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The Influencing Factors on the Development of Chinese SPORTS Industry in Digital Era: A Systematic Review

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Abstract

Purpose: With the introduction of the concept of "digital sports" in 2012, Chinese sports industry has begun to enter the digital era and the original business model, market structure and other have been changed. After more than ten years development, digital sports industry has made remarkable achievements, but also exposed some problems. In order to find the answer to the problem, this paper conducted a descriptive statistical research on the factors impacting the digital development of Chinese sports industry. Through the analysis of the influencing factors, it hoped to put forward some suggestions to improve the digital development of Chinese sports industry benign.

Method: To descriptive statistics result objective and accurate, this study discussed the factors impacting the digital development of Chinese sports with a systematic review. It selected 770 articles from CNKI database from January 1st, 2012 to November 21st, 2020 for sorting and summary. After the screening with strict standards, 20 articles were left for information extraction. The extracted information was mainly used to explain the types of factors impacting the digital development of Chinese sports industry, and what factors are included in the different types.

Results: It showed that the factors impacting the digital development of Chinese sports industry could be divided into three types: political factors, economic factors, and technical factors. Different types contain different number of specific factors. Some of these factors contributed to the digital development of Chinese sports industry, while some of them had a diminishing or even negligible impact on the digital development of Chinese sports industry. After comprehensive consideration of the research topic, benign factors and ineffective factors were eliminated in this study, and the remaining factors were analyzed according to the actual situation. The analysis results showed that the main factors impacting the digital development of Chinese sports industry at the present stage were: sports policies, unbalanced consumption of population proportion and lack of regulatory rules.

Conclusion: Based on the results, this study proposed targeted suggestions, expanding the scope of sports welfare policy, enhancing the popularization intensity of sports science and technology, and strengthening the supervision of digital sports field. Among them, expanding the implementation scope of sports welfare policy aimed at welfare policies for emerging industries or trends. Enhancing the popularization intensity of sports science and technology targeted on the serious aging problem in China. The effective popularization can stimulate the elderly sports consumption, thus achieving the goal of promoting the development of sports industry. Strengthening the supervision was mainly reflected in the establishment of joint supervision by the government, the market and the society to ensure the healthy and orderly development of Chinese sports industry.

[Keywords] Digital Technology, Intelligent Sports, Chinese Sports Industry, Influencing Factor, Systematic Reviews

1. Introduction

The success of the 2008 Beijing Olympic Games has brought Chinese sports industry into a flourish period of development. By 2018, its total scale has reached 2,657.9 billion Yuan (US\$372.1 billion), accounting for 1.1% of the GDP, officially becoming one of Chinese pillar industries[1]. Looking back on this period of development, the 2008 Beijing Olympic Games provided an opportunity for the development of Chinese sports industry, and the Chinese government's strong advocacy provided a prerequisite for the development of it. Then the integration of digital technology and Chinese sports industry is an important means to promote its rapid development. This fusion in the development of Chinese sports industry began in 2012 smart sports and digital sports, and the Chinese government promulgated 'the document on accelerating the development of sports industry, promote the sports consumption of several opinions' by the State Council in 2014 to encourage wearable sports equipment, sports fitness guidance function of technology and equipment, sports drinks and nutritional health food and others, which formed strategic target officially[2]. Since then, Chinese sports industry and digital technology have integrated comprehensively, from 'Tencent' sports getting NBA network exclusive broadcast rights in the mainland area to create interactive stereoscopic live, to the App changing the participation way of Chinese mass sports like Keep and 'Tic Tok' and digital marathon held by 'Alisports'. Chinese sports gradually step into the digital era[3].

However, digital technology contributes to the rapid development of Chinese sports industry, but some problems causing by low technology, popularization of sports science and technology to be improved, lack of relevant regulatory laws and others also restricts the development speed of digital sports[4]. Especially after the outbreak of COVID-19, the inadequate integration of the sports industry and digital technology and other problems have caused a huge impact on small and medium-sized sports enterprises[5]. In order to ensure the benign development of Chinese sports industry in the digital era, many Chinese scholars directly or indirectly explored the influencing factors of development of Chinese sports industry in the digital era, and obtained a large number of research achievements. In order to have a more comprehensive and intuitive understanding of these factors, this study integrated and analyzed many viewpoints, and put forward corresponding suggestions according to the actual situation at this stage, aiming to provide practical suggestions for the sustainable development of Chinese sports industry in the digital era and theoretical guidance for further research on this issue.

2. Research Methods

From different perspectives and methods, Chinese scholars have directly or indirectly analyzed the factors impacting the development of Chinese sports industry in the digital era. This study employed the method of systematic review to make a comprehensive and objective synthesis of these viewpoints. Compared with traditional literature review methods, systematic review is more scientific and objective, which can ensure the accuracy of results[6]. It can be subdivided into qualitative and quantitative comments. The former is a qualitative evaluation and summary of the results and conclusions of the original literature. The latter is the process of combining results using statistical methods, also known as meta-analysis. In some research areas where it is difficult to combine analysis with statistical methods, qualitative retrospective method is more appropriate. Therefore, this study adopted qualitative research method to carry out descriptive statistics on existing text conclusions. In order to explain the research topic more comprehensively, after searching the current situation of development, development characteristics, development trend and development path of Chinese sports industry in the digital era, this study finally determined the research questions as: What types of factors impact the development of Chinese sports industry in the digital era? What are the specific factors?

2.1. Search strategy and study inclusion criteria

As an important part of systematic review, document standard plays a decisive role in the final result[7]. In order to ensure the accuracy and strictness of research results, this study sets the following standards from the following aspects to ensure the quality of literature retrieval : (1)database. In this study, CNKI(China National Knowledge Infrastructure) was used as the source of articles. With an internationally leading digital library and a resource sharing platform, CNKI is the largest monopolistic website that integrates all kinds of full-text academic information in China, which can guarantee the comprehensibility and reliability of the data [8]; (2)Key words. According to the research questions, after multiple screening, digitization AND sports industry development, intelligence AND sports industry development and other keywords were retrieved in CNKI; (3)Retrieval time. "Digital sports" was first proposed in 2012, and the integration of sports industry and digitization also started that year, so the start time was set as 2012; (4)Retrieve the type of document. This search includes only articles in core database and does not include other publications.

2.2. Data extraction and synthesis

Literature retrieval is the second step of systematic review, which is mainly about the thorough retrieval of relevant literature. This study was limited in Chinese language and data parameters from the start of January 1st, 2012 to November 21st, 2020. The search terms were chosen with digitization AND sports industry development, intelligence AND sports industry development and other keywords. The initial search returned 770 articles and these were narrowed down to 179 articles based on the information contained in their titles and abstracts by one researchers. The remaining 179 articles were cross reviewed by the other two researchers. It was reduced to 20articles by full paper screening. The information about factors and main contents were collected and scanned by two researchers and reexamined by another one. All the information were collected by a single researcher. The information extracted was identified by another researcher. As shown in the following <Table 1>.

Table 1. The information of articles.

Authors	Year	Topic	Corresponding contents
Lv C [9]	2016	Development of the Winter sports industry in China in "Internet + "	- More sports policies, marketing model innovation and multi-terminal interconnection technology platform construction were the impetus to the development of ice and snow sports industry
Chen XD [10]	2016	Opportunities and challenges brought by the internet to the operation mode of sports industry	- The increase of sports consumption demand, diversification of consumption, innovation of marketing model and sports policy brought opportunities for sports industry operation - Uneven population consumption ratio and unitary business model brought challenges to sports industry operation
Wang ZX [11]	2016	Innovation of sports service development model under the internet environment	- The increase of per-capita income, sports consumption demand and the innovation of marketing mode were conducive to the innovation of sports industry
Bai L, Sun CC [12]	2016	study of sports industrial talent cultivation in the internet era	- Lack of professional talents hindered the development of sports industry

Li H [13]	2016	Internet reconstruction of sport industry and its future trend	<ul style="list-style-type: none"> - Diversification of consumption and innovation of marketing model were the foundation of the future development of sports industry - Uneven population consumption ratio and unitary business model were the disadvantages of the sports industry
Xia YQ [14]	2016	Ecology of the sports industrial background the "internet + "	<ul style="list-style-type: none"> - The construction of online quick marketing platform, product technology innovation and multi-terminal platform were the development trend of sports industry
Yan XY [15]	2017	Study of innovation-driven development of the sports industry promoted by "internet+ " and related	<ul style="list-style-type: none"> - The increase of per-capita income, sports consumption demand and the diversification of consumption were conducive to the innovation of sports industry
Liu YF [16]	2017	Sports industry ecosystem in the era of "internet plus"	<ul style="list-style-type: none"> - Increasing consumer demand, big data, cloud computing and other technology applications, platforms and integration advantages promoted the development of the sports industry
Chen FY, Bu T [17]	2017	Sports industry development strategy under the background of "internet plus"	<ul style="list-style-type: none"> - Mobile Internet communication technology, online quick marketing platform, big data, cloud computing and other technologies and sensing technologies to increase the value of sports products were not advanced enough, hindering the development of sports industry
Li DP, Liang XJ, Deng CL [18]	2017	"Internet + " background leisure sports industry development trends, power and innovation path	<ul style="list-style-type: none"> - The construction of online quick marketing platform, the diversification of consumption and the innovation of marketing mode were conducive to the development of sports industry
Zhang B, Rao R [19]	2017	Sports industry development strategy study under the background of "internet plus"	<ul style="list-style-type: none"> - Mobile Internet dissemination technology, product technology innovation were conducive to the development of the sports industry
Wu CX [20]	2017	SWOT analysis and countermeasure research on the development of internet+ sports tourism industry	<ul style="list-style-type: none"> - Sports welfare policy, multi-terminal platform building and increasing consumer demand were opportunities for the development of sports industry - Regulatory rules, lack of professional talent, single operation mode hindered sports industry development
Zhang XY, Shao GT [22]	2017	Present situation and characteristic of the new sports industrial form under "internet + " environment	<ul style="list-style-type: none"> - Lack of professional talents restricted the development of sports industry - Uneven population consumption ratio and unitary business model hindered the development of sports industry - There are deficiencies in technology fusion
Zhang HR, Liu MH, Peng LF [21]	2018	Path choice of sports industry development under the background of " internet plus"	<ul style="list-style-type: none"> - Big data, cloud computing and other technologies accelerated the development of the sports industry - The multi-terminal interconnection technology platform improved sports consumption - There are deficiencies in technology fusion
Yang J [23]	2019	Development of leisure sports industry in Jiangxi province under the "internet plus" era	<ul style="list-style-type: none"> - The construction of multi-terminal interconnection technology platform and the widespread use of mobile Internet communication technology promoted the development of sports industry - Inadequate technological integration, lack of professionals and lack of regulatory rules were major obstacles

Chen M, Zhang JQ [24]	2019	Internet + and the development of sports industry	- The comprehensive application of big data, cloud computing and sensing were the foundation of the development of sports industry
Jiang XJ [25]	2019	Development of Sports industry: New Opportunities and Challenges	- The sports welfare policy, the widespread use of mobile Internet communication technology and the innovation of marketing mode were opportunities for the development of sports industry - The large gap between urban and rural consumption, the unbalanced consumption of population proportion and the single business model were the challenges of the development of sports industry
Liu JH [26]	2019	Sports industry in the network and digital age	- Increasing per-capita income, sports consumption demand and marketing model innovation were the characteristics of digital sports industry - Lack of sports welfare policies and insufficient technology integration hindered development speed
Wang XR [27]	2020	Development of ice and snow sports industry in "internet+" era	- Insufficient technical integration and lack of professional talents hindered the development of ice and snow sports industry - The construction of terminal interconnection technology platform and the increase of per-capita income were the driving forces for the development of ice and snow sports industry
Ren B, Huang HY [28]	2020	The power, mechanism and mode of the integration of Chinese digital economy and sports industry	- The sports welfare policy, the increase of per-capita income, the increase of sports consumption demand and the diversification of consumption were the driving forces for the development of the sports industry

3. Result

By summarize the articles, this study found that the factors impacting the development of Chinese sports industry in the digital era could be divided into three parts: political factors, economic factors and technical factors. As shown in the following <Table 2>.

Table 2. Summary of Influencing Factors.

No.	Types	Factors
1	Political factors	- Sports welfare policies still need to be strengthened
2	Economic factors	- Increasing per-capita income - Increasing demands for sports consumption - Diversification of consumption - Innovation of marketing model - large gap between urban and rural consumption levels - Uneven proportion of the population - Unitary business model

3	Technical factors	<ul style="list-style-type: none"> - Big data, cloud computing and other technologies and sensors are fully applied - Construction of multi-terminal interconnection technology platform - widely used Mobile Internet communication technology - Construction of online quick marketing platform - Product technology innovation - Insufficient technology convergence - Lack of professional talents - Lack of regulatory rules
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After summarizing, the following phenomena were found: 1. In the continuous development of digital sports industry, some factors had been solved or could not have an important impact on the development of Chinese sports industry; 2. Some influencing factors were benign factors, which were beneficial to the digital development of Chinese sports industry. In order to put forward more accurate and objective suggestions to promote the digital development of Chinese sports industry, this study eliminated all the benign factors in the following analysis, and screened the influencing factors according to the actual situation and relevant policies, regulations and other documents, and eliminated some ineffective influencing factors. The details are as follows:

(1)Political factors: The research results showed that the political factors impacting Chinese sports industry development was mainly reflected as sports welfare policies should be strengthened. The promulgation and implementation of sports policies was not only the internal driving force for the rapid improvement of Chinese sports consumption, but also an important guarantee for the healthy and sustainable development and high-quality development of Chinese sports industry[29]. After the integration of sports industry and digitalization, the Chinese government had repeatedly adopted measures and policies to encourage digitalization of Chinese sports industry, as shown in Table 3. Therefore, the development of Chinese sports industry need the support of sports policies. It will always be the primary factor affecting the digital development of Chinese sports industry. As shown in the following <Table 3>.

Table 3. Corresponding policies encouraging the digital development of sports industry

Year	Policies	Main contents
2014	Several Opinions of the State Council on Accelerating the Development of Sports Industry and Promoting Sports Consumption	Encouraging research and development of smart products such as wearable sports devices
2016	Notice of the State Council on the Issuance of the National Fitness Plan (2016-2020)	Encouraging the development of new forms of fitness for all, including online fitness training and education
2016	Guidelines of the General Office of the State Council on accelerating the Development of the Fitness and Leisure Industry	Encouraging the development of fitness and leisure services supported by mobile Internet, big data and cloud computing technologies
2016	The Outline Plan of 2030 Healthy China	Developing and applying big data of national physical health monitoring, and carrying out risk assessment of sports
2018	Guidelines of the General Office of the State Council on Accelerating the Development of the Sports Competition Performance Industry	Valuing and encouraging new technology of rebroadcast, safe monitoring and artificial intelligence applying in sports competition performance industry
2019	Opinions on Taking The 2020 Beijing Winter Olympics as an Opportunity to Vigorously Develop Ice and Snow Sports	Supporting new technology of ULTRA HD video and virtual reality applying in the live and broadcast of ice and snow sports events

2019	The Notice on Printing and Distributing the Outline of Building a Sports Power by the General Office	Using new information technologies such as the Internet s and cloud computing to promote the booking of sports venues and the distribution of event information, business service statistics
2019	Opinions of the General Office of the State Council on Promoting National Fitness and Sports Consumption and Promoting the High-quality Development of the Sports Industry	Promoting the application of emerging technologies such as intelligent manufacturing, big data and artificial intelligence in sports manufacturing.

(2)Economic factors: Economic development is one of the important factors impacting the development of the sports industry. Only with the stability of the national economy, the improvement of national income and consumption level, sports consumption would have a solid foundation[30]. According to the summary of the information, the main economic factors impacting the digital development of Chinese sports industry were the large gap between urban and rural consumption, the unbalanced consumption of population proportion and the single business model.

The gap between urban and rural consumption before the integration of digitization and sports industry was an important sports consumption problem. The digital technology had gradually solved collaborating marketing combining online and offline. It created more choices for consumers, so the factors barely impact on the development of Chinese sports industry at present. The consumption imbalance of population was caused by the fact that after the aging of Chinese population becomes serious year by year, the elderly had less understanding of sports science and technology and less acceptance. According to the current situation, this problem will still have an impact on the digital development of sports industry. The problem of single business mode is due to the short development time and weak foundation of Chinese sports industry. Many small and medium-sized sports enterprises can only carry out traditional business mode, which hinders the development progress of digital sports. But the Chinese government issued the Notice on Printing and Distributing the Outline of Building a Sports Power by the General Office to promote the transformation of small and medium-sized sports enterprises. Therefore, the influence of this factor on the digital development of Chinese sports industry is gradually diminishing.

(3) Technical factors: Technology is the direct driving force to promote the growth of sports industry. In sports industry, the emergence of any new technology and using can improve the quality of the products, production efficiency, reduce cost, and even promotes the emergence of new products. It might break the existing division of labor system in the sports industry, caused the expansion of the sports industry structure and complicated and stimulate the development of sports industry and related industry[31]. The integration of digital technology and sports industry is the proper way. But in this process, due to insufficient technology integration, lack of professional personnel, lack of regulatory rules and other factors, digital development of Chinese sports industry occurred problems frequently. However, with the intervention of the government and the adjustment of Chinese sports industry itself, the investment in digital technology innovation has been increased, and the training of professional talents in universities and other educational departments has been enhanced. From the current situation, all the rest problems will be solved, except regulatory rules still need to be clarified.

To sum up, the main factors impacting the digital development of Chinese sports industry at present were: sports policies, unbalanced consumption of population proportion and lack of regulatory rules.

4. Suggestions

4.1. Expand the implementation scope of sports welfare policy

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The strong support of national policies is the foundation of the development of Chinese sports industry[32]. The development of new technologies and sports industry can be still improved based on several documents encouraging the digital development of Chinese sports industry. Reviewing the welfare policies of digital sports industry issued by government in recent years, most of them focused on the promotion of mature technologies and sports industry, rather than some emerging trends or industries, such as sports e-sports. E-sports sports, one of the sports industry in China, is on the rise in recent years and popular among the younger generation in China from the beginning of the development, but it does not be support by some corresponding welfare policy. It will develop better and improve the diversified development of Chinese sports industry with some policies more than indirect benefit policies and wide potential market. Therefore, it is suggested to expand the implementation scope of sports welfare policies and issue targeted welfare policies for emerging industries and emerging trends.

4.2. Enhance the popularization of sports science and technology

At present, Chinese society is facing the serious aging problem. According to the National Bureau of Statistics of the People's Republic of China, the population of elderly will continuously increase. It is expected to surpass 410 million in 2036, with a population of more than 25.6% [33]. This phenomenon not only means that the elderly will become a major part of the social consumption group in the next 10 to 20 years, but also means that the proportion of the population consuming sports will continue to be unbalanced during this period. The elderly must be listed as the promotion target to achieve breakthrough progress at this stage by Chinese digital sports industry. Due to the poor receptivity and less contact channel to sports technology by the elderly, it is suggested that popularization activities of science and technology are held in the whole society. There are still some other ways to promote the popularization to introduce the advantages of sports technology changing life, such as helping the elderly to learn by young people, someone who have already learnt it or the community. It can attract accept and consumption of the elderly, also promote the development of digital sports, even stabilize society and improve living standards.

4.3. Strengthen supervision in digital sports field

The infringement of sports intellectual property rights occurs from time to time in the process of digital communication in China. Although digital information is simple to copy, carry, modify and disseminate, it also reflects the imperfect supervision system to some extent[34]. If Chinese digital sports industry wants to develop healthily and benign, it is suggested to establish a governance mode dominated by government, supplemented by market and regulated by social participation, and to establish strict industry standards to prevent the occurrence of unstable risks. First of all, the government should strengthen the rule of law supervision, increase punishment, such as the digital fraud, smart theft of information, network dishonesty and other problems to provide a good development environment for the digital sports industry. At the same time, the sports industry market has also set up risk management or risk identification programs due to its strict requirements on itself and joint efforts to resist digital criminal behaviors based on legitimate competition. A risk management plan can reduce loss[35]. Risk identification can effectively detect risks in advance and achieve the purpose of prevention[36]. In addition, the society should also play the role of supervision by means of public opinion echo and information sharing.

5. Conclusions

Network and digital technology not only promote productivity as a technical factor, but also shape the economic and social form as an economic development model and way of thinking[37]. The integration of Chinese sports industry and digital technology conforms to this form. From

the data of the existing industry and policy, the combination of network and digital technology and sports industry will improve in the future. In the network digital era, the production efficiency, market structure and business model of the sports industry will also be changed. In order to explore the way for the benign development of combination, this study, based on the total number of the system, conducted a descriptive research on the factors impacting the digital development of Chinese sports industry, and put forward corresponding development suggestions for the main factors. However, due to the descriptive statistics of the existing textual conclusions and the lack of quantitative analysis, there are still some limitations. It is hoped that it can be made up in the following research and the results of this study can provide some theoretical basis for further research.

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7. Appendix

7.1. Authors contribution

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	Initial name	Contribution
Lead Author	XFB	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	HBS	-Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/>
Co-Author	XMZ	-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>