

Critical Regionalism for Ingratiation: China's Foreign-Aided Stadiums After 2000

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Abstract: Stadiums have been one of China's most well-known and influential foreign aid projects that attract considerable attention. After 2000, a series of reforms in China's foreign aid generated significant influences on the designs of China's foreign-aided buildings, especially on large constructions such as stadiums. The authors aim to explore the development of China's foreign-aided stadiums after 2000 and analyze the influential aspects on the design processes. Critical regionalism for ingratiation is identified as the main architectural feature. The study is conducted through a detailed analysis of the foreign aid mechanism, case projects, first-hand materials, and interviews with Chinese architects involved. The authors consider these stadiums to represent a unique critical regionalism with cultural and climate elements embedded. It can be regarded as a considerable supplement to the current scholarship on Chinese contemporary architecture and Chinese sports buildings.

Keywords: China's foreign-aided stadium; Critical regionalism; After 2000

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1. Introduction

Since the 1950s, China has exported over 100 stadiums to the developing world, as one significant category of its construction aid, which attracts much attention from the academic world ^[1-4]. However, most studies discuss the diplomatic influence referred to as China's "stadium diplomacy" ^[5-9], rather than their architectural development ^[10-16], especially for the contemporary period. Although China has experienced the reform of market economy in construction since the 1980s, China's foreign-aided projects were still under the management of planned economy models before 2000 ^[14]. After 2000, more reforms were finally introduced into China's foreign-aided projects. China's foreign-aided stadiums benefit from such reforms and start to have new characteristics. Under such new circumstances, what are the main influential factors on these stadium designs, and what are the main attributes of these architectural outcomes that show the current development

of Chinese architectural design and its attitude and working modes in the face of overseas projects under the special diplomatic background? These constitute the main aims of this study.

2. China's aid mechanism of the new era: Market reform and bilateral mechanism

In the new century, China rapidly expanded its overseas aid activities to become one of the main non-Western donors^[17] and began to provide more aid to the countries along the BRI (Belt and Road Initiative)^[18,19]. After decades' economic reform, marketization was finally introduced into China's foreign-aided construction projects after 2000, 20 years behind China's domestic circumstances^[20]. More forms of economic aid were implemented besides grants, such as interest-free loans and concessional loans after 2000^[21]. Larger and more diversified financial support for construction projects contributes to the profound improvement of China's foreign-aided stadiums of the new era. Another effect generated by the new mechanism is that the recipient countries participate more in the process, especially for large, significant public buildings such as stadiums^[11]. For the recent significant China's foreign-aided stadiums, the winning schemes in the bid are finally selected by the representatives of recipient countries from the alternative schemes chosen by China's domestic experts. In the later processes of reviews and constructions, the recipient countries are also gaining more involvement. All these make the mechanism towards bilateral.

3. China's foreign-aided stadiums: Adjustment and adaptation through cooperation and competition

After 2000, China increased its number of foreign-aided stadiums. Over 60 stadiums were exported to other countries by China, with about three-fourths being outdoor stadiums and the rest being indoor. The number of stadiums experienced explosive growth and the geographic distribution varies in the fourth continents (Africa, Asia, Latin America, and Oceania) of the first decades^[14] but returned to focus the Africa and Asia after the BRI was proposed. Generally, 60% (36 stadiums) are located in Africa, while over 10% (7 stadiums) are in Asia (**Figure 1**). Since China's aid diplomacy transformed from grants to cooperation with various financial support modes, the scales and standards of these stadiums have also increased significantly compared with the previous periods.

3.1. Transition and adaptation under new circumstances

The new bid system in China's foreign-aided constructions provided chances for more Chinese design institutes to be involved in the first decade of the new century, including private firms (e.g., CCDI). Architectural designs of these stadiums benefited from various participants with diversified schemes, and the working mode tended to be parallel with that of commercial projects. Another transition lies in the working mode of architects that turned out to be more flexible, with multi-cooperation, especially with overseas companies, such as the My Dinh National Stadium in Hanoi and the Mahinda Rajapaksa International Cricket Stadium in Jamaica. After the Beijing 2008 Summer Olympics Games, China has been conducting intensive construction of sports venues consistent with the high international standards, not only in its capital but also in other major cities, which in turn has improved the design and construction level of stadiums constructed in the aid program. Chinese architects and design institutes got more practice and, coincidentally, returned to the court of designing foreign-aided stadiums independently after the 2010s.

Under such transitions, China's foreign-aided stadiums in the new era tend to be more diversified with higher standards, larger scales, and more powerful influence. Some of China's best foreign-aided stadiums were



Figure 1. Regional distribution of China's foreign-aided stadiums after 2000

designed and constructed. Over ten stadiums used full-coverage roofs, and many had tried the “skin” language in architectural expression, which required higher cost and more complex structures and materials. Recently, many recipient countries expect these aid buildings to be the symbol of the modern level of the city/country and to be qualified for the application of significant international sports events and other national events. The bidding mechanism forced Chinese architects to satisfy the recipient country’s preference, especially when it became the final decision-maker during the reform. Chinese architects started to introduce more regional design approaches, with attention to the local culture and climate, in their understanding in exploration of modern design languages. Such regional concerns in the architectural design of stadiums tend to break the economic limitations and conservative routines. More large-scale, multi-dimensional, and high-profile expressions of regional aspects were integrated in the outdoor stadiums. And these efforts gradually transformed from designs with the understanding of Chinese own understandings, to more ingratiating for the recipient countries.

3.2. Case studies

Three cases were selected for a comprehensive understanding. The national stadium of Tanzania was designed in the early years of the 2000s and was also the first case in which Chinese architects cooperated with a foreign design company. The design work of China’s foreign-aided stadium in the Ivory Coast lasted from the late 2000s to the early 2010s. The last stadium case in Cambodia was designed in recent years as China’s largest and most costly aid stadium ever since. These cases can illustrate the most recent development of architectural features of China’s foreign-aided stadiums after 2000.

3.2.1. Adapting standards and techniques: National Stadium of Tanzania

As it established diplomatic relations with China in 1964, Tanzania received a large amount of construction aid from China, such as factories and collieries, among which was China’s first large-scale aid project, the Tanzania-Zambia railway of 1,860 km long in 1975. For this newly independent country, sports played a crucial role in its nation-building process, and the stadium became a significant venue where national events were held, such as the National Liberation Day.

Designed by two South African companies, the initial scheme followed South African standards and adopted the usage habits of the Tanzanian locals. However, detailed and technical designs (including structures and materials) by BIAD needed to use the Chinese standard, for the construction to be led by BCEG in cooperation with Tanzanian contractors. This required Chinese architects to adapt Chinese standards into the local ones and which were used in the initial design. Although it was not the original creation completed by Chinese architects, how Chinese architects tried to adapt Chinese standards to the local designs through their developing designs is interesting and worthy of discussion.

Located in Dar es Salaam next to Uhuru Stadium, Tanzania’s previous national stadium, the new national stadium, also known as Benjamin Mkapa Stadium, has a 60,000-seat capacity and 69,050 m² gross floor area. With the considerations of Tanzania’s love for football games and the low frequency of track and field competitions, the shape of the stands was designed to hold two straight east-west edges and two semicircles to minimize the horizontal distance between the audience and the site for football games. This is quite different from the four-circle-center shape as commonly used in China’s domestic. The general layouts of the floors, the roof forms, and the surrounding facades also followed the shape of stands ^[22]. As over 10% of the local population was disabled, the conceptual design placed two large cross slopes on the north and south sides

following the semicircle shape, and one centralized slope at the main entrance to connect the ground floor and first floor. The idea was well conveyed in the in-depth design by Chinese architects and was even improved to better serve the capacity of traffic to the stadium by replacing the single slope of the main entrance with two separated ones alongside (**Figure 2**). The adjustment was also in coincidence with the site designs developed by the Chinese institute, with symmetric axial squares and parking areas. Besides, more quantities of seats for disabled people were arranged in this overseas stadium, which was of a higher standard than China's domestic barrier-free design standard ^[14].

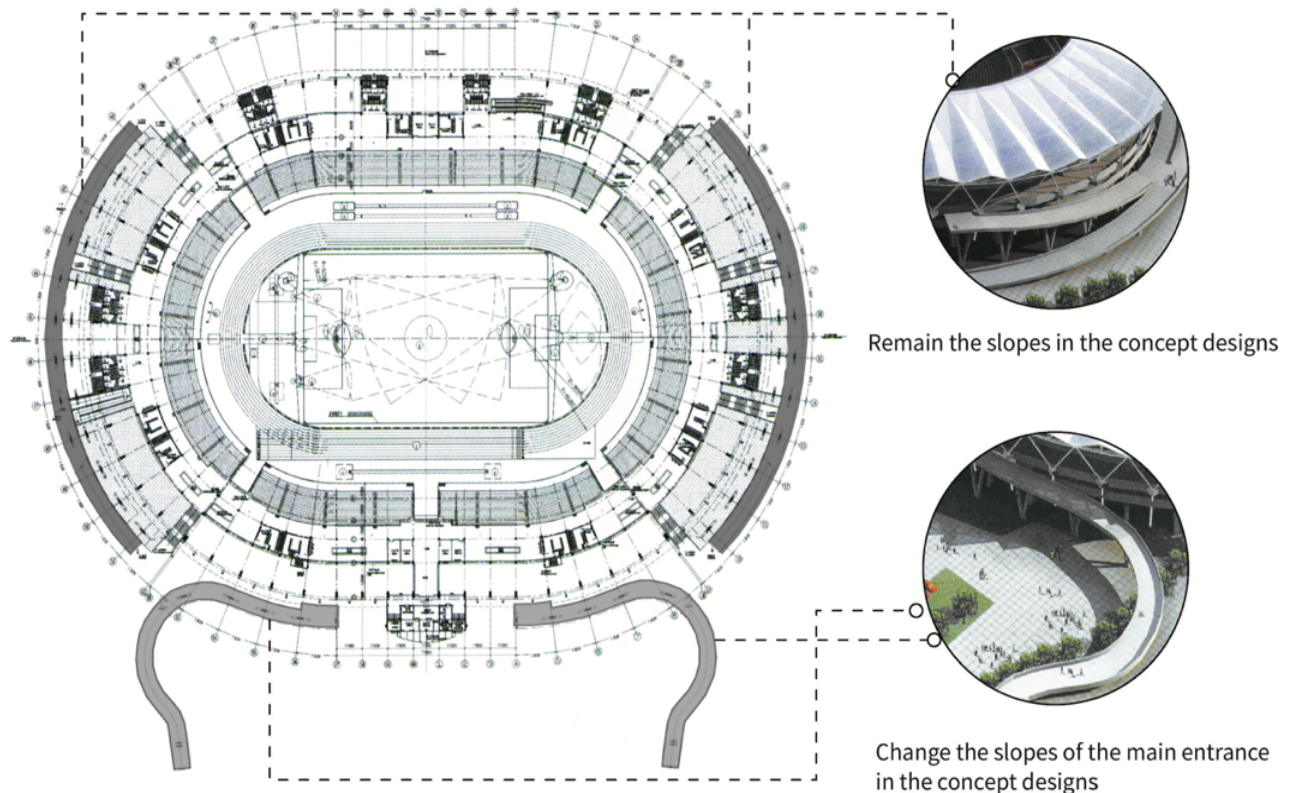


Figure 2. Improvement of the designs by Chinese architects in the China-aided national stadium of Tanzania (Source: drawn by the authors based on reference ^[22])

In addition, standards were not the only challenges that faced Chinese technicians. To portray a modernized stadium with advanced technologies, WAS Architects' initial designs used the membrane roof to fully cover the two-layer stands, together with the mainstream development of stadiums worldwide. To achieve the modern, international, and high-tech image, more advanced structures and technologies were utilized in the in-depth design by BIAD. The spatial pipe truss (for the main perpendicular and roof structure) and the cable-membrane tension structure were used in the stadium. Chinese architects introduced more V-shaped supporting columns than indicated in their initial designs. However, the repeating curved membrane roof was replaced by the folding triangular plane-shape membrane roof with V-shape section, which simplified the membrane structure and material requirements. Nevertheless, the structural teams of BIAD still tried hard on the structural designs ^[23,24], as the membrane structure was not commonly used in Chinese domestic stadiums at the beginning of the new century. The new structure reduced the weight to generate a more light-hearted appearance. Also, the roof was

constructed with an advanced ETFE material that had heat-resistant abilities (with solar reflectance above 70%). To improve the rainfall shortage in Dar es Salaam, a special rainwater recycling system was set up ^[22].

Such simplification and energy-efficiency approach seems to be the inheritance of the design routines from the previous period, when Chinese architects used economic methods to achieve the general effects ^[14]. However, the higher requirements and international cooperation of the foreign-aided stadiums forced them to pursue a better design. The ETFE material and membrane structure were first used in China-designed/constructed stadiums in advance of Chinese domestic stadiums (**Figure 3**), when several years later, Beijing's "Water Cube" national natatorium shone its light using the same advanced material and structure. The authors believe that the experiment of the new material and structure in this China-aided stadium might provide a practical reference for the widespread use of the membrane in Chinese domestic stadiums after 2008, and also prepared BIAD for its future winning of the design of other China's foreign-aided stadiums, such as the Cote d'Ivoire stadium.



Figure 3. The bird view (left) and inside view (right) of the Tanzania National Stadium (Source: <https://www.stadiumguide.com/tanzania-national-stadium/>)

Tanzania National Stadium hosted its first events in 2007 after construction was completed, and was officially inaugurated in 2009. The stadium is at present the home of Tanzanian top sides Simba and Young Africans and has replaced the Uhuru Stadium as the national team's home ground. Behind the officials' rhetoric of friendship and cooperation, this stadium revealed the mode of China's aid in the 21st century, transferring from ideologically driven to market-oriented, which benefited both sides through Chinese exportation of designs, labor, and materials, and Tanzania's experiences in techniques and constructions through involvement.

3.2.2. Understanding of the local and the design between bio-influence: China-aided stadium in the Ivory Coast

Ivory Coast established its diplomatic relationship with China in 1983. It has received construction aid from China ever since, such as the Senator's Home, the Conference Hall of the Ministry of Foreign Affairs, hospitals, schools, etc. In recent years, the Ivory Coast has been one of Africa's most dynamic economies, and China has become its largest financing country and the third greatest trading partner.

The new China-aided stadium was in the northern entry gate of Abidjan, the Ivory Coast's informal capital, in the suburban areas of Ebimpe and Anyama. The new stadium was a part of the Olympic Village Ebimpe, a multi-use governmental-level project with a total land of 287 hectares, which was expected to become the

centerpiece of the 2021 CAN. This China-aided Olympic stadium holds a 60,000-seat capacity and RMB 0.75-billion-yuan cost, covering 20 hectares. It is required to meet the standards of holding international high-level football, athletics, and rugby tournament games, and to be one of the largest and most modernized stadiums in Africa after its construction. Both the design and construction were put into bidding in domestic China by evaluations to determine the enterprises for the missions, as a result of the newly developed mechanism of China's foreign-aided construction project of the new era.

BIAD won the bid for designing the new national stadium project in 2015, with the concept of "African drum" (**Figure 4**). As introduced by its chief architect, Miao Liu, in our interview, the idea of a "drum" suddenly occurred to him when he was watching a football game at night while relaxing from the anxieties of working on the design of the stadium. The devotion of Africans to sports and the local culture filled the mind of the designer, and the concept was occasionally inspired by the sound of the game he was watching. The main image of this mega-structure looks similar to a drum with local ethnic characteristics. The designer believed that emphasizing symbolic and metaphorical forms might attract attention and help win the bid. Compared with the two other new stadiums to be constructed in the Ivory Coast, designed by foreign firms, the China-designed one holds relatively obvious characteristics shared with the new China-aided national stadium of Tanzania, identically designed by BIAD using the membrane roof in full circles and the waving-feeling supporting structural elements. The initial designs of this stadium also illustrate the influence Chinese architects received from Beijing's Olympic stadiums (Herzog and de Meuron's "Bird Nest" and "Water Cube," for instance) and their favor of the "skin" coverage in stadiums. Symbolization in the form of stadium "skins" was exported into China's overseas projects.



Figure 4. The initial winning design by BIAD of China-aided stadium in the Ivory Coast (Source: <http://www.biad.com.cn/newspost.php?id=22>)

However, the designers' favor of the local culture was actually misunderstood. The designers' favor of the local elements in their regional design approaches differed from what the recipient country wanted. With the opinions from the recipient country, the "African drum" concept was totally replaced by a new one dubbed "Arc de Triomphe" (Triumphal Arch). As one of the football world powers and the winner of CAN, this country's enthusiasm for football games represents its nation and spirit to a great extent. The designers had noticed the significance of football, but they expressed their feelings in a mild manner, which, however, the recipient country would like to portray in a contrary or more obvious way. The supporting structural elements of the facades were changed into tensioned lines upward from the base to imitate the shapes abstractly when people stretched their bodies with shoulders on shoulders as a metaphor of power and unity. The curved convergences

of each two lines on top formed the Triumphal Arch in deformation shapes, which enabled the general appearance of the facades to echo the winning cup of CAN. Decorations on the facade were designed with orange interior walls, white rods, and green plinth, which match the colors of the national flag and highlight the national image of the recipient country, conforming to the identity of being a new nation.

This case illustrates that the recipient country started to care about what the gift from China would look like and involved itself in the design of the donated stadium. Although China's experts made the final decision in the bidding evaluation procedure in China, the recipient country's opinions may also influence the final results greatly through the revision process. Such opinions sometimes interfered with the design and even totally changed it. The revisions with strong opinions from the recipient country expanded the working time of the design from 2014 to 2017 (Figure 5).



Figure 5. China-aided stadium in the Ivory Coast: top, rendering; bottom, the stadium in construction (Source: top and bottom left, from BIAD; bottom right, from <https://www.trendsmat.com/twitter/tweet/1152513481477906437>)

It can be revealed from this stadium that standard improvement was made for China's foreign-aided stadiums after the 2010s. The China-aided stadium in Ivory Coast has three-layer stands and a full coverage membrane roof with a higher cost, multiple functions, and better design standards for international games. Funded through an EIBC (Export-Import Bank of China) loan, the construction was completed by Beijing Constructor Group by the end of 2019, after 34 months from the ground-breaking, well ahead of the 2021 CAN, which will be staged in Ivory Coast. The author regards this stadium as a turning point where the designs of China's foreign-aided stadiums transformed from economic ones to high-standard ones with regional expressions.

3.2.3. High-profile adaptation: New National Stadium of Cambodia

In the next decade, to improve the design efficiency and understanding from Chinese architects, a new adjustment was applied. The bid mechanism in China's foreign-aided construction projects starts to give recipient countries more discourse rights based on their presence as one of the final decision-makers to choose the design scheme. Most of these countries, which gained their independence from long-time colonization in the 20th century or even in the new century, tend to express a strong consciousness of nationality and culture in these stadiums. Chinese architects tended to accommodate such desires for winning the bid through more obvious expression and high-profile adaptation in architectural designs.

As one of China's best partners in the Asian area, Cambodia received a lot of aid from China since the 1950s^[19,25–27]. In 2014, China agreed to finance one large stadium at a high cost of RMB 0.925 billion. It is China's most costly, largest-scale, and highest-standard foreign-aided stadium, as well as China's most expensive foreign-aided construction project. Different from China-aided stadiums of the previous period that emphasize economic efficiency^[14], this stadium may equal the large stadiums of China's major cities and will be qualified for holding continental sports events, big international football games, and national activities, as the new national stadium of Cambodia.

For the main stadium, aided by China, the design was completed by Chinese design institutes through a bid in China. The bid evaluation by Chinese experts selected three design schemes in 2015. The alternative schemes were later introduced to the Cambodian representatives. However, the Cambodian representatives could not decide, so they reported the schemes back to the governmental authorities of their country. In the end, it was Prime Minister Hun Sen of Cambodia who made the final choice upon his preference for the design from IPPR. This stadium became the first China's foreign-aided stadium where the design was chosen by the head of state of the recipient country.

Covering 14.9 hectares' site areas, the main stadium accommodates 60,000 seats with 80,000 m² gross floor areas. Surrounded by the indoor stadiums designed by Cambodia's local architects, which shared unique features symbolizing the country's tradition and culture, the imported mega-structure needs to be accommodated with the existing local contexts. However, as the largest and most modernized stadium of the country and being designed by the donor's state-owned design institute, the architectural expression seems to be obviously different.

As explained by the architects from IPPR in our interview, the design scheme from IPPR won Hun Sen's preference for its adoption of multiple regional design approaches of cultural expression, combined with modern architectural language and technologies. The form of the stadium followed the roof ridge of traditional Cambodian buildings, as two giant bridge columns with unique shapes were set at both ends of the north–south axis of the main stadium, serving as the convergence support of steel cables of its roof membrane structure. The front appearance of the giant columns simulates the hand gesture of “namaste,” which is a traditional Cambodian and Buddhist greeting, while their inclination coincided with the side shape of the structure to symbolize a dragon boat, a significant cultural element of Cambodia. Such imitation also existed in macro and micro scales, as such the ring-shape water system was located around the main stadium in the layout planning, as a reflection of Cambodia's traditional planning idea of “moat” . Furthermore, the decoration of special flower-shaped patterns was attached to the hollow grid plates of the gold-colored façade, as Cambodia's favorite traditional color.

The use of the concepts of “namaste” and “dragon boat” was favored by Cambodia's leader but generated

challenges for architectural techniques, especially the structure and construction. It was achieved through a complex structural design with unique hyperbolic herringbone-shaped towers, a large-angle ring column cable membrane truss awning system, and a ring column-beam supporting structure system. The section of the herringbone-shaped tower was gradually reduced from the bottom to the top and closed at a height of 78 m, finally reaching a height of 99 m. The top height of the tower was formally designed to be 96 m, but later changed by Hun Sen to be 99 m for his belief in the good fortune behind the new number. The exterior of the tower is made of fair-faced concrete, while the middle body is hollowed with partitions set horizontally, wing-shaped steel bones, and a steel bar skeleton inside. The 65-m cantilever cable-stayed locking membrane awning takes the ring beam and ring columns as the support system, and the ring columns outward tilt at an angle of 67 to 79 degrees from the ground. BIM technology was used for the steel mold configuration of the beam and columns, and SAP simulation analysis was carried out to control the tension deformation. ETFE was used as the membrane material, which has been widely experimented with successfully in China. The metal curtain wall is composed of stainless-steel cable and 1.2-mm-thick aluminum-magnesium-manganese perforated plates, covered between the ring columns around the stadium as the facade. The landmark and symbolic form was achieved at the expense of high cost and complex structure, with the help of advanced computer software and materials for the ingratiation of the recipient country.

Additionally, climate-concerned regional designs were utilized in the stadium, as many previous China-aided stadiums did. To cope with the hot dry season and long rainy season in Cambodia, plenty of open space was reserved under the first-floor platform, forming an all-weather activity venue. The main facades of the stadium adopted aluminum perforated plates, and the awning used a membrane to meet the requirements of sheltering from sun and rain, and natural lighting and ventilation. The hollow plates also contributed to the natural ventilation of the stadium. All three-layer stands were overlapped to introduce more air flows. The under-back areas of some seats were hollowed for ventilation and cooling, similar to the designs in the Olympic Stadium of Cambodia in the 1960s^[14]. The surrounding water system improved the microclimate of the site, which was also similar to the design of the Olympic Stadium of Cambodia. It seems that Chinese architects have gained experience in using these passive-efficient technologies through years of being involved in the foreign-aided projects, and through the knowledge learned from China-aided stadiums of the early period.

The construction began in June 2017 and was completed in October 2021. The Chinese firm is entirely responsible for construction, partnered with L.Y.P Group as the developer. This is the first time that the BIM was utilized in China's foreign-aided construction projects, and it has been increasingly widespread in the design and construction of Chinese domestic projects. Chinese enterprises start to experiment with new techniques in overseas projects for profits and efficiency with more open attitudes authorized by the government of the new period (**Figure 6**).



2018.3



2018.5



2018.12



2019.4



Figure 6. Construction processes of China-aided Cambodia's new national stadium (Source: top two and middle left, from IPPR; middle right, the photo was taken by the author in 2019, in which the author was on a site investigation with Chinese engineers Mr. Baiqing Liu and Mr. Zhiwei Yin from IPPR; bottom, the stadium after construction was completed, from https://8bur.cscec.com/xwzx18/gskx18/202108/3381511.html?ivk_sa=1024320u)

4. Conclusion

Generally, in the new century, significant transitions have happened in the influential aspects of the design of China's foreign-aided stadiums. China's foreign aid policy and mechanisms generated considerable impacts on the designs, mainly for the utilization of tender and bid systems, and more diversified funding modes in these overseas aid projects. Another significant development was the increasing participation of the recipient countries in deciding the design due to the transformation of the mechanism, leading to the "recipient countries' opinions" being one of the most influential aspects. Chinese architects considered more about the regional aspects and the recipient countries' preferences in their designs. Cultural symbolizations become the main theme of the design concept and play critical roles in the designs of China's foreign-aided stadiums, especially in recent years. And the climate-oriented approaches were improved from low passive techniques of the previous period to high-tech ones of the new era. Regional aspects turn out to be the main course on the design table of Chinese architects.

China's foreign-aided stadiums bloomed with diversity and transitions in recent years, improved in the design level of such stadiums with the pursuit of high-standard stadiums by the recipient countries, and the great development of China's stadiums from the pre-Olympic period to the post-Olympic period. Although these stadiums cannot be considered the best Chinese stadiums, they are mostly the best stadiums in the recipient countries. Influenced by China's special construction aid mechanism and the recipient countries' opinions, these stadiums have become the products of bi-control and bi-choice of the donor and the recipient sides. The authors consider these designs of the new era to represent a unique critical regionalism with cultural and climate elements embedded in the mega-structures with modernism, adaptation, techniques, cultures, or combinations thereof.

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