

# Research on big data platform construction for youth sports

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**Abstract:** This study employs documentary research and logical analysis methods to investigate the construction of a big data platform for youth sports. It argues that the construction of a big data platform is an inevitable choice for youth sports to align with social development trends, and that the sports demands of adolescents are the starting point and destination for the construction of the big data platform. Based on relevant demand theories, the study analyzes the generation process of youth sports demand and examines its influencing factors from sociological, economic, and relevant stakeholder perspectives. It further posits that big data can be applied to the analysis of youth sports demand, innovation in youth sports technology, products, and services. Finally, the paper discusses the construction of a youth sports big data platform from the perspective of the integration of youth sports demand and big data, providing insights to better promote the development of youth sports and implement the Healthy China strategy.

**Keywords:** Youth Sports, Big Data Platform, Sports Demand, Sports Technology, Sports Products, Sports Services

## 1. Introduction

This article delves into the current state and development trends of youth sports demand, as well as the application of big data technology in the field of youth sports. It begins by analyzing the current situation of youth sports participation in China, highlighting issues such as the shortage of sports facilities and unsatisfactory results in physical education teaching, and emphasizing the contradiction between the rapid growth in youth sports demand and the insufficiency of supply. The article then discusses the importance of big data platforms in youth sports, including policy support, the positive role of big data platforms, and the significance of demand analysis. It also explores the integration of big data with youth sports technology and how big data affects the development of youth sports products and services. Finally, the article summarizes the potential and importance of big data platform construction in promoting the development of youth sports, and looks forward to how big data technology will bring new vitality and innovation to the field of youth sports.

## 2. Big data platform and youth sports demand

In November 2015, the General Administration of Sport of China released the "Bulletin on the Status of National Fitness Activities in 2014". The survey results indicated that there is a significant gap between the behavior, motivation, forms of expression, and related factors of youth sports participation in China and the expected targets. College students continue to see a decline in endurance, speed, explosiveness, and strength, while the rates of overweight and obesity among primary and secondary school students remain high. The rate of poor eyesight among students is also on the rise, showing a trend towards younger ages. Other extensive research and real-world situations have also revealed issues such as a shortage of community sports and fitness facilities, unsatisfactory outcomes in school physical education, information asymmetry regarding youth sports among participants, and high costs of sports and fitness. The satisfaction of society towards public sports services for adolescents and the physical health of adolescents is not high. The demand for youth sports in China is growing rapidly, but the main participants in youth sports are relatively

singular, mainly the government, schools, and individuals, with insufficient participation from families, communities, associations, and various social and market forces. For many years, the contradiction between the growing demand and insufficient supply has not been effectively alleviated but has become more prominent. With the rise and widespread application of the internet, big data, and cloud computing technologies, youth sports are also developing towards real-time, precise, integrated, and informatized, large-scale directions [1]. The construction of a big data platform for youth sports has become an important part of the national strategies for a healthy China and a country strong in science and technology. Against the backdrop of relatively lagging sports system reform, using technical means and leveraging big data platforms has become one of the important channels to alleviate and solve this contradiction.

### **2.1. Policy Support for the development of the big data industry**

In September 2016, the "Youth Sports 'Thirteenth Five-Year' Plan" was promulgated, which proposed to "strengthen the construction of informatization" and promote the development of youth sports through the "Internet Plus" initiative, facilitating the construction of an informatized management and service system for youth sports work. The implementation of the youth sports big data strategy, the implementation of the "National Youth Amateur Training Athletes Information Management Measures (Interim)", the integration of relevant data of national youth sports, the establishment of a basic database and public information platform for youth sports, and the improvement of the openness and sharing of youth sports data information resources have been emphasized [2]. Currently, many sports policy documents in China involve the development of sports informatization and digitalization, fully demonstrating the strength of sports policies in actively guiding and promoting the development of youth sports big data. In other fields, relevant support policies have also been introduced, such as the "Internet of Things Development Plan (2016-2020)" promulgated by the Ministry of Industry and Information Technology in December 2016, which supports the research and development and industrialization development of data sharing service platforms, and strengthens the integrated innovation of the Internet of Things with mobile Internet, cloud computing, big data, and other fields [3]; the "Big Data Industry Development Plan (2016-2020)" promulgated in January 2017 points out that during the "Thirteenth Five-Year" period, big data technology and applications are in a period of innovation and breakthrough, and the development of big data in China will focus on completing seven major tasks in the next five years [4]; China's "National Economic and Social Development 'Thirteenth Five-Year' Plan" also proposes to promote the extensive application of big data, cloud computing, and the Internet of Things. The introduction of these policies has provided a good environment and important technical support for the construction of the youth sports big data platform. At present, governments, enterprises, and communities across the country are planning and constructing youth sports big data platforms, but the development is relatively slow due to factors such as insufficient resources such as technology and funds, or organizational coordination obstacles.

### **2.2. The positive role of youth sports big data platforms**

Currently, the services for youth sports big data are mainly implemented through websites, television networks, mobile apps, WeChat public accounts, and other such functions. However, the information presented through these channels is often isolated and fragmented, leading to issues such as redundant or excessive information, and a lack of alignment with actual needs, resulting in low utilizable value. The absence of digital functionality in the services provided by these channels leads to a low degree of satisfaction for the needs of relevant stakeholders, with many needs remaining untapped. The foundation should be the data of users, with more related connections mined and analyzed to enhance the transparency, sharing, and mobility of data, thereby innovating the application of big data in various fields. Efforts should be made to establish and improve functions such as timely fitness tracking, standardized management processes, and seamless integration between different services, as well as data standard docking technologies, to eliminate massive redundant data and integrate dispersed data. This integration aims to achieve the "digitalization, networking, visualization, and specialization" of integrated management in youth sports with health, education, industry, and other aspects. By using big data platforms to solve user problems, it allows adolescents, parents, and society to recognize and understand the significance of youth sports. On the premise of mutual benefits, big data platforms can stimulate youth sports demand, improve

the quality and efficiency of youth sports services, prevent and reduce the occurrence of information deficiencies and information silos, control and reduce transaction costs, and alleviate the difficulty of youth sports participation. Big data platforms will also give rise to new forms of youth sports organizations and promote changes in the structure of social organizations.

### 3. The starting point and destination of youth sports big data platform construction — Demand

#### 3.1. The emergence of adolescent sports demand

Maslow's hierarchy of needs theory posits that once a person's external conditions are met, it stimulates their higher-level needs. Alderfer's ERG theory suggests that humans have three core needs: existence needs, relatedness needs, and growth needs. A person may have more than one need motivating them at the same time, and when higher-level needs are frustrated, it can lead individuals to revert to lower-level needs [5]. This theory does not have a ladder-like structure, and these three needs can also operate simultaneously. McClelland's achievement motivation theory argues that the motivation for achievement is formed under certain social conditions. High-level human needs include the need for achievement, power, and affiliation. Frederick Herzberg's two-factor motivation theory posits that motivators satisfy an individual's need for self-actualization, while the effect of satisfying hygiene factors is akin to the role of health care in maintaining physical health [6]. In summary, the sports demands of adolescents are often implicitly expressed, and the factors influencing these demands are complex, involving individual and family factors, as well as the influence of peer groups and the social environment, and the impact of relevant stakeholders; they include natural factors as well as social and economic factors. Psychological needs are a higher-level form of need, arising from the gap between the "actual situation" and the "expected goals" of youth sports. To a certain extent, the sports demands of adolescents dictate their behavior and content in sports participation and are the basis and starting point for the production of youth sports products and related activities in the production chain. The emergence is shown in Figure 1:

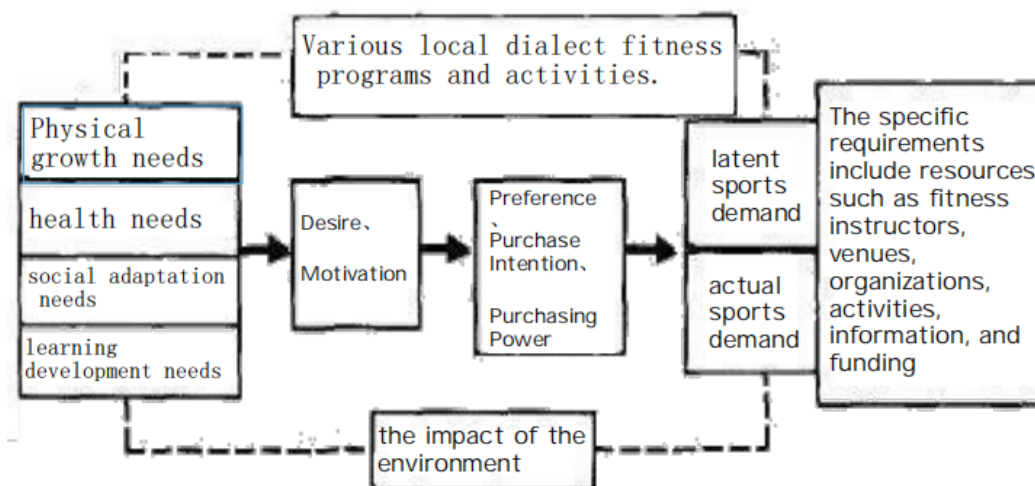


Figure 1: The Emergence of Adolescent Sports Demand

From a structural content perspective, the demands of youth sports can be divided into three levels: Core demands are the elements of sports activities; Support demands include sports organizations, sports venues and equipment, sports fitness guidance, and sports funding; Guarantee demands encompass sports policies and regulations, sports supply feedback, and the social environment along with the characteristics of adolescents themselves (Figure 2).



Figure 2: Structure of Adolescent Sports Demand Content

Adolescent sports demand may stem from instinctual needs, such as the need for growth and learning in physiological, psychological, and social adaptation aspects, or the need for adolescents to integrate into groups and express emotions; external environments can also stimulate demand, such as policy guidance, key influential people in life and learning circles (like parents and classmates), and innovative technologies that can directly or indirectly trigger adolescents' sports demand, thereby guiding the evolution of the structure of adolescent sports demand. Adolescent sports demand is constantly changing and adjusting, with sports fitness activities at the core, and revolving around elements such as sports facilities, sports organizations, sports funding, and sports fitness guidance. In the process of continuously balancing the development of adolescent sports demand and supply, influenced by factors such as sports policies and regulations, social environment, sports supply feedback, and characteristics of adolescents, the original sports demand of adolescents is continuously transformed and updated, forming new demands and gradually adapting to the aforementioned environment and characteristics.

### 3.2. The influencing factors of adolescent sports demand

From a sociological perspective, the factors influencing youth sports demand mainly include: Demographic characteristics of the youth population (region, age, gender, physical development, interests, etc.); The participation and awareness of sports among families, classmates, and friends [7]; The level of economic and social development and social culture; Technological progress; The level of sports development, especially the popularization and promotion of existing sports fitness programs or activities, and the emergence of new sports fitness programs and methods; Lifestyle; The youth's own experience and interpersonal interactions; Regional environmental impact factors: the location and climate of the place of residence, temperature and air quality, cultural customs, and the basic conditions of the existing sports environment, etc.

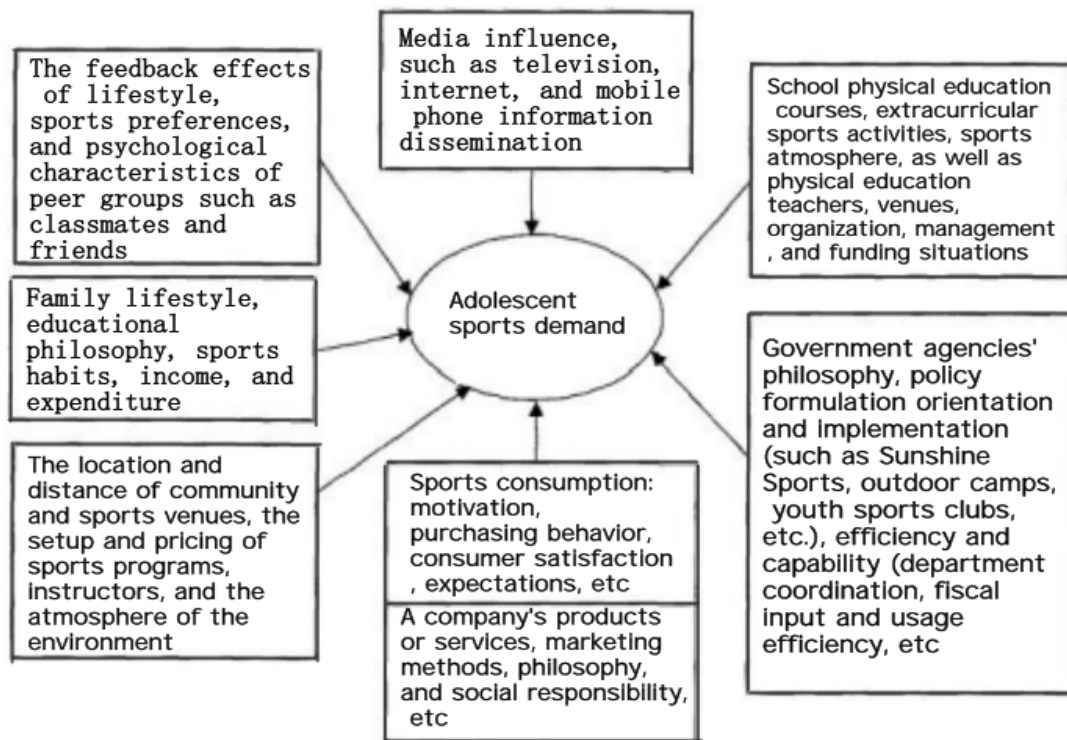


Figure 3: The Impact of Different Entities on Adolescent Sports Demand

From an economic perspective, the factors affecting youth sports demand mainly include: The price of youth sports fitness products and services and the prices of their substitutes and complements; The income level of adolescents and their families; Preferences for sports fitness among adolescents; Adolescents' expectations for sports fitness; The scale of the youth population. A common phenomenon is that after adolescents develop an interest in a particular sport through sports training classes or school physical education, they often lack the facilities and organizational forms to participate in sports activities when they return to their communities, which prevents a cumulative effect in their sports participation; upon re-entering school, facing the academic pressures of exam-oriented education, most adolescents find it difficult to maintain or further strengthen their awareness of sports participation [8]. Bronfenbrenner's "Ecological Systems Theory" proposed in 1979 in "The Ecology of Human Development" emphasizes that individual development is nested within environmental systems, where the environment and the individual interact and ultimately affect individual development [9], and it is clear that there is mutual constraint among the subsystems.

Finally, from the perspective of the main bodies related to youth sports, adolescents in the primary and secondary school stages mainly live and study in family, school, and community environments. In this relatively singular environment, the main entities involved are parents, teachers, school administrators, community committees, government departments, etc. The French educator Fröbel once said, "The destiny of a nation is not so much in the hands of those in power as it is in the hands of mothers," indicating the significant impact of parents or family environment on the development of adolescents, and youth sports is no exception [10]. The cognitive concepts of physical health and the supportive social environment are important factors affecting adolescents' participation in sports. Cultivating a good understanding of physical health and creating a strong social support environment can promote adolescents' active participation in physical exercise [11].

In summary, the factors influencing the sports demand of adolescents in China are very complex, with these factors being comprehensive, intersecting, and dynamically changing. The sports demands and rights of adolescents are the core part of the formulation of youth sports policies. The sports demand of adolescents

determines the scope, order, and evaluation standards of youth sports work. On the premise of respecting the sports demand of adolescents, the government's responsibility to serve youth sports should be strengthened.

## **4. The application and platform construction of big data in youth sports**

### **4.1. Youth sports demand analysis**

Demand analysis is a prerequisite for the scientific design and successful operation of a youth sports big data platform. Conversely, the youth sports big data platform can also trigger and stimulate youth sports demand, leading to a direct or mediated "ripple" interaction effect between the two. Clarifying demand issues is the logical starting point for the design and creation of the platform. Only by accurately identifying and analyzing the entities related to demand, analyzing the content of demand, the way demand is presented, assessing the extent of demand, and the related data conversion mechanisms can a foundation be laid for subsequent research and design. Youth sports demand analysis must correspond with the design, construction, operation, and evaluation of the big data platform. Adhering to a problem-oriented approach, demand analysis is conducted on several subsystems within the field of youth sports, analyzing the characteristics of each subsystem, and clarifying their relationships and shared demands. Then, by organizing and abstracting this information, an architecture can be designed to meet these demands, and finally, a platform model can be established [12]. The big data platform is directly related to and influences the needs of customers and the market. By analyzing massive amounts of information, valuable product and service markets can be discovered. Data prediction methods such as trend extrapolation, correlation analysis, and association rules are used to forecast the market and customer demands in youth sports.

Existing research on demand forecasting mainly follows two paths: The first is to analyze demand preferences, extent, and intensity from an economic perspective. The second is to understand the types of demand through questionnaire surveys and interviews. In real society, the application of big data and demand forecasting is quite widespread. For example, during the 2012 London Olympics, by analyzing data from multiple sources and types, such as GPS signals and social networks, predictions could be made about the city's weather, influx of people, and traffic conditions during the games, allowing for advance deployment and control to ensure the smooth conduct of the Olympic events. Google predicted flu outbreaks by aggregating Google search data, reaching the same conclusions 7-10 days earlier than disease control and prevention organizations [13]. Between 2014 and 2017, the Beijing Municipal Commission of Health and Family Planning used Baidu's big data mining and analysis technology to provide analysis and early warnings in areas such as epidemics, public emergencies, and population mobility, offering a data foundation and information basis for scientific management and decision-making.

### **4.2. The integration of big data with youth sports technology**

Through big data platforms, a vast amount of latent and potential demands can be effectively mined, stimulating and guiding demand, and innovating the presentation of demand, which is of great significance for improving the satisfaction of demanders. With the development of new technologies such as artificial intelligence, wearable devices, and virtual interaction technology, new ways and methods of youth sports participation are emerging continuously. Many innovative and exciting sports and fitness methods greatly cater to the current sports needs of adolescents, such as motion-sensing sports games, sports VR virtual reality technology, mobile fitness apps, and online marathon-type social sports applications. These technologies and innovative forms can all be connected through big data platforms to achieve "human-computer interaction" and "human-human interaction," thereby stimulating and stimulating their sports and fitness needs and attracting a large number of adolescents to participate in sports and fitness activities [14].

### **4.3. Big data and youth sports products and services**

The demand for youth sports is not static but constantly evolving. Currently, the demand for youth sports is primarily a passive one, led and driven by the government, but it is gradually shifting towards a balanced and dynamic development oriented by individual needs, societal needs, and market demands. At present, the

reform of the youth sports system in our country is still in a transitional phase, and the reform of the system and mechanisms of production factors is yet to be deepened.

Through the big data platform, products and services can be provided to meet the needs of relevant stakeholders. For instance, the platform can offer adolescents online queries and reservations for fitness venues and services, online purchasing of fitness equipment, youth sports and physical assessments, personalized fitness plans, sports fitness records and real-time monitoring, and remote sports fitness instruction services. The platform can also provide governments and management departments with personnel information management, organization of youth sports events, venue operations management, service quality monitoring and evaluation, statistical analysis of management information, browsing of other information resources, policy inquiries, and other services for information dissemination and promotion.

#### 4.4. The integrated application of big data and youth sports demand

The demand for youth sports serves as the premise and basis for the design and construction of youth sports big data platforms, and it is also the starting point and goal. The youth sports big data platform enables the digital integration of relevant entities and resources in youth sports. Throughout the entire process of "demand generation—one related entity meeting demand through supply mechanisms—efficacy evaluation," it utilizes big data technologies and methods to integrate online and offline resources through the big data platform, improving the efficiency of the entire process, guiding and generating new demands and behaviors, and even indirectly innovating the operational mechanisms of youth sports. The big data platform not only promotes the development of youth sports but also becomes an essential component of the entire youth sports chain. As shown in Figure 4:

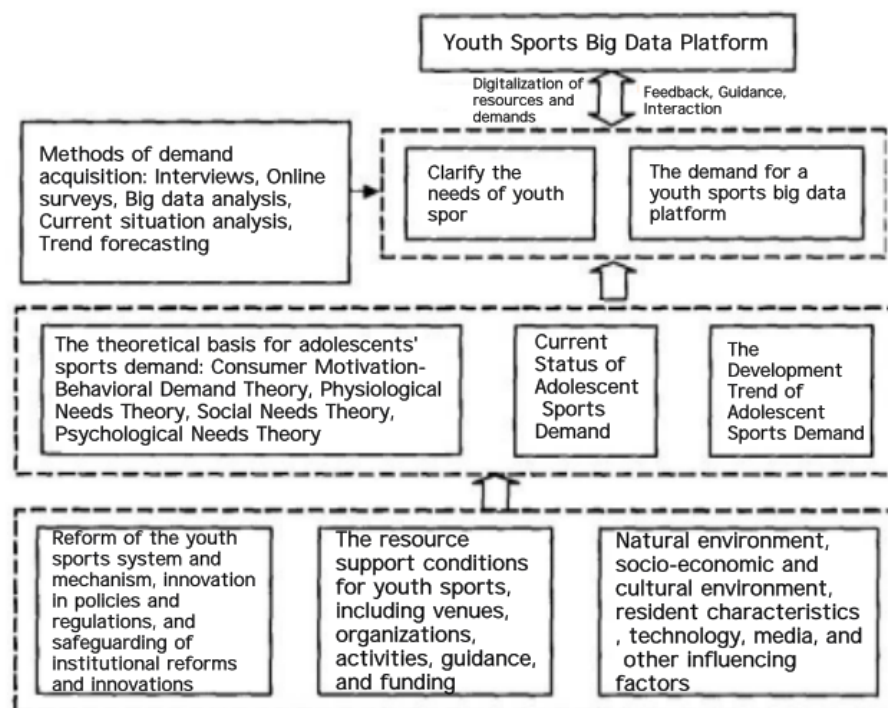


Figure 4: Schematic Diagram of the Integration between Youth Sports Demand and Big Data Platform

Once the youth sports big data platform is established, it generates platform demands, which include both the demands arising from the platform itself and the demands from the platform's stakeholders. The platform's own demands encompass the needs of platform designers, operators, and managers (such as data analysis technology, data management technology, platform functionality, business management, and demand response mechanisms, etc.). The stakeholders of the youth sports big data platform primarily refer



to adolescents and their parents, government, schools, communities, sports associations, and related enterprises, etc. Their demands include not only the service recipients' needs for the platform, such as data collection, inquiry, data statistics and analysis, and data application functionalities, but also information needs related to specific content or forms of expression concerning youth sports, such as venues, organizations, activities, human resources, and fitness guidance. Consequently, the aforementioned platform demands feedback into the real development of government and market, forming new guiding dynamics and innovative forms.

## 5. Conclusion

Against the backdrop of social development, policy support, and technological assistance, the conditions for the construction of a youth sports big data platform are becoming increasingly ripe, gradually forming a support network and social environment that promotes the development of youth sports [15]. The emergence and influencing factors of youth sports demand are closely linked to big data. Taking youth sports demand as the starting point and destination, it is essential to scientifically organize the relationship between the big data platform and youth sports demand, and to further carry out a series of specific research and construction work on the architectural design of the youth sports big data platform, platform operation mechanisms, online and offline resource integration mechanisms, and platform benefit evaluation. It can be anticipated that the development of youth sports, aided by big data technology, will burst forth with new vitality.

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