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DEVELOPMENT OF THE SPORTS INDUSTRY IN THE CONDITIONS
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The core of the geo-economy is the industry. Therefore, the geo-economic competition of countries in the world today mainly revolves around industries. Nowadays, the China's sports industry is facing difficulties such as the low degree of modernization of the industrial system, the slow evolution of the rationalization of the industrial structure, the unreasonable external structure of the sports industry, and the serious dependence on the path of industrial development. Therefore, for the high-quality development of the leading sports industry, the Chinese government has begun to pay attention to the transformation and upgrading of the industrial structure in recent years.

However, with the gradual imbalance of wealth distribution, international trade, resource endowment, and consumption. The competition in the fields of finance, science, and technology between the world's major geo-economic plates is intensifying day by day, and the opposition between "winners" and "losers" is becoming more and more serious. Under such circumstances, the modernization of China's sports industry structure and the continuous growth of industrial competitiveness will inevitably affect and erode the global monopoly profits of high-performance developed countries. At the same time, China's sports industry will inevitably face various geo-economic challenges through trade, investment, technology financing and even economic sanctions from conservative countries.

It should be pointed out that under the background of the increasingly fierce geo-economic competition, market competition theory cannot effectively guide the international competition under the global industrial redistribution. When the free-market mechanism is increasingly unable to meet the needs of the development of the sports industry, the upgrading of China's sports industry under the global value chain

needs to rely on the national mobilization system from the perspective of the geo-economy. At the same time, from the perspective of the geo-economy the core goal of the sports industry is to safeguard the interests of national economic, political, and cultural security, and to implement the will of the country. With the support of China's geo-economic strategy and industrial policy, it will help the Chinese sports industry to cope with the fierce geo-economic competition and challenges.

In particular, compared with western developed countries, the current development of China's sports industry is still in the primary stage. Due to the market of the sports industry being imperfect, it may go through a long process to completely rely on the adjustment of market mechanism to select the dominant sports industry. In addition, under the background of geo-economics, the transnational economic cooperation of China's sports industry in the international market faces a more complex geo-environment. Therefore, it is impossible for China's sports industry to implement the overall development strategy of "Grand Promotion". Priority should be given to the development of "key industries" with geo-economic advantages and more international competitiveness, to have a strong driving force and guidance for China's sports industry and even economic and social development.

From the perspective of geo-economic strategy, the core value of sports industry development lies in serving the national geo-strategy. In other words, the sports industry category from the perspective of geo-economics must not only reflect the needs of the development of China's sports industry, but also have strategic value, which can comprehensively safeguard national interests and feed back the implementation of China's geo-economic strategy.

According to the purpose and content of this study, in terms of the international competitiveness of different sports industries from the perspective of geo-economy, this paper believes that the industries connected with the geo-economy include the sports competition and performance industry, sports fitness and leisure industry, sports goods manufacturing industry, sports infrastructure construction, and sports tourism. Therefore, the choice of advantageous sports industry should be selected from these

five industries according to the international competitiveness of China's sports industry from the perspective of geo-economics.

According to the "Porter-Dunning" diamond model theory, first-level indicators of the international competitiveness evaluation index system of China's sports industry from the perspective of geo-economics select factor conditions; demand conditions; firm strategy, structure and rivalry; related supporting industries; transnational economic activities; government role; and opportunities. According to the design principles of the Delphi method, the data of the screening indicators are obtained through the evaluation of the importance of the secondary indicators by experts. According to the importance mean, standard deviation and coefficient of variation of the indicators, an evaluation index system is obtained consisting of seven first-level indicators and 26 second-level indicators.

Based on the evaluation index system of China's sports industry's international competitiveness from the perspective of geo-economics, this paper uses AHP group decision-making method to process the decision-making information of each element of the criterion layer and the index layer by experts, and obtain the final group decision-making conclusion. The results show that the first place of seven element in the first-level indicators is "firm strategy, structure and rivalry" with the weight index of 0.3242. The following order is, transnational economic activities, demand conditions, factor conditions, government, opportunities, and related supporting industries. In terms of secondary indicators, the top-ranked indicators are: international trade, industrial scale, industrial innovation capability, international market demand, multinational company, industrial efficiency, domestic market demand, industrial policy, and so on.

The comprehensive evaluation of the international competitiveness of China's sports industry from the perspective of geo-economics using fuzzy mathematics will be closer to the actual situation. on the basis of the known index system of China's sports industry and the comprehensive weight of each index from the perspective of geo-economics, this paper adopts the method of fuzzy mathematics to comprehensively evaluate the international competitiveness of each industry in China's sports industry.

Finally, the final ranking of the international competitiveness of China's sports industry from the perspective of geo-economics is: sporting goods manufacturing > sports tourism > sports competition and performance industry > sports fitness and leisure industry > sports construction industry. The results of the fuzzy comprehensive evaluation show that the total score of the international competitiveness of the sporting goods manufacturing industry is 7.4786, which is higher than the evaluation results of the international competitiveness of the other four industries.

Facing the dual pressure of the capital- and technology-intensive sporting goods manufacturing industry in established powers and the chasing effect of labor-intensive sporting goods manufacturing industries in emerging economies, China's sporting goods manufacturing industry must continue to climb the high-end of the international industrial chain and occupy the industry commanding heights to get rid of the risk of industrial hollowing out. However, this process deeply undermines the global monopoly profits of high-productivity conservative states. Especially when factors such as the new industrial revolution, the "rise" of trade protectionism and the global pandemic of COVID-19 are intertwined, various forms of geoeconomic challenges, which include trade, investment, market, technology, finance, and even economic sanctions faced by China's sporting goods manufacturing industry, have erupted intensively. In view of the current macro-geo-economic pattern and various geo-economic challenges faced by China's sporting goods manufacturing industry, this paper proposes a specific paths for the development of China's sporting goods manufacturing industry from the perspective of geo-economics. Specifically, it mainly includes: actively integrating into the geo-economic strategy, striving for the right to speak in the formulation of standards, and seizing the commanding heights of economic development; continuing to promote trade liberalization and facilitation cooperation; increasing investment in high-end innovation in the sports goods manufacturing industry; Brand building; financial innovation.

Furthermore, based on the geo-economic theory and the current practice of China's geo-economic strategy represented by the "One Belt, One Road" initiative, this

paper innovatively proposes the strategic concept of upgrading the sporting goods manufacturing industry to a geo-industry, that is, the geo-sporting goods manufacturing industry. The proposal of this strategic concept can make up for the limitations of its traditional sports goods manufacturing transnational economic cooperation in the pursuit of geographical interests, such as insufficient attention to political interests and geo-economic security. In addition, the proposal of the geo-sporting goods manufacturing industry has enriched the content system of geo-economics, helped the country formulate a scientific geo-strategy, and expanded the scope of geo-economic activities.

To sum up, this paper believes that the root cause of the current geo-economic conflict lies in the improvement of the competitiveness of China's emerging industries, including the sports industry. As the core part of the geo-economy, industry has inevitably become the core focus of the geo-economic competition between China and the conservative countries. As the most competitive industry in China's sports industry from the perspective of geo-economics, the sporting goods manufacturing industry is also an important manifestation of China's sports strength and even comprehensive national strength.

In the short term, in order to safeguard its own interests, the industrial upgrading of China's sporting goods manufacturing industry will inevitably be challenged by geo-economic challenges such as trade wars, technological blockades and economic sanctions from established powers. However, Moody's, one of the world's top three rating agencies, believed that "Made in China 2025" will not be affected by the Sino-US trade war. In the long run, China's sporting goods manufacturing industry has super-large market advantages and domestic demand potential, the world's most complete manufacturing industry system advantages, and the support of China's sports industry policy advantages. In addition, the practice of China's "Belt and Road" initiative, RECP and other geo-economic strategies has provided a solid guarantee for China's sporting goods manufacturing industry to promote the position of the international value chain from the middle link to the two ends, and truly achieve leapfrog development.

Most importantly, from the perspective of geo-economics, this paper argues that the level and modernization of the sporting goods manufacturing industry determine the level and modernization of China's entire sports industry. The "growth pole" effect of the sports goods manufacturing industry can effectively promote the overall high-quality development of the sports industry, and eventually form a modern sports industry system that integrates the development of fitness leisure and competition performance, high-end manufacturing and modern service industry, thus making China develop from a big sports country to a real sports power.

Keywords: geoeconomics, China, global trends, management methods, sports industry, sports tourism, sports services industry, Internet+ sports industry, sports fitness and leisure industry, sports competition industry, international competition and cooperation, "One Belt One Road", economic growth, evaluation system competitiveness, fuzzy comprehensive evaluation (FCE), strategic development, innovative development, financing.

АНОТАЦІЯ

Юй Цзі Цзянь. Розвиток спортивної індустрії в умовах геоекономічних викликів – Рукопис.

Дисертація на здобуття наукового ступеня доктора філософії (PhD) за спеціальністю 073 – Менеджмент. – Сумський національний аграрний університет, м. Суми, 2022.

Формування сучасної геоекономічної конкуренції країн світу взаємопов'язано з розвитком різних галузей промисловості. Спортивна індустрія, як складова світової або національної економіки, пов'язана з виробництвом, просуванням і збутом спортивних товарів, послуг, організацією та проведенням спортивних подій, а також зі спонсорством у спорті. На сучасному етапі розвитку спортивна індустрія Китаю стикається з певними труднощами. Наприклад, такими як низький рівень модернізації промислової системи, повільна еволюція раціоналізації промислової структури,

необґрунтована зовнішня структура та значна залежність від шляху розвитку промисловості. Саме тому, останнім часом, китайський уряд почав приділяти велику увагу трансформації та модернізації промислової структури спортивної індустрії країни.

Проте, з поступовим дисбалансом розподілу основних благ, тенденціями світової торгівлі, рівнем забезпеченості основними ресурсами та їх споживанням, конкуренція між основними геоекономічними «плитами» світу посилюється з кожним днем, а диспропорції між «переможцями» і «переможеними» стають все більш значимими. В таких умовах, модернізація структури спортивної індустрії Китаю та безперервне зростання промислової конкурентоспроможності неминуче вплинуть на глобальні монопольні прибутки розвинутих країн. При чому, спортивна індустрія Китаю неминуче зіткнеться з різними геоекономічними викликами: торгівлею, інвестиціями, фінансуванням технологій і, навіть, економічними санкціями консервативних країн.

Слід зазначити, що на тлі все більш жорсткої геоекономічної боротьби між країнами, теорія ринкової конкуренції, в умовах глобального промислового перерозподілу, не може ефективно регулювати міжнародну рівновагу. Механізм вільного ринку все більше не в змозі задовольнити потреби розвитку спортивної індустрії. В таких умовах, модернізація спортивної індустрії Китаю, в глобальному ланцюжку вартості, повинна орієнтуватися на національну систему мобілізації з точки зору геоекономіки. Але, водночас, з позиції забезпечення національної економічної, політичної та культурної безпеки країни. Завдяки впровадженню геоекономічної стратегії та промислової політики, китайській спортивній індустрії вдасться впоратися з жорсткою геоекономічною конкуренцією та геоекономічними викликами.

У першому розділі дослідження встановлено, що порівняно із західними розвиненими країнами, нинішній розвиток спортивної індустрії Китаю досі перебуває на первинній стадії. Ринок спортивної індустрії Китаю є недосконалим, країні потрібно пройти довгий процес, щоб повністю орієнтуватися на ринкові

механізми розвитку спортивної індустрії. Крім того, з позиції геоekonomіки, транснаціональне економічне співробітництво спортивної галузі Китаю на міжнародному ринку стикається з більш складним геоekonomічним середовищем. Тому спортивній індустрії Китаю неможливо реалізувати загальну стратегію розвитку «Grand Promotion». У дослідженні обґрунтовано, що визначення векторів соціально-економічного розвитку Китаю має орієнтуватися на «ключові галузі» промисловості з геоekonomічними перевагами та більшою міжнародною конкурентоспроможністю.

Розглядаючи значимість розвитку спортивної індустрії, з позиції геоekonomічної стратегії Китаю, категорія «спортивна промисловість» має не тільки задовольняти внутрішні потреби країни, але й мати стратегічне значення щодо захисту національних інтересів та сприяння реалізації китайської геоekonomічної стратегії.

У відповідності до мети та змісту дослідження, автор розглядає спортивну індустрію з позиції геоekonomіки, як галузь що включає виробництво спортивних товарів, будівництво спортивної інфраструктури, індустрію спортивних змагань, спортивний фітнес та індустрія відпочинку, спортивний туризм. Вибір найбільш пріоритетної сфери спортивної індустрії необхідно визначати з позиції її геоekonomічної міжнародної конкурентоспроможності.

У другому розділі дослідження побудовано індексну оцінку міжнародної конкурентоспроможності спортивної індустрії Китаю, яка, на відміну від існуючих, побудована на основі стандартного відхилення та коефіцієнту варіації ранжування геоekonomічних факторів вибору. В результаті отримано два рівня показників. Відповідно до теорії діамантової моделі "Портера-Даннінга", індикатори першого рівня системи індексів оцінки міжнародної конкурентоспроможності спортивної індустрії Китаю складаються з наступних чинників впливу: умови попиту, стратегія організації, структура та суперництво, суміжні допоміжні галузі, транснаціональна економічна діяльність, роль уряду, можливості. Відповідно до принципів проектування методу Дельфі, дані

скринінгових індикаторів отримані шляхом оцінки важливості другорядних індикаторів експертами (26 показників).

Базуючись на системі індексів оцінки міжнародної конкурентоспроможності спортивної індустрії Китаю з точки зору геоекономіки, в дослідженні використано груповий метод прийняття комплексних рішень (АНР - Analytic Hierarchy Process) для обробки вихідної інформації. Результатом використання цього методу стало обґрунтування групового рішення стратегічного розвитку спортивної індустрії в умовах невизначеності та многокритеріальності. За результатами проведеного дослідження встановлено, що першочергове значення у показниках першого рівня займає «стратегія організації, структура та суперництво» з ваговим індексом 0,3242. Далі визначена наступна черговість впливу факторів: транснаціональна економічна діяльність, умови попиту, роль уряду, можливості та відповідні допоміжні галузі. За ранжуванням впливу вторинних чинників, індикатори мають таку послідовність: міжнародна торгівля, промислові масштаби (обсяги), інноваційний потенціал промисловості, попит на міжнародному ринку, багатонаціональна компанія, ефективність промисловості, попит на внутрішньому ринку, промислова політика тощо.

Використання в дослідженні системи показників комплексної оцінки міжнародної конкурентоспроможності спортивної індустрії Китаю та прийомів нечіткої математики з позиції геоекономічних чинників впливу, дозволило побудувати міжнародний рейтинг галузей спортивної індустрії Китаю: виробництво спортивних товарів - спортивний туризм - спортивні змагання та індустрія продуктивності – спортивний фітнес і індустрія відпочинку - індустрія спортивного будівництва. Результати нечіткої комплексної оцінки показують, що загальний бал міжнародної конкурентоспроможності галузі виробництва спортивних товарів становить 7,4786, що вище за результати оцінки міжнародної конкурентоспроможності інших чотирьох галузей спортивної індустрії.

Спортивна індустрія Китаю постійно стикається з подвійним тиском, з одного боку, впровадженням капітало- та технологічно-інтенсивних технологій виробництва, а по-друге, гонитвою за ефектом трудомістких галузей виробництва спортивних товарів у країнах з економікою, що розвивається. Промисловість Китаю з виробництва спортивних товарів повинна продовжувати підніматися на високий рівень міжнародного промислового ланцюга щоб мінімізувати ризик промислового витиснення. Однак, цей процес може вплинути на глобальні монопольні прибутки високопродуктивних консервативних держав. Особливо, коли переплітаються такі фактори впливу, як нова промислова революція, «підйом» торговельного протекціонізму та глобальна пандемія COVID-19, а також постійно виникають різні геоекономічні виклики, серед яких: торгівля, інвестиції, ринок, технології, фінанси та навіть економічні санкції. З огляду на поточну макроекономічну модель та різні геоекономічні проблеми, з якими стикається китайська індустрія виробництва спортивних товарів, дане дослідження мало спробу запропонувати конкретні шляхи розвитку промисловості спортивних товарів Китаю з точки зору геоекономіки.

В третьому розділі дослідження автором запропоновано наступні напрями розвитку спортивної індустрії, серед основних: продовження активної інтеграції в геоекономічну стратегію країни, прагнення до захоплення пануючих висот в економічному розвитку, продовження сприяння лібералізації торгівлі та співпраці, збільшення інвестицій в інновації високого класу в галузі виробництва спортивних товарів, фірмове будівництво, фінансові інновації та інш.

Крім того, ґрунтуючись на геоекономічній теорії та поточній практиці геоекономічної стратегії Китаю, представленій ініціативою «Один пояс, один шлях», у третьому розділі дослідження розроблено стратегічну інноваційну концепцію перетворення промисловості виробництва спортивних товарів у геоіндустрію, тобто виробництва геоспортивних товарів. Така стратегічна концепція дозволить компенсувати обмеження традиційного транснаціонального економічного співробітництва у сфері виробництва

спортивних товарів у переслідуванні географічних інтересів, таких як недостатня увага до політичних інтересів і геоекономічної безпеки. Крім того, така концепція дозволить країні сформулювати наукову геостратегію та розширити сферу геоекономічної діяльності.

У дослідженні обґрунтовано, що останнім часом спортивна індустрія Китаю неминуче стала центром геоекономічної конкуренції між Китаєм і консервативними країнами. Будучи найбільш конкурентоспроможною галуззю, виробництво спортивних товарів також є важливим чинником розвитку національної економіки.

У короткостроковій перспективі, промислова модернізація виробництва спортивних товарів у Китаї може викликати такі геоекономічні проблемами, як: торговельні війни, технологічні блокади та економічні санкції. Однак Moody's, одне з трьох провідних рейтингових агентств світу, вважає, що китайсько-американська торгова війна не зможе вплинути на «Made in China 2025». У довгостроковій перспективі виробництво спортивних товарів у Китаї має значні ринкові переваги та наявний потенціал внутрішнього попиту; переваги найповнішої у світі системи виробничої промисловості та підтримки переваг політики спортивної індустрії Китаю. Крім того, ініціативи «Один пояс, один шлях», RECP та інші геоекономічні стратегії забезпечили міцні гарантії для просування позиції міжнародного ланцюжка створення вартості виробництва спортивних товарів у Китаї та забезпечені стрибкоподібного розвитку.

У дослідженні доведено, що рівень розвитку і темпи модернізації виробництва спортивних товарів визначають рівень і темпи всієї спортивної індустрії Китаю. Ефект «полюса зростання» індустрії виробництва спортивних товарів може ефективно сприяти загальному високоякісному розвитку спортивної індустрії в цілому та зрештою сформувати сучасну систему спортивної індустрії, яка об'єднає розвиток фітнес-відпочинку та змагань, високоякісного виробництва та сучасної індустрії послуг. Це буде сприяти

перетворенню Китаю з великої спортивної країни на справжню спортивну державу.

Ключові слова: геоекономіка, Китай, глобальні тренди, методи управління, спортивна індустрія, спортивний туризм, спортивна індустрія послуг, інтернет+ спортивна індустрія, спортивний фітнес та індустрія відпочинку, індустрія спортивних змагань, міжнародна конкуренція та співпраця, «Один пояс – Один шлях», економічне зростання, система оцінки конкурентоспроможності, нечітка комплексна оцінка (FCE), стратегічний розвиток, інноваційний розвиток, фінансування.

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LIST OF SYMBOLS

BRI - the Belt and Road Initiative

AHP - Analytic Hierarchy Process

FCE - Fuzzy Comprehensive Evaluation

CONTENT

ANNOTATION	2
LIST OF THE PUBLICATIONS	14
LIST OF SYMBOLS	17
INTRUDUCTION	19
SECTION 1 THEORETICAL AND METHODOLOGICAL APPROACHES TO THE SPORTS INDUSTRY	27
1.1.The essence of the category "sports industry"	27
1.2. Theoretical foundations of the formation of geoeconomics	34
1.3 Theoretical and methodological approaches research to the competitiveness sports industry	44
Conclusion to section 1	49
SECTION 2 ANALYTICAL RESEARCH ON THE CHOICE OF CHINA’S ADVANTAGEOUS SPORTS INDUSTRY FROM THE PERSPECTIVE OF GOE-ECONOMICS	50
2.1 The fundamental problem of China's advantageous sports industry selection from the perspective of geo-economy	50
2.2 The establishment of the international competitiveness evaluation system of China's sports industry from the perspective of geo-economics	69
2.3 The selection of China's advantageous sports industry from the perspective of geo-economics——Based on fuzzy comprehensive evaluation (FCE)	104
Conclusion to section 2	126
SECTION 3 RESEARCH ON THE DEVELOPMENT STATUS AND STRATEGY OF CHINA’S SPORTING GOODS INDUSTRY FROM THE PERSPECTIVE OF GEO-ECONOMICS	129
3.1 The geo-economic challenges which China sporting goods industry faces	129
3.2 The development strategy of China's sporting goods industry from the perspective of geo-economics	145
Conclusion to section 3	161
CONCLUSION	163
REFERENCES	169
APPENDIXES	186

INTRUDUCTION

Relevance of the topic. From the perspective of industrial development, as a rapidly rising emerging industry, the sports industry has maintained double-digit growth for more than 10 consecutive years. Especially after October 20, 2014, The State Council of China (2014) announced Opinions on Accelerating the Development of Sports Industry and Promoting Sports Consumption, the added value and growth rate of the sports industry increased significantly, officially entering a period of great development, showing a trend of explosive development.

On August 10, 2019, the State Council (2019) issued Outline released to build China into sports leader, which proposed the strategic goal of developing the sports industry into a pillar industry of the national economy by 2035. This is the first time to answer the strategic direction of the development of the sports industry from the policy level, and also the first time to position the sports industry as a pillar force to promote the development of the national economy from the national level.

However, it is undeniable that China's sports industry is far behind developed countries in terms of output value, production efficiency, and contribution to the national economy. The sports industry has exposed some structural problems and contradictions in the process of development, and there are serious structural imbalances between regional industries and within industries. Nowadays, the China's sports industry is facing difficulties such as the low degree of modernization of the industrial system, the slow evolution of the rationalization of the industrial structure, the unreasonable external structure of the sports industry, and the serious dependence on the path of industrial development. Therefore, for the high-quality development of the leading sports industry, the Chinese government has begun to pay attention to the transformation and upgrading of the industrial structure in recent years. In particular, national strategies such as the Belt and Road Initiative and Made in China 2025 have further accelerated the promotion of the status of China's sports industry in the global division of labor. In this context, China's sports industry has gradually upgraded from the low end of the global value chain to the middle and high end, and has played an

increasingly active role in the governance of the global value chain.

However, the upgrading of China's sports industry structure and the continuous improvement of industrial competitiveness will inevitably touch and erode the global monopoly profits of the developed countries with high productivity. Especially, with the gradual imbalance of wealth distribution, international trade, resource endowment, and consumption. The competition in the fields of finance, science, and technology between the world's major geo-economic plates is intensifying day by day, and the opposition between "winners" and "losers" is becoming more and more serious. Under this background, the basic goal of the geo-economic strategy of established powers represented by the US is to strive to maintain and consolidate the international political and economic order led by itself, and to ensure the original hegemony of the established powers. In sharp contrast, the rising powers, especially China, want a peaceful rise and a dominant position in the global governance system. A geo-economic struggle between the two is doomed.

As the core of the geo-economy is the industry, and under the impact of the restructuring of industrial chains, supply chains, and value chains triggered by against the backdrop of anti-globalization, trade protectionism, and especially the new crown pandemic, China's sports industry has to suffer from geo-economic shocks represented. Therefore, from the perspective of geo-economy and industrial development, China's sports industry is faced with a double attack of the high-end blockade and low-end lock. Even nowadays, in the most core areas such as finance, trade, science, and technology, China's sports industry has to face barriers and challenges almost everywhere. Therefore, under this background, it is necessary to conduct a further in-depth examination of the development of China's sports industry from the perspective of geo-economics, and then propose targeted development strategies.

However, compared with western developed countries, the current development of China's sports industry is still in the primary stage. Due to the market of the sports industry being imperfect, it may go through a long process to completely rely on the adjustment of market mechanism to select the advantageous sports industry. In addition,

China is faced with a series of problems such as more complicated macro geographical pattern, diplomatic relations between countries, economic policies of other countries, and intervention of third countries. Therefore, it is impossible for China's sports industry to implement the overall development strategy of "Grand Promotion". Priority should be given to the development of "key industries" with geo-economic advantages and more international competitiveness, to have a strong driving force and guidance for China's sports industry and even economic and social development. B After all, only on the basis of choosing the right one can we designate the sports industry cultivation and development strategy from the perspective of geo-economics, and realize economies of scale and characteristics. Taking this as a breakthrough can enhance the overall international competitive advantage of China's sports industry. At the same time, from the perspective of geo-economics, China's advantageous sports industry not only has a strong driving force and guiding force for China's economic and social development, but also can feed back the smooth implementation of China's geo-economic strategy represented by the "Belt and Road" initiative.

The literature review was based on the research of Ukrainian and Chinese scientists and representatives of developed countries. Nowadays, scholars have deeply researched on the topics such as the nature of geo-economics, national geo-economic interests, geo-economic strategies, transnational economic cooperation and competition and so on. The works of scientists such as: L. Ding and M. Chen (2009), Y. Han (2005; 2008; 2010), P. Krugman (1995), D. Li and X Li. (2009), Y. Li and L. Che (2020), E. N. Luttwak (1993), L. Qu, J. Hong, M. Liang, Z. Hu & H. Luo (2018), M. E. Porter (2011), W. Yang and S. Li (2021) and others are devoted to the research issue of geo-economics, industrial competitiveness. The question of the development of the sports industry was studied by the following scientists: Z. Brzezinski (1998), C. Graton and P. Taylor (2010), I. Irtysheva (2022), B. Liu (2010), G. Liu (2016), J. Liu and Y. Hou (2001), T. Kharchenko and Liu Ziming (2022), Y. Leonov (2021), A. Meek (1997), R. Meng, Y. Cheng and Y. Song (2021), B. Pitts, L. W. Fielding and L. K. Miller (1994), O. Slavkova and Li Zongx (2022), I. Stuler (2022), Y. Zhang, T.

Azamati and Z. Wang (2021) and others are devoted to the research issue of sports industry. Along with this, in view of the changes in the current geo-economic pattern, there is still a blank in the scientific literature on the sports industry from the perspective of geo-economics. So, what was obtained determined the choice of the topic of the dissertation research.

Connection of work with scientific programs, plans, topics. The dissertation research was conducted within the research was carried out within the framework of the projects Fujian Province Social Science Planning Project No. FJ2022B023; Henan Social Science Federation Research Project No. SKL-2022-2344.

The Aim and Objectives of the study. Aim of the dissertation work is to improve the theoretical and methodological principles and develop practical recommendations for the development of the sports industry in the conditions of geo-economic challenges.

Achieving the stated goals requires completing the following tasks:

- to find out the essence of the international competitiveness of China's sports industry from the point of view of geoeconomics;
- generalize methodical approaches to assessing the international competitiveness of China's sports industry from the point of view of geoeconomics by creating a system of integral indices;
- to justify a promising sports industry from the point of view of geo-economics through the established system of evaluation indices;
- to find out the prospects for the development of China's sports industry from the point of view of geoeconomics;
- propose measures to stimulate China's sports industry in terms of adaptation to the international geo-economic model and the needs of the global value chain and industrial division of labor;
- to develop directions for promoting the development of China's national economy, provided that the main sports sectors of the economy are developed.

The object of the research is the process of development Chinese sports industry.

The subject of the research is to use the geo-economic theory, industrial competition theory and other theories to study the international competitiveness of China's sports industry, the choice of competitive sports industry, and the geo-economic challenges and development path.

Research methods. This study adopts quantitative and qualitative research methods. At the same time, we adopt more suitable research methods for different research problems to ensure scientific research. This paper adopts the theory of geoeconomics, the theory of comparative advantage, the theory of competitive advantage and Porter's diamond model theory. This paper adopts the Delphi method and the AHP group decision-making method to construct the evaluation index system of China's sports industry from the perspective of geo-economics. Finally, this paper uses the fuzzy comprehensive evaluation (FCE) method to evaluate various industries of China's sports industry, and selects the most advantageous sports industry from the perspective of geo-economics for analysis.

The information base of the study was the scientific works of scientists, monographs, own scientific research, data the National Bureau of Statistics of China.

The scientific novelty of the obtained results lies in the deepening of the existing theoretical provisions and the development of scientific-practical and methodical recommendations for the development of China's sports industry in the conditions of geo-economic challenges.

Based on the results of the dissertation research, the following provisions were obtained, which have the status of scientific novelty:

first:

the conceptual theoretical and methodological foundations of the development of China's sports industry from the point of view of meeting the country's internal needs and protecting its national economic, political, and cultural security are substantiated in order to promote the implementation of China's geo-economic development strategy;

formulated axiological characteristics of geoeconomic problems (contradictions) of the development of the sports industry, which are based on adaptation to the new

international geoeconomic model, determination of the needs of the global value chain and industrial division of labor, in order to form priority sports industries;

improved:

system for assessing the level of international competitiveness of China's sports industry, which, in comparison with existing practice, is based on the use of the FCE method and geo-economic factors of influence, in order to determine the advantages of priority areas of the sports industry;

methodical approach to the index assessment of the international competitiveness of China's sports industry, which, unlike the existing ones, is built on the basis of the characteristics of the coefficient of variation, standard deviation and ranking of geo-economic factors of choice, which allows to form complex characteristics regarding the indicators of the first and second level of influence;

criterion measures and a system for evaluating the international competitiveness of China's sports industry from the point of view of geoeconomics, based on the application of group decision-making techniques (AHP - Analytic Hierarchy Process), in order to determine the sectoral vectors of the strategic development of the sports industry in conditions of uncertainty and multicriteria;

to be further developed:

theoretical generalization of the types of methods and methods of ensuring the international competitiveness of China's sports industry based on the formation of a system of strategic positioning of the industry, which will allow timely diagnosis of problems and provide stimulation of the progressive development of China's sports industry;

the conceptual and categorical apparatus of the theory of the development of the sports industry due to the deepening of the essence of such concepts as:

"sports industry" provided that it is considered as a set of industries for the production of sports goods, construction of sports infrastructure, the industry of sports competitions, sports fitness and the industry of recreation, sports tourism, which makes it possible to apply a systematic approach to the study of geo-economic problems of

the functioning of the international competitive environment and the justification of the most priority spheres of the sports industry;

"international competitiveness of the sports industry" from the point of view of geo-economic challenges and its division into realistic and potential, which allows determining target orientations, the efficiency of resource allocation and the ability of the sports industry to structural transformation;

scientific substantiation of the main challenges and threats to the development of the sports industry, based on taking into account the state of development and the structure of the sports goods industry, which will contribute to the active integration of the industry strategy into China's geo-economic strategy, the liberalization of international trade and the promotion of cooperation;

the formation of a modern toolkit for ensuring the progressive development of the sports industry, based on a stimulating component, which allows making appropriate changes in the strategic forecast for the distant perspective of the development of the sports industry in China in the conditions of the formation of a new international geo-economic model.

The scientific and practical significance of the dissertation. While enriching the content system of geo-economics, this research also builds a bridge between geo-economic theory and geo-economic practice to improve the application value of geo-economic theory. Since the core value of the development of the sports industry from the perspective of geo-economics is to serve the national geo-strategy, this research has high strategic value. This research can not only have high value in the development of the sports industry itself and China's national economy, but also fully safeguard national interests other than the economy and feed back the implementation of China's geo-economic strategy. The research results of this paper have practical application value.

Personal contribution of the applicant. The Ph.D. student has searched and analyzed literature sources on the topic of the work, selected methods and techniques, questionnaire design and survey, statistical processing, and analysis of the results.

Interpreter and generalize the obtained results, draw the dissertation's conclusions, and make practical recommendations under the supervisor's guidance.

Approbation of the results of the dissertation. The main provisions and results of the dissertation research were made public by the author at conferences, seminars, meetings, among which the most important The main results of the research were examined at international conferences were: III International Research and Practice Conference “Innovations of partner cooperation of education, economy and social defense in the conditions of inclusion and pragmatic rehabilitation of society”, (Podilsky, Ukraine, 2019); V International Scientific and Practical Conference of young scientists and students “Modern management: trends, problems and development prospects”,(Dnipro, Ukraine, 2020); 3rd International Scientific and Practical Conference “21st Century Management: Globalization Challenges”, (Poltava, Ukraine, 2019); International Scientific Conference «Development of the country's economic system in the context of international cooperation», (Odesa, Ukraine, 2019); Матеріали науково-практичної конференції викладачів, аспірантів та студентів Сумського НАУ (Sumy, Ukraine, 2019); International scientific and practical internet conference “Sixtieth economic and legal discussions” (Lviv, Ukraine, 2021)/

Publications. The main results of scientific research were published in 14 scientific articles: 4 articles in specialized publications of Ukraine, 1 articles in journals included in the scientometric databases Scopus, the rest - in other journals and conference proceedings.

Structure and scope. The dissertation consists of an introduction, three chapters, conclusions, a list of references and appendices. The total volume of work is 168 pages. The work contains 28 tables and 9 figures. The references consist 175 publications.

SECTION 1

THEORETICAL AND METHODOLOGICAL APPROACHES TO THE SPORTS INDUSTRY

1.1. The essence of the category "sports industry"

Industry is a generally categorized branch of economic activity. Industrial economics defines industry as a collection of enterprises or national economy and have the same characteristics in the production and operation of products and labor services (SU, 2010). The industry is the middle economic concept between macroeconomics and microeconomics. The aggregate of industries, the economic activities of consumers and governments constitute the national economy together.

Industry is the result of the development of social productivity. With the improvement of social productivity and the degree of specialization of the division of labor, industry changes and develops continuously. Modern western economics believed that industry relates to "various industries of the national economy" (Durlauf & Blume, 2008). That is to say, industry not only refers to the manufacturing industry, but also refers to all walks of life in the national economy. From sectors to industries, from production to distribution, services, culture, education, and sports can all be called industry.

In studying the sports industry-related issues, the definition of the sports industry should be clarified first. The definition of the sports industry is also a hot topic in sports theory. Over the years, scholars have interpreted the sports industry from different perspectives to perfect the theoretical system, and try to find a recognized definition. Up to now, there are still many debates and few conclusions. Sport, in essence, belongs to culture, and industry belongs to the economy. When sports and industry superposition and integrate, the cultural category of sports derives an economic dimension, and the economical category of the industry gives birth to cultural dimension. Therefore, some scholars argued that the cultural economy is the essential attribute of the sports industry (Yang & Fang, 2011). To seek an accurate understanding

of the concept of the sports industry, this paper discusses the current internationally recognized concept, to find a more accepted definition. The definition of the sports industry mainly includes the following types:

Alfie Meek (1997) believed that the sports industry includes sports performance and entertainment, sports products and services, and sports support organizations.

Pitts et al. (1994) believed that the sports industry sports performances, sports products, and sports marketing. Therefore, they defined the sports industry as "all sports and related products which include goods, services, places, people and ideas provided to customers".

Generally speaking, in South Korea, the sports industry is defined as sports economic activities and related products and services that generate value-added value through production and distribution (Kim & Kim, 2000). Jung (1998) defined the sports industry as a combination of companies that produce and distribute sports and sports-related products. It is different from the definition given by Pitts et al. that Jung regarded sports as an integral part of the sports industry and mass sports according to the development process of the sports industry and the demand for related products. According to the characteristics of economic activities, the sports industry can be roughly divided into the sports industry, sports product industry and sports service industry.

The sports industry can also be divided into the spectator sports industry and the participation sports industry (Parkhouse, 1996).

In the book *The Development of Japan's Sports Industry*, Takanori Miyauchi pointed out that the sports industry consists of hardware and software. The software includes sporting goods, information, and sports targeting services. Hardware includes sports manufacturers and suppliers in the sports field (Ji, 1994).

However, with the rapid development of the economy, the scale of the sports industry is expanding day by day, and the industrial structure has also changed. sporting goods industry, stadium construction industry, sports service information industry, etc., have emerged from the original "industrial matrix" respectively, and have expanded in

the social and economic fields with the value and function of sports.

Based on the practice and changes of China's sports industry, Fang (2010) believed that the sports industry is a collection of the same economic activities and the sum of economic sectors that provide sports products (including material products and service products) for society. Additionally, Lu et al. (2001) thought that the sports industry is an industry that creates value by utilizing its functions and radiation effects, and also a collection of the same kind of economic activities and the total of economic sectors that provide sports products for the society.

To sum up, there are two defining standards for the concept of sports industry: One is that the sports industry is a collection of enterprises that produce sports products and services of the same kind, or closely substituted relationship. It takes providing similar products as the standard and considers the industry as a collection of enterprises. The second is to define the sports industry as the collection of economic activities of sports and its related industries, and to engage in similar economic activities as the standard. Namely, the collection of production and business activities of sports and related industries carried out by various social departments. This paper holds that the main purpose of defining the sports industry is to promote the development of the sports industry, whether in terms of the foundation of theoretical discussion or the embodiment of practical operation. Based on the guidance of relevant economic theories and the purpose of this study, this paper decides to adopt the definition of the sports industry in the statistics of Sports and Related Industries in 2019 (General Administration of Sport of China, 2019). The classification of the sports industry in this definition better highlighted the characteristics and development status of sports activities in China, and fully considered the new formats and new models in the development of the sports industry. The classification of the sports industry in this definition better highlighted the characteristics and development status of sports activities in China, and fully considered the new formats and new models in the development of the sports industry. The classification combined industrial chain contents such as sports product manufacturing and sales together, and took into account

the emerging industry and its development trend formed by the integration of sports and related industries. Furthermore, it further improved and standardized the scope of the sports industry activities for the national sports industry policy to provide the necessary basis.

Industrial competition is the main carrier of economic competition between countries. With the end of the cold war, the geopolitical conflict is gradually gave way to the geo-economic competition. Competition between nations has shifted from the political and military arena to the economic arena. The mode of competition among countries has changed to occupy the world economic map and increase the market share of the target market through state regulation and participation (LuttwaK, 1993).

Both developed and developing countries have taken the cultivation of competitive industries (enterprises) and the expansion of international markets as the top priority in their economic development. Therefore, industrial competitiveness has become the focus of governments, industries, and academia.

Industrial competitiveness comes from the concept of competitiveness and international competitiveness. Therefore, before analyzing the connotation of industrial competitiveness, it is necessary to clarify "competitiveness" and "international competitiveness". The premise of competitiveness is competition. Without competition, it is impossible to have competitiveness. Competition is the soul of the market economy. It is precisely because of the need for competition, so the main body of competition has always taken various means to seek their competitive advantages, competitiveness is thus produced.

Competitiveness has a wide range of applications, both economic and political, both organizational and personal. The competitiveness referred to economic competitiveness in this paper. At present, most scholars define competitiveness by combining with countries, industries, enterprises, and products. For example, the World Economic Forum (WEF) defines competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of a country." (Paraušić et al., 2014). IMD (Institute of International Management and Development) believes that

competitiveness is a kind of ability for a country to create added value, that is, a country can increase its wealth by operating the original assets and forming its economic and social model through the process, attraction and positive integration relationship (Charles & Zegarra, 2014). Porter (1990) defined competitiveness as the ability of a country to create a "business environment" for industrial development. Paul Krugman (1996) believed that competitiveness is another aspect of productivity.

Fan (1998) argued that competitiveness refers to the position of a country's goods in the international market, and the concept of competitiveness can ultimately be understood as the concept of cost.

This paper holds that this definition of competitiveness is highly theoretical and can be expressed as follows: Competitiveness refers to the ability of competitors to transform their competitive assets (various real resources) into competitive processes that are stronger than their competitors. According to the different subjects of competition, competitiveness can be divided into four levels, namely, product competitiveness, enterprise competitiveness, industrial competitiveness, and national competitiveness. Industrial competitiveness results from a variety of factors, involving resource endowment, technology, system and policy, market demand, and other aspects.

Industrial competitiveness belongs to the medium level of competitiveness, which is between the macro national and micro-enterprise competitiveness, and is closely related to them. Industrial competitiveness can be divided into international and domestic two levels. Its research object can be the industry's competitiveness as a whole or a specific industry. Therefore, the definition of competitiveness depends on whether it is a macro perspective at the national level or a micro perspective at the enterprise level (Siudek & Zawojaska, 2014).

From a national macro perspective, when industries in one country/region are studied, the competitiveness of similar industries will be compared with those in other countries and/or regions. It can also be seen as comparing the competitiveness of countries in a particular industry. R.F. Feurer and K.Chaharbaghi (1994) argue that

competitiveness depends on the financial strength of company shareholders and consumers. Because they determine the company's ability to act and adapt in the market, and also determine the company's ability to change its strategy.

But from the micro perspective of enterprises, industrial competitiveness is based on enterprises' research and development capacity, production capacity, marketing capacity, and so on. Therefore, some scholars argued that the essence of industrial competitiveness is the competitiveness of an enterprise, which is embodied in its productivity, production efficiency, technological level, market share, human resources, and other factors (Lun, 2005).

The relationship between industrial competitiveness, and national competitiveness, enterprise competitiveness, and product competitiveness is shown in Figure 1.1. However, it is worth noting that in the context of economic globalization, industrial competitiveness is difficult to discuss in a small area. When we talk about industrial competitiveness, there are already implicit labels of internationalization and globalization.

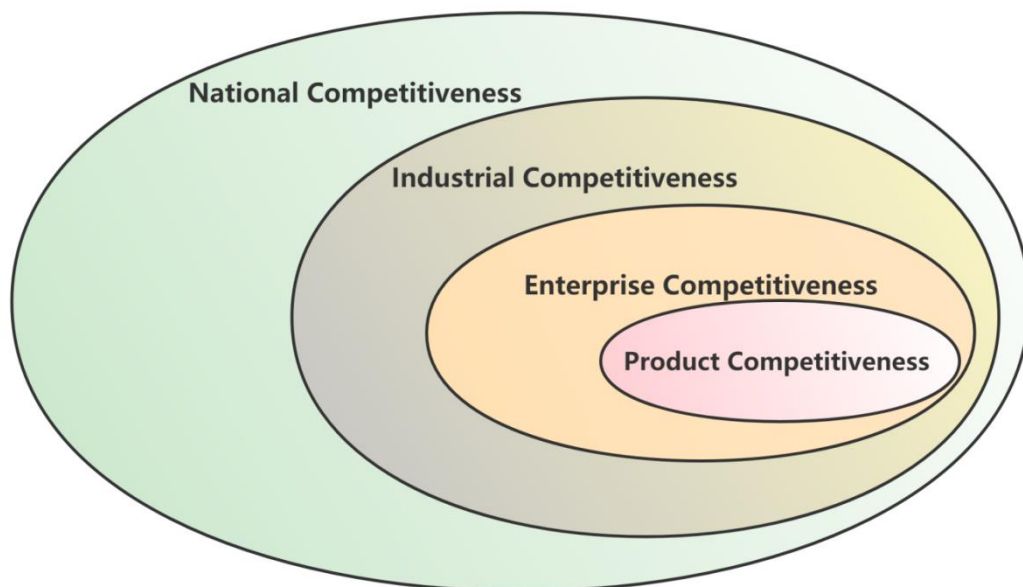


Figure 1.1 - The logical relationship of the competitiveness of various industries

**Source: author's development*

Since the study of industrial competitiveness is mainly a comparison between a

certain industry in a country or region, it can also be regarded as the study of the international competitiveness of an industry. Therefore, the definition of the international competitiveness of the industry also depends on the macro or micro perspective.

From the national point of view, the international competitiveness of the industry evolved from national competitiveness, emphasizing the comparison of production.

Michael Porter (1996) believed that a country's comparative advantage often lies in an industry or even one product. The international competitiveness of the industry and a country is closely related to higher production efficiency.

Jin (1996) thought that compared with other countries (or regions), the concept and connotation of the international competitiveness of the industry and the essence of the international competitiveness of the key elements of the industry (or several countries) are the same, namely production level and profitability.

From the micro product point of view, the international competitiveness of the industry evolves from the product competitiveness and emphasizes the comparison of the market. In 1989, the President's Commission on Industrial Competitiveness in the United States defined industrial (international) competitiveness as the ability to provide good products and services that raise national wealth and living standards in a free market (Waheeduzzaman & Ryans, 1996).

Pei and Wang (2002) believed that the international industrial competitiveness comes from the performance of relative and absolute competitive advantages. The former generally comes from market competition, while the latter generally comes from the attributes and characteristics of the region or country where the industry is located.

Therefore, during the international and domestic R&D, production, and market competition in other countries or regions, the macro and micro factors impacted the international industrial competitiveness comprehensively. The international industrial competitiveness is reflects the comprehensive effects of the domestic industry and the similar industry of other countries or regions in terms of production efficiency and

product competition.

Based on previous definitions and descriptions of international industrial competitiveness, this paper summarizes its basic characteristics are as follows: 1. The international industrial competitiveness is an economic concept involving economic relations between countries (regions), and actually is the comparison of productivity levels between countries (regions), which is an efficiency concept. 2. In a broad sense, international competitiveness has a hierarchy, that is, it is reflected in four levels: the international competitiveness of product, enterprise, industry, and country. 3. The international industrial competitiveness includes realistic competitiveness and potential competitiveness. Realistic competitiveness refers to market share, resource allocation efficiency, etc., and potential competitiveness such as innovation ability and structural transformation ability, etc. In conclusion, this paper believes that the international industrial competitiveness is a comprehensive ability to survive, compete and develop in the process of international competition, which is the main body of a country's industrial competition. This ability is manifested in many aspects, including both realistic productivity, such as market share and resource allocation efficiency, and potential competitiveness, such as innovation ability and structural transformation ability.

1.2 Theoretical foundations of the formation of geoeconomics

Geo-economics is a new science that first emerged in the West after the Cold War. It is a science to understand and deal with national relations from economic status and economic relations (Han, 2005). The birth of the word "geo-economics" can be traced back to the 1860s. French economic geographer Jacques Boudeville first mentioned "geo-economics" in studying the liberal growth pole theory (Stergiou, 2015). He envisioned geo-economics as a substitute for geopolitics. In 1990, Edward Lutwerk (1990) systematically proposed and explained the academic concept of "geo-economy" for the first time. In the book *National Interest*, the author believed that the competition

mode between countries has changed to occupy the world economic map through state regulation and participation, and improve the market share of the target market. This new model of competition is geo-economics. Zbigniew Brzezinski (1998) pointed out that economic geography is foreign economic means to serve the state's interests. Through these foreign economic means, such as talent, science and technology, capital, investment, trade, market, multinational companies, information, technology, etc., seek and consolidate hegemony and gain political, military, economic, and other aspects of the dominant position. With the change of international politics and international situation, the geo-economic theory began to get the attention of all countries rapidly, and gradually developed into three main schools: America, Russia, and Italy.

The American school mainly draws lessons from the analytical paradigm and methods of geopolitical theory and interprets geo-economic theory from economics. The American school emphasized the competition for market and economic competition and believed that the national interests must strive for the dominant position of the geo-economy using foreign investment, global division of labor, finance, high and new technology, and humanistic education.

The Russian school, discarding the traditional analysis methods of geopolitics, conducted research on the economy, energy, population, geography, and other aspects from the perspective of national strategy, and sought the method of cross-civilization harmonious geo-economic world order. Kochetov (2007) pointed out that the core of the geo-economy is energy, which plays the role of harmonious regulator of relations between countries and civilizations.

The Italian school put forward the dialectical geo-economic theory of competition and cooperation. Paul Savona believed that as the tertiary industry replaces the primary and secondary industries, the meaning of national boundaries tends to be nothingness, making the innovation of transnational social, economic and political structures the key to geo-economic development (Yu, 2014). This school also believed that geo-economics is a discipline that studies competition and cooperation between countries. The main actors are countries rather than other subjects such as multinational

corporations. They thought geo-economics is of great significance for future international reform (Ding & Chen, 2009).

With the increasing influence of geo-economic theory, the world is entering a new era of geopolitics and geo-economics. China's peaceful development is in urgent need of theoretical support of geopolitics and geo-economics. This has attracted more and more domestic scholars to pay attention to the geo-economy and try to study China's actual situation with this theory, which has become an important basis for the evolution and development of China's geo-economy strategy. At the end of the 20th century, the geo-economic theory was introduced into China. Different from other schools of geo-economics, Chinese scholars generally believe that China's geo-economic strategy should be oriented towards peaceful development.

In geo-economic theory research, Chinese scholars emphasize on mutual benefit and win-win, and "positive-sum" relationship. Therefore, in the article *Emerging Geo-economics*, Sa (1995) pointed out that the main content of geo-economics is to jointly promote economic development, interdependence, and common prosperity by utilizing geographical advantages. Ni and Qian (2008) also believed that one of the important aspects of building a new world economic order is implementing win-win cooperation and common development as its important principles.

On the application of geo-economic theory in China, Du et al. (2012) proposed that China should give priority to the "low politics" area with strategic resources at present, and try to obtain the necessary strategic foothold in Africa, Latin America, Western Europe, and other places as soon as possible by using more permeable economic means. At the regional level, China should seek to make achievements in "high politics" by selecting countries with geographical proximity, strong cultural affinity, and high strategic mutual trust.

After that, scholars made a comprehensive analysis of the geopolitical, geo-economic, and geo-cultural relations of China's neighboring countries. From the perspective of geo-economic space, economic means, economic policies, and economic resources, geo-economic theory and China's geo-economic strategy are of

great significance for safeguarding national interests. On this basis, Han (2010) proposed a new paradigm of the geo-economic strategy of advocating "East Asian cognitive community" and constructing a "harmonious world". Nowadays, scholars have generally believed that geo-economic theory and practice have important strategic significance for China's peaceful rise, construction and maintenance of China's geo-economic security.

In 2013, China issued the Belt and Road Initiative (BRI) and upgraded it to a national strategy after accumulating geo-economic theoretical studies by Chinese scholars and the improvement of China's comprehensive national strength. As a combination of geo-economic theory and Chinese practice, BRI is one of the most influential geo-economic cooperation projects in the world. "Belt and Road" initiative, as the most important geo-economic strategy of China, is conducive to the stable development of China and the improvement of the quality and efficiency of China's economy. It is an effective measure for China to achieve domestic development and international coordination. It is of great significance to enhance China's international influence and foster new advantages in international competition (Lu, 2015). BRI adheres to the construction concepts of openness and inclusiveness, peaceful cooperation, mutual benefit and win-win results, and mutual learning. It focuses on policy coordination, infrastructure connectivity, unimpeded trade, financial integration and closer people-to-people ties and builds a community of shared interests, responsibilities, and future featuring political mutual trust, economic integration, and cultural inclusiveness (National Development and Reform Commission of China, Ministry of Foreign Affairs of China, and Ministry of Commerce of the People's Republic of China, 2015).

BRI, starting from the intersection and integration of economic development and economic interests, provides new ideas and methods for solving relevant problems. The geo-economic theory logic and paradigm of BRI have been enriched.

Based on the geo-economic theory, Du and Ma (2012) believed that China will face relevant geopolitical challenges in the process of peaceful rise, and put forward

forward-looking suggestions that China should give priority to strategic resources in the "low politics" field, and strive for a strategic foothold by using more permeable economic means. Sports industry-related activities have internationally accepted technical standards, competition rules, and operation procedures are less affected by the social system, ideology, cultural tradition, religious belief, and other geopolitical factors. Therefore, it is easier to overcome the language barrier and cultural gap in international communication activities. The cooperation of the sports industry under the geo-economic strategy can better play the leading function of improving the livelihood of all countries, releasing consumption power, and transforming economic development. Therefore, the relatively friendly and relaxed political, social and cultural atmosphere is more conducive to expanding China's market share in international bilateral or multilateral sports products and services trade.

From the perspective of geo-economic development, the national interest as the ultimate goal and pursuit of the development of the sports industry in China is examined, ushering in new opportunities and broader space for the development of the sports industry, and greatly improving the strategic position and role of the sports industry. At the same time, the research on China's sports industry from the perspective of geo-economy can also enrich the connotation of geo-economic theory to a large extent.

Among the mature competition theories, comparative advantage theory and competitive advantage theory are the representative ones.

Adam Smith was the first to boil down the major fields of economics into a complete system. He believed that international trade was based on differences in production techniques between countries (Smith, 1937). Each country has its advantages in producing a certain product, which can be exchanged with each other, and all countries involved in the exchange can benefit. But absolute advantage theory has some limitations, it cannot explain the trade between countries with "absolute advantage" and "absolute disadvantage" in production technology.

David Ricardo (1955) inherited and developed Adam Smith's theory of absolute

dominance. He pointed out that if a country has an advantage in producing both products, it should produce the greater advantage. Even if a country does not have an absolute advantage in the cost of producing a product, it can still produce a product with a relatively lower cost in its country. It can also benefit from the exchange, which is the idea of "taking the weight of two interests and the light of two evils".

After that, scholars continuously enriched the theory of comparative advantage from the dynamic perspective, and got some independent theories from different perspectives. Raymond Vernon, a contemporary American economist, proposed the product life cycle theory, which expanded the scope of comparative advantage theory from the dynamic perspective. Vernon (1992) pointed out that factors of production not only include capital and labor, but also include natural resources and dynamic changes of production technology. Therefore, regional differences of factors of production and their dynamic changes are the root cause of comparative advantage.

According to factor endowment theory, the different supply of factors of production is the most fundamental cause of the regional division of labor and trade (Davidson, 1979). Due to the different endowment of factors of production, regions with relatively better factors can use their advantages to carry out the regional division of labor and specialized production and promote regional economic development.

Scholars introduced spatial economy and economies of scale into economic analysis, made comprehensive use of location theory, the regional division of labor theory, trade theory, and regional development theory. They proposed that traditional comparative advantage and natural endowment are no longer the cause of competitive advantage, but endogenous factors such as scale economy generated by regional competition, cooperation, and innovation (Helpman, 1984; Krugman, 1980).

The concept of competitive advantage first appeared in E. Chamberlin's Theory of Monopolistic Competition in 1939. However, the traditional competitive advantage theory is only a static theoretical system, but it lacks a dynamic analysis of the comparative advantage between countries (Mátyás, 1985). Porter (1996) believed that the comparative advantage theory, scale economy theory, and product cycle theory

(Vernon) cannot fully explain the source of industrial competitiveness. Because in the industrial competition, the factor of production no longer plays a decisive role, and its value is also in the rapid regression. Economies of scale do matter in industries that emphasize comparative advantage. However, this theory does not answer the national competitive advantage that we care about. With the question of which countries' enterprises can develop economies of scale, and what kind of industries can economies of scale be applied to, Porter (2011) proposed that the new theory of competitive advantage must be upgraded from the concept of comparative advantage to the level of national competitive advantage. Porter's competitive advantage theory, starting from the level of national competitiveness, explored how to compare the international market competitiveness of similar industries and improve industry competitiveness. Therefore, the theory has a very important reference value for the cultivation and development of China's sports industry from the perspective of the geo-economy.

As for the relationship between the theory of comparative advantage and the theory of competitive advantage, scholars generally believed that the theory of competitive advantage could not completely replace the traditional theory of comparative advantage in industrial competitiveness. Both of them play an important role. The position of each country's industry in the world economic system is determined by many factors. From the international division of labor, comparative advantage plays a decisive role. But from the perspective of industrial competition, competitive advantage plays a decisive role too. In reality, comparative advantage and competitive advantage jointly determine the international status and change trend of each country and industry (Zhu, 2003).

Therefore, in the analysis and research on the international competitiveness of a specific industry, it is unnecessary to deliberately separate the functions of comparative advantage and competitive advantage, let alone accurately measure the two to measure their actual influence on industrial development (Jin et al., 1997).

Comparative advantage and competitive advantage are both different and related. The differences are mainly reflected in the following aspects: comparative advantage

refers to the relationship between different industries (or products) in different countries. In contrast, competitive advantage refers to the relationship between the same industry in different countries. The former emphasizes the potential possibility of industrial development in various countries, while the latter emphasizes the realistic industrial development situation in various countries. The former ultimately comes down to a country's resource assessment, while the latter emphasizes the strategic behavior of enterprises. The deep relationship between them is as follows: in the industrial development, comparative advantage and competitive advantage will play a role simultaneously when foreign economic relations occur; Industries with comparative advantages tend to form stronger international competitive advantages. Comparing a country's industry can only be reflected through competitive advantage. The essence of both is the international comparison of productivity. The difference is that the former emphasizes the comparison of productivity between different industries in different countries. In contrast, the latter emphasizes the comparison of productivity between the same industries in different countries.

In 1990, Professor Michael E. Porter of Harvard University put forward "the National Diamond model, an analytical framework system for the competitive advantage of industries" in His book the Competitive Advantage of Nations (Porter, 1990). Porter believed that traditional trade theories could not well explain the international competitive advantages of a country's industries and enterprises, and new theories are needed to explain them . So he came up with the diamond model to explain why a country's industry or enterprise gains a competitive advantage in the international market. The diamond model consists of four basic factors and two auxiliary factors. The four basic factors are: factor conditions, demand conditions, firm strategy, structure, and rivalry, and related supporting industries. The supportive factors are chance and government. Whether a country's particular industry is internationally competitive depends on six factors (Figure 1.2).

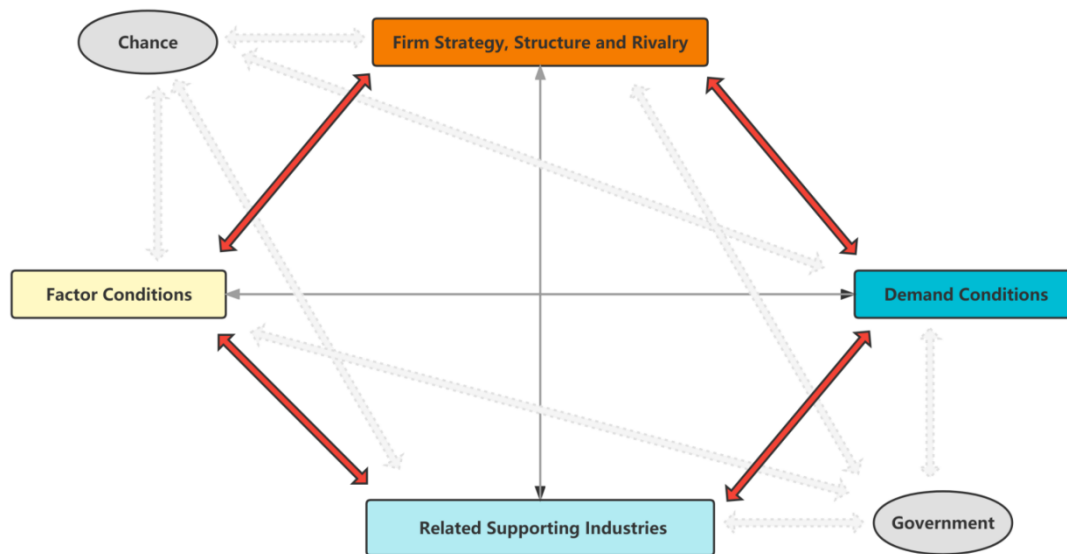


Figure 1.2 - Porter's diamond model schematic diagram

**Source: Porter, (1990), author's development*

Diamond model theory is by far the most influential theory of international competition in the industry, recognized by the academic community. It also provided a relatively complete analysis framework for the study of industrial competitiveness due to the "diamond system" theory. In addition, the empirical research of some scholars has verified the rationality of this theory to a certain extent, so the "diamond model" theory has been almost unanimously recognized by the academic community. Therefore, people takes this theory as the theoretical basis for studying international industrial competitiveness.

It is worth noting that Porter's diamond model for the research of international competitiveness theory has made an outstanding contribution, the analysis method breaks through the traditional comparative advantage analysis, for the later research on international competitiveness and international trade provides a new theoretical analysis paradigm, also provided a comparatively complete theoretical framework for this study.

In the later research, J.Dunning (1993) supplemented Porter's "national diamond model" by introducing "multinational corporation" as another exogenous variable (or auxiliary factor) into Porter's national diamond model. The academic circle called this

model as "Porter-Dunning" theoretical model. Later studies had proved that the "Porter-Dunning" model is more complete and successful. In the past ten years, the academic research on the international competitiveness of industry generally do not exceed the 7-factor framework of the Porter-Dunning model (Figure 1.3).

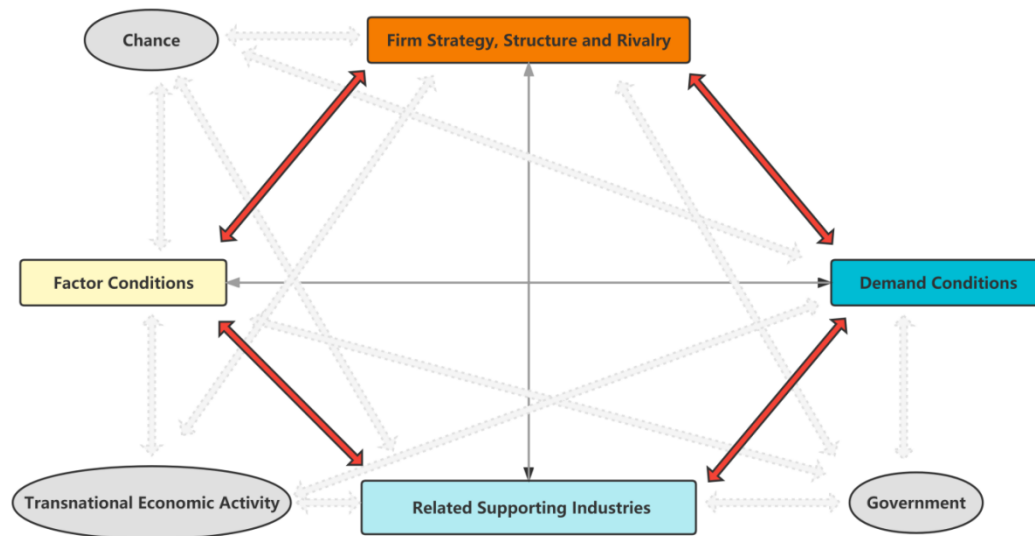


Figure 1.3 - Porter-Dunning model schematic diagram

**Source: J.Dunning (1993); author's development*

As mentioned above, Porter's "diamond model" put forward that the competitive advantage of a country's enterprises comes from the domestic economic environment of the home country, that is, "home country diamond" is the source for enterprises to obtain competitive advantages. However, Rugman et al. (1993) studied Canada and showed that a single "home country diamond" could not explain the source of competitive advantage of Canadian enterprises. Similarly, Cartwrights (1993) found in his study of New Zealand and Hodgetts (1993) in his study of Mexico that in the background of economic globalization, competitiveness should not only be limited to the domestic market, and export foreign markets play an important role in industrial development.

In addition, Porter imagined government as a supporting factor. Still, scholars pointed out that the diamond model overemphasized the role of firms and markets and downplayed the important role of government in improving industrial competitiveness

and international trade. The rapid economic growth of countries like India, China, South Korea, and Japan is closely related to the role of government. Government policy can create or destroy an industry, so it should be considered the fifth key factor in the model (Öz, 2002; Zeller, 2004).

In terms of research objects and purposes, this paper decides to use the "Porter-Dunning" diamond model to evaluate and analyze the international competitiveness of China's sports industry from the perspective of the geo-economy. At the same time, this paper believes that the government plays a crucial role. Because from the perspective of the geo-economy, the realization of national interests of the core goal of the sports industry development carries out the will of the state. Therefore, the state and government must support or guide the economic behavior of the sports industry, and provide the necessary protection force for the development of the sports industry from the perspective of the geo-economy.

1.3 Theoretical and methodological approaches research to the competitiveness sports industry

"The Economics of Sports" was the first book using economic theory to analyze sports, and it was also the first textbook of sports economics which introduced the development of the sports industry in the United States in detail and provided a good reference value for those engaged in related study and research (Leeds et al., 2018).

Due to the market economy system, the sports industry inevitably entered the commercial field (Fletcher, 1989). Therefore, it has become a consensus in academic circles that the development of the sports industry plays an active role in promoting economic growth (Bartoluci, 1997). In particular, as a labor-intensive industry, the sports industry is playing an increasingly important role in absorbing social employment (Gratton & Taylor, 2000). In addition, accelerating the development of the sports industry will also help improve people's physical fitness and improve labor efficiency (CABANE, 2014).

As the sports industry plays an increasingly important role in the national economy, in recent years, relevant government departments and scholars paid more and more attention to the research on the competitiveness of the sports industry. A large number of scholars involved in public policy research, management, and economics have also begun to carry out a series of studies on the competitiveness of the sports industry. Estiri et al. (2010) analyzed the driving force of the sports industry competitiveness from management factors, globalization strategy, market policy, cultural structure, organizational structure, and employees. Humphries and Howard (2008) described the development status of the sports industry in the United States and China from the aspects of the goal, scale, scope, and development degree of the sports industry. From the perspective of economics, they analyzed the economic value of the sports competition performance industry. They pointed out that sports participation and the time opportunity cost of participating in sports events are very important factors. Mahony and Howard (2001) believed that technological factors, human resources, market demand, policies, and other influencing factors have an important influence on the sustainable development of the sports industry in the future.

Under the background of China's rapid economic development, with change of the urbanization process, money, people's income, the residents' consumption ability and consumption idea, media and infrastructure, and unceasing transformation of the government's policy, Chinese scholars paid more attention to study the development of China's regional sports industry competitiveness and foster (Liu & Hou, 2001; Shan & Xu, 2004).

It should be emphasized that the international competitiveness and development of the sports industry involve multi-faceted issues such as resource endowment, industrial layout, industrial planning, and international trade. Therefore, scholars have further studied the cultivation of the sports industry competitiveness in detail from different levels.

Hefner (1990) applied the input-output model to the sports industry and studied the influence of various economic factors on the development of the sports industry

competitiveness. International trade has always been the focus of the sports industry's international competitiveness research. Lowe (1978) introduced the important role of the sports industry in international relations in detail, and emphatically studied the international competitiveness of sports products from the perspective of international trade. Andreff, M et al. (2009) analyzed the competitiveness of the sporting goods industry in Asia, Eastern Europe and emerging countries from the perspective of global trade division. Budzinski (2012) analyzed the commercial trade behavior and competitiveness of the sports industry from the perspective of the EU sports market.

Given the impact of industrial policy on the development of the sports industry, Government and Sports Industry co-authored by Grayton and Taylor (2010) mainly introduced the role positioning and important role of government in the development of the sports industry competitiveness. Rhodes and Apeldoorn (1997) focused on the anti-monopoly, fair competition, and competitiveness of the sports industry from the perspective of policies and regulations such as internal market, fair competition, and state aid in the EU. Desbordes (2001) revealed the impact of the category of industrial organization and the duration of reform on the competitiveness of the sports industry through the case study.

Bao (2005) made a comprehensive evaluation of sports GDP, sports consumption level, the proportion of the sports industry in the national employment-population, and sports enterprise competitiveness, and made a comparative analysis with foreign sports industries. Some scholars evaluated and analyzed the development of the sports industry by taking sports industrial structure, sports resource allocation, system construction and legal guarantee, cultural orientation, and scientific and technological support as indicators (Cao & Dong, 2003; Lin, 2004). Based on the five elements involved in competitive advantage and combined with the characteristics of the sports industry, Liu (2010) constructed the evaluation index system of regional sports industry competitiveness.

In terms of international industrial competitiveness, Zhang summarized the research status of domestic scholars on the core competitiveness of the sports industry,

and constructed the evaluation index system of the core competitiveness of the sports industry in China through fuzzy model theory (Zhang & Zhang, 2016). Bi et al. (2005) built an evaluation index system for the international competitiveness of the sporting goods industry from the perspectives of China's existing competitiveness and potential competitiveness based on the existing research on the international competitiveness of the industry.

It is not difficult to see from the above literature that Chinese scholars' research on the evaluation index of international competitiveness of the sports industry is relatively diversified at present. However, there are inevitable limitations due to the different fields and perspectives of researchers. The evaluation index system of each industry competitiveness is complicated, and the construction of the evaluation index system will change due to the different perspectives of researchers.

Since January 1, 2010, the establishment of the China-ASEAN Free Trade Area has exerted a far-reaching influence on regional integration in East Asia and the international economic and trade pattern. China and ASEAN have homology not only in culture, but also strong complementarity in the economy. The completion of the free trade Zone and the substantial reduction of tariff levels have greatly improved the flow efficiency of production factors in the region, and the growth of sports industry-related trade is an inevitable result (Feng, 2014; Hu, 2020).

The significance and value of the completion of the Free Trade Area to the exchange and cooperation of the sports industry between China and ASEAN. Scholars studied the development strategies of China's sports industry in ASEAN Free Trade Area from the following aspects: building exchange platform for the sports industry, establishing open industry concept from education, expanding sports tourism market, strengthening sports training exchange and cooperation, implementing brand strategy, cultivating sporting goods market and so on (He et al., 2014; Wu, 2005).

The proposal and implementation of BRI in 2013 marked that China's geo-economic research completed the transition from "theoretical deepening stage" to "theoretical innovation stage combining China's experience", and China began to enter

the geo-economic practice stage of the "peaceful rise" strategy. With the deepening of China's Belt and Road Initiative, China has carried out extensive cooperation and exchanges with countries and organizations along the Belt and Road in sports culture, sports events, tourism, sporting goods trade, and other sports industry fields. Through BRI, the development of China's sports industry is conducive to building foreign cultural discourse systems, telling Chinese stories, spreading Chinese voices and Chinese characteristics (Guan & Lv, 2017). BRI has built a platform for sports exchanges and cooperation among countries along the Belt and Road, promoted the new situation of international communication of sports culture in China, laid a foundation for international communication of sports culture. Therefore, BRI provided the premise and path guidance for enhancing the national soft power and shaping the new national image (Zhang et al., 2018). In addition, the author sorted out the sports resources of the important node countries of BRI in Africa (Egypt, Ethiopia, Kenya and South Africa), and explored the feasibility of the sports industry cooperation between China and this region (Tao & Cheng, 2018). With the deepening of exchanges and cooperation in the field of humanities in the SCO, scholars began to conduct a series of studies on the cooperation and exchanges in the sports industry of the SCO, especially among Russia, Mongolia, Kazakhstan, and other countries (Yang, 2018; Zhang et al., 2021). Hu (2018) explored the top-level design of the sports industry cooperation among BRICS countries to provide empirical support for sports industry cooperation from the perspective of the geo-economy.

Following the successful bid for the 2022 Beijing Winter Olympics, China has set a vision target of "bringing 300 million people to participate in the ice-snow industry." China's ice-snow industry has received unprecedented development opportunities. In this context, China began to actively promote cooperation with the ice-snow industry in countries and regions along the Belt and Road, and put forward the concept of "Ice Silk Road" (Guo & Zhang, 2019). The space of bilateral ice-snow industry cooperation from the international situation, political advantage, resource advantage, economic advantages, and industrial advantage, and put forward the

cooperation idea of China and Mongolia, Russia, Finland, and even the whole Europe in terms of trade, service, resources, market, and culture.

Conclusions to section 1

1.To sum up, the current studies on the sports industry have not only systematically analyzed and demonstrated the basic theoretical problems of the sports industry, but also conducted detailed empirical analysis on specific problems in the operation of the sports industry. It has enriched the research content of the sports industry theory and sports economics, and provided theoretical support for China's sports industry from the perspective of geo-economy.

2.From the perspective of the geo-economy, the sports industry is of great and special strategic significance by its political, economic, social and cultural characteristics. The study of the sports industry from the perspective of the geo-economy regards national interests as the ultimate goal and pursuit of the sports industry development. This has greatly improved the strategic position and role of the sports industry and ushered in new opportunities and broader space for the development of the sports industry. However, the existing studies have not formed a systematic study on the development of the sports industry under geo-economic theory. In particular, there is a lack of research on the feasibility, index evaluation, demonstration, and development path of international competitiveness of the sports industry from the perspective of geo-economy.

3.Due to the current complex international geo-economic pattern and increasingly fierce competition to China's sports industry has brought unprecedented challenges, this paper decides to study the international competitiveness of China's sports industry from the perspective of the geo-economy. Based on the contradictions and existing problems in the development of the sports industry in China at the present stage, this paper focuses on the selection and shaping of international competitiveness of China's superior sports industry under the new geographical economic pattern, to add necessary timeliness and global sense to the research in this field.

SECTION 2

ANALYTICAL RESEARCH ON THE CHOICE OF CHINA'S ADVANTAGEOUS SPORTS INDUSTRY FROM THE PERSPECTIVE OF GOE-ECONOMICS

2.1 The fundamental problem of China's advantageous sports industry selection from the perspective of geo-economy

On August 10, 2019, the State Council (2019) issued Outline released to build China into sports leader, which proposed the strategic goal of developing the sports industry into a pillar industry of the national economy by 2035. This is the first time to answer the strategic direction of the development of the sports industry from the policy level, and also the first time to position the sports industry as a pillar force to promote the development of the national economy from the national level. The pillar industry of the national economy refers to the industry that occupies an important position in the national economic system and plays a supporting role in the national economy in a certain period. It has the characteristics of a large development scale, high technological density, strong industrial correlation, and good economic benefits (Ma & Luo, 2005).

From the perspective of industrial development, as a rapidly rising emerging industry, the sports industry has maintained double-digit growth for more than 10 consecutive years. Figure 2.1 shows that from 2006 to 2018, the scale of the sports industry continued to expand, and the industrial growth rate far exceeded the national GDP growth rate. Especially after October 20, 2014, The State Council of China (2014) announced Opinions on Accelerating the Development of Sports Industry and Promoting Sports Consumption, the added value and growth rate of the sports industry increased significantly, officially entering a period of great development, showing a trend of explosive development.

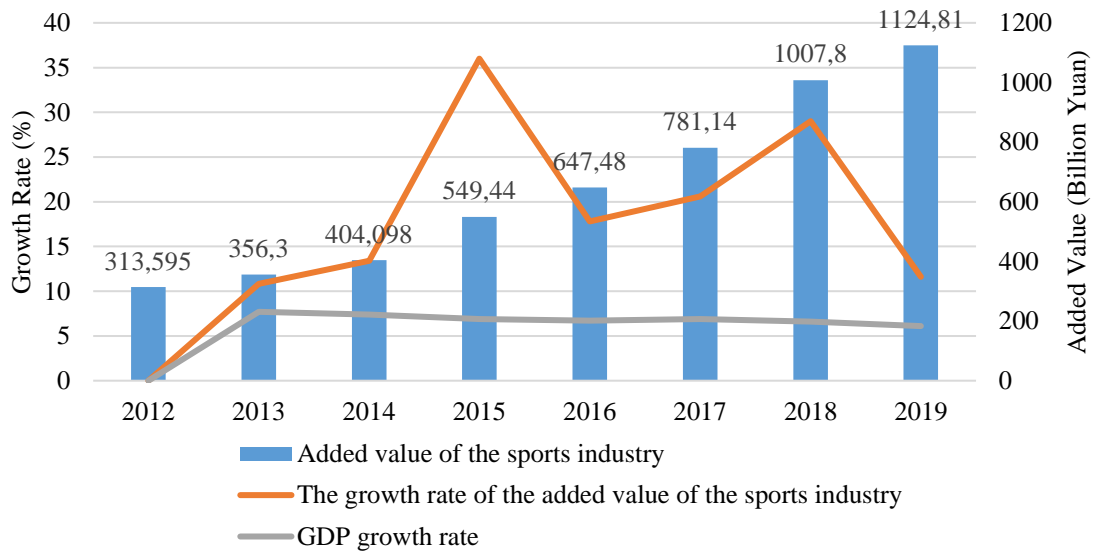


Figure 2.1 - Sports industry added value, growth rate, and GDP growth rate from 2012 to 2019

**Source: The data comes from the official websites of the National Bureau of Statistics and the General Administration of International Sports*

Huang (2020) used the grey forecasting model to establish the forecasting model of the total added value of China's sports industry and the development trend of GDP and concluded that the proportion of the added value of the sports industry in GDP will reach 4.58% in 2035. It can be predicted that by 2035, the sports industry will have a high economical contribution rate. However, the sports industry accounts for more than 3% of GDP in developed countries, which is an economic format in line with the world's industrial development direction. The added value of China's sports industry only accounted for 1.1% of GDP in 2018. Therefore, compared with developed countries, the scale of China's sports industry still has huge potential for growth and development.

The sports industry spans the second and third industries and has rich industrial categories. It is a comprehensive industry. On the one hand, the sports industry can break industrial boundaries with tourism, culture, education, health, medical and other industries through industrial integration to form a linkage effect. Through the crossover, penetration, and reorganization of respective industrial chains, new sports formats with

characteristics of related sectors can be further generated, such as sports tourism, sports health, sports medical rehabilitation, intelligent sports, sports exhibition, and so on. On the other hand, the linkage between industries is mainly reflected in the externality of sports industry, especially sports events. The holding of an event can drive the linkage of transportation, transportation, retail, accommodation, catering and other industries, reflecting a strong correlation effect. At the same time, the sports industry is a new economy, a soft industry with high human capital, high technology investment, light fixed assets investment characteristics. It is in line with China's future resource endowment structure and the world's industrial development direction of the economic format which can maintain relatively rapid and sustained growth.

Nowadays, with the development of knowledge progress and technological revolution, the development of the sports industry will be more dependent on high-tech and modern management methods, management methods, and organizational forms, and the brand of the knowledge economy of the sports industry will be more obvious. For example, the new generation of information technology represented by 5G, big data, VR/AR/MR, cloud computing, blockchain, artificial intelligence, industrial Internet, etc., has increasingly diversified application scenarios in the sports industry. Some new smart sports formats and products have been created, including smart sports tourism, online fitness, cloud competitions, online training, smart venues, VR competitions, and sports digital media. The sports industry's innovation and integration ability further show the characteristics of the new economy.

At present, the development of China's sports industry is in the critical period of striving to climb to the middle and high end of the global value chain (GVC). The development of the sports industry is faced with such prominent contradictions as "there are formats, no system," "there are chains, not smooth," "there are elements, not coordinated (Liu & Zhang, 2009)", which restrict the improvement of the overall competitiveness and efficiency of the sports industry system. Therefore, Outline released to build China into sports leader points out that building a modern industrial system is the primary task to achieve high-quality development of the sports industry.

Changing from the current sports industry system to a future-oriented modern sports industry system is the ultimate goal of supply-side structural reform of the sports industry, and also an important measure of high-quality development of the sports industry in the future.

From the point of view of connotation, the modern sports industry system is advanced and future-oriented, based on new technology and new comparative advantages, sustainable and has long-term international competitiveness of the new industrial system (Liu, 2016). It has the following characteristics: the first one is the dynamic industrial system driven by reform and innovation; The second is a highly open system in which sports resources are effectively allocated on a global scale; Third, digital and intelligent, low-carbon and environmentally friendly input-output system. Cloud computing, big data, blockchain, artificial intelligence, and other information technologies have been widely used in the sports industry; Fourth, a system of cross-border integration in a broader scope. Sports are deeply integrated with health, culture and tourism, education, elderly care, and other related industries, and the radiating and driving effects of sports in national strategies such as rural revitalization, targeted poverty alleviation, new urbanization, and BRI are more prominent. Fifth, the industrial organization system is an industrial ecosystem based on various platforms, a production service cooperation network led by large enterprises, and an organizational system of orderly coordination among small and medium-sized enterprises.

Especially in the wake of COVID-19, it will take some time for exports and consumption to recover. To stimulate economic growth, China will vigorously develop new smart infrastructure such as 5G, artificial intelligence, industrial Internet, smart cities, intercity high-speed rail and intercity rail transit, big data centers, and charging piles for new energy vehicles. There is no doubt that "new infrastructure" investment will bring opportunities to the investment and transformation and upgrading of the sports industry, such as the investment and construction of smart stadiums, smart venue facilities, sports big data centers, and other projects. Meanwhile, in terms of sports consumption demand, with the popularization of 5G technology, the further

development of mobile Internet, artificial intelligence, big data, and blockchain technology, the digitalization level of sports will be further improved. China's sports industry should seize the great opportunity of all-around innovation in production mode, new product form, consumption mode, and marketing mode of sports products and services brought about by applying science and technology to create effective sports demand and lead sports consumption.

With the end of the Cold War pattern, driven by market economy, scientific and technological progress, and other forces, the economic ties between countries and regions have become increasingly close. Although the Cold War mentality characterized by the "logic of conflict" still has a certain "market", the "logic of cooperation" has gradually been widely recognized in international exchanges. Therefore, geoeconomics, which studies the economic competition and cooperation behaviors of countries and regions under certain geographical conditions and their economic relations with each other, began to rise (Li & Li, 2009).

With the globalization, China has been a member of the WTO for 20 years. Over the past 20 years, China has deeply integrated itself into the world economy and made remarkable achievements. For the past 20 years, China's economy has been the sixth-largest globally, accounting for 4 percent of the world's total and 12 percent of that of the United States. Today, China's economy has risen to second place, accounting for 17% of the world's and 70% of that of the United States. Today, China is the world's factory and the largest trading partner of more than 100 countries. Over the past 20 years, Chinese investment has risen from over \$6 billion to over \$150 billion today. China's total GDP is expected to surpass the United States within the next decade. China has gone from a spectator receiver of international rules to a participant and builder. In the future, China will become the maker and leader of international rules. From the perspective of geo-economy, the rise of China's economy is a process in which the barriers to the free flow of goods and factors at home and abroad are constantly broken, a broader population and regions participate in the international market and division of labor, and the country forms a community of common destiny

with more and more partners on a global scale.

However, With the gradual imbalance of wealth distribution, international trade, resource endowment, and consumption. The competition in the fields of finance, science, and technology between the world's major geo-economic plates is intensifying day by day, and the opposition between "winners" and "losers" is becoming more and more serious. Today, under the influence of the anti-globalization trend, vicious competition among major economies has intensified and geopolitical risks have put the international economic order to the test. The changes of China's external geo-economic environment, as well as the resulting trade protectionism, financial and industrial conflicts in science and technology, have brought the geo-economic space squeeze and strategic uncertainty to China's opening-up. Geopolitical obstacles do not only put pressure on China's microeconomic subjects, but also affect the country's economic transformation and upgrading.

The core of the geo-economy is industry, and the analysis of China's geo-economy should be based on industrial pattern and industrial development (Yang & Li, 2021). Only when the industry of a country is located at the high end of the industrial chain of the international community, the commanding position of the strategic industry, and obtains a dominant position in the international market through high value-added products, can the country master the geo-economic dominance. Therefore, today's geo-economic competition is mainly around each specific industry. Faced with a large but not industrial solid structure, China will not always be content to stay at the lower end of the global capital, trade and industrial chain. China's industrial development strategy and policy are gradually making the established powers lose their competitive advantages, which leads to the formation of structural contradictions between China and the established powers in the competition of the geo-economy.

Nowadays, the construction of the whole industrial chain has gone beyond geopolitics to become the core of the geopolitical competition of great powers. As Peter Navarro, chairman of the United States National Trade Council, said bluntly that the essence of Sino-US trade friction is not trade, but industrial policy. Therefore, the

core of Sino-US geo-economic competition is industrial competition. Navarro (2018) believed China's industrial policy as a matter of economic and national security for the United States, and he said: "The goal of Made in China 2025 is to dominate all emerging industries in the future so that the American economy has no future." Therefore, the Trump administration's "hegemonic" trade policy is unprecedented. Through taxation, intellectual property, and other policies and trade protection, the United States government hopes to strengthen scientific and technological competitive advantages and force "manufacturing" to return. To strengthen the competition for the commanding heights of the new scientific and technical revolution and industrial development, the United States has even made all-out efforts to "contain" Chinese high-tech enterprises. This will undoubtedly impact on China's real economy, which is striving to move to the middle and high end of the GVC.

In March 2020, the European Commission published a new Industrial strategy for a globally competitive, green, and digital EU. The strategy document showed the characteristics of "EU First", aiming to implement industrial protection in the name of improving competitiveness and strategic autonomy. During the same period, Canada, Japan, and the United Kingdom also launched their industrial policy plans. The strengthening of industrial competition and the promulgation of protective policies show that the competition for discourse power and the dominant power in the international economic order is becoming increasingly fierce. All powers hope to shape new international economic and technological rules, to create a competitive environment conducive to their own development, so as to master the dominant power of the world economy and achieve strategic autonomy. Therefore, from the perspective of geo-economy and industrial policy development, China's industrial development is faced with a double attack of the high-end blockade and low-end lock. Even at a time, in the most core areas such as finance, trade, science, and technology, the Chinese industry is facing almost everywhere barriers.

When faced with competition and challenges, China used the "Belt and Road" geo-economic strategy and "Made in China 2025" to directly respond to the unfair and

unreasonable international industrial division of labor. BRI adopts a mutually beneficial and win-win way to carry out economic and trade cooperation with countries along the route to maintain and expand China's basic living space. In addition, BRI has reshaped China's domestic and foreign economic geography by establishing a new "flying geese" model of industrial division and industrial transfer with China as the lead. BRI also clarifies China's goal of taking the lead in global economic governance. Through the establishment of international economic, financial, trade, and shipping centers, China will be able to control the dominant power in international trade, product pricing, and resource allocation, and "seize" the right to make rules in economic and trade activities along the Routes. "Made in China 2025" is a major strategic plan made by the Chinese government to comprehensively improve the development quality and level of China's manufacturing industry under the new international environment. Its fundamental goal is to change the situation of "big but not strong" manufacturing in China. "Made in China 2025" clearly proposes to make China into a manufacturing power through 10 years of efforts and build China into a manufacturing power with global leadership and influence by 2045.

Under the background of the increasingly fierce geo-economic competition, market competition theory cannot effectively guide the international competition under the global industrial redistribution. Therefore, the free-market mechanism is increasingly unable to meet the needs of the development of the sports industry. From the perspective of the geo-economy, the core goal of the sports industry is to safeguard the interests of national economic, political, and cultural security, and to implement the will of the country. In the face of fierce geo-economic competition and challenges, the upgrading of China's sports industry under the GVC needs the guarantee of the national mobilization system to be carried out smoothly. This national mobilization system helps to formulate a relatively stable medium - and long-term policy for the sports industry, and to concentrate investment of funds and personnel in an organized and planned way under the road map.

Nowadays, competition in the GVC of the sports industry is gradually changing

to competition based on innovation ability. The research and development and market application of modern science and technology related to the sports industry need super-large-scale capital investment and departmental collaboration. Innovation is becoming more and more difficult, and the cost, difficulty, and risk of breaking the limit of technological growth and crossing the technical fault are becoming more serious. Private companies are increasingly unwilling or unable to afford the cost of upgrading the sports industry. When the cost of scientific and technological innovation and market application is no longer affordable or willing to bear by individual sports enterprises, both established and emerging powers need to further play an important role in developing economies of scale, optimizing resource allocation, and gaining competitive advantages from the perspective of geo-economic competition. In addition, the construction of stadiums and supporting infrastructure and the holding of sports events are characterized by public welfare, wide benefits, large investment, and long construction period, so the participation degree of social capital is low. Therefore, the development of this kind of sports industry needs to rely on the effective organization and promotion of the state and government. In general, in the context of the rapid expansion of the economic scale and the increasingly fierce geo-economic competition among big countries, the development of China's sports industry needs the support of the state.

Especially, Compared with western developed countries, the current development of China's sports industry is still in the primary stage. Due to the market of the sports industry being imperfect, it may go through a long process to completely rely on the adjustment of market mechanism to select the dominant sports industry. In addition, China is faced with a series of problems such as more complicated macro geographical pattern, diplomatic relations between countries, economic policies of other countries, and intervention of third countries. Therefore, it is impossible for China's sports industry to implement the overall development strategy of "Grand Promotion". Priority should be given to the development of "key industries" with geo-economic advantages and more international competitiveness, to have a strong driving

force and guidance for China's sports industry and even economic and social development. Therefore, the identification and selection of the advantageous sports industry is an important content that needs in-depth analysis in the development planning of the sports industry, and whether the selection is correct directly affects the overall development and goal realization of China's sports industry. Specifically, the importance of China's advantageous sports industry from the perspective of geo-economy is reflected in the following aspects:

1. The selection and development of China's advantageous sports industry from the perspective of geo-economics is in line with the requirements of the current China's new national system. The selection and development of the advantageous sports industry can play a decisive role in the allocation of market resources, and form a system that integrates social resources to the greatest extent and concentrates efforts on major affairs.

2. The development of the advantageous sports industry can help to form the growth pole of the overall development of China's sports industry. By attracting the surrounding elements, the industry can become the radiation center of China's sports industry. Focusing on cultivating one or two advantageous sports industries with geo-economic advantages and Chinese characteristics is conducive to the aggregation of various production factors, the perfection of the sports industry system, and the foundation for industrial management. The advantageous sports industry can become a breakthrough for the overall development of China's sports industry. Through the cultivation of advantageous sports industry, it can aggregate regional production factor resources, realize the marketization of the sports industry, and jointly cultivate and build its competitiveness.

3. The advantageous sports industry can reduce production costs, highlight product features, form economies of scale, and expand the market scale. Compared with similar international industries, superior industries are difficult to be surpassed because of the relative stability of production factors. In this way, natural barriers to entry can be formed in the competition with similar industries, which is conducive to

cultivating the core competitiveness of China's sports industry.

4. From the perspective of the geo-economy, the advantageous sports industry can better integrate into the national geo-economic strategy under its inherent industrial competitive advantages. In the fierce international geo-economic competition, it can better safeguard the interests of the national economy, politics, culture, security and other aspects with its strong international competitiveness.

To sum up, it is of great strategic significance to choose China's advantageous sports industry from the perspective of the geo-economy. To some extent, the choice of advantageous sports industry determines the development direction of China's sports industry, which is of guidance and guidance. The process of identification and selection of China's advantageous sports industry is the decision of China's sports industry development strategy.

Which sports industry category can become the alternative projects of China's dominant sports industry from the perspective of geo-economy is the premise of the research work of this paper. The classification of the sports industry refers to the corresponding division and induction of the relevant content of the sports industry (Qin, 2018). The classification of the sports industry is only a means of analysis, which serves to analyze the content. According to different classification standards and research purposes, the results of sports industry classification are also different.

From the theoretical perspective, scholars put forward two different classification systems, narrow and broad. Cong (2001) argued that the sports industry only refers to the sports service industry. The sports industry belongs to the category of tertiary industry according to the three-industry classification, so it is a collection of enterprises that produce and provide sports, sports services, or labor products. However, many scholars believed that the so-called sports products include sporting goods and sports services. According to the definition of the sports industry in a broad sense, the sports industry is an industry that creates value by taking advantage of its functions and radiation effects. Therefore, sports industry should be a collection of the same kind of economic activities and the sum of economic departments that provide sports products

for society (Lu et al., 2001).

From a statistical point of view, countries and regions also have different understandings of the connotation of the sports industry, and there are also differences in a specific classification. For example, in North America, many sports-related industries are not directly distributed under the sports industry, but subordinate to the construction industry, manufacturing industry and other industries (Meek, 1997). The classification standard of the British sports industry is divided into main industry, supporting industry, and correlation industry according to the position of sports industry in the structure of sports industry (Blair, 2011). In addition, the United Nations, the European Union, Australia, Japan, and South Korea also have different classifications of the sports industry.

In China, the General Administration of Sport has reclassified the activities in the national economic industry classification that meet the characteristics of the sports industry according to the latest Industry Classification of the National Economy in 2017, and compiled the Sports Industry Statistical Classification (2019). There are 11 major categories, 37 middle categories and 71 different industries in this classification.

The above analysis shows that the diverse classification of different sports industries from research perspectives or research purposes, there are great differences. From the perspective of theory, practice, policy guidance, or statistical practice, there are many classification methods. From the perspective of geo-economy, the following points are taken into consideration when determining the classification of sports industry types:

1. From the perspective of geo-economic strategy, we should choose the sports industry category which conforms to national strategic interests. In other words, the sports industry category in the geo-economic perspective should not only reflect the needs of the development of China's sports industry, but also have strategic value and can comprehensively safeguard national interests.

2. Where there is a market, there is an industry. The formation and development of the sports industry is the marketing process of different types of the sports markets

(Zhang, 2006). The type of the sports industry needs to be determined according to the international market environment and laws. Whether it is the ontology industry of the sports industry or related industries, there are only externalities in a certain regional sports industry system, that is, the development of the industry either needs to purchase raw materials from other regions or sell products to other regions, which can be called geo-industry. The geo-economic activities related to the sports industry are also mainly carried out around the geo-sports industry.

3. According to the purpose and content of this study, in terms of the international competitiveness of different sports industries from the perspective of geo-economy, this paper believes that the division of sports industry types should not be too rough or too detailed. Therefore, we should aim at several typical sports industry types that China can develop independently according to resource endowment conditions. This is conducive to the development of different sports industries according to the region's resource advantages.

To sum up, this paper believes that the industries connected with the geo-economy include the sports competition and performance industry, sports fitness and leisure industry, sporting goods industry, sports infrastructure construction, and sports tourism. The original details are as follows:

I Sports competition and performance industry. On March 28, 2015, China issued The Vision and Actions on Jointly Building the Silk Road Economic Belt and the 21st Century Maritime Silk Road (after this referred to as the "The Vision and Action"). The document proposed to actively carry out sports exchanges and support countries along the Belt and Road in bidding for major international sports events (Song, 2015). The sports competition and performance industry is the most shining part of the sports industry, an advantageous industry with global competitiveness. Sports competition and performance industry can not only effectively promote the development of fitness and leisure, sports intermediary, sports training, sporting goods and other forms of business, but also have a wide range of relevance with tourism, press and publication, Internet, accommodation, catering, transportation, and other

industries. As an important means of national and city marketing, large-scale sports events can add vitality, charm, and influence to a city. The report of large-scale events from TV, newspaper, Internet, and other media can strengthen the country's soft power and international discourse power. According to the Global Sports Impact Report 2019 released by SPORTCAL, the UK's leading sports marketing agency, China ranks first with 43 major sports events that have been held and will be held, with a total score of 40,700 points (SPORTCAL, 2019). With the gradual maturity of China's international sports competition market, the types of sports events are increasingly rich. More emerging international sports events, regional linkage events, and sports tourism events have entered the market of China's sports competition and performance industry to meet the needs of different participants.

II Sports fitness and leisure industry. Fitness and leisure industry is one of the core industries of the sports industry. The State Council of China (2016) issued Guiding Opinions of the General Office of the State Council on Accelerating the Development of the Fitness and Leisure Industry. The Opinions pointed out that fitness leisure industry is an important part of the sports industry. It is a series of economic activities with sports as the carrier, participation experience as the main form, and the purpose of promoting physical and mental health to provide the public with related products and services.

At present, China's sports fitness and leisure industry has entered the stage of free competition. In this stage, the main body of the market is gradually improved, and the competition is increasingly fierce. As the international leading fitness enterprises, including "24 Hours" from the United States, Alexander and so on, have gradually started to enter the Chinese market, China's local fitness enterprises have gradually begun to chain-oriented and brand-oriented development. At the same time, the government also began to introduce various policies and measures to encourage the backbone fitness and leisure enterprises with independent brands, innovation ability, and competitive strength to become bigger and stronger. In this process, sports fitness and leisure enterprises can further enhance their core competitiveness and extend the

industrial chain and profit chain using management output and chain operation. At the same time, it will foster many leading enterprise groups with international competitiveness and influence and encourage enterprises to "go global".

Furthermore, Belt and Road Sports Tourism Development Action Plan 2017-2020 also proposed that innovation and inclusiveness of national fitness international exchanges and sports culture exchanges should be strengthened (The General Administration of Sport, 2017). The government encouraged and supported local governments and foreign sister cities to carry out national fitness exchanges jointly. From the perspective of geo-economy, with the help of geo-economic platforms such as BRI, the full use of multilateral and bilateral mechanisms and the integration of various resources, Chinese sports culture brand activities such as martial arts, Qigong, Dragon Boat, Kite, and Weiqi can be effectively promoted. This can strengthen the discourse power of international sports organizations in China, thus forming a universal international consensus and establishing Chinese standards of international cultural market rules and Chinese experience and concepts of cultural industry development (Liu, 2018). To sum up, the development of sports, fitness and leisure industry from the perspective of geo-economy not only creates a barrier for national cultural security, but also ensures that China gains advantages in international cultural strategic competition.

III Sporting goods industry. The manufacturing industry plays an important role in a country's international competition. It can also be said that the manufacturing industry is the cornerstone of a country's economy (RYNN & MELMAN, 2008). The author pointed out that manufacturing is the lifeblood of a country, and countries with weak manufacturing industries are easily controlled by countries with advanced manufacturing industries. China is a big country in sporting goods industry, and the sporting goods industry has occupied a large proportion in China's sports industry for a long time. After years of accumulation and development, China's sporting goods industry has developed into a world base and an important force in the manufacturing industry.

With the gradual release of the dividend of the sports industry policy and the continuous improvement of people's living standards, the scale of the sporting goods industry has grown rapidly. According to the Data Announcement of the Total Size and Added Value of the National Sports Industry in 2017, from the perspective of the internal structure of the sports industry, the total output of sporting goods and related products manufacturing has reached 1,350.92 billion CNY, up 12.9% from the previous year. The sporting goods industry has long occupied the largest share of the sports industry. At present, China's sporting goods industry capacity scale, structural adjustment, and other aspects of great changes. The comparative advantage of China's sporting goods industry is gradually shifting from a labor-intensive industry to a capital and knowledge-intensive industry. However, as far as the external environment is concerned, China's sporting goods industry faces the double-layer competition of "high-end reflux" from developed countries and "middle and low-end diversion" from developing countries. In particular, the spread of COVID-19 in the world has intensified the rise of trade protectionism and the restructuring of the global industrial chain.

In the context of fierce geo-economic competition, the primary strategic goal of China's sporting goods industry is to break through the Western monopoly and realize China's transformation from a sporting goods industry power to a manufacturing power. Geo-economic measures such as BRI, the RCEP Agreement, and the China-EU Investment and Trade Agreement have provided valuable channels for upgrading China's industry. Optimizing the division of labor in the industrial chain and promoting the coordinated development of upstream and downstream industrial chains and related industries is the only way for China's sporting goods industry to eliminate the predicament of "locking at the low end of the value chain".

IV Sports construction industry. The sports construction industry refers to those engineering facilities that provide public services for sports production and residents' sports activities, including tangible material engineering facilities, such as stadiums and sports equipment, and intangible engineering facilities, such as information

networks and support services (Miller, 2002).

China's sports construction industry presents a large space for development. The construction experience of stadium facilities is becoming more and more mature. Especially in the construction of large-scale stadiums such as the Beijing International Olympic Center and the Water Cube, China has accumulated rich experience. During the preparations for the 2022 Beijing Winter Olympics, China has overcome various scientific and technological problems in newly built venues such as the National Speed Skating Stadium, the National Snowmobile Center, and the National Ski Jumping Center. The National Speed Skating Stadium even uses the world's most environmental and advanced carbon dioxide ice-making technology which is used in Winter Olympics game for the first time. At present, domestic stadiums rely on the Internet, 5G, artificial intelligence and other advanced technologies to facilitate the pace of smart stadium transformation. Overall, China's sports infrastructure construction and development capacity has become internationalized and high-tech (Xu, 2005).

Chinese enterprises have not only technological advantages, but also have huge cost advantages. By learning from the experience of developed countries, Chinese enterprises have continuously developed technical patents with independent intellectual property rights, and cultivated a large number of talents, thereby greatly reducing costs. At the same time, China's capacity to produce raw materials for infrastructure projects, such as steel and cement, has surpassed the world average (Zhao et al., 2016). In addition, China has more than 3 trillion foreign exchange reserves overseas, the establishment of the Asian Infrastructure Investment Bank and the Silk Road Fund, sports infrastructure projects to provide equity investment and financing, and other financial support (Jia & Qiu, 2016).

In recent years, under the framework of economic and technical assistance, China had made donations, interest-free loans or concessional loans to meet the construction needs of stadiums in countries along the Belt and Road. This move has even been called "China's stadium diplomacy" by Western scholars (Will, 2012). According to statistics, China has built more than 50 stadiums in Africa. In addition,

China has also aided the construction of national stadiums in Belarus, Croatia, Bahamas, Costa Rica, Samoa, Solomon Islands, Cambodia and other countries. Morgenthau believed that foreign aid, no matter what form, is political and its main purpose is to promote and protect national interests (Morgenthau, 1962). Therefore, foreign aid is not only to enhance the national strength of donor countries, but also a geo-economic tool to establish a "proper world order" (Walz & Ramachandran, 2011).

From the perspective of geo-economics, the overseas development of China's sports construction industry and the significance of foreign aid for stadiums mainly include the following points: 1. The construction of sports venues with foreign aid can consolidate the friendly relations between China and the countries aided. Because every construction aid project is a testament to the friendship between China and the recipient country. 2. The aided construction project of sports infrastructure plays a very prominent role in implementing of China's foreign policy and the realization of the strategic goals of international competition. Aid in the same type of project on a large scale and lasting for many years helps to maintain healthy and stable exchanges between China and the aided countries, and the aided countries can continue to give strong support to the cooperation between the two countries in other fields. 3. Sports infrastructure can enhance China's influence and national image. In the sense of architecture, as a kind of architecture, the stadium is bound to be stamped with Chinese cultural symbols. It is also a sculpture of Chinese spirit, and the materialization of Chinese consciousness. As a result, buildings such as sports venues express an identity, heritage, and impact that no other project can match.

V Sports tourism industry. In December 2016, the State Council promulgated the "Thirteenth Five-Year" National Tourism Development Plan, which means that the tourism industry will play an important role in the next national economic construction period . After that, the National Tourism Administration and the General Administration of Sports (2016) jointly issued the "Guiding Opinions on Vigorously Developing Sports Tourism". The document not only defined the scientific concept of

the sports tourism industry, but also further clarified the dialectical relationship between sports and tourism, that is, sports is an important resource for the development of the tourism industry, and tourism is an important driving force for promoting the sports industry (Chang, 2017).

According to the World Tourism Organization, the global sports tourism industry is growing at an annual rate of 14%, making it the fastest-growing tourism business in the tourism market. From 2015 to 2014, China's sports tourism industry is currently growing at an average annual growth rate of 30%-40%. At present, China's sports tourism market has gradually formed a productIION system based on the participation of large-scale events, sports performances, sports landscape, ice and snow sports, water sports, outdoor mountain sports, golf and ethnic and folk sports. At the same time, the socialization of the main body of investment in the sports tourism industry is becoming more and more significant. At present, sports projects designed by traditional scenic spots to increase the flow of tourists, project development by government departments to increase income, and project investment by social capital to realize capital expansion constitute the main form of sports tourism investment in China

Generally speaking, China's sports tourism industry has formed a new pattern with domestic tourists as the main body, foreign tourists as the supplement, and outbound tourists as the embellishment. During the China Open, the IAAF Diamond League, and the World Basketball World Sports Events, many tourists are attracted to watch and travel where the sporting events are held. Inbound tourism has also become an important part of the domestic sports market. For example, in the Shanghai F1 Grand Prix, inbound tourists account for nearly 30% of the total audience. In terms of outbound tourism, the number of overseas sports tours organized by China Sports Competition, China International Sports Tourism Corporation, China Travel Sports Travel Agency, and other organizations has gradually increased. A number of national boutique sports tourism routes are becoming mature.

At the geo-economic level, the Vision and Action proposed to strengthen tourism cooperation, expand the scale of tourism, jointly create international boutique tourism

routes and tourism products with Silk Road characteristics, and improve the level of visa facilitation for tourists from countries along the route. The "Belt and Road" initiative adheres to the traditional culture and spirit of the ancient Silk Road, which is "harmony" and "mutual benefit". It is helpful for China to build an international sports tourism brand, and it is also a "bridge" for China's "Beautiful China" image to the world. With the gradual deepening of the "Belt and Road" strategic tourism layout, the opportunities and conditions for sports tourism to be embedded in China's geo-economic strategy have become more mature.

In 2017, The General Administration of Sport (2017) proposed Belt and Road Sports Tourism Development Action Plan 2017-2020. It not only reflected that sports tourism is a hot spot in the current tourism development, but also showed that under the "One Belt, One Road" strategic deployment, sports tourism is an important driving force for expanding economic development space and cultivating new economic development. The functional characteristics of sports tourism in enhancing the country's image, rallying people's hearts, and promoting diplomacy are of great significance to help the construction of the "Belt and Road".

2.2 The establishment of the international competitiveness evaluation system of China's sports industry from the perspective of geo-economics

The principle of index selection. The selection of common evaluation indicators for the development of different industries in China's sports industry from the perspective of geo-economics should not only fully consider the common factors affecting the development of the industry, but also highlight the individual characteristics of the sports industry. In addition, the selection of indicators should also play a scientific guiding role in the practice of China's sports industry from the perspective of geo-economics. In general, the selection of evaluation indicators should follow the following principles.

The principle of uniqueness. Whether it is China or other countries, no matter

what kind of industry it is, in the expression of industrial development evaluation indicators, universal influencing factors such as geographical location, natural resources, and policy resources will be discussed. Although these indicators have reference value for the development of the sports industry, they also need to be considered and incorporated into the unique evaluation indicators of the development of the sports industry.

The principle of completeness: The research on China's advantageous sports industry from the perspective of geo-economics is to determine whether there are differences in the main influences of different industries in the sports industry, and what differences exist. To avoid the omission of factor analysis in the questionnaire design, in the early stage of the questionnaire design, the author should conduct interviews and field investigations with some experts in various fields for many times, to include the development conditions or influencing factors of different industries in the sports industry as comprehensively as possible.

The principle of independence: From the perspective of geo-economics, the development of China's sports industry itself is a complex system. The development of any type of sports industry results from the joint action of many factors, and these factors are related to some extent. However, the setting of evaluation indicators should try to avoid the intersection and repetition of indicators. The conditions for the development of the sports industry should be reflected from different aspects, and the independence of each indicator should be maintained.

Scientific principles: The establishment of the index system should be based on mature geo-economics, industrial development theory, and other related scientific theories, and comprehensively and accurately reflect the conditions for the development of different industries in the sports industry. The concept of each indicator should be clear, relatively independent and have a certain level, which can reflect the characteristics of different levels.

The principle of combining quantitative and qualitative: Although qualitative indicators often rely too much on the subjective awareness and knowledge of the

selected experts. However, because the development of the sports industry in China is still in its infancy, many indicators are difficult to measure by quantitative methods. Therefore, the construction of evaluation indicators adopts a combination of quantitative and qualitative, to ensure the accuracy of the evaluation results.

Design of Initial Evaluation System. According to the "Porter-Dunning" diamond model theory, first-level indicators of the international competitiveness evaluation index system of China's sports industry from the perspective of geo-economics select factor conditions, demand conditions, firm strategy, structure and rivalry, related supporting industries, transnational economic activities, government, and opportunities. The meaning of the indicators are as follows:

B1 Factor conditions. Factor conditions refer to all the elements and their environmental conditions necessary for material production. According to Porter's competition theory, production factors can be divided into primary and advanced production factors. Primary factors of production refer to natural resources, climate, geographical location, labor force, capital, etc. Advanced factors of production refer to modern communication, information, transportation, and other infrastructure, highly educated labor force, research institutions, etc. With the continuous development of social economy, the connotation of factors of production is increasingly enriched. As modern science, technology, management, information, and resources enter the production process, the structure of production factors will also change. And the more developed the productive forces, the greater the role of these factors.

B2 Demand conditions. Market demand is the driving force behind industrial development, which can guide the improvement of supply quality. Porter believed that when the market reaches a certain size, its composition and characteristics will affect the response of enterprises to customer needs.

For industries with competitive advantages, the market can provide enterprises with a clear demand forecast. And discerning customers will also spur companies to continue to innovate, thus forming stronger competitiveness than foreign competitors. Therefore, the demand conditions of domestic and foreign markets help to establish the

international competitive advantage of the industry.

B3 Firm strategy, structure, and rivalry. Firm strategy, structure, and rivalry refer to the basic fact that competition leads to businesses finding ways to increase production and to the development of technological innovations. The concentration of market power, degree of competition, and ability of rival firms to enter a nation's market are influential here. The formation of sports industry agglomeration and the improvement of industry concentration will help promote the formation of economies of scale for manufacturers in the industry. This is very important for sports enterprises to reduce costs, realize cost advantages, and expand their business scope, to better adapt to changes in the international environment.

B4 Related supporting industries. The competitive advantage of a certain industry can also come from the competitive advantage of its supporting industry or related industries. When a certain industry is internationally competitive, enterprises can also create competitive advantages for other industries in various ways. Competitive upstream manufacturers can provide downstream enterprises with the most cost-effective raw materials in a fast and efficient manner, which helps downstream industries to form their competitive advantages. Therefore, the close cooperation between world-class suppliers and upstream and downstream industries is essential for forming competitive advantages in an industry. Therefore, the international competitiveness of supporting industries and related industries in their respective fields has a profound impact on the international competitiveness of the sports industry.

B5 Transnational economic activity. In the context of economic globalization and regional economic integration, transnational economic cooperation plays an important role in the international development of the sports industry. As far as the development of the sports industry from the perspective of geo-economics is concerned, the transnational economy is the fundamental path for the geo-based sports industry to pursue geographical interests.

B6 Government. The role of government refers to the intervention and

governance of government departments in the whole process of reproduction of sports products and services and the overall operation of sports economy. According to geo-economic theory, the government should and must do something in the international competition of the sports industry, to effectively safeguard national interests. The government should create a good environment and a reasonable organizational structure for industrial development, and encourage manufacturers to create new competitive advantages continuously.

B7 Chance. For the development of the industry, there are many types of opportunities, including the invention and creation of basic science and technology, the fault of traditional technology, the sudden increase of production costs caused by external factors such as the oil crisis, major changes in financial markets or exchange rates, and the sharp increase in market demand, major government decisions, wars, etc. Opportunities have two very different outcomes for companies in the industry. One can help some enterprises to form a competitive advantage in the industry, and the other will lead to the loss of the original competitive advantage of some enterprises. Therefore, the development of the industry can only have the potential for development if it grasps the chance.

Based on the setting of first-level indicators, through literature review, through interviews with economics, sports economics, and experts, 30 secondary indicators were preliminarily selected after repeatedly discussing the index items and their connotations (*Table 2.1*), and formulate the first round of questionnaire materials accordingly (*Appendix A*).

The first round of questionnaire survey consists of 3 parts: 1. The first round of questionnaire survey consists of three parts: 1. The research background, research content, research methods, and work plan of the subject are briefly introduced in the letter. The experts can have a preliminary understanding of the subject and facilitate the follow-up questionnaire work; 2. Basic information of experts, including educational background, professional title, nature of the unit, current position and working years, etc.; 2. The initial framework of the evaluation index system.

Table 2.1 - List of first-level indicators for the international competitiveness of China's sports industry from the perspective of geo-economics

First-level Indicators	Secondary Indicators
Factor Conditions	Geographical Environment, Natural Resources, Sports and Cultural Resources, Human Resources, Capital Elements, Technical Elements
Demand Conditions	Domestic Market Demand, Foreign Market Demand, Domestic Consumer Behavior, Foreign Consumer Behavior
Firm Strategy, Structure and Rivalry	Industrial Scale, Enterprise Operation Mechanism, Industrial Innovation Capability, Industrial Cluster, Industrial Concentration
Related Supporting Industries	Internet Industry, Financial Industry, Media Industry, Tourism Industry, Cultural Industry, Manufacturing Industry
Transnational Economic Activity	Multinational Corporations, International Trade, Foreign Direct Investment, Foreign Investment
Government	Industrial Planning, Industrial Policy, Industrial Management System
Chance	The Belt and Road Initiative, Industry 4.0 (The Fourth Industrial Revolution)

**Source: author's development*

Improvement of evaluation system. The selection of experts is the key to the Delphi method. It is generally believed that the number of experts should be between 15 and 50, and should involve as many fields as possible (Mead & Mosely, 2001).

When determining the number of experts, it is not that the more the number of experts, the better. Some studies have shown that the accuracy of the letter inquiry results will increase with the number of letter inquiries experts, but after the number of experts reaches 15, the increase in the number of experts has little effect on the results (Sun & Wang, 2014). According to the research purpose and the fields involved in the research content, this study invited 15 experts from universities and sports industry administrative departments (Table 2.2). 15 experts have presided over sports industry research experience, and have published sports industry theme papers in core journals. In addition, the age levels of experts are evenly distributed, combining senior experts with many years of work experience with young and middle-aged experts with novel knowledge structures.

Table 2.2 - Information on the members of the expert group

Degree	Number	Title	Number	Working Years	Number	Work Place	Number
PhD	8	Professor	6	30+ Years	3	University	13
Master's Degree	6	Associate Professor	9	20-30 Years	5	Sports Administration	2
Undergraduate	1	Lecturer		10-20 Years	5	Others	
Others		Teaching Assistant		Within 10 Years	2		

Source: author's development

The first round of questionnaires is distributed and recycled by email or WeChat. In the first round, 15 questionnaires were distributed and 15 were recovered. The positive coefficient of experts was 100%. It shows that the experts have high enthusiasm for the subject. After that, the feedback from the experts was sorted out to form the "First Round of Expert Consultation Feedback Information Sorting". Judging from the feedback, the experts' opinions and suggestions mainly focus on the following aspects:

The content of the term "Geographical environment" is too broad, so experts recommends to change it to economic location; 2. Experts suggest that the term "human resources" be changed to "talent resources". Because the competition of geo-economics in the world today is essentially the competition of high-tech, and the competition of high-tech is the competition of talents in the final analysis; Domestic and foreign market demand already includes domestic consumer behavior and foreign consumer behavior, and it is recommended to delete it; 4.

Consideration should be given to increasing the indicators related to the added value of various industries in the sports industry, such as the proportion of the added value of each industry to the total output value of the sports industry, etc.; 5. "Outward direct investment" and "foreign investment" should combine into "transnational investment"; 6. It is recommended to delete the indicator of Industry 4.0, because

technical elements, the Internet industry, and industrial technological innovation capabilities are highly related to this indicator; 7. The impact of COVID-19 on the competitiveness of the sports industry and the layout of the GVC should be fully considered.

Table 2.3 - Statistical results of the second round of questionnaire survey

Expert positivity coefficient

Number	Indicator	Importance Mean	Standard Deviation	Coefficient of Variation (%)	Familiarity Mean	Judgment Mean	Expert Authority Coefficient	Content Validity
1	2	3	4	5	6	7	8	9
C1	Economic Location	4,00	0,52	12,91	0,66	0,83	0,74	1,00
C2	Natural Resources	3,73	0,44	11,85	0,69	0,91	0,80	1,00
C3	Sports Cultural Resources	4,00	0,52	12,91	0,77	0,92	0,84	1,00
C4	Talent Resources	4,67	0,47	10,10	0,70	0,89	0,80	1,00
C5	Capital Elements	3,93	0,44	11,24	0,62	0,93	0,77	0,93
C6	Technical Elements	4,80	0,40	8,33	0,62	0,86	0,74	1,00
C7	Domestic Market Demand	4,80	0,40	8,33	0,69	0,90	0,79	1,00
C8	International Market Demand	4,73	0,44	9,34	0,69	0,88	0,78	1,00
C9	Industrial Scale	4,07	0,44	10,87	0,79	0,93	0,86	1,00
C10	Enterprise Operating Mechanism	3,47	0,50	14,39	0,74	0,89	0,82	0,87
C11	Industrial Efficiency	4,73	0,44	9,34	0,77	0,90	0,83	1,00
C12	Industrial Innovation Capability	4,67	0,47	10,10	0,66	0,92	0,79	1,00
C13	Industrial Clusters	4,07	0,57	14,10	0,66	0,93	0,79	1,00
C14	Industrial Concentration	4,13	0,50	12,07	0,69	0,91	0,80	1,00
C15	Internet Industry	4,73	0,44	9,34	0,77	0,88	0,82	1,00
C16	financial Industry	3,73	0,44	11,85	0,62	0,89	0,75	0,93
C17	Media Industry	3,51	0,50	14,39	0,73	0,91	0,82	1,00
C18	Tourism Industry	3,53	0,44	13,54	0,81	0,92	0,86	1,00
C19	Culture Industry	3,33	0,47	14,14	0,75	0,89	0,82	1,00
C20	Manufacturing Industry	3,87	0,50	12,90	0,77	0,85	0,81	1,00
C21	Multinational Corporation	4,60	0,49	10,65	0,74	0,86	0,80	1,00
C22	International Trade	4,80	0,40	8,33	0,75	0,96	0,86	1,00
C23	Cross-border Investment	4,13	0,50	12,07	0,73	0,83	0,78	1,00
C24	Industry Planning	3,87	0,50	12,90	0,69	0,95	0,82	1,00
C25	Industrial Policy	4,80	0,40	8,33	0,78	0,95	0,87	1,00
C26	Industrial Management System	3,60	0,49	13,61	0,63	0,96	0,80	1,00
C27	The Belt and Road Initiative	4,73	0,44	9,34	0,69	0,92	0,80	1,00
C28	COVID-19	3,60	0,61	16,97	0,66	0,86	0,76	0,87

Source: author's development

After that, the feedback of the first round of expert consultants will be given to each expert, and further communication will be made on the feedback. The second round of the questionnaire (*Appendix B*) is developed based on full consultation with each expert. The questionnaire has two parts: the improvement framework of the evaluation index system and the evaluation form of the second round of the questionnaire.

Determination of the evaluation system. The second round of questionnaires requires experts to rate the importance, familiarity, judgment basis, rationality, and importance and feasibility of each indicator at the indicator layer. At the same time, experts can put forward comments on amendments again, additions, and deletions to the proposed indicators. Table 2.3 shows the statistical results of the second round of expert consultation, including the importance mean of secondary indicators, coefficient of variation, expert authority, and content validity. Based on the statistics in Table 2.3, this paper further tests the positive coefficient of experts, the degree of coordination of expert evaluation, and the reliability and validity according to the statistical results, as a reference for determining the evaluation index system.

The positive coefficient of experts is the ratio of the number of experts who completed the letter inquiries to the total number of experts. It is generally believed that the positive coefficient of experts exceeding 70% indicates that the letter inquiries have achieved better results (Macdonald et al., 2000). In this round of questionnaires, 15 copies were distributed, and 15 copies were returned. The positive coefficient of experts was 100%, indicating that experts had a high degree of concern for this round of questionnaires.

Expert authority coefficient. In addition to the enthusiasm of the experts, the authoritative degree of the experts also has a great influence on the reliability of the evaluation results. According to the data of the experts' evaluation of their authority, the degree of confidence of the experts' judgment on the indicators can be obtained. It is generally believed that the higher the expert's self-evaluation, the more credible the consultation results.

Familiarity is divided into five grades according to "very familiar, relatively familiar, basic familiar, less familiar, and very unfamiliar", and assigned 0.9, 0.7, 0.5, 0.3, and 0.1 points respectively; The assignment of judgment basis is shown in Table 2.4.

Table 2.4 - Assignment table of expert opinion judgment basis

Item	Degree of Influence on Expert Judgment		
	Great impact	General Impact	Little Impact
Theoretical Analysis	0,3	0,2	0,1
Experience	0,5	0,4	0,3
Knowledge of Domestic and Foreign Research	0,1	0,1	0,1
Intuitive Feeling	0,1	0,1	0,1

Source: author's development

Expert authority degree $C = (\text{familiarity score } C_s + \text{judgment score } C_a)/2$. When the degree of authority of experts is greater than 0.7, it indicates that the degree of authority is high. The results are shown in the statistical results of the fourth column of "Familiarity Mean" and the fifth column of "judgment Mean" in Table 2.4 The expert authority coefficient of the secondary indicators of the two rounds of experts' consultation is both higher than 0.7, while the overall expert authority reached 0.8.

Indicator importance and coefficient of variation. Table 2.3 shows the statistical results of the importance mean and coefficient of variation of each indicator in the indicator layer. According to the statistical results, the indicators whose score is greater than their score threshold and whose coefficient of variation is less than the threshold of their coefficient of variation should be included in the index system.

Table 2.3 shows the statistical results of the importance mean and coefficient of variation of each indicator. According to the statistical results, if the index score is greater than the scoring threshold, and the coefficient of variation is less than the critical value, it can be included in the index system. This paper adopts Likert grading evaluation, which is divided into five grades. In principle, indicators with an average importance of less than 3.5 and a coefficient of variation greater than 25% should be

discarded.

Coordination degree of expert. The consistency of expert opinions is also called the coordination degree of expert, which is also one of the indicators of the credibility of the consultation results. Suppose there is an expert, an indicator. The formula for calculating Kendall's W coefficient is as follows:

Suppose there are m experts and n indicators. The formula for calculating Kendall's W is as follows:

$$W = \frac{S}{\frac{1}{12}[K^2(N^3-N)-K \sum_{i=1}^K T_i]} \quad (2.1.)$$

In the formula: N is the number of objects being evaluated; K is the number of raters or the number of standards on which the scoring is based; S refers to the sum of the squared deviations of the sum of the grades R_i of each evaluated object and the average of all these sums \bar{R}_i , which is:

$$S = \sum_{i=1}^n (R_i - \bar{R}_i)^2 = \sum_{i=1}^n R_i^2 - \frac{1}{n} (\sum_{i=1}^n R_i)^2 \quad (2.2.)$$

$$T_i = \sum_{j=1}^{m_i} (n_{ij}^3 - n_{ij}) \quad (2.3.)$$

Here, m_i is the number of repeated grades in the evaluation result of the i -th evaluator, and n_{ij} is the same number of grades of the j -th repeated grades in the evaluation result of the evaluator.

Kendall's W coefficient fluctuates between 0 and 1. Generally, the larger the value, the better the coordination degree of experts on the evaluation of the index system, and the greater the divergence of expert opinions (Heiko, 2012).

Usually: Kendall's W coefficient < 0.2 indicates a poor degree of consistency; between 0,2 and 0,4 indicates a moderate degree of consistency; between 0,4-0,6

indicates a moderate degree of consistency; between 0,6-0,8 indicates a strong degree of consistency; 0,8-1,0 indicates a strong degree of consistency. In this study, through two rounds of expert consultation, SPSS 20.0 software is used to conduct statistics on the Kendall's W coefficient of the index layer. The results showed that since the Kendall's W coefficient was 0,602, there was no need to conduct the third round of questionnaires.

Test statistics	
N	15
Kendall's Wa	0,602
Chi-Square	243,665
df	27
Asymp. Sig	0.000
a. Kendall's Coefficient of Concordance	

Reliability of evaluation indicators (Cronbach's α). Reliability can be used to evaluate the consistency, stability, and accuracy of consultation results, and is an important indicator to measure the credibility of consultation conclusions. Cronbach's α is the most widely used reliability index in China. Therefore, this paper uses *Cronbach's α* to test the internal consistency reliability (Vaske et al., 2017). Its value ranges from 0 to 1, and the larger the value, the better the correlation between the indicators, and the more they can reflect the same concept. It is generally believed that Cronbach's α is preferably $> 0,70$, and $0,60-0,70$ is acceptable (Wu, 2003).

The formula for calculating *Cronbach's α* is as follows, where k is the number of indicators, \sum is the sum of variances of the indicator items, and S^2 is the variance of the total score.

$$\alpha = \frac{K}{K-1} \left(1 - \frac{\sum S_i^2}{S^2} \right) \quad (2.4.)$$

The calculation results using SPSS20.0 show that *Cronbach's α* of the secondary index of the international competitiveness evaluation index system of China's sports

industry from the perspective of geo-economics is 0,862, indicating that the index system has high credibility.

Content validity. Validity refers to the accuracy and validity of inquiry results, and it is an indicator that reflects the degree of agreement between the conclusions of the inquiry and the expected assumptions. In this paper, the content validity index (S-CVI/Ave) was used to evaluate the content validity. $S-CVI/Ave = \frac{\text{the number of experts who scored 3 or 4 for the rationality of the index}}{\text{total number of experts}}$. Generally speaking, when $S-CVI/Ave > 0,90$, it indicates that the content validity of quantity is better (Albert & Ludwick, 2011).

According to the statistics in Table 2.3, it can be seen that the content validity of the second round of questionnaires is greater than 0,9, except that the content validity of indicators C10 and C28 is poor. It can be seen that the overall content validity of the index is good.

Determininig the index system. Based on the research mentioned above and expert investigation, this paper finally determined the international competitiveness evaluation index system of China's sports industry from the perspective of geo-economics (Figure 2.2).

Explanation of the connotation of indicators.

C1: Economic location refers to the spatial relationship formed in the economic connection between a country, region and peripheral regions. A correct understanding of China's economic location is of great significance for understanding the overall situation of China's national economy, giving full play to its regional economic advantages and solving related production layout problems.

C2: Natural resources refer to natural elements (including geology, landform, hydrology, climate, biology, soil, etc.) that can be utilized and affect the development and layout of the sports industry and itself natural complexes.

C3: Sports cultural resources refer to many tangible and intangible resources such as natural resources and social resources related to sports culture that people use in sports production or sports activities.

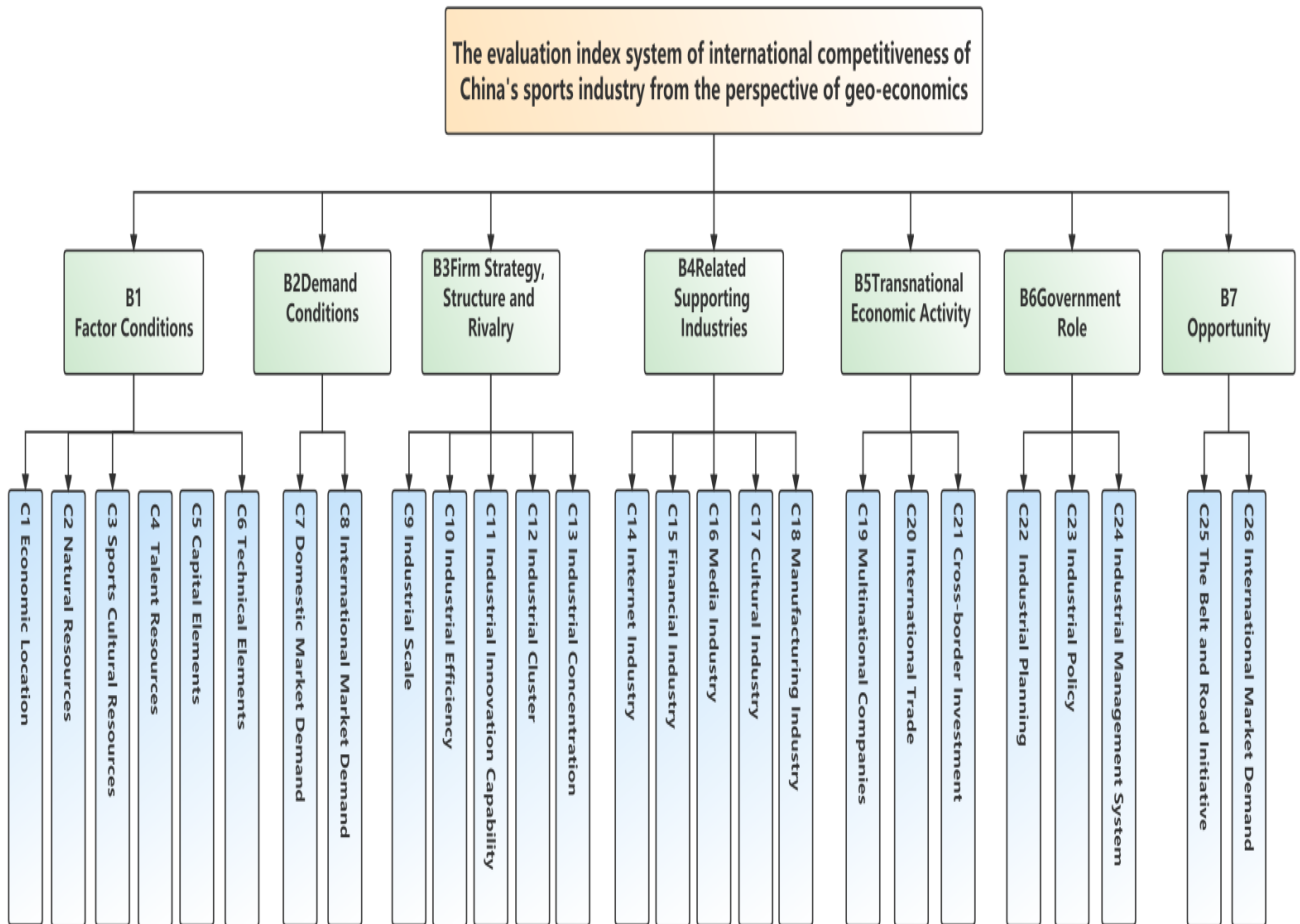


Figure 2.2 - Schematic diagram of the evaluation index system for the international competitiveness of China's sports industry from the perspective of geo-economics

Source: author's development

C4: Talent resource refers to the general term for people who have professional knowledge in a certain area, have the strong working ability and creative ability in the sports industry, and can make great contributions to the society (McKenna & Beech, 2008). Talent resource is the most important factor in all production resources.

C5: Capital elements are final input products, labor services, intermediate products, and financial assets in the production process through direct or indirect means (Zhou, 2012).

C6: Technical elements are the general term for all kinds of intangible resources that can create value in production activities, such as scientific theory, production

process, production skills, management experience, sales channels, and intellectual property rights (Patti et al., 1998).

C7: Domestic market demand of the sports industry is the total amount of products or services that consumers may purchase within the domestic sports product market under a certain period and conditions.

C8: International market demand of the sports industry is the total amount of products or services that consumers may purchase in the international sports product market under a certain period and conditions. Sufficient market space in the international market, discerning customers, and a complex international market competition environment are crucial to improving the international competitiveness of the sports industry (Davies & Ellis, 2000; Nair et al., 2007).

C9: Industrial-scale refers to the proportion of industrial output value in the total output value of the sports industry. This indicator can reflect the current industrial structure of the sports industry and the industry's status in the sports industry.

C10: Industrial efficiency refers to the proportion of the added value of industry to the total output value of the industry. This indicator reflects the direct input-output benefit of the business activities of enterprises in the industry.

C11: Industrial innovation capability is an innovative collection of sports enterprise groups. Industrial innovation is a systematic process, including four levels: technological innovation, product innovation, market innovation, and industrial integration (An, 2007).

C12: Industrial cluster is a geographical aggregation of interconnected enterprises and institutions in a particular field. Industrial agglomeration is generated by the interaction of increasing returns to scale of enterprises, transportation costs, and the movement of production factors through market transmission (Porter, 1998).

C13: Industrial concentration is an indicator used to measure the monopoly of a country or region in a certain industry, and is the basis for developing economies of scale and enhancing the international competitiveness of sports enterprises (Krugman & Venables, 1995).

C14: The internet industry refers to the industry that is based on computer network technology and uses network platforms to provide services and thus obtain income. The Internet platform built through technological means such as "Internet +", big data, and cloud computing can promote the development of various fields of the sports industry.

C15: Financial industry refers to a special industry that operates financial commodities, including banking, insurance, trust, securities, and leasing. The degree of correlation between the financial industry and the sports industry is mainly reflected in various aspects of the financial industry, such as financing and sports insurance related to the establishment and listing of sports companies.

C16: Media industry refers to the industrial group formed by the media entities that disseminate information and knowledge. It is a special industry that produces and disseminates all kinds of information products in text, graphics, art, language, video, sound, digital, symbols, and other forms and provides various value-added services. As an important carrier of sports activities, especially spectator sports and professional sports, the media industry plays an irreplaceable role in promoting sports events, disseminating sports culture, optimizing sports resources and promoting the development of the sports industry.

C17: Tourism industry is a comprehensive industry that meets various tourism needs of consumers by providing tourism products and services based on tourism resources and tourism facilities.

C18: The manufacturing industry is the cornerstone of economy and even the lifeblood of a country. Countries with weak manufacturing are easily controlled by countries with developed manufacturing."

C19: Multinational company refers to monopoly enterprises that take their own countries as their bases and set up branches or subsidiaries around the world through a foreign direct investment to engage in international production and business activities. Multinational corporations are the most active elements in the geo-economy, and they are also important means and tools in geo-economy competition (Han, 2010).

C20: International trade refers to the exchange of goods, services, and factors of production between different countries or regions. The international trade of the sports industry is an important manifestation of the active degree of international commercial exchanges of its sports products. It reflects the international status of a country's sports industry and its status in the international division of its world sports industry.

C21: Cross-border investment refers to the form of investment in which investors invest into two or more national enterprises for direct or indirect operations. Transnational investment is the basic means for monopoly enterprises to form transnational corporations and grab high monopoly profits. It is also an economic behavior in which a country's investors export intangible assets such as capital, equipment, technology, and management skills to obtain effective control over the operation and management of foreign enterprises.

C22: Industrial planning refers to the government's comprehensive use of various theoretical analysis tools, starting from the international and domestic economic development trends, to the positioning, industrial system, industrial structure, industrial chain, spatial layout, economic, social, and environmental impact, the implementation plan of China's sports industry development. Science plans made by etc.

C23: Industrial policy is the sum of various policies that the government intervenes in the formation and development of the sports industry to achieve certain economic and social goals (Yu et al., 2016). A reasonable sports industry policy is conducive to forming the common values of stakeholders in the industry, which in turn helps. Because of their efforts to improve the competitiveness of the sports industry.

C24: Industrial management system refers to the general term for the institutional setting, division of authority, operation mechanism, and other aspects of sports industry management. A reasonable sports industry management system can full play the function and efficiency of market allocation of sports resources.

C25: The Belt and Road Initiative is the most important geo-economic practice in China at present, and it is also for the development of geo-economic theory. BRI

plays an important role in actively promoting the trade liberalization of the sports industry, improving the degree of economic openness, eliminating trade barriers for sports products, red. BRI plays an important role in actively promoting the trade liberalization of the sports using trade and investment costs, and improving the speed and quality of regional economic cycles.

C26: The global pandemic of COVID-19 has brought huge trauma to the world economy, the global economy has suffered a deep recession, international trade and investment have shrunk sharply, the international financial market has been turbulent, and economic globalization has encountered adverse currents. Protectionism and unilateralism are on the rise.

Evaluation of the international competitiveness of China's sports industry from the perspective of geoeconomics based on the method of AHP based group decision making

To avoid the disadvantage that the traditional AHP is susceptible to the subjective influence of a single expert when constructing the judgment matrix, this paper decides to use the method of AHP based group decision making for research. The main work of this part is to formulate the third round of questionnaires according to the index system determined by the Delphi method, so as to obtain the judgment information of experts. Then, the decision information is processed by the method of AHP based group decision-making to get the conclusion.

The third round of questionnaires includes two materials, the main contents of which are as follows:

1. Precautions for filling in questionnaires, the basic situation of the third round of questionnaires was introduced, and the tasks of the experts were clarified.

2. The third round of questionnaires (*Appendix C*) includes three aspects: First, the final framework of the evaluation index system of China's sports industry's international competitiveness from the perspective of geo-economics is given as the core of the questionnaire materials; Secondly, the meanings and examples of the 1-9 scale are attached, so that experts can master the rules of the judgment matrix required

by the AHP; Finally, the judgment matrix table is designed according to the requirements of the AHP group decision method process. Among them, a 3×3 matrix is used to determine the relative importance of experts' subjective weight information; a 7×7 matrix is used to determine the relative importance of the first-level indicators; seven second-level indicator matrices are included.

Determining of expert subjective weight is one of the key issues to be solved in applying AHP based group decision making. Assuming that there are h pieces of information such as the highest education, professional title, working years, position, and research field of the existing experts participating in decision-making, each value has an ordered set $X = \{X_1, X_2, \dots, X_{aj}\}$, where $j = 1, 2, \dots, h$.

For example, when $j = 1$, it represents the highest education, the elements in the set can be specialist, undergraduate, master, and doctorate. Then the weight obtained by the j -th information for the expert S_i is:

$$f(S_i, X_j) = \frac{x_{S_i}}{\sum_{n=1}^k x_{S_n}}, f \in (0, 1) \quad (2.5)$$

The subjective weight of expert S_i is:

$$\omega_z^{S_i} = \sum_{j=1}^h k_j f(S_i, X_j), \sum_{j=1}^h k_j = 1 \quad (2.6)$$

Among them, k is the importance value of information j relative to other information, which can be obtained through the evaluation of experts participating in decision-making using AHP. Then the subjective weight vector of the expert group can be written as:

$$\omega_z = (\omega_z^{S_1}, \omega_z^{S_2}, \dots, \omega_z^{S_k}) \quad (2.7)$$

Table 2.5 - Assignment table of expert subjective weight information level

Degree	Assignment	Title	Assignment	Working Years	Assignment
PhD	5	Professor	5	30+ years	5
master's degree	4	Associate Professor	4	20-30 years	4
Undergraduate	3	Lecturer	3	10-20years	3
others	2	Teaching Assistant	2	within 10 years	2

Source: author's development

In this paper, from several pieces of information that affect the subjective weight of experts, three indicators of educational background, professional title, and working years are screened for the investigation of the subjective weight of experts, and the corresponding grades of these three pieces of information are assigned respectively (Table 2.5).

The corresponding scores and initial weights can be obtained according to the formula and the rank of the expert group members under three information, as shown in Table 2.6.

Table 2.6 - Scores and initial weights of experts' information

ID	Degree	Assignment	Weights	Title	Assignment	Weights	Working years	Assignment	Weights
1	2	3	4	5	6	7	8	9	10
S1	PhD	5	0,0746	Associate Professor	4	0,0606	Within 10 years	2	0,0364
S2	PhD	5	0,0746	Associate Professor	4	0,0606	Within 10 years	2	0,0364
S3	PhD	5	0,0746	Associate Professor	4	0,0606	10-20 years	3	0,0545
S4	PhD	5	0,0746	Associate Professor	4	0,0606	10-20 years	3	0,0545
S5	Undergraduate	3	0,0448	Associate Professor	4	0,0606	20-30 years	4	0,0727

Table 2.6 continued

1	2	3	4	5	6	7	8	9	10
S6	Master's Degree	4	0,0597	Associate Professor	4	0,0606	20-30 years	4	0,0727
S7	Master's Degree	4	0,0597	Associate Professor	4	0,0606	20-30 years	4	0,0727
S8	Master's Degree	4	0,0597	Associate Professor	4	0,0606	10-20 years	3	0,0545
S9	Master's Degree	4	0,0597	Associate Professor	4	0,0606	10-20 years	3	0,0545
S10	Master's Degree	4	0,0597	Professor	5	0,0758	20-30 years	5	0,0909
S11	Master's Degree	4	0,0597	Professor	5	0,0758	30+ years	5	0,0909
S12	PhD	5	0,0746	Professor	5	0,0758	10-20 years	3	0,0545
S13	PhD	5	0,0746	Professor	5	0,0758	20-30 years	4	0,0727
S14	PhD	5	0,0746	Professor	5	0,0758	30+ years	5	0,0909
S15	PhD	5	0,0746	Professor	5	0,0758	30+ years	5	0,0909

Source: author's development

To obtain the subjective weight of each expert, the relative importance of these three pieces of information needs to be considered comprehensively. In this paper, the relative weights are derived from the pairwise judgment matrix of the relative importance of the three pieces of information by experts in the third round, and the results are shown in Table 2.7.

The random consistency ratios of the 15 experts in Table 2.8 are all less than 0,1000. According to the judgment matrix given by 15 experts, the relative importance weights of education, professional title, and working years are 0,2468, 0,4782, and 0,2750, respectively.

Table 2.7 - Judgment results of the relative importance of subjective weight information of experts

ID	Degree	Title	Working Years	CR
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
S1	0,3108	0,4934	0,1958	0,0516
S2	0,1396	0,5278	0,3325	0,0516
S3	0,1958	0,4934	0,3108	0,0516
S4	0,1634	0,5396	0,2970	0,0088
S5	0,1634	0,5396	0,2970	0,0088
S6	0,2500	0,5000	0,2500	0,0000
S7	0,1896	0,5493	0,2611	0,0993
S8	0,2402	0,5499	0,2098	0,0176
S9	0,2599	0,4126	0,3275	0,0516
S10	0,2599	0,4126	0,3275	0,0516
S11	0,4934	0,3108	0,1958	0,0516
S12	0,2000	0,4000	0,4000	0,0000
S13	0,4000	0,4000	0,2000	0,0000
S14	0,1958	0,4934	0,3108	0,0516
S15	0,2402	0,5499	0,2098	0,0176
Relative Importance Weight	0,2468	0,4782	0,2750	

Source: author's development

The AHP group decision analysis in this paper mainly uses the software of YAANP 2.4(Yet Another AHP). YAANP is a network analytic hierarchy process auxiliary software, which provides help in model construction, calculation, and analysis for the decision-making process using network analysis method and analytic hierarchy process. The software has been widely used by academia for evaluation and evaluation problems in various industries.

YAANP has the following characteristics:

First, it can build a hierarchical model easily and quickly;

Second, the software can generate the corresponding judgment matrix according to the established hierarchical structure, which is convenient for the input of decision-making data;

The third is that the software provides data checking and automatic correction of inconsistent judgment matrix;

Fourth, it can output group decision conclusions and intermediate data in various file formats. Based on the above characteristic functions, this paper uses the weighted arithmetic mean to calculate AHP group decision-making. Specific steps are as follows:

Table 2.8 - Subjective weights of experts

ID	Degree	Title	Working Years	ω_z
		0,2468	0,4782	
S1	0,0746	0,0606	0,0364	0,0574
S2	0,0746	0,0606	0,0364	0,0574
S3	0,0746	0,0606	0,0545	0,0624
S4	0,0746	0,0606	0,0545	0,0624
S5	0,0448	0,0606	0,0727	0,0600
S6	0,0597	0,0606	0,0727	0,0637
S7	0,0597	0,0606	0,0727	0,0637
S8	0,0597	0,0606	0,0545	0,0587
S9	0,0597	0,0606	0,0545	0,0587
S10	0,0597	0,0758	0,0909	0,0760
S11	0,0597	0,0758	0,0909	0,0760
S13	0,0746	0,0758	0,0545	0,0696
S14	0,0746	0,0758	0,0727	0,0746
S15	0,0746	0,0758	0,0909	0,0796
S16	0,0746	0,0758	0,0909	0,0796

Source: author's development

I Constructing the judgment matrix. Experts use Saaty's 1-9 scale of pairwise comparisons to qualitatively describe the relative importance of the evaluation indicators at each level, and use accurate numbers to quantify them. The meanings of the numbers are shown in Table 2.9. Pairwise comparison judgment matrix

$A_{S_i}, B_1^{S_i}, B_2^{S_i}, B_3^{S_i}, B_4^{S_i}, B_5^{S_i}, B_6^{S_i}, B_7^{S_i}$ scored by experts.

Table 2.9 - The Fundamental Scale for Pairwise Comparisons

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two elements contribute equally to the objectives
3	Moderate Importance	Experience and judgment slightly favor one element over another
5	Strong Importance	Experience and judgment strongly favor one element over another
7	Very Strong Importance	One element is favored very strongly over another its dominance is demonstrated in practice
9	Extreme Importance	The evidence favoring one element over another is of the highest possible order of affirmation
Intensities of 2, 4, 6, and 8 can be used to express intermediate values.		

Source: author's development

Through expert consultation and examining the relative importance of each indicator of the first-level indicator and each indicator of the second-level indicator layer, each judgment matrix can be obtained, as shown in Table 2.10:

Table 2.10 - A-B judgment matrix

A	B_1	B_2	B_3	...	B_N
B_1	1	a_{12}	a_{13}	...	a_{1N}
B_2	a_{21}	1	a_{23}	...	a_{2N}
B_3	a_{31}	a_{32}	1	...	a_{3N}
...	1	...
B_N	a_{N1}	a_{N2}	a_{N3}	...	1

Source: author's development

In table 2.10, $a_{ij} = \frac{B_i}{B_j}$ represents the judgment value of the relative importance of factor B_i to factor B_j for the overall evaluation objective of A , and the value is determined by the relative importance of factor B_i and factor B_j . The characteristic of the matrix is that the elements on the diagonal are 1, that is, the importance of each element relative to itself is 1.

II Solving the Judgment Matrix by Using the Sum-Product Method. Obtaining the relative weights of the elements being compared under a single target layer—that is, a single-level ordering.

Add the resulting matrices row by row:

$$\omega_i = \sum_{j=1}^N \frac{a_{ij}}{N}, \quad (2.8)$$

Get column vectors:

$$\bar{\omega} = [\omega_1, \omega_2, \omega_3, \dots, \omega_N]^T, i = 1, 2, 3, \dots, N \quad (2.9)$$

The obtained ω vectors are respectively normalized to obtain the sorting weight vector of each element to be compared under a single criterion.

III Consistency check. The basic steps of the consistency check are as follows: First, calculate the largest eigenvalue λ_{max} of the judgment matrix. Then the maximum eigenvalue λ_{max} is substituted into the formula to calculate CI . Finally, the average random consistency index RI is introduced, the judgment matrix consistency CR is calculated (Ramanathan, 2001):

$$\lambda_{max} = \sum_{i=1}^N \frac{(A\omega)_i}{n\omega_i}, i = 1, 2, \dots, N \quad (2.10)$$

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (2.11)$$

In the formula, A is the $A - B$ judgment matrix, n is the order of the judgment matrix, and λ_{max} is the maximum eigenvalue of the judgment matrix.

The higher the consistency of the judgment matrix, the smaller the value of CI . When $CI = 0$, the judgment matrix is completely consistent. However, establishing the judgment matrix, the inconsistency of thinking judgment is only one of the reasons that affect the consistency of the judgment matrix. Using the 1-9 scale as the result of

the comparison between the two factors is also why the judgment matrix deviates from the consistency. It is not appropriate to set an acceptable standard of inconsistency based solely on the value of CI . To obtain a critical value of consistency check applicable to different order judgment matrices, the influence of matrix order must be eliminated.

This problem is addressed in the AHP with the proportion of consistency. The average random consistency index RI is introduced. RI is a correction coefficient used to eliminate the inconsistency of the judgment matrix caused by the influence of the order of the matrix. The specific numerical parameters are shown in Table 2.11.

Table 2.11 - The average consistencies of random matrices

Size of Matrix	1	2	3	4	5	6	7	8	9	10	11	12
Random Consistency Index(RI)	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48

Source: author's development

$$CR = \frac{CI}{RI} \quad (2.12)$$

Usually, for the judgment matrix of $n \geq 3$, when $CR \leq 0.1$, that is, when the relative error CI of λ_{max} deviates from n does not exceed one tenth of the average random consistency index RI , it is generally considered that the consistency of the judgment matrix is acceptable (Pang & Liu, 2002); Otherwise, $CR > 0.1$ at that time, indicating that the degree of deviation of the judgment matrix from the consistency is too large, and necessary adjustments must be made to the judgment matrix to make it have satisfactory consistency.

IV Result aggregation. First, the conclusion of each expert is obtained. Then the conclusions of each expert are aggregated with the subjective weight of the experts to obtain the final group decision conclusion. According to the subjective weight of each

expert, the corresponding indicators w_i are weighted and averaged. Then all the judgment matrices of each expert are assembled in this way, and the w_i of all the assembled judgment matrices can be obtained.

$$\omega_A = \frac{1}{15} \sum_{i=1}^{15} \omega_z \omega_A^{S_i}, \quad \omega_{B_j} = \frac{1}{15} \sum_{i=1}^{15} \omega_z \omega_{B_j}^{S_i}, \quad j = 1, 2, \dots, 7 \quad (2.13)$$

V Conclusion of AHP based group decision making

$$\omega_F = [\omega_{B_1}, \omega_{B_2}, \omega_{B_3}, \dots, \omega_{B_7}] \omega_A \quad (2.14)$$

VI Data processing. Through the judgment matrix of each expert on the target layer, the weight and random consistency ratio of each criterion layer element can be derived respectively, and the results are shown in Table 2.12.

Table 2.12 - The calculation results of each element of the first-level index and the weight vector after subjective weight adjustment

	ω_{B_1}	ω_{B_2}	ω_{B_3}	ω_{B_4}	ω_{B_5}	ω_{B_6}	ω_{B_7}	CR	ω_z
1	2	3	4	5	6	7	8	9	10
S1	0,1625	0,1481	0,2741	0,0623	0,2277	0,0798	0,0455	0,0870	0,0574
S2	0,0695	0,1559	0,2742	0,1115	0,2254	0,0871	0,0765	0,0549	0,0574
S3	0,0935	0,1538	0,3102	0,0385	0,2481	0,0805	0,0755	0,0714	0,0624
S4	0,0727	0,1159	0,3378	0,0393	0,2695	0,0907	0,0741	0,0766	0,0624
S5	0,1198	0,1414	0,3512	0,0417	0,1932	0,0938	0,0589	0,0747	0,0600
S6	0,1657	0,1020	0,3388	0,0332	0,2537	0,0605	0,0461	0,0832	0,0637
S7	0,1281	0,1046	0,4029	0,0515	0,1983	0,0691	0,0454	0,0953	0,0637
S8	0,0706	0,1575	0,2736	0,0579	0,2518	0,1169	0,0717	0,0847	0,0587
S9	0,1877	0,1072	0,3093	0,0330	0,2445	0,0666	0,0518	0,0959	0,0587
S10	0,1419	0,0945	0,3180	0,0390	0,2245	0,1050	0,0771	0,0900	0,0760
S11	0,1008	0,1547	0,2740	0,0910	0,2318	0,0987	0,0490	0,0817	0,0760
S12	0,0557	0,1718	0,3245	0,0495	0,1610	0,1523	0,0852	0,0662	0,0696
S13	0,1074	0,1615	0,3435	0,0609	0,1914	0,0908	0,0445	0,0726	0,0746
S14	0,0768	0,1397	0,3853	0,0350	0,1643	0,1460	0,0528	0,0749	0,0796
S15	0,0710	0,1120	0,3239	0,0305	0,2063	0,1961	0,0603	0,0707	0,0796
ω_B	0,1069	0,1345	0,3242	0,0512	0,2175	0,1050	0,0608		

Source: author's development

The results show that the consistency test results of each expert target layer judgment matrix are all less than 0,1.

Table 2.13 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B1

	ω_{C_1}	ω_{C_2}	ω_{C_3}	ω_{C_4}	ω_{C_5}	ω_{C_6}	CR	ω_z
1	2	3	4	5	6	7	8	9
S1	0,1011	0,0497	0,0667	0,1482	0,2834	0,3508	0,0553	0,0574
S2	0,1016	0,0738	0,0742	0,2768	0,2181	0,2556	0,0707	0,0574
S3	0,0895	0,0532	0,0646	0,2630	0,1874	0,3423	0,0533	0,0624
S4	0,0852	0,0786	0,0791	0,2769	0,1778	0,3024	0,0991	0,0624
S5	0,0830	0,0710	0,0948	0,3176	0,1723	0,2614	0,0863	0,0600
S6	0,1615	0,0841	0,0696	0,2171	0,3237	0,1439	0,0795	0,0637
S7	0,1606	0,0744	0,0811	0,2616	0,1262	0,2962	0,0877	0,0637
S8	0,1275	0,0571	0,0693	0,2555	0,2110	0,2796	0,0893	0,0587
S9	0,1196	0,1116	0,0580	0,3242	0,1476	0,2389	0,0919	0,0587
S10	0,1365	0,0540	0,1091	0,2185	0,1714	0,3104	0,0819	0,0760
S11	0,0900	0,0574	0,1101	0,2608	0,1898	0,2919	0,0498	0,0760
S12	0,2123	0,0551	0,1120	0,1866	0,0726	0,3614	0,0754	0,0696
S13	0,1488	0,0590	0,0631	0,2652	0,1826	0,2812	0,0933	0,0746
S14	0,1472	0,0409	0,0596	0,2705	0,1574	0,3244	0,0835	0,0796
S15	0,0587	0,0464	0,0999	0,2439	0,1384	0,4127	0,0592	0,0796
ω_c	0,1220	0,0632	0,0817	0,2519	0,1813	0,2998		

Source: author's development

Finally, perform arithmetic weighted average processing with the subjective weight of experts to obtain the attribute weight vector ω_B .

Table 2.14 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B2

	ω_{C_7}	ω_{C_8}	CR	ω_z
1	2	3	4	5
S1	0,5000	0,5000	0	0,0574
S2	0,3333	0,6667	0	0,0574
S3	0,5000	0,5000	0	0,0624
S4	0,6667	0,3333	0	0,0624
S5	0,5000	0,5000	0	0,0600
S6	0,5000	0,5000	0	0,0637

Table 2.14 continued

<i>I</i>	2	3	4	5
S7	0,3333	0,6667	0	0,0637
S8	0,5000	0,5000	0	0,0587
S9	0,2500	0,7500	0	0,0587
S10	0,3333	0,6667	0	0,0760
S11	0,2500	0,7500	0	0,0760
S12	0,3333	0,6667	0	0,0696
S13	0,5000	0,5000	0	0,0746
S14	0,3333	0,6667	0	0,0796
S15	0,6667	0,3333	0	0,0796
ω_C	0,4323	0,5677		

Source: Calculated by the author

In the same calculation method, the weight vector and the random consistency ratio of the sub-criteria layer can be derived from the judgment matrix of the experts under the sub-criteria layer.

Table 2.15 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B3

	ω_{C_9}	$\omega_{C_{10}}$	$\omega_{C_{11}}$	$\omega_{C_{12}}$	$\omega_{C_{13}}$	CR	ω_z
<i>I</i>	2	3	4	5	6	7	8
S1	0,4038	0,1821	0,2682	0,0834	0,0624	0,0471	0,0574
S2	0,2011	0,2218	0,1373	0,0982	0,3416	0,0739	0,0574
S3	0,4704	0,1444	0,2412	0,0767	0,0673	0,0739	0,0624
S4	0,2388	0,2188	0,3474	0,1149	0,0801	0,0972	0,0624
S5	0,3811	0,1176	0,2920	0,1434	0,0660	0,0723	0,0600
S6	0,3906	0,1676	0,0644	0,1285	0,2489	0,0530	0,0637
S7	0,1683	0,3548	0,2276	0,0851	0,1643	0,0751	0,0637
S8	0,4311	0,1816	0,2330	0,1028	0,0515	0,0399	0,0587
S9	0,3954	0,2531	0,1733	0,1026	0,0757	0,0776	0,0587
S10	0,4316	0,2117	0,1676	0,1171	0,0720	0,0681	0,0760
S11	0,4018	0,1328	0,2757	0,1255	0,0643	0,0393	0,0760
S12	0,2129	0,2627	0,3300	0,1194	0,0749	0,0718	0,0696
S13	0,3782	0,1279	0,2426	0,1712	0,0801	0,0800	0,0746
S14	0,2604	0,3459	0,2160	0,1028	0,0749	0,0494	0,0796
S15	0,2661	0,1858	0,3880	0,1111	0,0490	0,0428	0,0796
ω_C	0,3343	0,2081	0,2429	0,1132	0,1016		

Source: Calculated by the author

The results are shown from Table 2.13 to Table 2.19. Perform arithmetic weighted average processing with the subjective weights of experts to obtain the criterion layer weight vector ω_C .

Table 2.16 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B4

	$\omega_{C_{14}}$	$\omega_{C_{15}}$	$\omega_{C_{16}}$	$\omega_{C_{17}}$	$\omega_{C_{18}}$	CR	ω_z
<i>l</i>	2	3	4	5	6	7	8
S1	0,3933	0,2043	0,0823	0,0594	0,2607	0,0468	0,0574
S2	0,3631	0,2186	0,0808	0,0560	0,2815	0,0401	0,0574
S3	0,3619	0,1504	0,0854	0,0514	0,3508	0,0413	0,0624
S4	0,2429	0,2349	0,1121	0,0745	0,3356	0,0508	0,0624
S5	0,3946	0,1706	0,1199	0,0639	0,2510	0,0555	0,0600
S6	0,2359	0,1924	0,0851	0,1079	0,3787	0,0834	0,0637
S7	0,2421	0,1789	0,0947	0,0618	0,4225	0,0858	0,0637
S8	0,3498	0,1612	0,1134	0,0847	0,2909	0,0430	0,0587
S9	0,2797	0,1845	0,1103	0,0746	0,3508	0,0315	0,0587
S10	0,2339	0,1813	0,1150	0,0863	0,3834	0,0348	0,0760
S11	0,3331	0,1608	0,1218	0,0846	0,2997	0,0890	0,0760
S12	0,3658	0,1929	0,0912	0,0624	0,2877	0,0524	0,0696
S13	0,2633	0,1423	0,1217	0,0676	0,4051	0,0457	0,0746
S14	0,3332	0,1767	0,0994	0,0774	0,3132	0,0506	0,0796
S15	0,2645	0,1939	0,1266	0,0735	0,3414	0,0842	0,0796
ω_C	0,3081	0,1821	0,1049	0,0729	0,3321		

Source: Calculated by the author

Combined with the YAANP software and the above calculation results, this paper can finally construct the weight of each index of the international competitiveness evaluation index system of China's sports industry from the perspective of geoeconomics.

Table 2.17 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B5

	$\omega_{C_{19}}$	$\omega_{C_{20}}$	$\omega_{C_{21}}$	CR	ω_z
<i>l</i>	2	3	4	5	6
S1	0,4429	0,3873	0,1698	0,0176	0,0574
S2	0,6333	0,2605	0,1062	0,0370	0,0574
S3	0,4160	0,4577	0,1263	0,0088	0,0624

Table 2.17 continued

<i>l</i>	2	3	4	5	6
S4	0,2519	0,5889	0,1593	0,0516	0,0624
S5	0,2395	0,6232	0,1373	0,0176	0,0600
S6	0,1373	0,6232	0,2395	0,0176	0,0637
S7	0,4429	0,3873	0,1698	0,0176	0,0637
S8	0,1593	0,5889	0,2519	0,0516	0,0587
S9	0,6194	0,2842	0,0964	0,0825	0,0587
S10	0,3202	0,5571	0,1226	0,0176	0,0760
S11	0,4429	0,3873	0,1698	0,0176	0,0760
S12	0,2014	0,7071	0,0915	0,0904	0,0696
S13	0,2431	0,6687	0,0882	0,0068	0,0746
S14	0,4429	0,3873	0,1698	0,0176	0,0796
S15	0,1924	0,6327	0,1749	0,0088	0,0796
ω_c	0,3413	0,5077	0,1511		

Source: Calculated by the author

Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B6 are shown from Table 2.18.

Table 2.18 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B6

<i>l</i>	$\omega_{C_{22}}$	$\omega_{C_{23}}$	$\omega_{C_{24}}$	CR	ω_z
2	3	4	5	6	
S1	0,1638	0,5390	0,2973	0,0088	0,0574
S2	0,1593	0,5889	0,2519	0,0516	0,0574
S3	0,2973	0,5390	0,1638	0,0088	0,0624
S4	0,5390	0,2973	0,1638	0,0088	0,0624
S5	0,2857	0,5714	0,1429	0,0000	0,0600
S6	0,2721	0,1199	0,6080	0,0707	0,0637
S7	0,1698	0,4429	0,3873	0,0176	0,0637
S8	0,3873	0,4429	0,1698	0,0176	0,0587
S9	0,1638	0,5390	0,2973	0,0088	0,0587
S10	0,5571	0,3202	0,1226	0,0176	0,0760
S11	0,2114	0,6551	0,1335	0,0516	0,0760
S12	0,2311	0,6651	0,1038	0,0825	0,0696
S13	0,6080	0,2721	0,1199	0,0707	0,0746
S14	0,1066	0,6999	0,1935	0,0088	0,0796
S15	0,2721	0,6080	0,1199	0,0707	0,0796
ω_c	0,2984	0,4896	0,2120		

Source: Calculated by the author

Table 2.19 - Calculation results of the expert judgment matrix for the second-level indicators under the first-level indicator B7

	$\omega_{C_{25}}$	$\omega_{C_{26}}$	CR	ω_z
S1	0,7500	0,2500	0	0,0574
S2	0,7500	0,2500	0	0,0574
S3	0,8000	0,2000	0	0,0624
S4	0,6667	0,3333	0	0,0624
S5	0,6667	0,3333	0	0,0600
S6	0,6667	0,3333	0	0,0637
S7	0,8000	0,2000	0	0,0637
S8	0,7500	0,2500	0	0,0587
S9	0,6667	0,3333	0	0,0587
S10	0,8333	0,1667	0	0,0760
S11	0,7500	0,2500	0	0,0760
S12	0,8571	0,1429	0	0,0696
S13	0,6667	0,3333	0	0,0746
S14	0,8333	0,1667	0	0,0796
S15	0,8750	0,1250	0	0,0796
ω_c	0,7601	0,2399		

Source: Calculated by the author

The summary results are shown in Table 2.20.

Table 2.20 - The final weight of the evaluation index of the international competitiveness of China's sports industry from the perspective of geo-economics

	ω_{B_1}	ω_{B_2}	ω_{B_3}	ω_{B_4}	ω_{B_5}	ω_{B_6}	ω_{B_7}	Weights	Rank
	0,1069	0,1345	0,3242	0,0512	0,2175	0,1050	0,0608		
C1	0,1220							0,0130	21
C2	0,0632							0,0068	24
C3	0,0817							0,0087	23
C4	0,2519							0,0269	15
C5	0,1813							0,0194	17
C6	0,2998							0,0320	13
C7		0,4323						0,0581	7
C8		0,5677						0,0763	4
C9			0,3343					0,1084	2
C10			0,2081					0,0675	6
C11			0,2429					0,0787	3
C12			0,1132					0,0367	10
C13			0,1016					0,0329	11
C14				0,3081				0,0158	19
C15				0,1821				0,0093	22
C16				0,1049				0,0054	25
C17				0,0729				0,0037	26

Table 2.17 continued

C18				0,3321				0,0170	18
C19					0,3413			0,0742	5
C20					0,5077			0,1104	1
C21					0,1511			0,0329	12
C22						0,2984		0,0313	14
C23						0,4896		0,0514	8
C24						0,2120		0,0223	16
C25							0,7601	0,0462	9
C26							0,2399	0,0146	20

Among the seven major sectors of the first-level indicators, the indicator of firm strategy, structure, and rivalry ranked first, with a weighted index of 0,3242. This fully reflects the importance of the forces within the sports industry to its international competitiveness. The overall ranking of the second-level indicators of this indicator is also higher. Among them, the secondary indicators before the ranking test are industrial scale, industrial innovation capability and industrial efficiency. Their weights are 0,1084, 0,0787, and 0,0675. As China's sports industry is still in its infancy, the industrial scale of each industry in the sports industry determines the formation of the scale effect of each industry and the rationality of the structure of the sports industry. Therefore, the appropriate industrial scale is an important component of the international competitiveness of China's sports industry, and it is also an important factor to be considered when the country and the government formulate sports industry policies. Industrial innovation is an innovative collection of sports enterprise groups. Industrial innovation is a systematic process, including four levels: technological innovation, product innovation, market innovation, and industrial integration.

Although the gap between China's sports industry and developed countries is narrowing, industrial innovation capabilities and the lack of products with independent intellectual property rights are important reasons for the passive situation of low-end lock-in of China's sports industry. Therefore, this indicator is particularly important for promoting the current international competitiveness of China's sports industry. Industrial efficiency is a comprehensive reflection of enterprise profitability and development level (Stability, 2009). The higher the industrial efficiency, the higher the

added value of the enterprise, the higher the level of profitability, and the better the effect of input and output.

The indicator Transnational economic activity weights 0,2175, ranking second among the first-level indicators, which is in line with the expectations of this paper. That is why, according to the geo-economic theory and the characteristics of geo-economics, this paper selects the improved porter-Dunning diamond model, and innovatively adds three indicators of multinational corporations, international trade, and transnational investment. Statistics show that the weight of international trade is 0,1104, ranking first among 26 secondary indicators. As the main carrier of transnational economic activities, the weight of multinational corporations accounted for 0,0742 and was also ranked before the exam. The weight of cross-border investment is 0,0329, ranking 12th.

The demand condition weight is 0,1345, ranking third. It is worth noting that this paper adds foreign market demand indicators to the original Porter diamond model based on geo-economics. The influence of demand conditions is reflected in: In recent years, to solve the contradiction between supply and demand in the sports industry, the supply-side structural reform of China's sports industry has been deepened under the guidance of domestic and foreign market demand, aiming to strengthen the effective supply of sports products. In addition, through industrial integration, market innovation, and format innovation, the ecological transformation of the sports industry is promoted, which will lead to the transformation and upgrading of the demand side, that is, the sports consumption structure.

In terms of factors conditions, the weights of high-end factors such as technical factors, talent factors and capital factors are significantly higher than other production factor indicators. This further confirms that the competition for geo-economic strategic resources in the 21-st century has extended from the original competition for resources such as oil and gas, minerals, raw materials, and grains to competition in the fields of talents, information, science, and technology, and finance.

The weight of government indicators ranks fifth, but government plays a very important role in constructing the international competitiveness of China's sports industry. The nature and situation of the geo-economic competition among major powers determine that the free-market mechanism is increasingly unable to adapt to the new situation. In this context, the national mobilization mechanism stands out by its highly coordinated organizational structure, which can effectively coordinate and allocate national resources, and plays an increasingly important role. As contemporary great power competition has entered the stage of industrial policy competition, formulating and implementing industrial policies that conform to the reality has become the top priority of great power geo-economic competition. At present, the goal of China's sports industry policy is to transform from a labor-intensive industry to a capital-intensive industry, and then develop a technology-intensive industry. Therefore, the sports industry policy not only reflects the relationship between the government and the market, but also determines the development direction of the industry, which in turn determines the efficiency of economic development and its impact on international trade and the world economy.

The chance weight is 0,0608. Although this indicator ranks low, the weight of the sub-indicator of the “Belt and Road Initiative” is 0,04621, ranking ninth and relatively high. As the most representative geo-economic strategy in China, it plays a crucial role in the international competitiveness of China's sports industry. Therefore, the importance is also at the forefront. With the emergence of covid-19 and the global spread, China's geo-economic interests are facing severe challenges. Whether it is the interconnection between domestic regions, or the pattern of economic and trade cooperation between China and neighboring countries and even the world, it will be seriously affected. Under this background, China's geo-economic interests face severe challenges. On the one hand, China, whose geo-economic interests continue to expand outward in the process of participating in globalization, has to face a more and more complex international economic environment. On the other hand, the negative effects

of protectionism have been exacerbated by the new crown pneumonia epidemic, which has worsened the already shrinking global trade and investment.

Compared with other indicators, the weight of related supporting industries is only 0,0512, ranking at the bottom. However, under the general trend of the era of "sports +" integrated development, the integrated development of sports and related industries, fields, and formats will become an important way for the incremental reform and innovative development of the sports industry. According to the experience of developed countries, the deep integration of sports with the Internet industry, tourism industry, cultural industry, creative industry and media industry will create economic benefits for the society and develop the national economy. It is also an important link in the upgrading of China's sports industry.

2.3 The selection of China's advantageous sports industry from the perspective of geo-economics - Based on fuzzy comprehensive evaluation (FCE)

FCE is a fuzzy mathematical algorithm established in the evaluation process, quantifying and synthesizing the nonlinear evaluation in reality, and finally obtaining comparable quantitative results (Liu et al., 2020). As the development of China's sports industry is still in its infancy, relevant statistical work is not yet complete. Because most evaluation indicators have a certain degree of ambiguity, there is no absolute and very precise affirmation and negation. The comprehensive evaluation of the international competitiveness of China's sports industry from the perspective of geo-economics using fuzzy mathematics will be closer to the actual situation.

1.Principles, Characteristics, and Steps of FCE Method. The FCE method is a comprehensive evaluation method based on fuzzy mathematics. The comprehensive evaluation method transforms qualitative evaluation into quantitative evaluation according to the membership degree theory of fuzzy mathematics, that is, using fuzzy mathematics to make a general evaluation of things or objects restricted by many factors. It has the characteristics of clear results and strong systematic, which can better

solve vague and difficult to quantify problems, and is suitable for solving various non-deterministic problems.

The most notable feature of the FCE method is that the optimal evaluation factor is the benchmark, and its evaluation value is 1. The remaining inferior evaluation factors get the corresponding evaluation value according to the degree of inferiority.

The steps of the FCE method are as follows:

Step 1: To determine the evaluation index U of the FCE object. P evaluation object indicators, $U = \{u_1, u_2, \dots, u_p\}$

Step 2: To determine the comment level domain of the object, that is, the judgment set V . $V = \{v_1, v_2, \dots, v_p\}$, Each level is relative to a fuzzy subset.

Step 3: To establish a fuzzy membership matrix R . After the fuzzy subset of the level is established, each factor of the selected evaluation object must be quantified step by step, $u_i (i = 1, 2, \dots, p)$, that is, to determine the membership matrix of the fuzzy subset of the evaluated object, so that the fuzzy relationship matrix of the object can be obtained, as follows:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & r_{22} & \cdots & r_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ r_{p1} & r_{p2} & \cdots & r_{pm} \end{bmatrix}_{p \cdot m} \quad (2.15)$$

Element in row and column in matrix represents the degree of membership of a certain evaluated object to the v_i -level fuzzy subset from factor perspective. The performance of an evaluated object in a certain factor is characterized by a fuzzy vector $(R|u_i) = (r_{i1}, r_{i2}, \dots, r_{im})$. In contrast, in other evaluation methods, it is mostly characterized by the actual value of an indicator. Therefore, from this perspective, FCE requires more information.

Step 4: To determine the weight vector K of the evaluation factor. In the FCE, determine the weight vector of the evaluation factor: $K = (a_1, a_2, \dots, a_p)$. The element in the weight vector is essentially the degree of membership of the factor to

the fuzzy sub{factors important to the evaluated thing}. The paper uses AHP to determine the relative importance order among the evaluation indicators. The weight coefficients are thus determined and normalized before synthesis. Which is:

$$\sum_{i=1}^p a_i = 1, a_i \geq 0, i = 1, 2, \dots, n \quad (2.16)$$

Step 5: To synthesize the evaluation result vector of the FCE. Using an appropriate weight set to synthesize and the membership matrix R of each evaluated object, the evaluation result vector S of the evaluated object can be obtained. Which is:

$$KR = (a_1, a_2, \dots, a_p) \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{bmatrix} = (b_1, b_2, \dots, b_m) = S \quad (2.17)$$

Among them, is obtained from the operation of the j -th column of K and R , which indicates that the evaluated object has the membership degree of the fuzzy subset of the v_j -level grade as a whole.

Step 6: To analyze the FCE judgment result vector. In practice, we generally use the maximum membership principle for processing, but in some special cases, using this principle will reluctantly lose a lot of information, and may even obtain distorted evaluation results. In this way, the weighted average method can be used to find the membership level, and for a plurality of things to be evaluated, it is possible to sort according to their level positions and calculate their corresponding scores.

2.Design of international competitiveness evaluation model of Chinese sports industry from the perspective of geo-economics. In the first half of this chapter, the indicators at all levels in evaluating the international competitiveness of China's sports industry from the perspective of geo-economics have been determined, and the weight coefficients of the indicators at all levels have been obtained by using the analytic hierarchy process. Next, this paper will introduce how to use the established evaluation

system to use the FCE method to evaluate the international competitiveness of China's sports industry.

From the perspective of geo-economics, the international competitiveness evaluation system of China's sports industry is an evaluation index system with secondary indicators. Therefore, a FCE process is formed for each first-level indicator, namely, production factors, demand conditions, industrial strategy, structure, horizontal competition, related industries, transnational economic activities, government, and opportunities. Specifically, first, FCE should be carried out on the second-level indicators decomposed by each first-level index. Then, the fuzzy synthesis with the weights of the first-level indicators can be used to obtain the FCE results of the international competitiveness of various industries in China's sports industry from geo-economics.

The FCE factor sets obtained from the international competitiveness index system of China's sports industry from the perspective of geo-economics is as follows:

$$B_1 = \{C_1, C_2, C_3, C_4, C_5, C_6\}$$

$$B_2 = \{C_7, C_8\}$$

$$B_3 = \{C_9, C_{10}, C_{11}, C_{12}, C_{13}\}$$

$$B_4 = \{C_{14}, C_{15}, C_{16}, C_{17}, C_{18}\}$$

$$B_5 = \{C_{19}, C_{20}, C_{21}\}$$

$$B_6 = \{C_{22}, C_{23}, C_{24}\}$$

$$B_7 = \{C_{25}, C_{26}\}$$

Constructing Comment Sets:

In this part, the forth round of questionnaire (*Appendix D*) is designed. The content of the survey is the evaluation of various indicators in the international competitiveness evaluation system of China's sports industry from the perspective of geo-economics.

Table 2.22 - Experts' evaluation results on the international competitiveness of China's sports industry from the perspective of geo-economics

Indicator	Sports Competition and Performance Industry					Sports Fitness and Leisure Industry					Sporting Goods Industry					Sports Construction Industry					Sports Tourism Industry				
	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C1	5	7	2	1	0	3	5	6	1	0	4	6	4	1	0	4	6	4	1	0	7	5	3	0	0
C2	6	7	1	1	0	7	5	3	0	0	5	5	3	2	0	4	3	6	2	0	6	8	1	0	0
C3	5	8	2	0	0	6	8	1	0	0	6	6	3	0	0	4	4	6	1	0	6	8	1	0	0
C4	7	6	2	0	0	6	6	2	1	0	3	4	5	2	1	7	5	2	1	0	3	3	7	2	0
C5	6	5	3	2	0	6	6	2	1	0	6	6	3	0	0	5	6	3	1	0	3	7	5	0	0
C6	3	6	5	1	1	4	4	5	1	1	2	4	6	2	1	2	4	6	2	1	1	4	7	2	1
C7	8	5	2	0	0	8	6	1	0	0	6	7	2	0	0	7	6	3	0	0	6	7	2	0	0
C8	3	4	6	2	0	1	2	5	6	1	6	6	3	0	0	4	4	6	1	0	3	4	3	3	2
C9	0	2	5	6	2	0	3	6	5	1	9	4	2	0	0	1	3	4	5	2	0	4	6	4	1
C10	6	7	2	0	0	7	7	1	0	0	0	4	4	5	2	0	2	6	6	1	6	7	1	0	0
C11	2	5	5	3	0	6	5	4	0	0	2	3	6	3	1	3	7	4	1	0	3	4	6	2	0
C12	1	4	8	2	0	2	6	5	1	1	7	6	2	0	0	5	7	3	0	0	1	3	8	3	0
C13	4	7	3	1	0	3	4	6	1	1	3	7	3	2	0	3	7	3	2	0	3	4	7	1	0
C14	3	6	5	1	0	3	7	4	1	0	2	4	6	2	1	0	3	8	3	1	1	5	8	1	0
C15	4	8	3	0	0	1	6	7	1	0	2	3	7	2	1	5	7	2	1	0	2	5	7	1	0
C16	4	9	2	0	0	4	9	2	0	0	0	4	6	4	1	0	1	8	4	2	4	9	2	0	0
C17	5	8	2	0	0	6	5	4	0	0	0	3	6	3	3	0	1	7	6	2	8	5	2	0	0
C18	2	6	4	3	0	5	6	3	1	0	7	6	2	1	0	4	4	6	1	0	2	4	7	2	0
C19	1	4	6	3	1	0	4	5	3	3	2	7	3	2	1	2	5	7	1	0	3	5	5	2	0
C20	1	3	6	5	0	1	1	6	6	1	6	7	2	0	0	1	3	7	4	0	3	4	6	2	0
C21	6	6	2	1	0	2	3	8	1	1	4	5	3	1	1	2	4	7	2	0	3	5	6	1	1
C22	4	7	2	2	0	7	7	1	0	0	2	4	6	2	1	5	6	3	1	0	2	5	6	2	0
C23	5	5	3	1	0	8	5	1	1	0	1	3	8	3	0	2	5	5	3	0	4	6	4	1	0
C24	0	5	7	2	1	3	5	6	1	0	3	3	6	1	2	1	3	6	4	1	4	4	6	1	0
C25	3	8	4	0	0	2	4	7	2	0	3	4	6	2	0	4	4	5	2	0	3	6	6	0	0
C26	0	0	4	6	5	0	5	6	4	0	7	5	3	0	0	2	4	5	2	2	0	3	5	4	3

The subjects of the investigation were still experts in the first three rounds of investigation, the author unrolls 15 copies and recovers all of them which is the effective rate was 100%.

The evaluation results are shown in Table 2.22, where the values in the table represent the number of people who chose the corresponding option. The paper refers to the opinions of the experts interviewed, according to the importance of the indicators and combined with people's daily scoring habits. The scores of different grades are used to give corresponding scores to the first-level indicators, and the scores are shown in Table 2.21.

To construct comment sets:

$$V = \{v_1, v_2, \dots, v_p\} = \{\text{Excellent, Good, Moderate, Unqualified, Very Unqualified}\} \quad (2.18)$$

Table 2.21 - Score table

Degree	Excellent	Good	Moderate	Unqualified	Very Unqualified
Score	10	8	6	4	2

Building weight sets:

Through the previous analysis and calculation of the evaluation indicators of China's sports industry from the perspective of geo-economics using the AHP method, the weight set vectors of the indicators at all levels have been obtained, which are as follows:

$$K_1 = \{0,1220; 0,0632; 0,0817; 0,2519; 0,1813; 0,2998\}$$

$$K_2 = \{0,4323; 0,5677\}$$

$$K_3 = \{0,3343; 0,2081; 0,2429; 0,1132; 0,1016\}$$

$$K_4 = \{0,3081; 0,1821; 0,1049; 0,0729; 0,3321\}$$

$$K_5 = \{0,3413; 0,5077; 0,1511\}$$

$$K_6 = \{0,2984; 0,4896; 0,2120\}$$

$$K_7 = \{0,7601; 0,2399\}$$

$$K = \{0,1069; 0,1345; 0,3242; 0,0512; 0,2175; 0,1050; 0,0608\}$$

FCE on the international competitiveness of China's sports competition and performance industry from the perspective of geo-economics

Setting the membership degree matrix be R_i , $R_i = \{r_{i1}, r_{i2}, \dots, r_{im}\}$. means that the i -th index in the evaluation factor corresponds to the membership degree of each in the comment set, that is,, which $j = 1, 2, \dots, m$.

$$R_{B_1} = \begin{bmatrix} 0,3333 & 0,4667 & 0,1333 & 0,0667 & 0 \\ 0,4000 & 0,4667 & 0,0667 & 0,0667 & 0 \\ 0,3333 & 0,5333 & 0,1333 & 0 & 0 \\ 0,4667 & 0,4000 & 0,1333 & 0 & 0 \\ 0,4000 & 0,3333 & 0,2000 & 0,1333 & 0 \\ 0,2000 & 0,4000 & 0,3333 & 0,0667 & 0,0667 \end{bmatrix} \quad (2.18)$$

Performing compound operations on fuzzy matrices:

$$S'_{B_1} = K_1 R_{B_1} = (0,1220; 0,0632; 0,0817; 0,2519; 0,1813; 0,2998)$$

$$\begin{bmatrix} 0,3333 & 0,4667 & 0,1333 & 0,0667 & 0 \\ 0,4000 & 0,4667 & 0,0667 & 0,0667 & 0 \\ 0,3333 & 0,5333 & 0,1333 & 0 & 0 \\ 0,4667 & 0,4000 & 0,1333 & 0 & 0 \\ 0,4000 & 0,3333 & 0,2000 & 0,1333 & 0 \\ 0,2000 & 0,4000 & 0,3333 & 0,0667 & 0,0667 \end{bmatrix} \\ = (0,3432; 0,4111; 0,2012; 0,0565; 0,0200);$$

By normalizing and using the formula $S_{B_1} = \frac{S'_{B_{ij}}}{\sum_{j=1}^6 S'_{B_{ij}}}$, the evaluation value of the factor conditions expressed by membership degree can be obtained as:

$$S_{B_1} = (0,3432; 0,4111; 0,2012; 0,0565; 0,0200)。$$

Similarly, the evaluation results of other secondary indicators can be calculated as follows:

The result of the evaluation value expressed by the membership degree of demand conditions is:

$$S_{B_2} = (0,3441; 0,2955; 0,2847; 0,0757)$$

The result of the evaluation value expressed by the membership degree of firm strategy, structure and rivalry is:

$$S_{B_3} = (0,1503; 0,3003; 0,3008; 0,2042; 0,0446)$$

The result of the evaluation value expressed by the membership degree of related supporting industries is:

$$S_{B_4} = (0,2067; 0,4550; 0,2514; 0,0870)$$

The result of the evaluation value expressed by the membership degree of transnational economic activity is:

$$S_{B_5} = (0,1170; 0,2530; 0,3597; 0,2476; 0,0228)$$

The result of the evaluation value expressed by the membership degree of government is:

$$S_{B_6} = (0,2428; 0,3731; 0,2366; 0,1007; 0,0141)$$

The result of the evaluation value expressed by the membership degree of chance is:

$$S_{B_7} = (0,1520; 0,4054; 0,2667; 0,0960; 0,0800)$$

Finally, the fuzzy matrix of the first-level index of the international competitiveness of China's sports competition and performance industry from the perspective of geo-economics is:

$$S = \begin{pmatrix} S_{B_1} \\ S_{B_2} \\ S_{B_3} \\ S_{B_4} \\ S_{B_5} \\ S_{B_6} \\ S_{B_7} \end{pmatrix} = \begin{pmatrix} 0,3432 & 0,4111 & 0,2012 & 0,0565 & 0,0200 \\ 0,3441 & 0,2955 & 0,2847 & 0,0757 & 0 \\ 0,1503 & 0,3003 & 0,3008 & 0,2042 & 0,0446 \\ 0,2067 & 0,4550 & 0,2514 & 0,0870 & 0 \\ 0,1170 & 0,2530 & 0,3597 & 0,2476 & 0,0228 \\ 0,2428 & 0,3731 & 0,2366 & 0,1007 & 0,0141 \\ 0,1520 & 0,4054 & 0,2667 & 0,0960 & 0,0800 \end{pmatrix}$$

By binding weight vector set

$$K = (0,1069; 0,1345; 0,3242; 0,0512; 0,2175; 0,1050; 0,0608)$$

Perform compound operations on fuzzy matrices.

Finally, the final comprehensive evaluation result can be calculated:

$$Z = KS = (0,1069; 0,1345; 0,3242; 0,0512; 0,2175; 0,1050; 0,0608)$$

$$\begin{pmatrix} 0,3432 & 0,4111 & 0,2012 & 0,0565 & 0,0200 \\ 0,3441 & 0,2955 & 0,2847 & 0,0757 & 0 \\ 0,1503 & 0,3003 & 0,3008 & 0,2042 & 0,0446 \\ 0,2067 & 0,4550 & 0,2514 & 0,0870 & 0 \\ 0,1170 & 0,2530 & 0,3597 & 0,2476 & 0,0228 \\ 0,2428 & 0,3731 & 0,2366 & 0,1007 & 0,0141 \\ 0,1520 & 0,4054 & 0,2667 & 0,0960 & 0,0800 \end{pmatrix} = (0,2025; 0,3232; 0,2895; 0,1571; 0,0279)$$

The results show that in the evaluation of the international competitiveness of China's sports competition and performance industry from the perspective of geo-economics, 20,25% of the experts think it is excellent, 32,32% of the experts think it is good, 28,95% of the experts think it is average, and 15,95% of the experts think it is insufficient. 2,79% of experts believe that it is seriously insufficient.

According to the above statistics and the assignments of the index evaluations in

Table 2.22, we can sequentially calculate the specific scores of each first-level index and the comprehensive evaluation results of the international competitiveness evaluation of China's sports competition and performance industry from the perspective of geoeconomics.

The final score for factor conditions is:

$$F_{B_1} = S_{B_1}N = (0,3432; 0,4111; 0,2012; 0,0565; 0,0200) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 8,1940$$

The final score for demand conditions is:

$$F_{B_2} = S_{B_2}N = (0,3441; 0,2955; 0,2847; 0,0757,0) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 7,8160$$

The final score for firm strategy, structure, and rivalry is:

$$F_{B_3} = S_{B_3}N = (0,1503; 0,3003; 0,3008; 0,2042; 0,0446) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 6,6155$$

The final score for related supporting industries is:

$$F_{B_4} = S_{B_4}N = (0,2067; 0,4550; 0,2514; 0,0870) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 7,5637$$

The final score for transnational economic activity is:

$$F_{B_5} = S_{B_5}N = (0,1170; 0,2530; 0,3597; 0,2476; 0,0228) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 6,3886$$

The final score for government is:

$$F_{B_6} = S_{B_6}N = (0,2428; 0,3731; 0,2366; 0,1007; 0,0141) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 7,2636$$

The final score for chance is:

$$F_{B_7} = S_{B_7}N = (0,1520; 0,4054; 0,2667; 0,0960; 0,0800) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 7,0320$$

According to the scores assigned to the indicators in Table 2.22, we can calculate the final score of the evaluation of the international competitiveness of China's sports competition and performance industry from the perspective of geoeconomics:

$$F = ZN = (0,2025; 0,3232; 0,2895; 0,1571; 0,0279) \begin{pmatrix} 10 \\ 8 \\ 6 \\ 4 \\ 2 \end{pmatrix} = 7,0320$$

FCE on the international competitiveness of China's sports fitness and leisure industry from the perspective of geoeconomics. According to the survey results of the fourth expert questionnaire in Table 2.22, and according to the fuzzy evaluation process of the international competitiveness of China's sports fitness and leisure industry from the perspective of geo-economics, the evaluation results of the secondary indicators are as follows:

The result of the evaluation value expressed by the membership degree of factor conditions is:

$$S_{B_1} = (0,3398; 0,3585; 0,2246; 0,0570; 0,0200)$$

The result of the evaluation value expressed by the membership degree of demand conditions is:

$$S_{B_2} = (0,2684; 0,2486; 0,2181; 0,2271; 0,0378)$$

The result of the evaluation value expressed by the membership degree of firm strategy, structure, and rivalry is:

$$S_{B_3} = (0,2297; 0,3173; 0,2907; 0,1258; 0,0366)$$

The result of the evaluation value expressed by the membership degree of related supporting industries is:

$$S_{B_4} = (0,2416; 0,4367; 0,2670; 0,0548)$$

The result of the evaluation value expressed by the membership degree of transnational economic activity is:

$$S_{B_5} = (0,0540; 0,1551; 0,3974; 0,2814; 0,1122)$$

The result of the evaluation value expressed by the membership degree of government is:

$$S_{B_6} = (0,4428; 0,3731; 0,1373; 0,0468,0)$$

The result of the evaluation value expressed by the membership degree of chance is:

$$S_{B_7} = (0,1013; 0,2827; 0,4507; 0,1653)$$

Finally, the final comprehensive evaluation result is:

$$Z = (0,2237; 0,2871; 0,2896; 0,1564; 0,0435)$$

The results show that in the evaluation of the international competitiveness of China's sports competition and performance industry from the perspective of geo-economics, 22,37% of experts believe that it is excellent, 28,71% of experts believe

that it is good, 28,96% of experts believe that it is average, 15,64% of experts believe that it is insufficient, and 4,35% of experts believe that it is seriously insufficient.

According to the above statistical results and the scores assigned to the indicators in Table 2.22, the specific scores and comprehensive evaluation results of each indicator at the international competitiveness evaluation standard level of China's sports competition and performance industry from the perspective of geoeconomics are as follows:

The final score for factor conditions is $F_{B_1} = S_{B_1} N = 7,8817$;

The final score for demand conditions is $F_{B_2} = S_{B_2} N = 6,9653$;

The final score for firm strategy, structure, and rivalry is $F_{B_3} = S_{B_3} N = 7,1560$;

The final score for related supporting industries is $F_{B_4} = S_{B_4} N = 7,7307$;

The final score for transnational economic activity is $F_{B_5} = S_{B_5} N = 5,5152$;

The final score for government is $F_{B_6} = S_{B_6} N = 8,4238$;

The final score for chance is $F_{B_7} = S_{B_7} N = 6,6401$.

The final comprehensive score of the international competitiveness evaluation of China's sports competition and performance industry from the perspective of geoeconomics is $F = ZN = 6,9837$.

FCE on the international competitiveness of China's sporting goods industry from the perspective of geo-economics. The result of the evaluation value expressed by the membership degree of factor conditions is:

$$S_{B_1} = (0,2492; 0,3222; 0,3017; 0,0901; 0,0368)$$

The result of the evaluation value expressed by the membership degree of demand conditions is:

$$S_{B_2} = (0,4000; 0,4288; 0,1712; 0; 0)$$

The result of the evaluation value expressed by the membership degree of firm strategy, structure, and rivalry is:

$$S_{B_3} = (0,3061; 0,2859; 0,2326; 0,1315; 0,0439)$$

The result of the evaluation value expressed by the membership degree of related supporting industries is:

$$S_{B_4} = (0,2203; 0,2940; 0,3236; 0,1301; 0,0543)$$

The result of the evaluation value expressed by the membership degree of transnational economic activity is:

$$S_{B_5} = (0,2889; 0,4466; 0,1662; 0,0556; 0,0328)$$

The result of the evaluation value expressed by the membership degree of government is:

$$S_{B_6} = (0,1148; 0,2199; 0,4653; 0,1518; 0,0482)$$

The result of the evaluation value expressed by the membership degree of chance is:

$$S_{B_7} = (0,2640; 0,2827; 0,3520; 0,1013; 0)$$

Finally, the final comprehensive evaluation result is:

$$Z = (0,2819; 0,3373; 0,2537; 0,0931; 0,0332)$$

The results show that in the evaluation of the international competitiveness of China's sports competition and performance industry from the perspective of geo-economics, 28,19% of experts believe that it is excellent, 33,73% of experts believe that it is good; 25,37% of experts believe that it is average, 9,31% of experts believe that it is insufficient, and 3,32% of experts believe that it is seriously insufficient.

According to the above statistical results and the scores assigned to the indicators in Table 2.22, the specific scores and comprehensive evaluation results of each indicator at the international competitiveness evaluation standard level of China's sports competition and performance industry from the perspective of geo-economics are as follows:

The final score for factor conditions is $F_{B_1} = S_{B_1}N = 7,3130$;

The final score for demand conditions is $F_{B_2} = S_{B_2}N = 8,4576$;

The final score for firm strategy, structure, and rivalry is $F_{B_3} = S_{B_3}N = 7,3581$;

The final score for related supporting industries is $F_{B_4} = S_{B_4}N = 7,1256$;

The final score for transnational economic activity is $F_{B_5} = S_{B_5}N = 7,7463$;

The final score for government is $F_{B_6} = S_{B_6}N = 6,4028$;

The final score for chance is $F_{B_7} = S_{B_7}N = 7,4185$.

The final comprehensive score of the international competitiveness evaluation of China's sports competition and performance industry from the perspective of geo-economics is $F = ZN = 7,4786$.

FCE on the international competitiveness of China's sports construction industry from the perspective of geo-economics.

The result of the evaluation value expressed by the membership degree of factor conditions is:

$$S_{B_1} = (0,2891; 0,3197; 0,2803; 0,0909; 0,0200)$$

The result of the evaluation value expressed by the membership degree of demand conditions is:

$$S_{B_2} = (0,3531; 0,3243; 0,3135; 0,0378; 0)$$

The result of the evaluation value expressed by the membership degree of firm strategy, structure, and rivalry is:

$$S_{B_3} = (0,1289; 0,3082; 0,2801; 0,2244; 0,0584)$$

The result of the evaluation value expressed by the membership degree of related supporting industries is:

$$S_{B_4} = (0,1493; 0,2470; 0,4114; 0,1530; 0,0442)$$

The result of the evaluation value expressed by the membership degree of transnational economic activity is:

$$S_{B_5} = (0,0995; 0,2556; 0,4667; 0,1783; 0)$$

The result of the evaluation value expressed by the membership degree of government is:

$$S_{B_6} = (0,1789; 0,3250; 0,3077; 0,1743; 0,0141)$$

The result of the evaluation value expressed by the membership degree of chance is:

$$S_{B_7} = (0,2347; 0,2667; 0,3333; 0,1333; 0,0320)$$

Finally, the final comprehensive evaluation result is:

$$Z = (0,1825; 0,2963; 0,3381; 0,1606; 0,0268)$$

The results show that in the evaluation of the international competitiveness of China's sports competition and performance industry from the perspective of geoeconomics, 18,25% of experts believe that it is excellent, 29,63% of experts believe that it is good; 33,81% of experts believe that it is average, 16,06% of experts believe that it is insufficient, and 2,68% of experts believe that it is seriously insufficient.

According to the above statistical results and the scores assigned to the indicators in Table 2.22, the specific scores and comprehensive evaluation results of each indicator at the international competitiveness evaluation standard level of China's sports competition and performance industry from the perspective of geoeconomics are as follows:

The final score for factor conditions is $F_{B_1} = S_{B_1}N = 7,5336$;

The final score for demand conditions is $F_{B_2} = S_{B_2}N = 8,1583$;

The final score for firm strategy, structure and rivalry is $F_{B_3} = S_{B_3}N = 6,4501$;

The final score for related supporting industries is $F_{B_4} = S_{B_4}N = 6,6378$;

The final score for transnational economic activity is $F_{B_5} = S_{B_5}N = 6,5532$;

The final score for government is $F_{B_6} = S_{B_6}N = 6,9602$;

The final score for chance is $F_{B_7} = S_{B_7}N = 7,0774$.

The final comprehensive score of the international competitiveness evaluation of China's sports competition and performance industry from the perspective of geoeconomics is $F = ZN = 6,9207$.

FCE on the international competitiveness of China's sports tourism industry from the perspective of geo-economics.

The result of the evaluation value expressed by the membership degree of factor conditions is:

$$S_{B_1} = (0,2215; 0,3329; 0,3520; 0,0736; 0,0200)$$

The result of the evaluation value expressed by the membership degree of demand conditions is:

$$S_{B_2} = (0,2865; 0,3531; 0,1712; 0,1135; 0,0757)$$

The result of the evaluation value expressed by the membership degree of firm strategy, structure and rivalry is:

$$S_{B_3} = (0,1597; 0,3008; 0,3525; 0,1509; 0,0223)$$

The result of the evaluation value expressed by the membership degree of related supporting industries is:

$$S_{B_4} = (0,1560; 0,3392; 0,4280; 0,0770; 0)$$

The result of the evaluation value expressed by the membership degree of transnational economic activity is:

$$S_{B_5} = (0,2000; 0,2995; 0,3773; 0,1233; 0,0101)$$

The result of the evaluation value expressed by the membership degree of government is:

$$S_{B_6} = (0,2269; 0,3518; 0,3347; 0,0866; 0)$$

The result of the evaluation value expressed by the membership degree of chance is:

$$S_{B_7} = (0,1520; 0,3520; 0,3840; 0,0640; 0,0480)$$

Finally, the final comprehensive evaluation result is:

$$Z = (0,1986; 0,3215; 0,3374; 0,1158; 0,0247)$$

The results show that in the evaluation of the international competitiveness of China's sports competition and performance industry from the perspective of geoeconomics, 19,86% of experts believe that it is excellent, 32,15% of experts believe that it is good; 33,74% of experts believe that it is average, 11,58% of experts believe that it is insufficient, and 2,47% of experts believe that it is seriously insufficient.

According to the above statistical results and the scores assigned to the indicators in Table 2.22, the specific scores and comprehensive evaluation results of each indicator at the international competitiveness evaluation standard level of China's sports competition and performance industry from the perspective of geoeconomics are as follows:

The final score for factor conditions is $F_{B_1} = S_{B_1}N = 7,3242$;

The final score for demand conditions is $F_{B_2} = S_{B_2}N = 7,3222$;

The final score for firm strategy, structure and rivalry is $F_{B_3} = S_{B_3}N = 6,7666$;

The final score for related supporting industries is $F_{B_4} = S_{B_4}N = 7,1489$;

The final score for transnational economic activity is $F_{B_5} = S_{B_5}N = 7,1733$;

The final score for government is $F_{B_6} = S_{B_6}N = 7,4381$;

The final score for chance is $F_{B_7} = S_{B_7}N = 6,9923$.

The final comprehensive score of the international competitiveness evaluation of China's sports competition and performance industry from the perspective of geoeconomics is $F = ZN = 7,0946$.

(4) *Analysis of the evaluation results of various industries in China's sports industry from the perspective of geoeconomics.* From the results of the final scores of various industries, it can be concluded that the international competitiveness of China's sports industry from the perspective of geo-economics is ranked as follows: Sporting goods industry > sports tourism industry > sports competition and performance industry > sports fitness and leisure industry > sports construction industry. The total score of the international competitiveness of the sporting goods industry is 7,4786 points, which is higher than the results of the international competitiveness assessment of the other four industries. This shows that from the perspective of geo-economics, the comprehensive strength of the current international competitiveness of China's sporting goods industry

is higher than that of other industries.

Meanwhile, Figure 2.3 shows that that from the perspective of geo-economics, each industry in China's sports industry has its advantages and disadvantages. However, compared with other industries, the sporting goods industry has obvious advantages in demand conditions, industrial strategy, structure, horizontal competition, transnational economic activities, and opportunities, even though it ranks behind in the two dimensions of production factors and government.

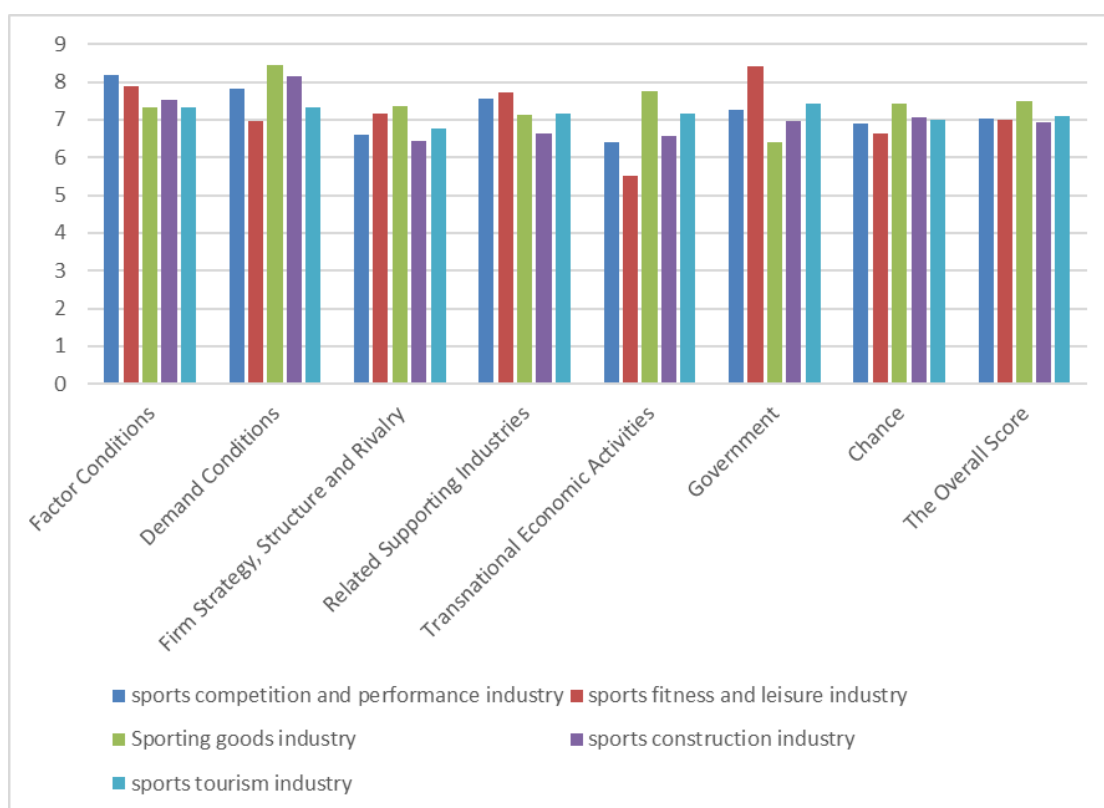


Figure 2.3 - Statistical results of first-level indicators and comprehensive scores of various sports industries

From Table 2.23, in 2019, the total scale of the sporting goods and related industries manufacturing industry accounted for 46,2% of the total output of the sports industry. In 2020, under the influence of the new crown epidemic, the scale of the sporting goods industry is still as large as 44,9%. At the same time, the added value of the sporting goods industry in 2019 was as high as 30,4%, much larger than that of other industries.

Table 2.23 - 2019 and 2020 China's sports industry status

	2019						2020					
	Total Output			Value Added			Total Output			Value Added		
	Total (billion CNY)	Constitute (%)	Growth rate (%)	Total (billion CNY)	Constitute (%)	Growth rate (%)	Total (billion CNY)	Constitute (%)	Growth rate (%)	Total (billion CNY)	Constitute (%)	Growth rate (%)
Sports Industry	2948,34	100,0	10,9	1124,81	100,0	11,6	2737,2	100,0	-7,2	1073,5	100	-4,6
Sports Competition and Performance Industry	30,85	1,0	5,7	12,23	1,1	18,7	27,3	1,0	-11,5	10,3	1,0	-15,6
Sports Fitness and Leisure Industry	179,66	6,1	74,8	83,19	7,4	74,4	15,8	5,8	-12,1	73,6	6,9	-11,5
Sporting Goods Industry	170,02	5,8	23,5	70,7	6,3	14,8	155,4	5,7	-8,6	64,5	6,0	-8,8
Sports Tourism Industry	1361,41	46,2	3,1	342,1	30,4	0,6	1228,7	44,9	-9,7	314,4	29,3	-8,1
Sports Construction Industry	93,98	3,2	45,5	21,19	1,9	41,3	94,8	3,5	0,9	21,7	2,0	2,4

* Source: National Bureau of Statistics of China

Table 2.23 shows that the current overall structure of China's sports industry is relatively unbalanced. The current sports equipment manufacturing industry has a significant scale advantage, while other sports industries are too small to form a scale effect, so the competitive advantage is relatively weak. It should be pointed out that due to the unreasonable industrial structure, to a large extent, the overcapacity of the sporting goods industry has been caused, and even the waste of resources. In addition, the total current output and added value of China's sports service industry do not account for a high proportion of the entire sports industry, resulting in differences in the level of agglomeration of the sports service industry. Therefore, the agglomeration of the sports industry presents a situation in which the sports industry is led by the sporting goods industry, while the sports service industry is relatively lagging.

From the perspective of the domestic sports consumption structure (Figure 2.4), in 2020, China's physical consumption will account for 53,7% of sports consumption, a decrease of 25,3 percentage points compared with 2014; the proportion of participation consumption and viewing consumption will be 20,6% and 7,7%

respectively. Compared with 2014, an increase of 13,7 and 2,5 percentage points respectively. Physical sports consumption here refers to the consumption behavior of people using currency to buy various sports physical consumption materials related to sports activities. Such as buying sports equipment, clothing, shoes. Judging from the current domestic consumption structure in China, the sporting goods industry has relatively obvious advantages.

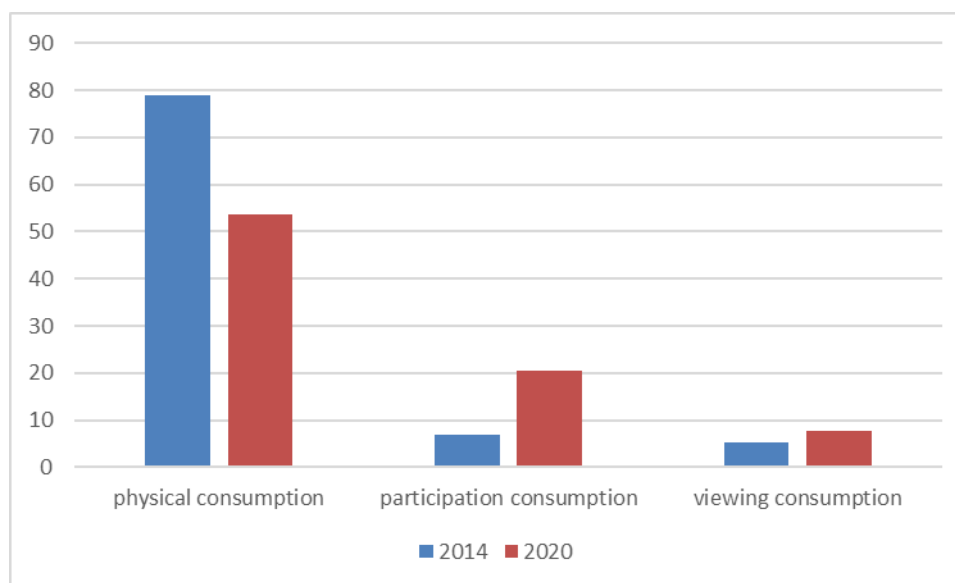


Figure 2.4 - The proportion of three types of sports consumption in 2014 and 2020

* Source: National Bureau of Statistics of China

At the level of transnational economic activities, China's current well-known international sports companies and brands are mainly concentrated in sporting goods industry. In recent years, Anta, Li-Ning and other brand companies with international influence have continued to grow. For example, Anta Sports took the lead in acquiring FILA in Italy, DESCENTE in Japan, KOLON Sport in South Korea, and Amer Sports in the world sports brand. Xtep International acquired Yilian International Group, which owns many high-end sports and leisure brands such as K-Swiss and Palladium, for 1,75 billion CNY, accelerating the deepening of the international market. In comparison, the popularity and competitiveness of multinational companies in other industries lag behind.

According to the results of the fourth national economic census, as of the end of 2018, there were 238,000 legal entities in the sports industry in China, with 4,439 million employees (excluding industrial activity units and self-employed employees). The total assets of legal persons in the sports industry exceeded 3 trillion CNY, reaching 3,149.82 billion CNY. The operating income of the legal person unit of the sports industry was 2,346.04 billion CNY. There are 43,000 legal entities in the national sporting goods industry, with 2,363 million related employees and a total industry asset of 913,60 billion CNY. These figures account for 18,0%, 53,2%, and 18% of the total sports industry. 29,0%. The number of employed people in the sports industry accounts for more than half of the total number of employees in the entire sports industry. Compared with other industries, the sporting goods industry has played a more important role in promoting employment.

Table 2.23 also shows that the impact of the new crown epidemic on the sports service industry in 2020 is very severe, further exacerbating the unreasonable situation of the sports industry structure. Statistics show that in 2020, only the sports competition and performance industry and sports fitness and leisure activities have a year-on-year growth rate of -15,6% and -11,5%, while the sporting goods industry is said to be relatively less affected by only -8,1%. The sports facility construction industry performed the most prominently, and was the only one of the five industries to achieve positive growth.

To sum up, this paper believes that from the perspective of geo-economics, compared with the other four types of sports industries, China's sporting goods industry has more significant international competitiveness and geo-economic advantages.

Conclusion to section 2

1. In the context of increasingly fierce geo-economic competition, the theory of market competition has been unable to fully and effectively guide the international competition faced by China's sports industry under the background of global industrial re-division. From the perspective of geo-economics, the core goal of international

competition in China's sports industry is to maintain national economic, political, cultural security and interests, so there is a shadow of the country behind it, and the implementation of the will of the country is the will of the country. Therefore, the free market mechanism is increasingly unable to meet the needs of the current development of China's sports industry. In the face of fierce geo-economic competition and adjustment, the upgrading of China's sports industry under the GVC requires the guarantee of the national mobilization system to be successfully implemented. Therefore, this chapter focuses on a series of issues, such as the international competitiveness of China's sports industry and the choice of the advantageous sports industry from geo-economics.

2. In addition, because the current development of China's sports industry is still in its infancy, and the market is not fully developed, it is bound to go through a long process to select and cultivate a competitive sports industry solely by the adjustment of the market mechanism. In addition, under the background of the new international economic structure, the cross-border economic cooperation of China's sports industry in the international market is facing a more complex geo-economic environment. Therefore, the development of China's sports industry cannot implement an overall development strategy of "big push". This paper believes that the advantage industry, from the five types of industries connected with geo-economics and China's geo-economic strategy, should be selected and cultivated. And then, with the help of the important role of the state in developing economies of scale, optimizing resource allocation and obtaining competitive advantages from the perspective of geo-economics, giving full play to advantageous industries has a strong driving force and guiding force for China's sports industry and even economic and social development.

3. First of all, this paper combines the Porter-Dunning diamond model and geo-economic theory, uses the Delphi method to conduct several rounds of expert interviews and investigations, and finally constructs an indicator system for the international competitiveness of China's sports industry from the perspective of geo-economics. The indicator system includes first-level indicators and 26 second-level indicators consisting of seven factors of production factors, demand conditions,

industrial strategies and competitors' performance, related supporting industries, transnational economic activities, government factors, and opportunities.

4. Based on this indicator system, this paper conducts the third round of expert questionnaire survey among experts. Through the group decision-making analysis hierarchy process, this paper determines the weight of the first-level index and the second-level index of the international competitiveness evaluation index system of China's sports industry from the perspective of geo-economics, and the final comprehensive weight of each second-level index. Finally, based on the international competitiveness index system and comprehensive weight of China's sports industry from the perspective of geo-economics, this paper further adopts the method of fuzzy mathematics to comprehensively evaluate the international competitiveness of each industry in China's sports industry from the perspective of geo-economics.

5. The evaluation results show that the final ranking of the international competitiveness of China's sports industry from the perspective of geo-economics is: Sporting goods industry > sports tourism > sports competition and performance industry > sports fitness and leisure industry > sports construction industry. The total score of the international competitiveness of the sporting goods industry is 7.4786 points, which is higher than the results of the international competitiveness assessment of the other four industries. This paper believes that, from the perspective of geo-economic theory, the reason why the sporting goods industry has become China's dominant sports industry is that in terms of the current development of various industries in the sports industry, multiple aspects such as industrial structure, residents' sports consumption, and transnational economic activities are common. result of action.

SECTION 3

RESEARCH ON THE DEVELOPMENT STATUS AND STRATEGY OF CHINA'S SPORTING GOODS INDUSTRY FROM THE PERSPECTIVE OF GEO-ECONOMICS

3.1 The geo-economic challenges which China sporting goods industry faces

Western international relations theory held that the rise of great power will inevitably damage the vested interests of the existing great powers, cause drastic changes in the established international pattern and international order, and even lead to wars. (Liu & Xie, 2018) This redistribution of international interests is, from a game-theoretical point of view, a zero-sum game, in which one party benefits and the other party loses. Under the current theme of peace and development, the possibility of launching a war is relatively small. Still, out of fear of the rise of emerging powers, established powers will inevitably use all means to contain them.

In the geo-economic struggle of the 21st century, the basic goal of the geo-economic strategy of established powers represented by the United States is to strive to maintain and consolidate the international political and economic order led by itself, and to ensure the original hegemony of the established powers. In sharp contrast, the rising powers, especially China, want a peaceful rise and a dominant position in the global governance system. A geo-economic struggle between the two is doomed. At present, with the improvement of China's comprehensive national strength and international influence, China has shifted from passively accepting international rules to being able to influence and change international rules and the environment (Wu, 2021). To sum up, under the new geo-economic structure, the rising powers and the established powers represented by China will inevitably launch a series of competitions around regional and even world economic dominance.

As far as the sporting goods industry is concerned, a country's industry can only hold economic dominance if it is located at the high end of the international industrial chain and gains a dominant position in the international market through high value-

added sports products. As a low-productivity country, the core goal of the current development of China's sporting goods industry is to upgrade from the traditional labor-intensive sporting goods industry to the capital and technology-intensive sporting goods industry. However, with the upgrading of the industrial structure and the continuous improvement of the industrial competitiveness of China's sporting goods industry, it will inevitably touch and erode the global monopoly profits of the high-productivity conservative countries represented by each.

In recent years, the increasingly fierce geo-economic competition economy has intensified the reconstruction and adjustment of the global industrial chain. In this context, countries have begun to formulate systematic industrial policies to seize the opportunity of restructuring the global industrial chain and supply chain. Currently, the geo-economic challenge that China sporting goods industry faces is not only from technology and industry, but covers all aspects of the trade, investment, finance, technology, and economic diplomacy. The specific performance is as follows:

1. Anti-globalization challenge. The fundamental reason for the rise of China's sports industry lies in the reform and opening-up policy. The experience of China's economic development proves that the great achievements of high-quality economic development in China in the past were highly dependent on economic globalization. In the process of opening up to the outside world, China's sports goods manufacturing industry has grown rapidly through the capital, technology, equipment and other favorable conditions brought by globalization. Therefore, China's sports goods manufacturing industry is deeply dependent on external market environment.

However, the outbreak of the international financial crisis in 2008 caused a heavy blow to the world economy. In order to speed up the economic recovery and reduce unemployment, most developed countries adopted different means such as green trade barriers and technical barriers to protect their own trade. A new round of anti-globalization emerged and expanded rapidly. In particular, the outbreak of the trade war between China and the United States in 2018 and the outbreak of the novel coronavirus pandemic further fermented anti-globalization. At present, anti-globalization is not only eroding the existing achievements of win-win cooperation of

the international community, but also jeopardizing the free trade and global investment system. It is the biggest obstacle to the historical trend of economic globalization.

On the one hand, the impact of anti-globalization, such as rising tariffs, declining new investment and depression of financial markets, weakens the development of China's sports goods manufacturing industry. The anti-globalization situation will inevitably lead to the restriction or even separation of trade, investment and other financial links between China's sports goods manufacturing industry and other countries, especially developed countries. On the other hand, since China's sports goods manufacturing industry is in its infancy, changes in economic and trade rules have raised the threshold for China's sports goods manufacturing industry to participate in related trade. The improvement of production costs and relevant standards will further weaken its competitiveness, make its economic development weak, very unfavorable to its development.

2. Downward pressure on the global economy. In recent years, the world economy has suffered from a variety of overlapping risks, including the conflict between Russia and Ukraine, the energy crisis, food security, the worst inflation, violent interest rate hikes by the US Federal Reserve and many central banks, and sovereign debt difficulties faced by most developing countries.

Foreign institutions generally expect the global economic growth in 2023 to decline to about 2,3%, and forecast that China's economic growth in 2023 at 4,5-5,0% range. For some time to come, the Chinese economy will still face such challenges as weak consumption and export momentum and a sluggish real estate market brought about by the global economic recession.

Especially in the context of global inflation, prices and wages began to interact, causing production costs to rise sharply. Chinese sporting goods companies will continue to face high energy, transportation and labor costs. In addition, against the background of slowing growth of external demand, the main contradiction in the foreign trade field of China's sports goods manufacturing industry has changed from the supply chain blockage and the lack of capacity to fulfill the contract during the epidemic to the current weakening of external demand and declining orders, which is

an important change.

To sum up, global inflation and downward pressure on the world economy are increasing, and various adverse factors facing China's sports goods manufacturing industry are still fermenting, and the situation is still complex and severe.

3. *Challenges of trade barriers and trade frictions.* With the continuous advancement of trade liberalization worldwide, trade frictions and struggles continue. In foreign trade, tariffs and non-tariff (import licenses, quota management, anti-dumping and anti-subsidy measures, etc.), monopoly and anti-monopoly, intellectual property protection, and national treatment have become the main means of geo-economic struggles of various countries (Han, 2008).

At present, the export scale of China's sporting goods is much larger than the import, and the industry products are mainly exported. According to the data of China Customs Information Network, as of 2018, China's sporting goods were exported to 123 countries/regions in the world, of which the United States, Germany, Japan, the United Kingdom, Hong Kong, Canada, France, and Italy were the top 8 countries/region in terms of export share (Table 3.1). From 2014 to 2018, the export market concentration ratio CR8 was 43.18%, 41.42%, 40.23%, 43.66%, and 42.54%, which belonged to the oligopolistic market structure of the middle and upper levels.

Table 3.1 - Statistics of the Top 8 Countries/Regions of China's Sporting Goods Exports from 2014 to 2018 (Billion USD)

	USA	Germany	Japan	UK	Hong Kong	Canada	France	Italy
2014	3,84	0,494	0,487	0,458	0,437	0,418	0,372	0,355
2015	3,646	0,534	0,473	0,445	0,395	0,392	0,342	0,328
2016	3,155	0,465	0,418	0,404	0,407	0,397	0,251	0,234
2017	3,412	0,438	0,53	0,418	0,411	0,404	0,257	0,251
2018	3,345	0,489	0,567	0,445	0,417	0,413	0,265	0,248

* *Source:* systematized by the author

The traditional industrial organization theory believes that this type of industrial market structure has a weak anti-risk capability and is easily affected by the international environment and trade policies. In particular, the low prices of sports products exported from China have a great impact on the industry of similar products

in the importing countries/regions. They are likely to cause international trade frictions such as "anti-dumping" and "countervailing investigations". Especially when importing countries implement trade protection measures of tariff barriers, China's trade volume of sporting goods will drop rapidly. For example: On July 6, 2018, the United States began imposing additional tariffs of 25% on \$34 billion worth of Chinese imports to the United States. The inevitable Sino-US trade war in sporting goods export trade is affected by the Sino-US trade war.

Compared with the traditional means of tariffs, non-tariff measures are a more subtle and arbitrary means of trade protection. Today, the established powers use this method more to safeguard their national interests in the increasingly fierce international competition. In particular, Technical Barriers to Trade (TBT) has accounted for 30% of non-tariff barriers in international trade. The developed countries in the sports industry, relying on their own technological and economic advantages, formulate strict technical standards, technical regulations, and demonstration systems, which restrict the export trade of sporting goods of the rising countries. Taking the TBT notification incidents encountered by China's international trade of sporting goods in the United States in recent years as an example, since the global financial crisis in 2008, the incidents of Chinese sporting goods and equipment encountering TBT in the United States have become more frequent. Specific products have included swimming pool-related equipment and equipment, leisure and entertainment products and equipment, outdoor sports equipment, aviation sports equipment, diving sports equipment, e-sports products, and equipment, etc. (Table 3.2).

It is foreseeable that, as the international geo-economic struggle becomes more and more intense, the established power, with its dominance and discourse power in the field of the sporting goods industry, will more frequently adopt technical standards, environmental protection standards, health standards, and even labor standards and standard. Human rights as an excuse to defend their interests. However, with the acceleration of the transformation and upgrading of China's sporting goods industry, the export trade of sporting goods and equipment will inevitably face more frequent trade frictions.

Table 3.2 - Typical Cases of China's Sporting Goods and Equipment Exports Affected by the United States TBTs

	Typical Cases
2018	Taking protecting human health and safety as the goal and reason, the United States proposed to revoke the license rules and regulations of swimming pools and wading pools, hot tubs and spas, and replace them with the license rules and regulations of aquatic venues. The covered products include: swimming pools, hot tubs, water quality, Sports equipment and equipment, etc.
2017	To prevent fraud and consumer protection, the United States has formulated ASTM F963-07e1 toy consumer product safety standard according to Section 106 of the Consumer Product Safety Improvement Act. The government proposed to update ASTM F63 and ASTM F963-16 as mandatory toy safety standards. Covered products including: children's equipment, entertainment equipment, sporting goods and equipment, etc.
2016	To prevent fraud and consumer protection, the United States proposed to clarify existing regulations, update management specifications and safety requirements, and ensure responsiveness and accountability mechanisms. Covered products include: amusement rides, entertainment equipment, sporting goods and equipment, etc.
2015	To protect human health and safety, the American Society for Testing and Materials (ASTM) and the International Committee (F37) have formulated revised standards for light sport aircraft. Covered products including: light sport aircraft, aviation sports equipment, etc.
2011	To protect consumers, the United States revised its comments on the definition of light sport aircraft by removing "automatic" from the term "automatic flaps". Covered products including: gliders, aviation sports equipment, etc.
2009	To protect human life, the Consumer Product Safety Commission accepted the standards and procedures recognized by the third-party conformity assessment agency for testing bicycle helmets, diving sticks, bicycles, etc. in accordance with special CPSC regulations. covered products including bicycle helmets, diving sticks, etc., bicycles and related equipment, etc.
2008	To protect consumers, the Kansas State Competition and Gaming Commission proposed new requirements for electronic game consoles, covered products including: electronic sports products and equipment, etc.

* *Source: systematized by the author*

At the same time, with the rising cost of primary production factors such as labor and land, China's sporting goods industry is facing A brutal squeeze from other emerging Asian countries in the traditional low-end field. The foreign trade balance value of sporting goods represents the export trade competitiveness of sporting goods, and the larger the value, the stronger the competitiveness (Meng et al., 2021). In recent years, the balance of foreign trade balance of sporting goods in developing countries such as India and Vietnam has even surpassed that of China (Table 3.3). In contrast,

China has gradually lost its comparative advantage in the cost of primary production factors, resulting in a decline in the competitiveness of sporting goods export trade. With the rising labor cost and land cost in China, the appreciation of the RMB exchange rate, the increasingly strict environmental protection requirements, and the saturation of production capacity, China's labor-intensive industries such as sportswear, shoes, and hats are gradually losing their comparative advantages. Some industries are gradually being taken over by other economies or other countries. If China does not make rapid enough technological progress and industrial upgrading, it will face the danger of industrial hollowing out.

Table 3.3 - The foreign trade balance value of sporting goods in several countries

	China	USA	Germany	Italy	Japan	South Korea	Indonesia	Thailand	Vietnam	Brazil	Russia
2014	426,35	15,01	5,23	10,17	1,1	3,32	220,41	49,81	245,04	5,67	1,44
2015	416,78	14,57	6,73	10,58	1,24	3,43	230,13	56,05	310,93	6,03	1,51
2016	402,37	15,68	7,85	11,29	1,44	3,27	245,68	64,08	379,04	6,35	1,54
2017	392,36	16,78	8,32	11,78	1,38	3,64	267,87	74,05	450,08	6,68	1,84
2018	397,67	18,93	9,84	12,37	1,33	3,95	278,94	87,05	538,74	7,01	1,75

*Source: United Nations Comtrade Database, <https://comtrade.un.org>

4. *Geo-economic Challenges in Investment.* In recent years, China has continuously promoted the transformation and upgrading of its industrial structure, and great changes have taken place in the overall structure of foreign capital utilization. In 2020, China's service industry used foreign capital of 776,77 billion CNY, accounting for 77,7% of the total used foreign capital. In comparison, the proportion of foreign capital utilized by the manufacturing industry dropped from 70% to about 30% from 2003 to 2018. In 2020, the proportion of foreign capital utilized by the manufacturing industry was even lower than 23%. In this context, with the adjustment of China's sports industry structure, more capital and investment are mainly concentrated in the sports service industry, so the investment in the sports industry shows a certain trend

of "de-industrialization" as a whole. However, due to the squeeze at both ends of the "high-end return" in developed countries and the "middle and low-end diversion" in developing countries, the proportion and efficiency of foreign capital utilization in China's sporting goods industry are further exacerbated.

After the 2008 financial crisis, to change the hollowing out of the domestic manufacturing industry and solve the problem of unemployment, the established powers successively issued a series of protective policies aimed at revitalizing the domestic manufacturing industry. With the help of a new round of scientific and technological revolution, industrial revolution, and digital economy, the established powers have attracted some mid-to-high-end manufacturing industries to return to their home countries, to seek a more favorable dominant position in the future GVC division of labor system. However, as the technological and industrial gap between China and Europe and the United States gradually narrows, the technology-intensive and value-added products exported by China, including sporting goods, are getting higher and higher. Conservative countries and other countries have to establish stricter trade protection and investment review mechanisms and integrate them into their industrial strategies to maintain their dominant position in the GVC.

In this context, China's sporting goods-related investment will inevitably be resisted to varying degrees to prevent China from forming a competitive advantage over its own country. For example, the United States government has attracted some high-end manufacturing industries to return to the United States by reducing manufacturing taxes, increasing investment in infrastructure construction, and implementing trade protection. As the cost of manufacturing in the United States will be greatly reduced, the technological innovation capabilities of the United States will also be extremely attractive to international capital. In recent years, EU policymakers have become more vigilant and defensive about Chinese capital-exporting to Europe. In 2017, the European Union issued the "Foreign Direct Investment Review Regulations". Changes in European foreign investment policies directly affect the process of Chinese enterprises' direct investment in Europe. After reaching an all-time peak of USD 37.2 billion in 2016, Chinese FDI in Europe fell by 28% year-on-year in

2017. In 2019, it even fell to \$117, a drop of 49%, which is the lowest point since 2013. There is no doubt that Chinese sports companies' investment in Europe is also inevitably affected by the change in investment policy. After that, in March and June 2020, the EU further issued the "Guidelines on the Protection of European Strategic Assets and Member States' Handling of Foreign Direct Investment and Free Flow of Capital from Third Countries", which is intended to protect European high-tech industries from other countries' acquisition or competition. This means that the barriers for Chinese companies to invest in Europe will rise again, especially in technology.

In addition, as the leader of the GVC division of labor system, multinational companies are looking for new value lowlands worldwide and reshaping the GVC (Zhou et al., 2010). Today, internationally renowned sports brands intend to or have moved factories from the coast of China to Vietnam, Cambodia, and other countries; Vietnamese media even said: "Vietnam has replaced China as the largest producer of Nike." FDI capital in Southeast Asia has continued to grow in recent years. According to the ASEAN Investment Report 2019, ASEAN attracted foreign direct investment (FDI) for three consecutive years, from USD 147 billion in 2017 to USD 155 billion in 2018, a record (Cui & Li, 2020). Nike closed its Taicang factory in China as early as 2009 and sent it to Vietnam to lay off 1,400 factory workers. In 2012, to integrate global resources, Adidas also closed its factory in Suzhou Industrial Park and moved it to Myanmar. At the same time, Adidas also lifted the OEM agreement with 300 factories in China, causing many companies that rely solely on Adidas to increase production capacity to face bankruptcy. To help sports companies get rid of the rigid constraints of the cost of production materials such as labor to a certain extent and create higher corporate value, not only foreign-funded companies, but also Chinese sporting goods companies Li-Ning, Anta, 361°, and other companies have begun to inspect the Philippines, Vietnam, Indonesia, and other countries' investment environment. Shenzhou International, a leader in China's textile manufacturing industry, is a raw material supplier of sportswear for Nike, Adidas, and Puma, etc. Currently, only two overseas production bases in Vietnam and Cambodia provide Shenzhou International with 50% of the fabric production capacity and 40% of the production capacity.

Garment production. Jinjiang Guohui and Baofeng Shoes have set up factories in Vietnam.

In addition, due to the shortage of production capacity of epidemic prevention materials in various countries exposed by the epidemic, developed countries such as the United States and Europe have also realized the huge gap in manufacturing production with China. The hollowing out of the manufacturing industry has attracted great attention from the countries mentioned above. At the same time, multinational companies also recognize the need for a diversified layout. Enterprises began to look for raw material suppliers in as many parts of the world as possible to carry out production and operations in areas close to the sales market, to enhance the flexibility and resilience of the manufacturing industry chain to respond to emergencies and diversify the risks of the manufacturing industry chain. These factors will increase the willingness of developed countries' manufacturing industries to flow out of China in the medium and long term. Therefore, in the medium and long term, it is a relatively high risk for multinational companies to gradually transfer their sporting goods or production lines in China out on a large scale.

5. *Geo-economic challenges from markets.* The established powers' leading position in sporting goods industry is closely related to the large-scale market, especially the high-end demand market size. Today, the rapidly expanding and upgrading Chinese sports consumption market has unique competitive advantages in the large-scale industrialization and commercialization of the innovation chain. This is the main factor that affects or even determines the formation of the symmetric game pattern in the strategic competition of scientific and technological innovation between China's emerging countries and the established powers. To break the symmetric game pattern, on the one hand, the country covets and seizes the domestic high-end sporting goods demand market in China. Through various geo-economic means, China is forced to unilaterally implement a comprehensive market opening strategy for its innovative and competitive products, to maintain the established powers' global market advantage and innovation monopoly interests. On the other hand, by obstructing or even cutting off China's local sporting goods enterprises to use their high-end market space to obtain

channels and space to improve their independent innovation capabilities.

Continuing to take the Sino-US trade war as an example, the United States uses the alliance system it has built to use various national security and value systems as an excuse to force other countries not to purchase and use products from specific Chinese high-tech companies, and also to force Ask other countries not to export certain high-end production equipment to China. With this "asymmetric market opening" strategy, not only occupies China's domestic high-end demand market, but also prevents China's penetration of the United States domestic high-end market. It can be seen from this that the established powers are using the channels of "demand leads to innovation" and "innovation commercialization and industrialization" to completely curb the opportunities for China's sporting goods enterprises to improve their independent innovation capability system and strengthen their global competitiveness.

As far as the sportswear industry is concerned, the current international and domestic mid-to-high-end markets are almost monopolized by foreign companies. In 2019, the market share of China's sporting goods can be seen. Among the CR8, only Nike and Adidas accounted for 43,3% of the market share (Figure 3.1). Although Chinese national brands such as Li-Ning, Anta, Xtep, and 361° have improved their rankings, they are still weak overall relatively.

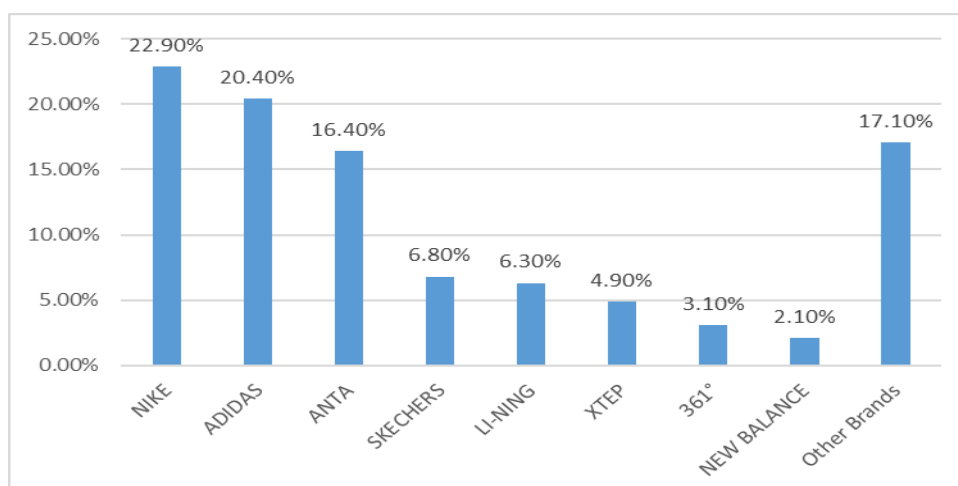


Figure 3.1 - Statistics of in the market share of China's sporting goods in 2019

**Source: systematized by the author*

In particular, it should be pointed out that most of the current high-end sports professional equipment is imported from abroad. Most of the training and competition equipment for professional athletes is imported from abroad. The National Games also requires the use of a large number of imported equipment, such as badminton courts from Japan, tennis nets and tennis posts from Canada, hockey balls from the United Kingdom, diving boards from the United States, barbells for weightlifting competitions from Sweden, boxing gloves and helmets from Germany, and A total of 47 items of equipment for shooting target throwing tables, flying saucers, and British and Swedish javelins. As the Beijing Winter Olympics is approaching, driving 300 million people to participate in the ice and snow sports plan to advance further, the development of the ice and snow equipment industry continues to accelerate, and it is expected to become a new growth point. It is estimated that in 2022, the annual sales revenue of China's ice and snow equipment industry will exceed 20 billion CNY, with an average annual growth rate of more than 20%. Canada, the United States and EU have quickly monopolized China's fast-growing ice and snow industry market, especially the high-end market, by the established industry chain of ice and snow equipment and industrial cluster advantages. For example: Snow resort facilities, including snow and ice aerial ropeway, snow press vehicles, snow guns, and snowmobiles, all need to be imported. In addition, imported ski equipment such as snowboards, skis, and advanced sports protective equipment is also the first choice for domestic ski professional athletes and enthusiasts (Li & Che, 2020).

6. *The geo-economic challenges of technology.* The goal of geo-economic struggles is to seize dominance in the world economy and control in relative economic struggles. The acquisition of such status or dominant power is often pinned on high-tech contests. Therefore, in recent years, various conservative countries have intensively launched a series of industrial policies and revitalization plans, hoping to lead the changing and future of the manufacturing, seize the commanding heights of future industrial competition, and consolidate their leading position.

The core competition among international sporting goods companies in the technical competence in design, technical patents, material research and development,

manufacturing process level, and automated production. Compared with developed countries, China still has a huge investment gap in human capital, R&D design, database, software, brand, and other intellectual capital, which seriously restricts the development of the sporting goods industry. In addition, the incumbent inertia is also one of the important reasons for the low end of China's sporting goods industry to be locked. Incumbent inertia means that enterprises ignore the threat of breakthrough innovation and insist on improving the original technology rather than making revolutionary breakthroughs (Spulber, 2014). This lag in innovation initiatives is mainly due to the sunk costs and conversion costs that are difficult to smooth out caused by asset specificity.

Table 3.4 shows that from 2014 to 2018, China's sporting goods Import was mainly composed of technology intensive products. This is because the key components, key equipment and molds, software support, and new materials of China's sporting goods industry are generally controlled by multinational companies and need to be imported from abroad. For example, at present, 80% of the control chips required for mid-to-high-end treadmills produced in China come from abroad, and 70% of the motors need to be imported.

Table 3.4 - Statistics of the Nature Structure of China's sporting goods Import

Year	Total Import (Billion USD)	Labor-intensive Products		Technology Intensive Products	
		(Billion USD)	%	(Billion USD)	%
2014	0,725	0,179	24,65	0,546	75,35
2015	0,784	0,202	25,76	0,582	74,24
2016	0,858	0,201	23,47	0,657	76,53
2017	0,946	0,226	23,88	0,72	76,12
2018	1,073	0,23	21,43	0,843	78,57

**Source: systematized by the author*

Additionally, according to data from China Customs Information Network, as of 2018, China has carried out import trade of sporting goods with 37 countries/regions worldwide. The United States, Germany, Japan, Italy, the United Kingdom, Canada, France, and Hong Kong are the top 8 countries/regions in terms of sporting goods

import share (Table 3.5). Import market concentration ratio CR8 from 2014 to 2018 was 93,66%, 93,36%, 88,11%, 88,69%, 81,55%, $CR8 \geq 80\%$, which belongs to a very high oligopoly market structure.

Table 3.5 - Statistics of the Top 8 Countries/Regions of China's sporting goods Imports from 2014 to 2018 (Million USD)

	USA	Germany	Japan	Italy	UK	Canada	France	Hongkong
2014	2030	1120	930	740	550	510	480	430
2015	2170	1260	1090	790	530	520	510	450
2016	2120	1350	1140	820	580	560	520	470
2017	2410	1510	1280	1030	570	520	560	510
2018	2540	1430	1330	1210	610	610	540	480

**Source: systematized by the author*

The over-concentration of the import market structure makes the imported core technology, key equipment, high-end raw materials and other intermediate products required to produce sporting goods in China vulnerable to technological blockade.

To curb and maintain China's industrial upgrading and structural adjustment, and even expand the technological gap with Chinese industries, the established powers would rather suffer a huge trade deficit than relax the export of high-tech and high-value-added products to China. For example: In 2018, the United States aimed at basic scientific research, 5G digital communication, artificial intelligence, aviation, machinery, biotechnology and new materials and other fields that are critical to the United States security and competitiveness, and implemented 301 investigation and corresponding sanctions against China from aspects such as intellectual property rights and technology transfer and even talent cultivation.

To sum up, the international competition of the sporting goods industry is essentially a competition in science and technology. Today, in the process of geo-economic struggle, the established powers continue to implement the strategy of strengthening technological blockade. This has profoundly affected the progress of China's sporting goods industry in the research and development of new materials, digitization of production lines, intelligent transformation, and intelligent product upgrades, and hindered the industrial upgrading of China's sporting goods industry.

7. *Geo-economic challenges in finance.* Han (2010) believed that in the geo-economic struggle, one of the important means used by some economic powers is financial hegemony. Financial hegemony refers to the behavior of developed countries taking advantage of their military, political and economic advantages and occupying a dominant position in the international monetary system, and forcing their own will, principles, or rules in the entire system to obtain hegemonic interests. Today, financial hegemony has become one of the important means by which great powers compete for world hegemony.

Under the international monetary system dominated by the USD standard, the exchange rate of a country's currency is affected by the exchange rate of USD. It fluctuates with the fluctuation of the exchange rate of the USD. The United States stands at the top of the design of the international monetary system, uses the USD standard to control the voice of international finance, and uses the exchange rate to play economic interests with other countries. In 2019, when the Sino-US trade war was at its most intense, Trump declared China a currency manipulator, and the Sino-US trade war eventually turned into a financial war. The usual method of the United States to deal with "currency manipulators" is to negotiate with them, forcing the currency of "exchange rate manipulators" to appreciate, to achieve the goal of balancing the international balance of payments and curbing the economic growth of other countries. It is coupled with the unlimited quantitative easing monetary policy implemented by the Federal Reserve since the COVID-19 outbreak. The massive US bond issuance nearly doubled the Fed's balance sheet, further fueling the CNY's appreciation. This is undoubtedly worse for China's current export of sporting goods.

For the international trade of sporting goods, the exchange rate has an important price conversion function, and the change of the RMB exchange rate has an important impact on the quantity and scale of the trade of sporting goods. The depreciation of the USD will lead to the rise of the real exchange rate of RMB, which will inhibit the export of China's sporting goods. The appreciation of the RMB will increase the export price of China's sporting goods, reduce the competitiveness of export prices, and lead to a decline in external demand. At the same time, it will reduce the import price of

sporting goods, enhance the price competitiveness of imported sports commodities, and lead to an increase in import demand. The survey shows that the export of sporting goods is marginal or even unprofitable due to exchange rate uncertainty, which greatly affects the enthusiasm of sports enterprises that earn foreign exchange through export (Xu & Mao, 2016). At present, it is more difficult for sporting goods manufacturers to make export quotations, and the short-term trend of export orders is more obvious. Some sporting goods companies are affected by the exchange rate appreciation in 2019, and the maximum period of export orders is only 15 days. In addition, the continuous appreciation of the renminbi will cause the inflation index to continue to rise, which will make sporting goods companies face the dual pressures of rising raw material costs and rising labor costs. This has hit many Chinese sporting goods companies, especially foreign trade companies and foreign-invested companies settled in USD. Product profits have been further compressed, and many manufacturers face unprofitable and constantly facing the danger of losing money and closing their doors. At the same time, the appreciation of RMB also inhibits the inflow of foreign investment in the sporting goods industry.

8. *Economic sanctions.* Economic Sanctions refer to the punitive economic measures taken by one or more countries against countries that violate international obligations, treaties, and agreements. It is often used by economically powerful countries to attack and weaken the political, economic, and military power of other countries (Yi & Li, 2018). The ultimate purpose of economic sanctions is to better serve the national interests of the country, especially the economic interests of the country. Beginning in 2020, the US Department of Commerce has proposed to boycott Xinjiang products, mainly cotton, through diplomacy, allies, and international organizations on the grounds of "human rights in Xinjiang." The European Union subsequently adopted a similar initiative.

In fact, behind the appearance of sanctions on Xinjiang cotton is the competition between China and the established power over the discourse power of the international industrial chain. The essence of the United States forcing multinational companies to choose sides is to compete for the commanding heights of standards and the discourse

power of international cotton and related industries, aiming to shake the foundation of China's industrial chain. China's textile industry has formed the world's most complete industrial chain and the highest processing facilities, becoming the world's largest supply center. From the perspective of supply chain and industrial chain, in 2020, cotton output in Xinjiang accounted for 87,3% of the national proportion. According to the "2019 World Trade Statistics Report", China's total textile and apparel exports accounted for 33,7% of the total global export market. The sports apparel industry is the midstream and downstream industries of the Xinjiang cotton industry chain. At the same time, its export trade is too concentrated with developed countries such as the United States. Therefore, the established powers represented by the United States sanction Xinjiang cotton and cotton textile products, which will inevitably have a serious impact on the supply chain, value chain, and international trade of China's sports apparel industry.

What needs to be added and emphasized is that the Xinjiang cotton incident is by no means an ordinary economic problem, and there are profound geopolitical struggles behind it. By tying up industrial development, human rights, ideology, etc., the United States, while cracking down on Xinjiang cotton brands and related industries, is also trying to crack down on China's international image and international status, undermining the relationship between China and the Islamic world and the smooth progress of the "Belt and Road" initiative implement.

3.2 The development strategy of China's sporting goods industry from the perspective of geo-economics

From the perspective of geo-economics, formulation the industrial policy of the leading power in the sporting goods industry has a significant inhibitory effect on the transformation and upgrading of China's sporting goods industry. To maintain the dominance, countries will inevitably adopt a series of geo-economic measures such as trade protection, finance, technology, investment, and even economic sanctions to create obstacles and weaken their competitiveness.

However, we should also see the positive effect of geo-economic competition on China's sporting goods industry. On the one hand, the fierce geo-economic competition has provided valuable industry reference experience for China's sporting goods industry. On the other hand, it will make China more determined to transform and upgrade the sporting goods industry, optimize the industrial structure, and further strengthen China's belief and determination to improve its industrial innovation capability through independent research and development. Based on the analysis of various aspects of geo-economic challenges above, this section puts forward the following policy recommendations from geo-economics.

1. China should actively integrate into the geo-economic strategy, strive for the right to speak in a standard setting, and seize the commanding heights of economic development

Standards are the most important discourse system in international industrial competition. Whoever dominates international standards has industry control. Now that the global economy is reshuffled, both the established powers and emerging countries strive to compete for the right to speak and seize the commanding heights of a new round of economic development. Overall, compared with developed countries, the development experience and industry standard system of China's sporting goods industry are still slightly insufficient. However, it is undeniable that after the initial foreign investment and industrial technology upgrading, Chinese sporting goods already have the foundation to build a GVC in the international market. Although it is difficult to build a GVC of China's leading sporting goods industry on a global scale in the short term, it can be achieved on a local area such as the "Belt and Road" region.

It should be pointed out that China is a large-scale late-rising country with a relatively complete industrial and scientific research system. Therefore, China's sporting goods industry can improve its international competitiveness through technical standards, and can quickly obtain the discourse power of technical standards and gain considerable influence. China cannot be too hasty, but at the same time it can leapfrog certain stages that ordinary developing countries usually go through. BRI has the most important significance for reshaping the international economic geography

and formulating China's standard discourse power. On the one hand, BRI has established the new industrial division of labor of the wild-geese flying pattern, which takes China as the "geese head". On the other hand, BRI is conducive to transferring China's sports-related infrastructure investment and mature sporting goods production capacity to the underdeveloped areas along the route, thereby accelerating the development of the sports industry in the countries along the route, which will form a win-win situation of mutual benefit. At the same time, the signing of RCEP as a new type of free trade agreement will also have an important impact on the reconstruction and development of GVC. Under the framework of RCEP, ASEAN countries will undertake more labor-intensive sporting goods industries in China with the advantage of their demographic dividend. Undoubtedly, this will help China's sporting goods industry actively participate in the formulation of relevant rules and the construction of a standardized certification system. In the process of promoting the mutual assistance, cooperation, and common development of the countries along the "Belt and Road", China can improve the institutional discourse power in the reconstruction of the regional value chain with the help of the smooth regional industrial chain and supply chain, and strongly promotes the sporting goods industry to climb to the high-end.

To sum up, China's sporting goods industry should actively integrate into the geo-economic strategy represented by the "Belt and Road" initiative, and take this opportunity to speed up the sharing of China's development experience and industry standard system with other countries. At the same time, the realization of the interconnection of the sporting goods industry and other fields can also help to increase the world's value recognition, trust, and support for China, and help to build a regional value chain dominated by Chinese industries.

2. Promoting trade liberalization and facilitation continuously.

As we all know, reform and opening up, and joining the WTO have continuously promoted the process of China's trade liberalization. Through deep participation and integration into the division of labor system within the product and the upgrading of its value chain, China has achieved global attention. Therefore, in the context of the increasingly serious trend of anti-globalization and trade protectionism, China must

unswervingly promote trade liberalization and facilitation cooperation.

In addition to the WTO, BRI, RCEP, and other international economic and trade cooperation organizations, China should also actively participate in or conclude more free trade agreements and regional trade agreements, strive to promote the innovation of international trade liberalization and facilitation systems and mechanisms, and eliminate relevant trade tariff barriers and non-tariff barriers. By realizing trade liberalization of intermediate or high-end sports products with countries with a higher level of economic development, and liberalization of trade in primary sports products with countries with a lower level of economic development, to create necessary conditions for participation and integration into the global product division.

3. Accelerating the construction of innovation consortium mechanism of the sporting goods industry.

The changing geo-economic landscape has intensified competition among sporting goods manufacturers and producers in various countries. To gain a competitive advantage in the international market of China's sporting goods industry, it is inevitable to rely on new technologies to promote the innovation and upgrading of sporting goods and increase the market share of sports products. China must respond to challenges and actively solve the bottlenecks problem to accelerate the realization of high-quality and high-end development with technological innovation as the core.

In 2021, President Xi Jinping emphasized the need to give full play to the role of enterprises as question-makers, promote the coordination of key projects and the integration of R&D activities, and accelerate the construction of an innovation consortium led by leading enterprises, supported by universities and institutes, and coordinated by various innovation entities. By developing an efficient and powerful general technology supply system, the effectiveness of the transfer and transformation of scientific and technological achievements will be improved. The innovation consortium refers to the joint establishment of industrial technology research institutes and industrial innovation alliances by enterprises, universities, and scientific research institutes under government's encouragement, and the joint construction of engineering centers, engineering laboratories, and technology centers. In recent years,

with the support and guidance of relevant government departments, leading or advantageous sports enterprises, scientific research institutions, and institutions of higher learning have been initially effectively organized. The sporting goods industry gathers scientific and technological strength in a consortium, and focuses on weak links such as key materials, basic components (components), basic processes, and basic industrial technologies, and strengthens key core technology research.

Taking advantage of China's new national system, the government concentrated its efforts to launch the "Science and Technology Winter Olympics" the key research and development plan. The state allocated a special fund of 1.4 billion CNY, launched more than 70 scientific research projects, and attracted hundreds of scientific research institutes and enterprises to participate in the plan. For example, due to the late start of the ice-snow research in China and little experience in holding international competitions, China's snow track technology is almost blank. Under the international technical blockade imposed on China, China cannot even obtain the parameter standards for track snow. In 2017, China established a research team on the key of ice and snow technologies for the Beijing Winter Olympics.

In 2021, under the leadership of the Chinese Academy of Sciences and the Northwest Institute of Eco-Environment and Resources of the Chinese Academy of Sciences, the ice-like snow track technology will finally be conquered by China. Surprisingly, the team has also developed ice and snow hardness measuring instruments, ice and snow particle size measuring instruments, and other professional testing equipment for ice and snow tracks. In addition, the four ice venues, including the National Speed Skating Stadium and the Capital Gymnasium, have all adopted the internationally advanced carbon dioxide transcritical direct cooling ice-making technology developed by Tianjin University through school-enterprise cooperation. This technology is one of the most advanced, environmentally friendly, and efficient ice-making technologies available. In 2021, the China-made snowmobiles developed by China Aerospace Science and Technology Corporation and China FAW Group used aerospace-grade technology to develop and deliver the domestic 2-up snowmobiles and 4-up snowmobiles, and obtain the international certification of competition equipment,

thus breaking the foreign monopoly in this field. Anta, Beijing Institute of Fashion Technology, and the National Winter Sports Apparel and Equipment R&D Center have broken through the key technologies of high-performance clothing research, and development for sports and training competitions. It broken the state of China's dependence on imports of competition clothing, and achieving "Made in China" that surpasses the world level. Tianjin University of Technology cooperated with related enterprises to break through the main research and development of key technologies for winter low-temperature protection clothing. Under the promotion of the innovative consortium model, China has made breakthroughs in key technologies in competition equipment and venue equipment to improve product performance. Under the promotion of the innovation consortium, China has made breakthroughs in key technologies in competition equipment and venue equipment to improve product performance. At the same time, sporting goods enterprises have grown and developed, built a national-level technology business incubator and a national-level maker space, and cultivated many high-tech enterprises and technology-based small and medium-sized enterprises. Under the guidance of the innovation consortium, traditional enterprises are gradually transformed to carry out R&D and manufacturing of high value-added sports equipment.

In addition, Anta, as a leading enterprise in China's sporting goods industry, cooperates with top universities in textiles and materials, such as Tsinghua University, Beijing Institute of Fashion Technology, and Donghua University. Through in-depth exploration creative design, new product research and development, and talent cultivation, Anta has formed a complete set of industry-university-research cooperation models. In summary, this paper believes that the innovation consortium can give full play to the unique national mobilization mechanism or national system advantages of the country and the government in industrial development, and provide necessary support and guidance to the sporting goods industry in terms of finance, finance, and taxation. On the other hand, innovation consortia can promote the market-oriented transformation of scientific and technological innovation with the help of a free market mechanism. By reducing costs and prices, improving the feedback ability and

entertainment of equipment, making professional fitness equipment accepted by the public, and promoting Chinese sporting goods to seize the mid-to-high-end market.

4.To accelerate the service-oriented process of the sporting goods industry.

Servitization was first proposed by Vandermerwe and Rada (1988). They believed that manufacturers should offer customer-focused bundles of goods, services, support, self-service and knowledge. The literature widely viewed servitization as how firms create value by adding services to products (Baines et al., 2009). From the perspective of the industrial chain, services play an important role in the manufacturing value chain. According to the "smile curve" theory, processing and production are in the middle of the "smile curve", and R&D, design, sales, and service are at the two ends of the "smile curve" (Ye et al., 2015). Therefore, making research and development, design, sales and service at both ends of the "smile curve" is the foundation for higher profits.

The international sporting goods giant Nike adopts a strategy of complete de-manufacturing, and only controls businesses with high economical added value such as R&D, design, brand management, and sales in the industrial chain. This has a very good enlightenment significance for the service transformation of China's sporting goods industry. Product servitization is also one of the key factors for the successful transformation of the Chinese sportswear brand "Anta". According to the capability and characteristic, enterprises can take upstream industrial chain servitization, downstream industrial chain servitization, upstream and downstream industrial chain servitization and complete de-manufacturing, etc., to realize the gradual service-oriented transformation of enterprises from low-level to high-level. sporting goods enterprises can significantly improve the level of R&D and design related to the core competitiveness of enterprises by intervening in upstream links through R&D, design, and planning. At the same time, the investment of productive services in the upstream links can also effectively improve the production efficiency of manufacturing enterprises, and realize the improvement of the innovation ability of the regional sports manufacturing industry; sporting goods enterprises can effectively shorten the distance with customers by extending downstream of the value chain through logistics,

transportation and after-sales service. In this way, sporting goods companies can be more timely and accurately understand customer needs, thereby enhancing their participation in the downstream links of the industry chain (Liu et al., 2016).

To sum up, servitization plays an important role in guiding China's sporting goods industry to extend to the high end of the industrial value chain, increasing the economic added value of sporting goods and improving the product export structure. Therefore, the transformation of China's sporting goods industry to service-oriented manufacturing is an important development direction for the supply-side structural reform of China's sporting goods industry. It is also an inevitable trend for China's sporting goods industry to gain competitive advantages.

5. To strengthen brand building.

Product competition in the 21st century is an era of brand competition, and the competition in the sporting goods industry is no exception. The quality of brand competitiveness will determine the quality of the international survival and development of sporting goods. In the face of the increasingly competitive international sports market, it is impossible to gain a foothold in the international sporting goods market with no-brand, no innovation, and low-level imitation. However, Chinese sporting goods brands are still in their early stages of growth. Facing the giants of the international sporting goods industry, neither in the local nor the international market, they have no absolute competitive advantage. Brand building has played an important role in making sporting goods companies bigger, stronger, and more refined. Establishing a good brand image and actively carrying out brand promotion can bring huge benefits to sporting goods producers. At the same time, to expand the sports brand effect, it is necessary to have accurate brand positioning, good brand marketing strategies and operation methods.

In 2014, the "Guiding Opinions on Accelerating the Development of the Sports Industry" issued by the General Office of the State Council pointed out that it is necessary to effectively promote the brand building of sporting goods and enhance the international market competitiveness of Chinese sporting goods brands. However, this is destined to be a long-term and systematic project. At the same time, it is also a

dynamic development process for sporting goods brands from unknown to well-known, and from domestic brands to international brands. For sporting goods enterprises with a large scale and market potential, they will actively "go global" with the help of the local Belt and Road Initiative, RCEP, and other geo-economic strategies. Sports enterprises should accelerate the transition from exporting products to exporting technology, equipment, and joint ventures, increase overseas investment, and expand the global influence of sports brands.

6. Financial innovation is the driving force for the high-quality development of the sporting goods industry.

The sporting goods industry enterprises need a lot of financial support in various aspects such as equipment upgrades, technological transformations, expansion of production, and upstream and downstream layouts. Except for the leading multinational companies, most sporting goods companies are small and medium-sized enterprises, which generally have problems such as weak funds, narrow financing channels, high financing risks, and low evaluation reliability. However, without financial support, it is difficult for small and medium-sized sporting goods enterprises to consider normal operating capital turnover and continuous investment in transformation and upgrading. From the perspective of geo-economics, the level of currency internationalization and the efficiency of financial market services can provide financial support for sporting goods multinationals to carry out bilateral trade, two-way direct investment, technological innovation, etc., and thus can significantly improve a country's value chain status. At the same time, financial services can help reduce the transaction costs of sporting goods companies and enhance the competitiveness of their products, and strengthen the control of different links in the GVC and the transaction network of different production factors. Therefore, financial cooperation with financing as the main content is a development path that should be attached to great importance to the sporting goods industry from geo-economics.

From the "Several Opinions of the State Council on Developing the Sports Industry to Promote Sports Consumption" to the "Action Plan for Further Promoting Sports Consumption (2019-2020)", a series of national policy documents require

vigorously attracting social capital, establishing financial support channels invested by social capital into the sports industry, and strengthening cooperation with financial institutions to expand financial services. On the one hand, China should make full use of investment and financing mechanisms such as the Asian Infrastructure Investment Bank, the BRICS Development Bank, and the Silk Road Fund to provide financing services for the development of bilateral trade, two-way investment in sporting goods and the development of corporate technology research and development in countries along the route. On this basis, developing diversified financial service channels, eliminating the time and space constraints of regional financial services, and giving priority to providing preferential and convenient financial services to attract high-tech multinational sporting goods enterprises to expand direct investment in the country. On the other hand, the government should guide and encourage enterprises, especially capital-intensive and technology-intensive multinational sporting goods enterprises, to expand the scale of the use of RMB in international sporting goods economic and trade settlements such as bilateral trade and two-way direct investment in countries along the Belt and Road, and use the Asian Financial platforms such as investment banks consolidate the role of the RMB as a regional currency. In addition, focusing on deepening financial market reform and the orderly opening of capital accounts, reduce the risk of currency internationalization through stable economic growth and appropriate policy control measures, and maintaining a relatively stable exchange rate level.

All in all, high-quality, high-efficiency, multi-level, and diversified financial cooperation platforms, and mechanisms are the solid foundation and conditions for the transformation and upgrading of the value chain of China's sporting goods industry from the perspective of geo-economics.

*7. The idea of upgrading the sporting goods industry to a geo-industry I
Definition of Geo-Sports Industry.*

Geo-industry is an industry type with the ultimate goal of serving national geographical interests. Under the guidance of national geo-strategy, the geo-industry strengthens the economic relations between the two sides using economic trade, overall

output, and economic control and constructs the pattern of benefit sharing and asymmetric risk-taking. In this way, the geo-industry can influence the political behavior of other countries and protect their own political, economic, and security interests (Qu et al., 2018). The geo-industry is a new concept, but not a new industrial category, nor a new thing. It can be the primary industry, the second industry, or the third industry. The primary basis of its establishment is the economic competition and complementary relationship between countries, to choose the advantageous sector to play the role of geo-industry. To better play the role of geo-industry, geo-industry should choose those advantageous industries based on the economic competition and complementary relations between countries. Some scholars also pointed out that in a certain regional industrial system, the industry with externality, that is, the development of the industry either needs to purchase raw materials from other regions, or needs to sell products to other regions, which can be called geo-industry (Wang, 2015). A region's pillar industries, leading industries and their associated industries, strategic emerging industries, and some basic industries all belong to geopolitical industries. Geo-economic activities also mainly revolve around these geo-industries.

Combined with the definition of geo-industry, in terms of the characteristics of the geo-economic era faced by China at this stage and the geo-economic challenges faced by the development of the sporting goods industry, this paper argues that some of the transnational economic cooperation projects led by the leading sporting goods industry also has a certain nature of the geo-industry. However, no scholars have systematically studied its connotation characteristics and operation mechanism from the perspective of geographical interests. To distinguish the traditional sporting goods industry, we call it the geo-sporting goods industry. In addition to the general industrial mission of providing products, creating jobs, gaining profits, and technological innovation, the geo-sporting goods industry can also undertake the mission of implementing the national geo-economic strategy and helping the country maintain and obtain geo-interest, with richer connotations. As a geo-economic strategy, the geo-sporting goods industry can make up for the limitations of its traditional sporting goods transnational economic cooperation to pursue geographical interests, such as

insufficient attention to political interests and geo-economic security. Therefore, upgrading the sporting goods industry to a geo-industry is a rich and important practice of geo-economic theory with Chinese characteristics.

Characteristics of Geo-Sporting Goods industry.

First, the geo-sporting goods industry is a comprehensive national geopolitical interest, and the process of realizing the interests is long-term. Different from the traditional sporting goods industry, which pursues profit maximization in the short term, the geo-sporting goods industry pursues comprehensive national interests in terms of economy, politics, and security. Due to the complexity of the operating mechanism and environment, its opponents will also launch a series of control and anti-control competitions. Therefore, the realization of geographical interests in the geo-sports industry will not be achieved overnight, and often requires long-term planning and layout.

Second, the geo-sporting goods industry has a clear motivation to control the discourse right and dominance of the industrial field of other countries or regions. Market control, technical control, capital control, and raw material control are all geo-economic means that can be selected by the geo-sporting goods industry. Unlike the "zero-sum game"-based geopolitical thinking, although China's geo-sporting goods industry has the characteristics of control, it should adhere to the principle of extensive consultation, co-construction and sharing advocated by the "Belt and Road" initiative. China's geo-sporting goods industry should join hands with partners to make the "cake" bigger and achieve the goal of common prosperity. However, when geo-economic and even geopolitical conflicts break out, such as the current Sino-US conflict, the control and anti-control features of the geo-sporting goods industry will force the opponents to consider huge losses of sanction or conflict. Therefore, the economic control of the geo-located sporting goods industry is a win-win situation that includes deterrence. Even if the deterrence derived from such control is potential, it can influence the relationship of competitors, industrial policy arrangements, etc., thereby extending the space of power and creating a more favorable geographical environment for China.

Third, there is a shadow of the country behind the geopolitical sporting goods

industry, which is implementing the national will. On the one hand, the state will come forward and use the national mobilization mechanism to support or guide the development of geo-industries; On the other hand, to a certain extent, traditional geopolitical means such as politics, diplomatic negotiations, and even military are indispensable protective forces for the geo-sporting goods industry.

Guiding ideology of geo-located sporting goods industry.

As far as China is concerned, the geo-sporting goods industry should be guided by the geo-economic strategy and purpose represented by the "Belt and Road" initiative. Fully relying on the existing bilateral and multilateral mechanism of China with the relevant countries, based on the existing and effective regional cooperation platform, BRI will take the historical symbol of ancient Silk Road, hold high the banner of peaceful development, actively develop economic cooperation and partnership with the countries along the Belt and Road, jointly create a community of shared interests, community of destiny and community of the responsibility for political mutual trust, economic integration, and cultural inclusiveness (Shang, 2019).

As the most influential geo-economic strategy at present, BRI is not only China's positive response to the changes in the world's political and economic structure and economic globalization, but also expands the space for China's economic activities and reshapes the international economic geography. Today, BRI has become an important geo-economic strategy for China to participate in global openness and cooperation, improve the global economic governance system, promote global common development and prosperity, and promote a community with a shared future for mankind. Therefore, in today's global geo-economic landscape, China's geo-sporting goods industry should take the "Belt and Road" initiative as its guiding ideology.

Theoretical Guidance of Geographic sporting goods industry.

First of all, under the guidance of geo-economic theory, after upgrading the geo-industry, the sports industry has changed from the pursuit of profit maximization in the general industry to the pursuit of comprehensive interests in economic, political, security, and other aspects, and the process of realizing the benefits is long-term. Because its operating mechanism and operating environment are more complex than

the simple sports industry, the realization of geographical interests will not be achieved overnight. It often requires long-term planning and layout of the country and sporting goods companies. In addition, the great guiding significance of geo-economic theory is to guide China's sporting goods industry to rely on its economic advantages and use foreign economic means, such as talents, technology, capital, investment, trade, market, multinational company information, technology, etc. as geo-economic means. Realize the dominance of obtaining national interests.

Second, as the direct theoretical source of geo-economics, geopolitics is a discipline that observes and discusses the evolution of the world political pattern and the relationship between countries or groups of countries from a macroscopic background. Geopolitics and geo-economics interact strategically like "twin siblings"(Jin & Zhao, 2014). Traditional geopolitical means, such as political influence, diplomatic negotiation, bilateral relations, etc., are the necessary protection forces for implementing of geo-economics. The practice has proved that it is unacceptable to ignore the country's political interests and strategic security interests or make it difficult to maintain and traumatized by economic development. For example, the unrestricted and blind introduction of foreign capital just to develop the domestic economy, so that the economic lifeline of the country is controlled by foreign capital, will lead to the loss of the country's political independence and autonomy. Although economic interests are an important part of national interests, political interests, and national security interests are the basic conditions for a country to survive. Only on the premise of adhering to the country's political and security interests can we seek national economic interests.

Third, the regional economic theories, especially the regional balanced growth theory and the regional economic disequilibrium growth theory, are of great significance to regional economic development. On the one hand, regional economic integration is the most important form of geo-economics. On the other hand, the sporting goods industry is the carrier and realization form of regional development, so the regional economic development theory also plays an important role in developing the geo-sports industry.

The path of geo-sporting goods industry to pursue geopolitical interests.

Within the framework of regional economic integration, a series of transnational economic cooperation carried out by transnational corporations is the fundamental path for the geo-sports industry to pursue geopolitical interests. What transnational economic cooperation actively pursues is geo-economic interests, and other geo-economic interests are the external effects of transnational economic cooperation. This is because economic cooperation acts as a "stabilizer" for the relationship between the two countries. Both sides are willing to accommodate each other for economic interests, thus making it possible for the two countries to cooperate in non-economic fields such as political security and ecological environment.

As the fundamental path for the geo-sporting goods industry to pursue geographical interests, transnational economic cooperation is the result of regional economic integration and the interaction of transnational corporations. On the one hand, "the essential feature of geo-economy is regional economic integration, that is, regional economic integration or regional economic grouping, and no country can stay out of the wave of regional economic integration for a long time. On the other hand, the competition of multinational corporations is essentially a contest between countries and between governments, which reflects a country's economic policy level and the government's ability to safeguard national interests. In today's world, multinational companies control 50% of the world's international trade, more than 90% of international direct investment, and more than 80% of new technologies, new processes, and new technology patents. Therefore, multinational corporations are the most active elements in the geo-economy, and also an important means and tool in geo-economic competition (Wang et al., 2015).

According to the above analysis, the concept model of geo-industry can be represented in Figure 3.2.

The Importance of Theoretical Significance and Practical Significance of Geographic Sporting Goods Industry Mode.

First of all, the concept of geo-sporting goods industry is to enrich the content system of geo-economics. As a special subject of transnational economic cooperation,

the geo-sporting goods industry plays a unique role in pursuing national geo-economic interests. With the support of the state, the geo-sporting goods industry is guided by in-depth cooperation and effective control. Through patient planning, it pursues long-term and stable geographical interests.

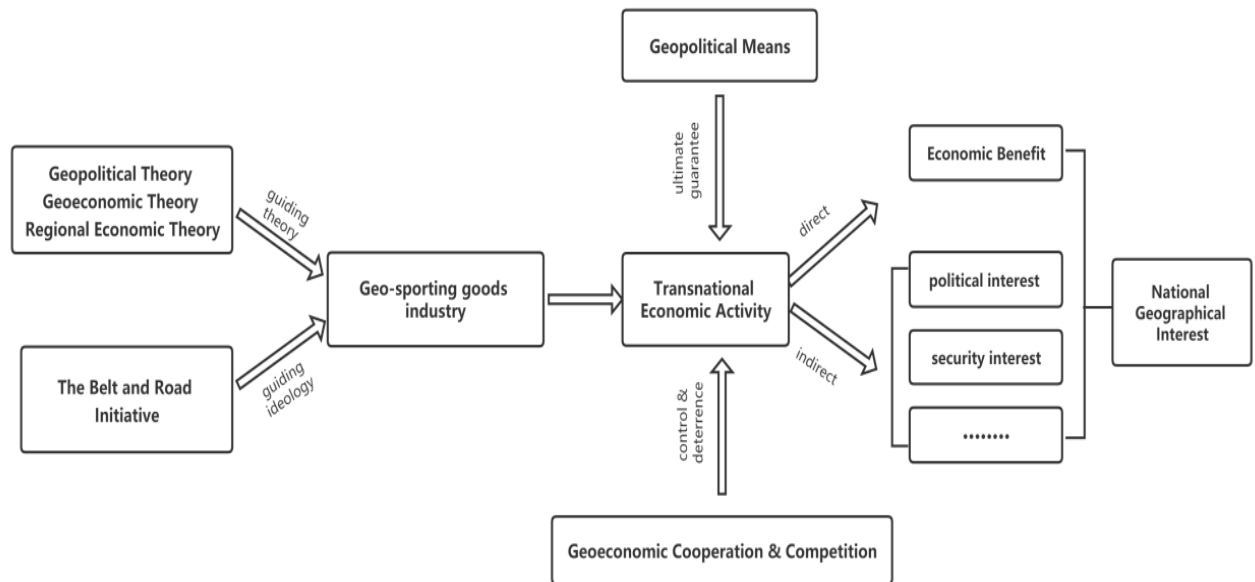


Figure 3.2 - Concept model of geo-sporting goods industry

**Source: systematized by the author*

Second, as a late-developing country in the sporting goods industry, China is relatively disadvantaged in terms of resource endowment, technology, and trade opportunities in the process of catching up with and surpassing the established powers. When the sporting goods industry is upgraded to a geo-industry, the late-mover advantage can be better utilized, and the limited resources can be concentrated in the sporting goods field, which is the key development of the country. At the same time, the geo-sporting goods industry can more effectively learn from and imitate the advanced technology and experience of developed countries in the sports industry, create absolute advantages through industrial policies and national mobilization mechanisms, and accelerate the upgrading of the sporting goods industry chain.

Third, limited by capital, technology, and other factors, the transnational cooperation business of general sporting goods enterprises is usually limited to the

fields with small investment and profit, and it is difficult to get involved in the fields with public characteristics, large investment, and long payback periods, such as stadiums and gymnasiums and infrastructure-related sporting goods. In addition, the R&D and market application of modern technology related to sporting goods require large-scale capital investment and departmental collaboration, making innovation more and more difficult, and the cost, difficulty, and risk of breaking the limit of technological growth and crossing technological faults are increasing. Due to the increasingly high requirements for infrastructure investment in applying new technologies, private sporting goods companies are increasingly unwilling or unable to bear the cost of industrial upgrading. It is more difficult for general sports enterprises to get involved in the bottlenecks and weak links that restrict the development of the sporting goods industry and the related technical and technological fields controlled by the state. However, the geo-sporting goods industry has inherent advantages due to the support of the state. With the help of the national mobilization system, the geo-sporting goods industry can give full play to the important role of the state in developing economies of scale, optimizing resource allocation and obtaining competitive advantages, carrying out more extensive transnational cooperation, and expanding the scope of geo-economic activities.

Conclusion to section 3.

1.This chapter firstly analyzes the development status and layout of China's sporting goods industry from the perspectives of industrial scale, research and development, market concentration, industrial agglomeration, and international trade in sporting goods. Then, from the perspective of geo-economics, it focuses on the challenges and threats faced in developing China's sporting goods industry, such as trade, investment, market, technology, finance, and even economic sanctions. Based on these challenges, this chapter finally points out the development path of China's sporting goods industry from geo-economics.

2.The specific paths include: actively integrating into the geo-economic strategy,

striving for the right to speak in the formulation of standards, and seizing the commanding heights of economic development; continuing to promote trade liberalization and facilitation cooperation; increasing investment in high-end innovation in the sporting goods industry; brand building; financial innovation and other paths. In addition, based on the geo-economic theory, this chapter also innovatively puts forward the strategic concept of upgrading the sporting goods industry to a geo-industry, that is, the geo-based sporting goods industry.

CONCLUSION

The core of the geo-economy is the industry, and the industrial pattern and industrial development are the foundation of China's geo-economy and can also reflect the pattern of China's geo-economy. Only when the industry is located at the high end of the industrial chain of the international community, the commanding position of the strategic industry, and obtains a dominant position in the international market through high value-added products, can the country master the geoeconomic dominance. Therefore, the geo-economic competition of countries in the world today mainly revolves around industries. The sports industry is a sunrise industry, a green industry, a pillar industry for the development of the national economy, and has an increasingly significant role in promoting economic and social development.

However, from the perspective of geo-economics, with the changes in today's world structure, market competition theory has been unable to fully and effectively guide international competition under the background of global industrial re-division, and the free market mechanism is increasingly unable to adapt to the development of China's sports industry. In the fierce geoeconomic competition, the sports industry can not only assume the responsibility of safeguarding the interests of the country's economy, politics, culture, security, etc., but also need to rely on the national mobilization system to obtain relatively stable medium and long-term industrial policy support. Based on this, this paper conducts a series of researches on the development of China's sports industry from the perspective of geoeconomics.

First, combining the current geo-economic environment in China and the objective needs of sports industry development, this paper first expounds the necessity of choosing China's advantageous sports industry from the perspective of geoeconomics. This paper argues that, on the one hand, in the fierce geo-economic competition, the cross-border economic cooperation of China's sports industry is deeply affected by a series of complex problems such as the macro-geo-economic pattern, the diplomatic relations between countries, the economic policies of the other country, and the intervention of third-party countries. Geoeconomic competition. So it

faces more complex competition than the free market. On the other hand, because the current development of China's sports industry is still in its infancy, the market is not well developed. The development of China's sports industry does not have the conditions to implement a large-scale overall development. Therefore, the selection of China's advantageous sports industry from the perspective of geo-economics is an important part of the sports industry development plan that needs in-depth analysis, and the correctness of its selection directly affects the overall development and international competitiveness of China's sports industry.

Second, on the basis of the research purpose and content need, from a perspective of the economic geography, the practice of transnational economic activities, the sports industry at present, this paper argues that focusing on the economic geography of docking industry mainly includes: sports competition and performance industry, sports fitness and leisure industry, sports goods manufacturing industry, sports construction industry, sports tourism industry.

Third, based on the Porter-Dunning diamond model and geo-economic theory, this paper uses the Delphi method to obtain the data of screening indicators through experts' assessment of the importance of secondary indicators. Then, according to the mean value, standard deviation and coefficient of variation of primary indicators, Finally, the evaluation index system is composed of seven first-level indicators, including factor conditions, demand conditions, firm strategy, structure and rivalry, related supporting industries, transnational economic activity, government role and opportunity, and 26 second-level indicators.

Fourth, according to the evaluation index system determined by the Delphi method, experts are invited to score the relative importance of each element at the criterion level and the index level. With the help of YAANP2.4 software, this paper adopts the method of weighted arithmetic mean of expert results to carry out AHP group decision analysis. First, according to the results of the questionnaire survey, this paper assigns the weights of the three information of education, professional title and working years and the corresponding grades and finally calculates the subjective weight of experts. Afterwards, according to experts' constructing a pairwise judgment

matrix of the importance of indicators at all levels, determine the respective weights of the first-level and second-level evaluation indicators and the comprehensive weight of the second-level indicators in the international competitiveness evaluation index system of China's sports industry from the perspective of geo-economics.

Fifth, on the basis of the known index system of China's sports industry and the comprehensive weight of each index from the perspective of geo-economics, this paper adopts the method of fuzzy mathematics to comprehensively evaluate the international competitiveness of each industry in China's sports industry. Finally, the final ranking of the international competitiveness of China's sports industry from the perspective of geo-economics is: sporting goods manufacturing > sports tourism > sports competition and performance industry > sports fitness and leisure industry > sports construction industry. The results of the fuzzy comprehensive evaluation show that the total score of the international competitiveness of the sporting goods manufacturing industry is 7.4786, which is higher than the evaluation results of the international competitiveness of the other four industries. Finally, this paper concludes that the comprehensive strength of the international competitiveness of China's sporting goods manufacturing industry from the perspective of geo-economics is higher than that of other industries.

Sixth, in recent years, with the increasing emphasis on the development of the sports service industry at the national level, although the sports goods manufacturing industry has declined in China's sports industry, it occupies the largest proportion. China's status as a sports goods manufacturing power has not changed. Stimulated by the sports power and healthy China strategy, the concentrated release of China's sports consumption demand and the growth of consumers' diversified and multi-level demand for sports goods. In recent years, the industrial upgrading of the sporting goods manufacturing industry and the transformation of enterprises have accelerated, and the slowdown in the growth rate of the sporting goods industry has been effectively reversed. With the gradual increase in the market concentration of the sporting goods manufacturing industry, the effect of industrial clusters has become more and more obvious, and the import and export trade volume of China's sporting goods industry has shown a good overall situation. play an increasingly important role in the national

economy.

Seven, facing the dual pressure of the capital- and technology-intensive sporting goods manufacturing industry in established powers and the chasing effect of labor-intensive sporting goods manufacturing industries in emerging economies, China's sporting goods manufacturing industry must continue to climb the high-end of the international industrial chain and occupy the industry commanding heights to get rid of the risk of industrial hollowing out. However, this process deeply undermines the global monopoly profits of high-productivity conservative states. Especially when factors such as the new industrial revolution, the "rise" of trade protectionism and the global pandemic of COVID-19 are intertwined, various forms of geoeconomic challenges, which include trade, investment, market, technology, finance, and even economic sanctions faced by China's sporting goods manufacturing industry, have erupted intensively.

Eighth, based on the current macro-geo-economic pattern and various geoeconomic challenges faced by China's sporting goods manufacturing industry, this paper proposes a specific paths for the development of China's sporting goods manufacturing industry from the perspective of geo-economics. Specifically, it mainly includes: actively integrating into the geo-economic strategy, striving for the right to speak in the formulation of standards, and seizing the commanding heights of economic development; continuing to promote trade liberalization and facilitation cooperation; increasing investment in high-end innovation in the sports goods manufacturing industry; Brand building; financial innovation.

Ninth, based on the geo-economic theory and the current practice of China's geoeconomic strategy represented by the "One Belt, One Road" initiative, this paper innovatively proposes the strategic concept of upgrading the sporting goods manufacturing industry to a geo-industry, that is, the geo-sporting goods manufacturing industry. The proposal of this strategic concept can make up for the limitations of its traditional sports goods manufacturing transnational economic cooperation in the pursuit of geographical interests, such as insufficient attention to political interests and geo-economic security. In addition, the proposal of the geo-sporting goods

manufacturing industry has enriched the content system of geo-economics, helped the country formulate a scientific geo-strategy, and expanded the scope of geo-economic activities.

To sum up, this paper believes that the root cause of the current geo-economic conflict lies in the improvement of the competitiveness of China's emerging industries, including the sports industry. As the core part of the geo-economy, industry has inevitably become the core focus of the geo-economic competition between China and the conservative countries. As the most competitive industry in China's sports industry from the perspective of geo-economics, the sporting goods manufacturing industry is also an important manifestation of China's sports strength and even comprehensive national strength. Economic globalization and market internationalization are major trends in the international economy. In addition, China's sports industry started late, so many high-end equipment and technologies rely on foreign companies. But from a geo-economic point of view, for reasons of economic security and political security, developed countries generally do not give us the most advanced and core technologies. Some foreign businessmen are only willing to export sports products to the Chinese market, but do not agree to cooperate and transfer technology; Some foreign businessmen transfer some labor-intensive products to China for production during the major adjustment of the international industrial structure. The Chinese side is only a production workshop of the foreign side and does not master the core key technologies.

In the short term, in order to safeguard its own interests, the industrial upgrading of China's sporting goods manufacturing industry will inevitably be challenged by geo-economic challenges such as trade wars, technological blockades and economic sanctions from established powers. However, Moody's, one of the world's top three rating agencies, believed that "Made in China 2025" will not be affected by the Sino-US trade war. In the long run, China's sporting goods manufacturing industry has super-large market advantages and domestic demand potential, the world's most complete manufacturing industry system advantages, and the support of China's sports industry policy advantages. In addition, the practice of China's "Belt and Road" initiative, RECP and other geo-economic strategies has provided a solid guarantee for China's sporting

goods manufacturing industry to promote the position of the international value chain from the middle link to the two ends, and truly achieve leapfrog development.

Most importantly, from the perspective of geo-economics, this paper argues that the level and modernization of the sporting goods manufacturing industry determine the level and modernization of China's entire sports industry. The "growth pole" effect of the sports goods manufacturing industry can effectively promote the overall high-quality development of the sports industry, and eventually form a modern sports industry system that integrates the development of fitness leisure and competition performance, high-end manufacturing and modern service industry, thus making China develop from a big sports country to a real sports power.

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APPENDICES

APPENDIX A

**Questionnaire on the international competitiveness index system of China's sports industry from the perspective of geoeconomics
(the first round)**

Dear Expert:

First of all, thank you for taking the time out of your busy schedule to participate in this survey. In order to complete my doctoral dissertation "Research on the Selection and Development Strategies of China's Superior Sports Industry from the Perspective of Geo-economics", it is now necessary to investigate the evaluation system of the international competitiveness of the sports industry from the perspective of geoeconomics. Please fill in the following according to your experience.

1. Personal information (please tick the corresponding column)

Degree:	PhD ()	Master's Degree ()	Undergraduate ()	Other ()
Title:	Professor ()	Associate Professor ()	Lecturer ()	Other ()
Work Place	University ()	Sports Administration ()		Other ()
Working Years:	Within 10 Years ()	10-20 Years ()	20-30 Years ()	30+ Years ()

2. Investigation on the Index Level of China's Sports Industry Evaluation System from the Perspective of Geo-economics

In view of the issue of the selection and development strategy of China's advantageous sports industry from the perspective of geo-economics and according to the "Porter-Downing" diamond model theory, this paper divides the international competitiveness evaluation system of the sports industry from the perspective of geoeconomics into seven first-level indicators. They are factor conditions, demand conditions, firm strategy, structure and rivalry, Related supporting industries, transnational economic activity, government role and opportunity. On this basis, 30 three-level indicators were preliminarily selected through literature search and interviews with experts in economics, sports economics, and sports industry-related disciplines. On the basis of the first-level indicators, this paper preliminarily selects 30 third-level indicators through literature query and interviews with experts in economics, sports economics, and sports industry-related disciplines (Table 1).

Table 1. List of primary indicators of international competitiveness of China's sports industry from the perspective of geo-economics

First-level indicators	Secondary indicators
Factor conditions	Geographical Environment, Natural Resources, Sports and Cultural Resources, Human Resources, Capital Elements, Technical Elements
Demand conditions	Domestic Market Demand, Foreign Market Demand, Domestic Consumer Behavior, Foreign Consumer Behavior

Firm strategy, structure and rivalry	Industrial Scale, Enterprise Operation Mechanism, Industrial Innovation Capability, Industrial Cluster, Industrial Concentration
Related supporting industries	Internet Industry, Financial Industry, Media Industry, Tourism Industry, Cultural Industry, Manufacturing Industry
Transnational economic activity	Multinational Corporations, International Trade, Foreign Direct Investment, Foreign Investment
Government	Industrial Planning, Industrial Policy, Industrial Management System
Chance	The Belt and Road Initiative, Industry 4.0 (The Fourth Industrial Revolution)

However, due to the limitations of professional level, knowledge background, and experience in sports industry practice and theoretical research, these indicators may be relatively rough, and some are even very unreasonable. Therefore, I hope you can inspect them one by one and give suggestions from your own professional point of view. The 30 secondary indicators are described as follows:

C1: The geographical environment is the space for people to engage in foreign exchanges and carry out foreign economic activities, and it is a basic condition for the emergence and development of international relations.

C2: Natural resources refer to natural elements (including geology, landform, hydrology, climate, biology, soil, etc.) that can be utilized and affect the development and layout of the sports industry and their natural complexes.

C3: Sports cultural resources refer to many tangible and intangible resources such as natural resources and social resources related to sports culture that people use or can use in sports production or sports activities.

C4: Human resources refer to the general term of education, ability, skills, experience, physical strength, etc. possessed by people in an organization that can be used by the enterprise and contribute to value creation within a certain period of time.

C5: Capital elements are final input products, labor services, and intermediate products and financial assets in the production process through direct or indirect means.

C6: Technical elements are the general term for all kinds of intangible resources that can create value in production activities, such as scientific theory, production process, production skills, management experience, sales channels, and intellectual property rights.

C7: Domestic market demand of the sports industry is the total amount of products or services that consumers may purchase within the domestic sports product market under a certain period and conditions.

C8: International market demand of the sports industry is the total amount of products or services that consumers may purchase in the international sports product market under a certain period and conditions.

C9: Domestic consumer behavior refers to the various actions and decision-making processes that Chinese consumers (including individuals, groups and organizations) take to obtain, use, and dispose of consumer goods.

C10: Foreign consumer behavior refers to the various actions and decision-making processes that international consumers (including individuals, groups and organizations) take to obtain, use, and dispose of consumer goods.

C11: Industrial status refers to the proportion of the output value of a sports industry in the total output value of the sports industry, which reflects the current industrial structure of the sports industry and the industry's status in the sports industry.

C12: Enterprise operation mechanism refers to the functional system that promotes, regulates and restricts the normal operation of various production factors of the enterprise system to achieve enterprise goals.

C13: Industrial efficiency refers to the proportion of the added value of an industry to the total output value of the industry. This indicator reflects the direct input-output benefit of the business activities of enterprises in the industry.

C14: Industrial innovation capability is an innovative collection of sports enterprise groups. Industrial innovation is a systematic process, including four levels: technological innovation, product innovation, market innovation, and industrial integration.

C15: Industrial cluster is a geographical aggregation of interconnected enterprises and institutions in a particular field.

C16: Industrial concentration is an indicator used to measure the monopoly of a country or region in a certain industry, and is the basis for developing economies of scale and enhancing the international competitiveness of sports enterprises.

C17: Industrial concentration is an indicator used to measure the monopoly of a country or region in a certain industry, and is the basis for developing economies of scale and enhancing the international competitiveness of sports enterprises.

C18: Financial industry refers to a special industry that operates financial commodities, including banking, insurance, trust, securities and leasing.

C19: As an important carrier of sports activities, especially spectator sports and professional sports, media industry plays an irreplaceable role in promoting sports events, disseminating sports culture, optimizing sports resources and promoting the development of the sports industry.

C20: Tourism industry is a comprehensive industry that meets various tourism needs of consumers by providing tourism products and services based on tourism resources and tourism facilities.

C21: Cultural industry refers to the activities that provide the public with cultural and entertainment products and services, and the collection of activities related to these activities. The development of cultural industry can enrich the cultural connotation of my country's sports industry and help break through the international communication pattern of "the West is strong and I am weak".

C22: Manufacturing industry is the cornerstone of a country's economy and even the lifeblood of a country. Countries with weak manufacturing are easily controlled by countries with developed manufacturing."

C23: Multinational companies refer to monopoly enterprises that take their own countries as their bases and set up branches or subsidiaries around the world through foreign direct investment to engage in international production and business activities.

C24: International trade refers to the exchange of goods, services and factors of production between different countries or regions. The international trade of sports industry is an important manifestation of the active degree of international commercial exchanges of a country's sports products.

C25: Foreign direct investment is an economic behavior in which a country's investors export intangible assets such as capital, equipment, technology and management skills in order to obtain effective control over the operation and management of foreign enterprises.

C26: Industrial planning refers to the government's comprehensive use of various theoretical analysis tools, starting from the international and domestic economic development trends, to the positioning, industrial system, industrial structure, industrial chain, spatial layout, economic, social and environmental impact, implementation plan of China's sports industry development. Science plans made by etc.

C27: Industrial policy is the sum of various policies that the government intervenes in the formation and development of the sports industry in order to achieve certain economic and social goals.” A reasonable sports industry policy is conducive to the formation of the common values of stakeholders in the industry, which in turn helps Because of their efforts to improve the competitiveness of the sports industry.

C28: Industrial management system refers to the general term for the institutional setting, division of authority, operation mechanism and other aspects of sports industry management. A reasonable sports industry management system can give full play to the function and efficiency of market allocation of sports resources.

C25: The Belt and Road Initiative is the most important geo-economic practice in China at present, and it is also for the development of geo-economic theory. The Belt and Road Initiative plays an important role in actively promoting the trade liberalization of the sports industry, improving the degree of economic openness, eliminating trade barriers for sports products, reducing trade and investment costs, and improving the speed and quality of regional economic cycles.

C30: Industry 4.0, also known as the fourth industrial revolution, is the era of using information technology to promote industrial transformation, that is, the era of intelligence.

3. Opinions and suggestions can be considered from the following aspects

In addition to these 30 indicators, do you think there are other more important indicators with higher research value that need to be added?

Are there any indicators among the 30 indicators that are of little significance or relevance to this research and should be deleted?

are there indicators highly similar or correlated so that they need to be combined into one?

Please write your comments and suggestions in the space below. (Example: It is recommended to merge C1 and C2, on the grounds that the content of these two indicators is highly similar, so C1 need to be deleted.

APPENDIX B

**Questionnaire on the international competitiveness index system of
China's sports industry from the perspective of geo-economics (the second
round)**

Dear expert:

After synthesizing the opinions and suggestions given by the experts in the first round of questionnaires, we adjusted the evaluation system, and sorted out and clarified the connotation of each indicator. In this round of questionnaires, this paper hopes to use your professional knowledge and rich experience to evaluate them again: ① Fill out the "Second Round Questionnaire Evaluation Form"; ② Please fill in your suggestions for additions, deletions, modifications or merging of the current evaluation system in the blank below the corresponding indicators place.

Table 1. List of international competitiveness indicators of China's sports industry from the perspective of geo-economics (the second round)

First-level indicators	Secondary indicators
Factor conditions	Economic Location, Natural Resources, Sports and Cultural Resources, Talent Resources, Capital Elements, Technical Elements
Demand conditions	Domestic Market Demand, Foreign Market Demand
Firm strategy, structure and rivalry	Industrial Scale, Enterprise Operation Mechanism, Industrial Innovation Capability, Industrial Cluster, Industrial Concentration
Related supporting industries	Internet Industry, Financial Industry, Media Industry, Tourism Industry, Cultural Industry, Manufacturing Industry
Transnational economic activity	Multinational Corporations, International Trade, Cross-border Investment
Government	Industrial Planning, Industrial Policy, Industrial Management System
Chance	The Belt and Road Initiative, COVID-19

Table 2. Evaluation form of international competitiveness index of China's sports industry from the perspective of geo-economics (the second round)

		Importance					Familiarity					Reference for Judging				reasonability			
		Very Important	Important	Ordinary	Unimportant	Very Unimportant	Very Familiar	Familiar	Ordinary	Unfamiliar	Very Unfamiliar	Theoretical	Practical	Literature Review	Intuition	Reasonable	Relatively	ordinary	Unreasonable
C1	Economic Location																		
C2	Natural Resources																		
C3	Sports Cultural Resources																		
C4	Talent Resources																		
C5	Capital Elements																		
C6	Technical Elements																		
C7	Domestic Market Demand																		
C8	International Market Demand																		
C9	Industrial Scale																		
C10	Enterprise Operating Mechanism																		
C11	Industrial Efficiency																		
C12	Industrial Innovation Capability																		

Questionnaire on the international competitiveness index system of China's sports industry from the perspective of geo-economics (the second round)

After the second round of questionnaires, we obtained the final framework of the evaluation system, and sorted out and clarified the connotation of each indicator again. In this round of questionnaires, with the help of your professional knowledge and rich experience, in accordance with the operational requirements of the AHP, we hope you can provide a pairwise judgment matrix for the evaluation index system of the international competitiveness of China's sports industry from the perspective of geo-economics.

1. The evaluation index system of international competitiveness of China's sports industry from the perspective of geo-economics

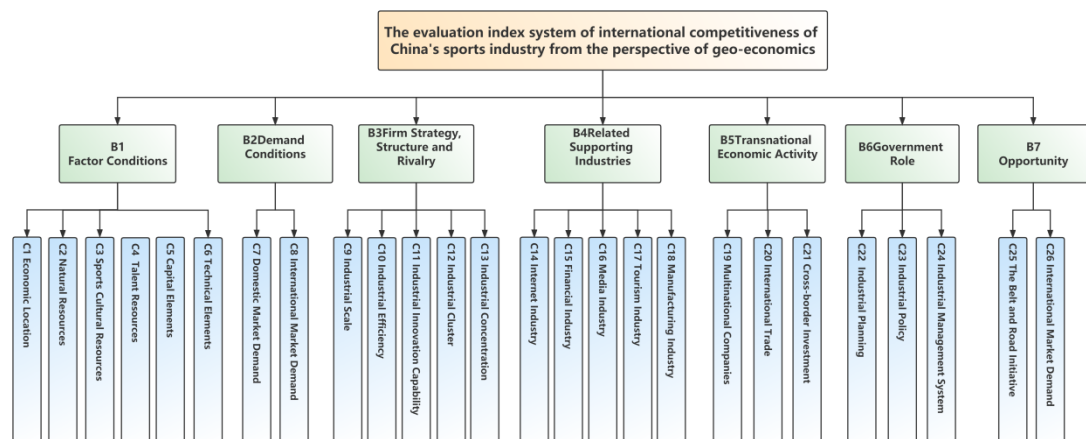


Figure 1 - Schematic diagram of the evaluation index system for the international competitiveness of China's sports industry from the perspective of geo-economics

1.1 Description of first-level indicators

According to the Porter-Dunning diamond model theory, first-level indicators of the international competitiveness evaluation index system of China's sports industry from the perspective of geo-economics selects factor conditions, demand conditions, firm strategy, structure and rivalry, related industries, transnational economic activities, Seven elements of government factors and opportunities. The meaning of the indicators are as follows:

B1: Factor conditions refer to all the elements and their environmental conditions necessary for material production.

B2: Demand conditions refer to the size and nature of the customer base for products, which also drives innovation and product improvement. Larger, more dynamic consumer markets will demand and stimulate a need to differentiate and innovate, as well as simply greater market scale for businesses.

B3: Firm strategy, structure and rivalry refer to the basic fact that competition leads to businesses finding ways to increase production and to the development of technological innovations. The concentration of market power, degree of

competition, and ability of rival firms to enter a nation's market are influential here.

B4: Related supporting industries refer to upstream and downstream industries that facilitate innovation through exchanging ideas. These can spur innovation depending on the degree of transparency and knowledge transfer.

B5: Transnational economic activity is the fundamental path for the geo-based sports industry to pursue geographical interests.

B6: Government refers to the intervention and governance of government departments in the whole process of reproduction of sports products and services and the overall operation of sports economy.

B7: Chance refers to types of opportunities which include the invention and creation of basic science and technology, the fault of traditional technology, the sudden increase of production costs caused by external factors. Opportunities can be positive and negative for the development of industry.

1.2 Description of secondary indicators

Due to the limitations of professional level, knowledge background, and experience in sports industry practice and theoretical research, these indicators may be relatively rough, and some are even very unreasonable. Therefore, I hope you can inspect them one by one and give suggestions from your own professional point of view. The 26 secondary indicators are described as follows:

C1: Economic geographical location refers to the spatial relationship formed in the economic connection between a country, region and peripheral regions.

C2: Natural resources refer to natural elements (including geology, landform, hydrology, climate, biology, soil, etc.) that can be utilized and affect the development and layout of the sports industry and their natural complexes.

C3: Sports cultural resources refer to many tangible and intangible resources such as natural resources and social resources related to sports culture that people use or can use in sports production or sports activities.

C4: Talent resource refers to the general term for people who have professional knowledge in a certain area, have strong working ability and creative ability in the practice of sports industry, and can make great contributions to the society.

C5: Capital elements are final input products, labor services, and intermediate products and financial assets in the production process through direct or indirect means.

C6: Technical elements are the general term for all kinds of intangible resources that can create value in production activities, such as scientific theory, production process, production skills, management experience, sales channels, and intellectual property rights.

C7: Domestic market demand of the sports industry is the total amount of products or services that consumers may purchase within the domestic sports product market under a certain period and conditions.

C8: International market demand of the sports industry is the total amount of products or services that consumers may purchase in the international sports product market under a certain period and conditions.

C9: Industrial scale refers to the proportion of industrial output value in the

total output value of the sports industry. This indicator can reflect the current industrial structure of the sports industry and the status of the industry in the sports industry.

C10: Industrial efficiency refers to the proportion of the added value of an industry to the total output value of the industry. This indicator reflects the direct input-output benefit of the business activities of enterprises in the industry.

C11: Industrial innovation capability is an innovative collection of sports enterprise groups.

C12: Industrial cluster is a geographical aggregation of interconnected enterprises and institutions in a particular field.

C13: Industrial concentration is an indicator used to measure the monopoly of a country or region in a certain industry, and is the basis for developing economies of scale and enhancing the international competitiveness of sports enterprises.

C14: Internet industry refers to the industry that is based on computer network technology and uses network platforms to provide services and thus obtain income.

C15: Financial industry refers to a special industry that operates financial commodities, including banking, insurance, trust, securities and leasing.

C16: Media industry refers to the industrial group formed by the media entities that disseminate all kinds of information and knowledge. It is a special industry that produces and disseminates all kinds of information products in the form of text, graphics, art, language, video, sound, digital, symbols and other forms and provides various value-added services.

C17: Tourism industry is a comprehensive industry that meets various tourism needs of consumers by providing tourism products and services based on tourism resources and tourism facilities.

C18: Manufacturing industry is the cornerstone of a country's economy and even the lifeblood of a country. Countries with weak manufacturing are easily controlled by countries with developed manufacturing."

C19: Multinational company refer to monopoly enterprises that take their own countries as their bases and set up branches or subsidiaries around the world through foreign direct investment to engage in international production and business activities.

C20: International trade refers to the exchange of goods, services and factors of production between different countries or regions.

C21: Cross-border investment refers to the form of investment in which investors invest into two or more national enterprises for direct or indirect operations. Transnational investment is the basic means for monopoly enterprises to form transnational corporations and grab high monopoly profits.

C22: Industrial planning refers to the government's comprehensive use of various theoretical analysis tools, starting from the international and domestic economic development trends, to the positioning, industrial system, industrial structure, industrial chain, spatial layout, economic, social and environmental impact, implementation plan of China's sports industry development. Science plans made by etc.

C23: Industrial policy is the sum of various policies that the government intervenes in the formation and development of the sports industry in order to achieve certain economic and social goals.

C24: Industrial management system refers to the general term for the institutional setting, division of authority, operation mechanism and other aspects of sports industry management. A reasonable sports industry management system can give full play to the function and efficiency of market allocation of sports resources.

C25: The Belt and Road Initiative is the most important geo-economic practice in China at present. The Belt and Road Initiative plays an important role in actively promoting the trade liberalization of the sports industry, improving the degree of economic openness, eliminating trade barriers for sports products, reducing trade and investment costs, and improving the speed and quality of regional economic cycles.

C26: The global pandemic of COVID-19 has brought huge trauma to the world economy, the global economy has suffered a deep recession, international trade and investment have shrunk sharply, the international financial market has been turbulent, and economic globalization has encountered adverse currents. Protectionism and unilateralism are on the rise.

2 Saaty's 1-9 scale of pairwise comparisons

Table 8 The Fundamental Scale for Pairwise Comparisons

Intensity of Importance	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one element over another
5	Strong importance	Experience and judgment strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another its dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation
Intensities of 2, 4, 6, and 8 can be used to express intermediate values.		

Compare the indicators arranged vertically (columns) with those arranged horizontally (rows) to determine the relative importance. For example, an expert gave the judgment matrix of each indicator for the goal of "the international competitiveness of China's sports industry from the perspective of geo-economics" as follows:

A	B1	B2	B3	B4	B5	B6	B7
B1 Factor conditions	1						
B2 Demand conditions	-	1					
B3 Firm strategy, structure and rivalry	-	-	1				
B4 Related industries	-	-	-	1			
B5 Transnational economic activities	-	-	-	-	1		
B6 Government role	-	-	-	-	-	1	
B7 Opportunity	-	-	-	-	-	-	1

Note: "1/2" marked red in the table means that B1 Factor conditions are slightly less important than B2 Demand conditions; "-" means no need to fill in.

3 The third round of questionnaires

3.1 Expert subjective weight information importance judgment matrix

This subject needs to consider the weight of experts when assembling expert decision-making information. This paper subjectively believes that the three factors of experts' education, professional titles and working years will have an impact on the experts' right to speak. The specific proportion of these three factors needs to be calculated through the judgment matrix you give.

Expert subjective weight	Degree	Title	Working years
Degree	1		
Title	-	1	
Working years	-	-	1

3.2 Judgment matrix of the importance of each indicator at the criterion level of the evaluation system

For the decision-making objective A, "International competitiveness of China's sports industry from the perspective of geo-economics", what do you think is the relative importance of each first-level indicator? For the sake of brevity, this indicator is only indicated in the left column.

A	B1	B2	B3	B4	B5	B6	B7
B1 Factor conditions	1						
B2 Demand conditions	-	1					
B3 Firm strategy, structure and rivalry	-	-	1				
B4 Related industries	-	-	-	1			
B5 Transnational economic activities	-	-	-	-	1		
B6 Government role	-	-	-	-	-	1	
B7 Opportunity	-	-	-	-	-	-	1

3.3 The importance judgment matrix of the secondary indicators of the evaluation system

The second-level indicator 7 judgment matrix corresponds to the relative importance comparison of 26 indicators under the seven first-level indicators B1-B5 respectively.

B1 Factor conditions

B1	C1	C2	C3	C4	C5	C6
C1 Economic geographical location	1					
C2 Natural Resources	-	1				
C3 Sports Cultural Resources	-	-	1			
C4 Talent Resources	-	-	-	1		
C5 Capital Elements	-	-	-	-	1	
C6 Technical Elements	-	-	-	-	-	1

B2 Demand conditions

B2	C7	C8
C7 Domestic market demand	1	
C8 International market demand	-	1

B3 Firm strategy, structure and rivalry

B3	C9	C10	C11	C12	C13
C9 Industrial scale	1				
C10 Industrial efficiency	-	1			
C11 Industrial innovation capability	-	-	1		
C12 Industrial cluster	-	-	-	1	
C13 Industrial concentration	-	-	-	-	1

B4 Related industries

B4	C14	C15	C16	C17	C18
C14 Internet industry	1				
C15 Financial industry	-	1			
C16 Media industry	-	-	1		
C17 Cultural industry	-	-	-	1	
C18 Manufacturing industry	-	-	-	-	1

B5 Transnational economic activities

B5	C19	C20	C21
C19 Multinational company	1		
C20 International trade	-	1	
C21 Cross-border investment	-	-	1

B6 Government role

B6	C22	C23	C24
C22 Industrial planning	1		
C23 Industrial policy	-	1	
C24 Industrial management system	-	-	1

B7 Opportunity

B7	C25	C26
C25 The Belt and Road Initiative		
C26 COVID-19		

C15 Financial Industry	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C16 Media Industry	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C17 Cultural Industry	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C18 Manufacturing Industry	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C19 Multinational Company	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C20 International Trade	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C21 Cross-border Investment	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C22 Industrial Planning	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C23 Industrial Policy	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C24 Industrial Management System	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C25 The Belt and Road Initiative	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
C26 COVID-19	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1

