

## A Study on China's County Sports Center Planning Strategy from Smart Shrinkage Perspective

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**Abstract:** At the end of 2017, the urbanization rate of China's permanent residents was 58.52%, which has increased by 1.17% over last year. It is expected to exceed 60% by 2020. Rapid urbanization has brought about expansion of large cities and contraction of small and medium cities. Most of counties become population decline areas, which are not suitable for extensive development. Meanwhile, sports facilities in China's counties are extremely lacking. The promotion of sports industry and national fitness policy are imminent. Based on current situation of urban and industry development, this paper points out the problems and misunderstandings of current county sports centers in China, and combines several planning practices to propose the view of “smart shrinkage”. According to the planning and construction of county sports centers, this paper proposes four planning strategies: improving efficiency under shrinkage, intensive scale under precise orientation, function rebuilt under needs and the open and flexible interfaces, intending to guide the development of counties in China and to provide reference for planning and construction of county sports centers.

**Keywords:** Shrinking County, Smart Shrinkage, County Sports Center, Planning Strategies

### 1. Introduction

Driven by competitive sports represented by Olympic Games and National Games in recent years, China's sports industry has developed rapidly. The hosting of big events such as the 2008 Beijing Olympic Games, the 2010 Guangzhou Asian Games, the 2013 Liaoning National Games and the 2017 Tianjin National Games led to a construction boom of sports centers. Negative issues were also exposed such as high investment, low utilization and difficult operation. After the reflection of post-Olympic era and the fervent preparation for the 2022 Beijing winter Olympics, the planning and construction of China's sports centers faces new opportunities and choices once again.

For large and medium cities, the planning of new sports centers often follows the principle of “smart growth”, to improve the land exploitation intensity and the output efficiency (Dovey, K., 2012). These sports centers will become catalysts for new developing areas because of their multiple functions and landmark effects. However, for China's 2,856 counties, are in a rapid urbanization process and still developing (Ma, S., and Long, Y., 2018). The condition of counties can't support such extensive development, not to mention the high investment and continuous operation of sports centers. The

strategy of “smart shrinkage” can actively guide land utilization, adapt to the county development trend, and seek the balance between economic input and social benefits (Zhao, M *et al.* 2015). Therefore, author puts forward the smart shrinkage view based on the planning and construction of county sports centers, and carry out a lot of research in order to provide reference for the sports facilities at county level and town level in China.

## **2. Structural imbalance and planning misunderstandings of county sports centers**

### **2.1. Shrinkage trend of county development**

At the end of 2017, the urbanization rate of China's permanent residents was 58.52%, which has increased by 1.17% over last year. It is expected to exceed 60% by 2020. Rapid urbanization has brought about expansion of large and medium cities and shrinkage of countryside (Academic Work Committee of China Urban Planning Society, 2017). But counties are in an embarrassing situation, most of them have become population decline areas. The recession caused by shrinkage is contrary to original purpose of urbanization. The problem is not the shrinkage itself but the methods facing with shrinkage. The construction of large sports centers is obviously not smart, that will overdraw and decentralize limited resources of county under this background. Therefore, it is necessary to form a consensus based on smart shrinkage to adapt to transformation of county economy.

### **2.2. Unbalanced structure of county sports facilities**

Significant achievements of China's sports facilities have been made since new century. However, sports facilities in most of counties are still lacking while total number is growing rapidly, and the quantity, coverage and regional distribution of construction are difficult to meet needs of society. “The Sixth Nationwide Sports Fields Census Data” shows that the number of sports fields in China has reached 1,694,600. Among them, there are 365,983 sports fields in the county, accounting for 22%. The indoor gymnasiums in counties are less than 9%. The rate in towns are even lower, only 5% (General Administration of Sports of China, 2014). The rest are mostly outdoor fields (Figure 1). Compared with the quantity, the quality is also low. They are far from the conditions for organizing sports events or opening to residents. Counties have a sharp contradiction between demand of sports facilities and current conditions.

### **2.3. Misunderstandings of county sports center planning**

For the sports center projects, most governments of counties build for the first time or haven't built for a long time, lacking professional knowledge and construction experience. It is easy to get into blind and luxurious mistakes at the beginning because there is no operational preparation. The excessive standards will increase the cost of construction, operation and even abandonment stage, which will bring continuous burden to local finance. Another situation often facing with is that planning conditions are various and lack accurate correspondence with planning of sports centers, it will result in poor site selection, poor supporting facilities around, poor site conditions and improper scale of site, all of which are negative factors affecting sports center planning.











## **3. Strategies from the perspective of smart shrinkage**

Facing problems and misunderstandings in county sports center planning, author proposes some strategies according to recent projects based on perspective of smart shrinkage.

### 3.1. Land Use: improving efficiency under shrinkage

#### 3.1.1. Compound development

Traditional sports centers operate on competition economy and related industries. In United States, Europe and some large cities of China, economic returns of sports industry are considerable. However, the county sports centers lack of sports events and population foundation, that can't survive by sports industries. It is necessary to develop multiple functions for sports centers by adding some functions related to residents' life (Thom, M., 2012). For example, the Dongshan County Sports Center in Fujian province, combines cultural functions such as museums, gallery, and theatre to form a culture and sports center that consisted of one stadium and six venues. Meanwhile it connects west an east urban green space to form a city's sports park belt. The Zhongmou County Sports Center in Zhengzhou city merges three gymnasiums in the planning to save land, while adds 42,000m<sup>2</sup> of commercial spaces

<b>Table 1</b> Comparison of case indexes of county and district sports centers					
Name	Tengchong City Sports Center	Yanshi City Sports Center	Huayin County Culture and Sports Center	Dongshan County Culture and Sports Center	Tongbai County Sports Center
Site plan					
Grade	County-level City	County-level City	County-level	County-level	County-level
Population	660,000	632,000	263,000	220,000	438,000
Content	1 stadium and 2 gymnasiums	1 stadium and 2 gymnasiums	1 stadium and 1 gymnasiums	1 stadium and 6 gymnasiums	2 gymnasiums
Site	10.7 hm <sup>2</sup>	11.6 hm <sup>2</sup>	16.8 hm <sup>2</sup>	38 hm <sup>2</sup>	3.9 hm <sup>2</sup>
Area	83,000 m <sup>2</sup>	40,000 m <sup>2</sup>	71,000 m <sup>2</sup>	152,000 m <sup>2</sup>	15,000 m <sup>2</sup>
Plot ratio	0.77	0.34	0.42	0.36	0.39
Note	No training track	Training track share with school	Multi functions complex	Culture and sports complex	No stadium
Name	Zhongmou County Sports Center	Xinxian County Sports Center	Huinan County National Fitness Center	Xinyang City National Fitness Center	Pulandian City Sports Center
Site plan					
Grade	County-level	County-level	County-level	District-level	District-level
Population	800,000	270,000	370,000	850,000	916,000
Content	1 stadium and 3 gymnasiums	2 gymnasiums	1 stadium and 1 gymnasium	1 stadium and 2 gymnasiums	1 stadium and 2 gymnasiums
Site	8.8 hm <sup>2</sup>	8.6 hm <sup>2</sup>	3.7 hm <sup>2</sup>	16.3 hm <sup>2</sup>	18.8 hm <sup>2</sup>
Area	35,000 m <sup>2</sup>	32,000 m <sup>2</sup>	15,000 m <sup>2</sup>	48,000 m <sup>2</sup>	77,000 m <sup>2</sup>
Plot ratio	0.40	0.37	0.42	0.29	0.41
Note	No training track, Complex	No stadium	No stands in stadium	No stands in stadium	Complex

underground as profitable space (Table 1).

### 3.1.2. Improve utilization efficiency

Different from construction in large cities, the land use and construction scale of county sports center is limited, so we should tighten the layout and shorten the service radius. It takes 2 hectares of land to build a standard athletic track. If you consider some stands and necessary space, that would be at least 3 hectares of land. Meanwhile you must have suitable site on shape and conditions, the cost and scale of land is large for counties. Therefore, the utilization efficiency of land is the key to the success of county sports centers. Table 1 lists planning indicators of several county sports centers. It shows that the land area is mostly in 10-20 hectares, which is also the economic scale of county sports center. According to traditional layout of one stadium and two gymnasiums, we can achieve appropriate plot ratio of about 0.4, but it is difficult to increase training track. In sports center in Tengchong, an attempt is made to plan one stadium and two gymnasiums in mountainous of nearly 10 hectares' site. The density is obviously high that the plot ratio is over 0.7, which affects the quality and usage of outdoor space. Because of limited population and land in counties, priority should be given to building construction, while the outdoor sports fields are less important that can be properly shrunk, without reference to the standard of large or medium sports centers.

## 3.2. Construction Standard: intensive scale under precise orientation

### 3.2.1. Reasonable competition level

As most counties lacking of economy, competitions and events support, smart shrinkage should first be considered as decompetition. County sports centers can't host big sports events such as Chinese National Games, Chinese Football Association, Chinese Basketball Association. In a few cases, it can be used as a sub-venue for these events. In "Construction Standards for Public Sports Buildings"(Ministry of construction of China, 2009), competitions hosted by sports centers is classified into special, A, B and C from Olympic Games to local sports games, the level of county sports centers is mostly C-Class or B-Class at most (Table 2). Still take the stadium as an example, Table 3 stipulates relationship between the seats number and urban population. Counties with population less than 200,000 should not build a stadium with more than 10,000 seats, while counties with population less than 500,000 build a stadium of C-Class with 15,000 seats is enough. For small counties, the population should be urban population, because many people are scattered in remote areas that it is difficult to participate in sports, we need to consider the appropriate reduction for this factor. Therefore, it is reasonable that there are no stadium or no stands in some county sports centers such as Xinxian County and Tongbai County.

<b>Table 2</b> Level of stadium		
Grade	Main events	Seats number
Super	Olympic, FIFA, IAAF World Championships	>60000
Grade A	National and other international competitions	60000-25000
Grade B	Regional and national individual competitions	15000-25000
Grade C	Local and mass sports meetings	5000-15000

Table 3					
Construction scale of stadium according to population					
Area of per seat (m <sup>2</sup> ) Population	Seats	40000-30000	30000-20000	20000-10000	10000-5000
More than 2 million		1.20-1.25	1.20-1.25	1.10-1.25	1.10-0.80
1-2 million			1.20-1.25	1.10-1.25	1.10-0.80
0.5-1 million				1.10-1.25	1.10-0.80
0.2-0.5 million				1.10-1.25	1.10-0.80
Less than 0.2 million					1.10-0.80

### 3.2.2. Estimated construction cost

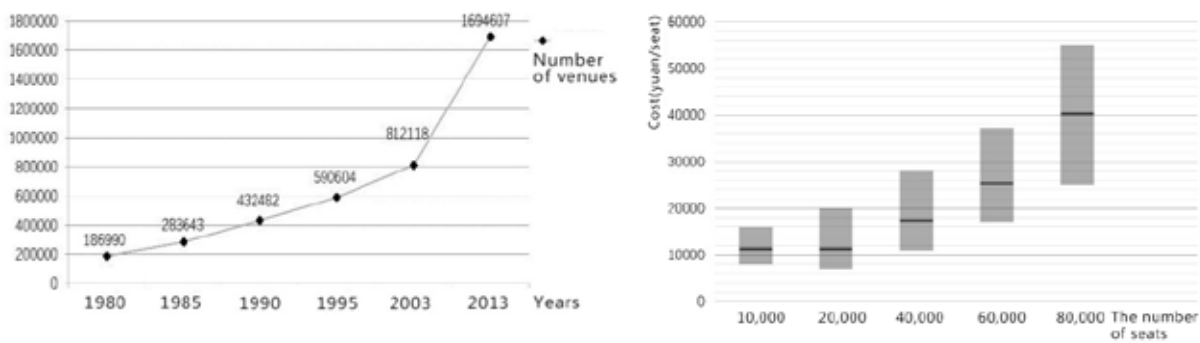
China's county sports centers are in short supply now, especially in the central and western regions. In this case, National Development and Reform Commission of China put forward the overall goal of improving coverage rate of county sports centers, national fitness centers and fitness facilities in the “Implementation Plan of 13th Five-Year Public Sports Popularization Project” (National Development and Reform Commission, 2016). At the beginning of county sports center development, proper understanding of construction standards and costs is guarantee for planning. The cost of Sports buildings is usually estimated by the average cost of seats, but this way is easy to ignore the change of the average cost caused by the increase seats number. If the seats number increases to a certain level, it will cause change in stand form, the building will require a lot of stairs for upper stands, also cause an increase in the span of structure and the area of roof, which leads to a sharp increase in the average cost of the seats (Figure 2)( John, G *et al.* 2017). So, the cost of a stadium with 40,000 seats is far more than two times of one with 20,000 seats. Figure 3 illustrates the average cost of seats in stadium with different number of seats. Choosing an appropriate point on the parabola is the key for government to make decision. For counties, the cost-effectiveness ratio of athletic track and football field is higher than stadium with stands and roofs which should be carefully controlled. The gymnastics have low cost and high utilization rate, so the area can be properly increased. However, it is unnecessary to increase the seats number and diving pools in natatoriums.

## 3.3. Function planning: function rebuilt under needs

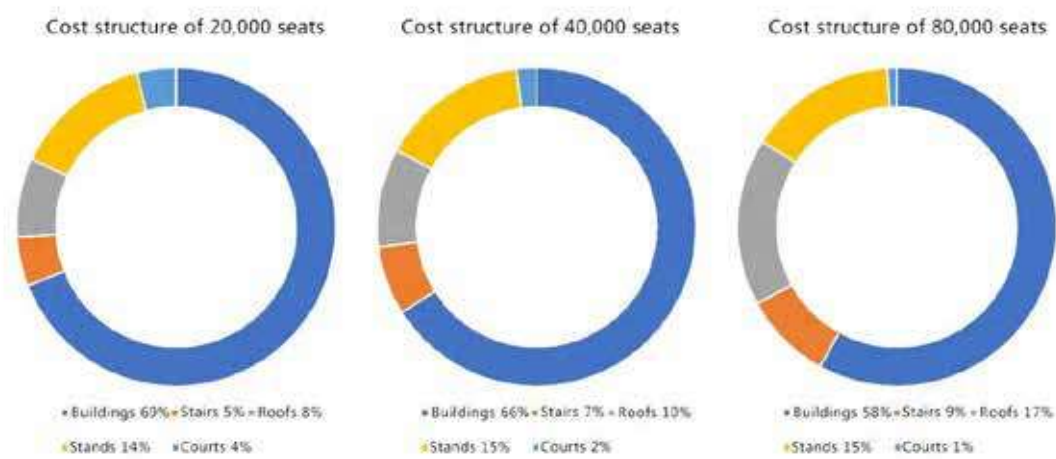
### 3.3.1. Public fitness function

Including 2021 Shaanxi National Games, there have been eight provinces in China that have hosted this sports event. The participation of whole province benefits the small and medium cities that receive the construction of sports centers. However, current situation in China is that the proportion of large sports center is relatively higher than fitness centers. For the public, small fitness centers are more popular for better participation and flexibility. Those fitness centers should not be the same as traditional stadiums and gymnasiums, but take national fitness as the primary function. In the planning of Tongbai County Sports Center in Nanyang City, Henan Province, we formulated three principles based on the conditions and limitations: Firstly, the park is designed as a national fitness park, adding fitness paths, fitness equipment, open-air fields and other simple facilities; secondly, the old athletic track and gymnasium are completely retained, but reformed the gymnasium into a fitness center;

finally, only a gymnasium and a natatorium are built to save costs. The new two buildings are classified as class-C to serving the public fitness and small competitions. They are designed together and also share some facilities (Table 1). Through above planning measures, with the minimum cost and construction, the fitness conditions for residents have been significantly improved, so that the government and the public get a win-win situation.



**Figure 1.** Number of venue in China over the years **Figure 3.** Relationship between the number of seats and the average cost of seats in stadium



**Figure 2.** Cost of stadiums with different number of seats

### 3.3.2 Non-sports function

The county government can not set up sports, culture, media, tourism and other departments separately, instead, a comprehensive bureau is responsible for the operation and management of all those events, creating convenience for the county sports centers to organize activities. Culture, art, commerce, public welfare is highly participatory, which can balance the part of the people and time in sports and form a supplement, which is also a strategy to improve efficiency under the scale shrinkage John, L. K., Philip, E., and Richard, R., 2013). Activities such as commercial performances and exhibition, which are similar with sports in space requirement, can be designed as multifunction; outdoor sport can be combined with sports parks to add entertainment facilities such as outdoor bleachers and theatres, and leave a certain space for temporary facilities as a backup for other temporary events. The Dongshan County Culture and Sports Center will serve as a window to display Guandi Culture and

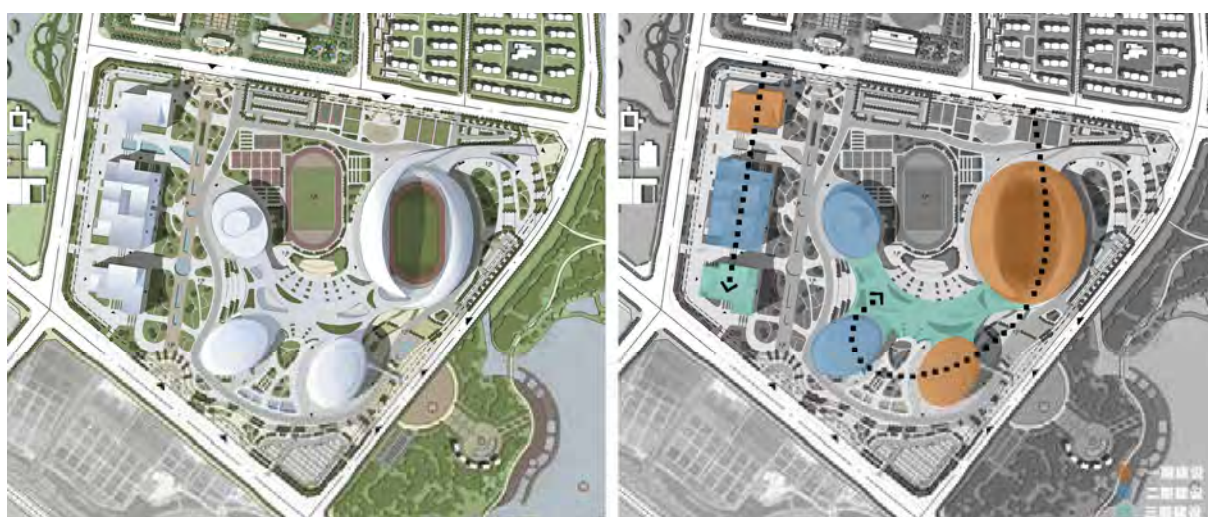


Minnan Customs after completed, also can be the space for festivals and worships. The Tengchong City Sports Center will also support for cultural activities such as Tengchong Fengma Music and Art Festival and Minority Festival. The sports centers are changing from the traditional “Arena mode” to “Complex mode”, truly becoming the carrier of residents' culture and sports life.

### 3.4. Continuous operations: open and flexible interfaces

#### 3.4.1. Break up the goal into parts

41.80% of China's sports centers run by public institutions, with redundant personnel structure and weak profitability. And it is easy to leave unused after one-off built, which is not synchronized with regional development. Although the State advocates such modes of operation as "Public Construction and Private Operation" and "Entrusted Management", it is difficult for county to introduce professional operation companies, because counties always lack of geographical and economic advantages. In this case, smart shrinkage is not reflected in the increase of profits but the reduction of operating costs. Smart timing control and building in phases are particularly important. For large projects, one time planning, phased building and flexible strategy can reduce irreversible construction, and operational goals can also be adjusted in the development. The construction of Dongshan County Culture and Sports Center is divided into three phases. In the first phase, a museum and workers' cultural palace are built firstly to meet needs of large festival activities such as the county sports meeting. In the second phase, other gymnasiums will be built to complete the landmark and attract residents. In the third phased, the 20,000 m<sup>2</sup> platform and other businesses will be built by cooperate with social capital in a long term, after surrounding residential areas developed (Figure 4). Another smart shrinkage is reflected in breaking the whole operational goals into parts to improve operational efficiency and diversity. The planning of Xinyang County National Fitness Center distributes the stadium and two gymnasiums in two blocks. The first two gymnasiums will focus on public service functions such as cultural activities and daily fitness, different from the stadium focusing on large activities and events in the future (Table 1). This strategy can also distract the operational pressure of large sports centers.



**Figure 4.** Phased Construction of Dongshan Culture and Sports Center

### 3.4.2. “Sports +” mode

Blind shrinkage will restrict scale effectiveness of sports centers and lead operation into a alley. Smart shrinkage is also reflected in the focus of performance goals, including the reduction of similar sports functions, the integrating of sports-related industries, and the merger of public services. In order to gather social forces and cross-industry resources to enhance the operation of sports centers, it is necessary to create an open interface of "sports +" for sports centers in planning. "Sports + tourism" is one of the popular models in recent years. Tengchong International Marathon, Mountain Bike Race, Super Mountain Race and other popular sports IP are successful in combination of tourism and sports industry, making the number of tourists increased from 7.5 million in 2015 to 14.14 million in 2017 by nearly 50% per year. The new sports center, which is located face to the Ice and Snow Tourist Town, complements functions and infrastructures each other. By attracting tourists and increasing price, driving great growth of operating income. Another typical model is “sports + training”. Tengchong covers an altitude of about 2000 meters, which is the boundary of the sub-plateau and plateau training base. Huayin Cultural and Sports Center will be built into the largest roller skating base in China. Including the sports center in the high popularity tourist attractions, well-known series events sites, domestic and international competitions, training bases, not only get the benefit of sports, but also the restraint of shrinkage caused by the event-driven economic warming.

## 4. Conclusions

For a long time, China's county sports centers have been ignored and underestimated due to lack of technical difficulties and major sports events, so they are classified as simple development activities. The meaning of introducing smart shrinkage is that it can help reducing excessive expansion of a single type, unnecessary construction and low value-added projects. By this way, the planning of county sports centers can coincide with regional development. In other words, shrinkage is not an end. It aims to improve efficiency under right scale and makes necessary adjustments on the premise of ensuring quality, fairness and sustainability.

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