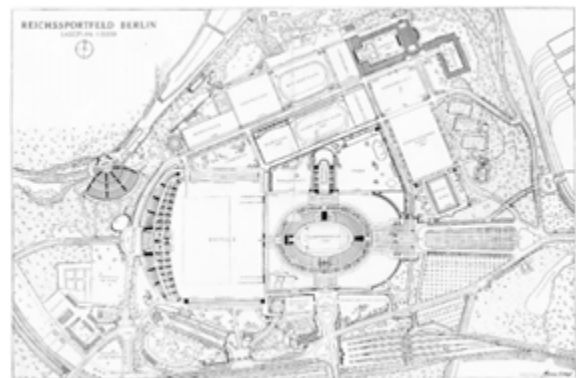


Figure 17: Site-plan of Olympiastadion

4.2 Construction Start-up stage: Soviet Influence and Simplicity and Economy

In the beginning of the construction stage, from 1949 to the Reform and Opening Up, China basically followed a foreign policy of 'alliance with the Soviet Union and opposition to the America', and basically drew its modern architectural nourishment from the Soviet Union. In the early 1950s, the Soviet Union began to provide large-scale construction assistance to China, and the architectural creations were deeply influenced by the Soviet Union ideology, and 'socialist content and national form' became the supreme guidance in architectural creations. After the Great Leap Forward, economic savings itself became a necessary requirement for architectural construction, and reflection on national forms also became the mainstream architectural thinking, at this time, the designers

could not take the 'capitalist' road of modernist architecture, so they could only weaken the attention to architectural forms as much as possible, and reduce the architectural features in form.

The Soviet Union was also in the midst of the Khrushchev era, and after 1955, the Soviet Architectural Society under Stalin was abolished, abandoning the 'Stalinist' aesthetic and replacing it with an architectural style aimed at pursuing high efficiency and economic benefits. The Central Lenin Stadium, built before the Workers Stadium, bears a strong resemblance to it. Built in 1956, Luzhniki Stadium (Стадион 'Лужники'), known as the Central Lenin Stadium before the collapse of the Soviet Union, is located on the banks of the Moscow River in the south-west of the city, and was the national stadium of the Soviet Union (also Russia), as well as the largest stadium, which was constructed for the purpose of hosting the Spartak Games of the Soviet People in 1956. Built under the direction of Alexander Vlasov, it has a total of 80,000 seats. The stadium's architectural style is simple and frugal, and it has undergone a number of alterations and extensions in later years.

The two buildings, the Workers Stadium and the Luzhniki Stadium, are similar in form and volume, and show the same architectural style and compositional features, and the buildings of the capital city in this Stage were deeply influenced by the Soviet architectural style. Among them, the biggest difference between the Workers Stadium in terms of elevation is that the Luzhniki Stadium emphasises vertical composition, with robust and powerful columns with vertical bar windows and designed with curved porticos, while the columns of the Workers Stadium are thinner, and the horizontal bar windows emphasise the horizontal composition in a more minimalist way. The completion of the Labour Stadium not only demonstrates that China has the ability to build mega stadiums after 10 years of development, but also assumes more political meanings, its name is closely related to the historical position of the working class and the main theme of the times, which emphasises the development of the country's national strength and the awakening of the country's will, and at the same time, swears to the independence of the country from the cultural and spiritual level.



Figure 18: Central Lenin Stadium



Figure 19: Site-plan of Stadium

4.3 Asian Games stage: Catching up with the West and Connecting with the World

After the reform and opening up in 1978. Lifting the political burden, sports architecture began to get rid of the limitations of national sentiment, the formal thinking of sports architecture quickly turned to modernism, and domestic sports architecture designers began to learn from the experience of advanced Western venues. Under the background of internal reform and opening up to the outside world, Chinese sports architecture also began to connect and catch up with advanced western sports architecture. In this Stage, the planning of a large sports centre appeared for the first time in the capital. The overall planning of the Olympic Sports Centre is people-oriented, and it is the first large-scale sports park in China to achieve the separation of pedestrian and vehicular traffic and a barrier-free environment for the whole field (Ma, 1990). In terms of building technology, the Olympic Sports Centre stadium is the first in China to adopt the canopy technology of steel pipe space mesh shell.

A similar foreign building to this phase is the Stadium of France (Stade de France), built in 1998. Located in the north of Paris, the Stadium of France is the national stadium of France and the home of the national football

team, and was built for the 1998 FIFA World Cup with a seating capacity of 80,000 people. The design idea is 'open, transparent and fluid', and its architectural image consists of a vertical facade and a horizontal ring (roof) suspended above the stadium. The curved steps give the building a sense of movement, while the roof discs 'floating' above the city symbolise the dexterity of movement(Hu & Zhang, 1998). The Stade de France was characterised by 'high technology', with its suspended circular roof and mobile stands being the most advanced designs of the time. Comparing with the high technology, high efficiency, adaptable and changeable development direction of Stadium of France in the same Stage, although some new technical means have been applied in the Olympic Sports Centre Stadium, it is still in a catching-up stage compared with it in all aspects.

4.4 Olympic Games stage: Parallelism and Cultural Expression

After the new millennium, China's political situation has stabilised, its economic level has greatly improved, and the society has developed in a comprehensive and harmonious manner; sports architecture has also faced multiple development opportunities and has developed rapidly. International competitions for sports buildings have provided opportunities for foreign design organisations, and a large number of advanced design ideas and technologies have been conveniently introduced into China, directly promoting the progress and development of Chinese architectural design. The National Stadium, as a co-operation work between a foreign firm and a Chinese design institute, not only reaches the world advanced level in overall planning, structural technology and functional layout, but also contains 'the oriental aesthetic thought of order and introspection' and 'the perfection of a single object'. It combines Chinese oriental aesthetics and humanistic style with contemporary art and Olympic sportsmanship(Li, 2008).The design of sound, light, heat and drainage fully embodies the concept of Green Olympics.

The London Olympic Stadium ('London Bowl'), which was completed 4 years later, has a different architectural character from the 'Bird's Nest'. Located in the Stratford district of East London, the stadium is designed for 80,000 people. Since the London Olympics began with the themes of 'sustainability' and 'economy', the concept of 'sustainability' has been incorporated into the design, with the stadium being constructed as a lightweight frame with a steel composite base. The main structure of the stadium is a lightweight frame, with a basic steel hybrid structure forming the main body of the stadium. Plans to demolish the upper levels after the games to reduce the size of the stadium to a permanent 25,000-seat venue did not materialise and the stadium is now used as the home of West Ham United of the Premier League. Compared to the two stadiums, the 'Bird's Nest' focuses more on appearance and practicality, and is a display of national culture, national image and national strength. As London itself has large stadiums such as Wembley Stadium, the 'London Bowl' focuses more on practicality and economy. The difference between the two venues is a reflection of the economic and cultural background of the two countries.



Figure 20: Stadium of France



Figure 21: London Olympic Stadium

4.5 Post-Summer Olympics Stage: Cultural Confidence and Low Carbon Sustainability

In the post-Olympic era, China's economic development has undergone a historic and substantial change, entering

the stage of 'adjustment, optimisation and upgrading', and industrialisation, specialisation, and a balanced focus on competitive and popular sports have driven the development of the sports industry. In the construction industry, the design and construction of buildings return to the rational road, iconic no longer become the only pursuit, green ecological and sustainable construction has become an important way out of the development. In the context of cultural self-confidence and national rejuvenation, cultural heritage, respect for tradition and integration of science and technology became the mainstream of design in this Stage.

The capital stadium in this Stage is represented by the New Workers Stadium. As a professional football stadium, the new stadium has a high degree of integration of technology and culture, reproducing the simple appearance of the old stadium with the technique of fair-faced concrete. The canopy adopts the creative concept of 'national prosperity and people's peace, gold purlins', and uses the rib-supported single-layer arched shell structural system to present the classic composition of "'San Jiao Liu Wan' (Three Crossings and Six Rays) decorative motif" window lattice(Sheng et al., 2021). The canopy also integrates the functions of sun shading, lighting, siphon drainage, snow melting, photovoltaic power generation and acoustic noise reduction, which maximally realises the sustainable concept of the whole life cycle to reduce the energy consumption of the building and practice the concept of green and low-carbon.

A similar project from the same Stage was the Santiago Bernabeu Stadium (Estadio Santiago Bernabéu) in Madrid, Spain. Located in the north of Madrid, the stadium is an iconic landmark in Madrid and is one of the home stadiums of Real Madrid FC and the Spanish national team. The stadium has a capacity of 81,000 people. Due to new demands for use, the stadium, built in 1947, will be remodeled in 2020, using high-tech elements to create a new experience for fans(Gmp Architects, 2024). The renovation project will cover the building's unified image with a softly curved surface formed by metal louvres, and a translucent curtain wall that connects the inner and outer scenes, enriching the view of spectators and pedestrians, and giving a unique spatial quality to the public environment around the stadium. At the same time, the design takes into full consideration of the surrounding urban space, and will include additional viewing corridors, movable roofs, commercial complexes and other service facilities. A sense of technology, integration with the urban space, humanised experience, and the addition of commercial operations characterise the stadium's architectural design in this new era.

On the basis of 'sustainability', the New Workers Stadium actively integrates into the city, and adopts the concept of integrating metro and commercial operations in the underground space for operation and maintenance, which is very similar to the design concepts of technology, commerce, humanity, and localisation of Madrid's Bernabeu Stadium, but with more respect for tradition and cultural expression.

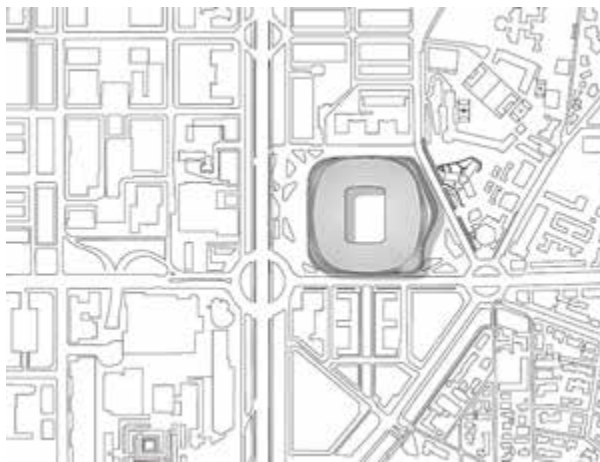


Figure 22: Site-plan of Bernabeu Stadium



Figure 23: Bernabeu Stadium

In conclusion, within the broader historical and cultural context, the stylistic evolution of China's capital stadiums has undergone a complex trajectory, transitioning from an initial phase of Western influence and appropriation, through a Stage marked by eclectic formal collages and Soviet-inspired models, towards a convergence

with international architectural trends. This developmental path ultimately culminated in a dynamic shift characterised by growing cultural confidence, alongside an increasing emphasis on low-carbon and sustainable design principles.

Table 2: Comparison of Capital Stadium buildings from different stages

Stage	New Building	Time	Scale/Capacity	Architectural Features
1 EDS	Xian Nong Tan Stadium	1936	Medium /30,000	Traditional Chinese style, modern sports
2 CSS	Workers Stadium	1959	Mega /80,000	"Soviet-style", frugal and economical
3 AGS	Olympic Sports Centre	1986	Large/40,000	Modernist architecture, new structural systems
4 OGS	National Stadium	2007	Mega /80,000	Technology, Oriental aesthetics, Olympic spirit
5 PSOS	New Workers Stadium	2023	Mega /68,000	Fusion of technology and culture, sustainability

Table 3 Comparison of backgrounds from different stages

Stage	Social	Architectural	Political	Economic
1 EDS	Transformation of social systems amidst external wars and internal revolutions	Western-dominated activities, beginning of modern architecture	Internal and external turmoil	Low level
2 CSS	Exploration of socio-political structures centred on political forms	Establishment of architectural systems, influenced by the Soviet Union and politics	Internal exploration	Low level
3 AGS	Economic reform and opening up with a focus on economic development and societal progress	Flourishing architectural theories and technological advancements	Stability	Initial development
4 OGS	Economic advancement and societal openness under globalisation influences	New developments in architectural theory, industry liberalisation and institutionalisation	Openness	Rapid development
5 PSOS	Emphasis on economic quality and low-carbon humanism post-rapid development	Continuous advancement in building science and technology, embracing new urban design concepts	Inclusiveness	Quality development

Table 4: Comparison of other countries' stadiums in different stages

Stage	Other Country Stadium	Time	Scale/Capacity	Architectural Features
1 EDS	Germany - Berlin Olympic Stadium	1936	Mega /110,000	Super-scale, solemn
2 CSS	Soviet Union - Luzhniki Stadium	1956	Mega /80,000	Frugal and economical

Stage	Other Country Stadium	Time	Scale/Capacity	Architectural Features
3 AGS	France - Stade de France	1998	Mega /80,000	High-tech, adaptable
4 OGS	United Kingdom - London Olympic Stadium	2012	Mega /80,000	Sustainable, economical
5 PSOS	Spain - Santiago Bernabeu Stadium	2024	Mega /81,000	Technological, humanised

5. The Changing Relationship between Stadium Architecture and the City: Connecting History, Present and Future

5.1 Trend towards the convergence of stadium siting

In the site selection of the stadium building in the capital, it presents the characteristics of siting in the peri-urban area of the city boundary and moving outward with the development of the city. In 1936, the vicinity of Xiannongtan was a peri-urban area, and the stadium was 3.8 km away from Tiananmen Square(city centre); by the end of the 1950s, the urban area of Beijing was gradually expanded, and Youth Lake in the eastern suburb was chosen as the site of the Workers Stadium, which was 4.8 km away from Tiananmen Square, and the site of the Olympic Stadium Centre in the 1980s was even further to the north, which was 8.4 km away from the Tiananmen Square; after the new millennium, due to the development of the city, the construction of a mega stadium was not suitable for the south side of the Olympic Stadium Centre. After the new millennium, due to urban development, it was not suitable to build a mega-stadium on the south side of the Olympic Stadium, so the National Stadium was even further north, with a distance of 9.5 km from the centre; in the post-Olympic era, the city has reached its limit of development, and the location of the Workers Stadium has changed from a suburban area to the core area of the city, so the restoration of the stadium will enable it to be better integrated into the city to serve it. Compared with other national stadiums, Berlin Olympic Stadium is the furthest away from the city centre, located 11 km to the west, while Madrid Bernabeu Stadium is the closest, only 4.2 km away, and most of the other stadiums are between 6 and 8 km away. It can be seen that the sites of the capital stadiums, after moving outwards to their limits, will gradually stop moving and will instead be invested in the renewal of the existing stadiums, forming a spatial core that is constantly integrated into the city.

5.2 Trend towards composite stadium functions

In the overall planning of the Capital Stadium, it can be seen that the overall presentation of the small venues to large single venues, to sports centres, sports parks and then to urban parks, culture, tourism and business integration space of the development of the transformation, which reflects the capital stadium venues layout more intensive and organic, venues function gradually composite integration, the construction of more flexible mode of operation, the public participation continues to enhance the characteristics of the stadium.

In terms of venue categories, it can be seen that integrated stadiums such as the Bird's Nest, London Bowl, Luzhniki Stadium and other integrated stadiums are often used as one of the buildings of the sports centre, forming a cluster effect with other venues to better serve large-scale integrated tournaments, while professional football stadiums such as the New Workers Stadium, Stade de France and Bernabeu Stadium are mostly operated and maintained as independent stadiums in the city's core area, which are also more flexible in terms of the number of events and activities held in the stadiums. This is also more in line with its main activities such as football tournaments. The introduction of commercial, leisure, cultural and tourism businesses in the New Workers Stadium and the new Bernabeu has enabled the stadium to become a city landmark, cultural and sports business card, and a centre of vitality. The attention to urban spatial integration and infrastructure compensation will further drive the overall improvement of the surrounding environment, making the stadium a sports complex in the city, and contributing to the new pattern of 'stadium-region' integrated and linked development in the city.

5.3 Trend towards the adaptive reuse of sports architectural heritage

Major stadiums in capital cities, as events or Olympic legacies, are not only static buildings but also dynamic cultural vehicles. In response to the multiple challenges of tourism, gentrification and climate change, the capacity of the stadiums should be continuously upgraded in order to redefine their social function and cultural

significance. In this regard, it is important to enhance the sustainability of the building, for example, by retrofitting it with a new energy recovery system, enhancing the connectivity of the urban space, for example, by optimising public transport connections, increasing public participation, for example, by utilising NGOs to organise events and implementing a policy of free admission, integrating the land around the building, integrating the renovation and development of the building, revitalising the space, utilising the intensity of the use of the venue by means of an innovative investment and financing model, and enhancing its spatial relevance to the urban environment. And enhance the spatial correlation with the urban environment. This will strengthen their role in improving the quality of life of urban residents and stimulating urban vitality.

6. Conclusion

Beijing stadium architecture, especially the national stadium, is the window and embodiment of the national image and national culture. This paper takes vertical and horizontal comparison as the main vein to analyse the construction background, building scale, construction concept and architectural image of the capital stadium architecture in different periods. At the same time, it also compares the stadiums of other countries in the same period horizontally, explores the unique temporal characteristics behind the stadiums, sums up their architectural features and concepts, and finally concludes that 'The wave of stadium construction orientated to tournament celebrations: from the region to the world' and 'Changes in Architectural Style and Philosophy in the Context of the Times: From Western Learning to Parallel Development'. It provides new ideas for the construction of stadiums in the capital city and other cities and the display of national dignity. We also summarise the urban development characteristics of stadiums in terms of their relationship with the city, and propose optimisation strategies that not only enhance public participation and promote the synergistic and sustainable development of architecture and urban space, but also ensure that these iconic stadiums continue to play a key role as important carriers of the national image, connecting history, the present and the future.

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