Demographic Trends Impact Chinese Sports Industry

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Contributor: Stevo Popovic

Demographic change is a fundamental characteristic of China's demographic development. The primary problem in China's population development has shifted in recent years from overall pressure to structural challenges.

demographic structure   sports industry

1. Introduction

China's population is a critical factor in its economic and social development; however, there is little research on the development mechanism of the sports industry from a population structure perspective in Chinese sports theories. Few researchers have examined the impact of China's population structure on the development of the sports industries from a single vantage point, such as the urbanization level, the consumption expenditure of urban and rural inhabitants, and the aging of the population. The relationship between population structure and the development of the sports industries is not examined holistically.

Improvements to the demographic structure, such as improved urbanization quality [1], population quality [2], and gender structure optimization [3], are critical drivers of industrial development and structural upgrading, and improvements to industrial structure can further promote demographic structure improvement, such as synergistic industrial structure and urbanization development [4][5].

Another factor to consider throughout the economic restructuring and upgrading process is China's recent demographic imbalance, which is characterized by an aging population [6]. China's economy has enjoyed over forty years of tremendous growth since the reform, and the Chinese economy has garnered worldwide attention. Demographic challenges such as the declining demographic dividend, the population's accelerated aging, the population's slowing growth, the gender imbalance, and the population's uneven spatial distribution are increasingly emerging.

Because demographic changes have a significant impact on the industry's production and demand conditions, it is critical to clarify the relationship between demographic changes and the development of the sports industry, as well as its degree of influence.

2. Inertia in Total Population Growth and Slowdown in Population Growth

According to public data from the seventh national demographic census in 2020 (**Table 1**), China's total population reached 1.41 billion people, maintaining the trend of continued growth. Compared to the sixth census data [7], it increased by 72.05 million people, a 5.38% increase. The population's natural growth rate recovered, and the trend of slowing total population growth continued, with an average annual growth rate of 0.53%, which is 0.04% lower than the sixth census. This is a result of the interaction of economic and social development, changes in traditional fertility culture, and population policy. Clearly, China's period of fast population expansion has come to an end, and at this point, the impact of this trend on the economy and society's sustainable development is dialectical. On the one hand, the fundamental situation of China's large population base has not changed, and population and resources remain tightly balanced. On the other hand, the trend toward slower population growth requires proactive measures and long-term planning to promote long-term balanced population development.

Table 1. Comparing the sixth and seventh national censuses of the population.

	Sixth National Demographic Census	Seventh National Demographic Census
Total population (per 10,000 inhabitants)	134,091	141,178
Population sex ratio (female = 100)	105.21	105.07
Elderly people aged 60 and above (%)	8.90	13.50
Urbanization rate (%)	49.95	63.89
University education (per 100,000 inhabitants)	8930	15,467

Data obtained from the National Bureau of Statistics of China.

3. The Population's Sex Ratio Is Generally Acceptable, and the Gender Structure Has Gradually Improved

According to the seventh national demographic census, the sex ratio of China's total population in 2020 is 105.07 (**Table 1**), which is slightly lower than the sex ratio in the sixth census. In terms of births, the sex ratio has decreased significantly over the last decade, and the sex ratio of China's population is gradually normalizing and the gender structure is improving. Improving the gender structure may have a wide range of socioeconomic consequences, and the gender dividend generated by increasing gender equality in China will provide significant extra-economic gains, which will serve as a major engine of growth in the next years. Thus, balancing the population sex ratio is a crucial measure for China's economic and social development to be healthy.

4. The Elderly Population Is Increasing in Size, and the Pace of Population Aging Is Accelerating

At the moment, China's population age structure is as follows: first, the proportion of children in the population is declining; second, the working-age population is progressively declining; third, the population is aging, and the

aging process is clearly accelerating. According to the seventh national demographic census [8], mainland China's total elderly population is 264 million, accounting for 18.7% of the overall population (**Table 1**). The demographic structure has entered a period of profound aging, with the working-age population declining and the senior population expanding, thereby raising the social burden and increasing demand for fundamental public services. The social security system, the medical and health care system, as well as the job and retirement systems, are all facing significant challenges. The realistic urgency of actively managing with an aging population has never been greater. The 19th Communist Party of China Central Committee's Fifth Plenary Session elevated actively coping with the aging population to a national strategy [9], and establishing a national social and livelihood system capable of adapting to the normalization of an aging society has become an urgent requirement for sustainable and healthy economic and social development.

5. Accelerated Urbanization and Increased Population Mobility

China's urban population has continued to grow in recent years, with the urbanization rate expected to reach 63.9% in 2020 (**Table 1**), indicating a rapid growth trend and a pattern of significant migration and mobility between urban and rural areas. The population that is migrating to cities is not only productive but also consumer, with high consumption and investment driving rapid growth. This is a critical source of power for achieving high-quality economic development, but it also creates new requirements for improving urbanization quality and promoting coordinated regional development. According to the All-China Women's Federation's Research Report on the Situation of Left-behind Children in Rural Areas and Urban-Rural Mobility in China [10], there are 61,025,500 rural left-behind children and 35,810,000 mobile children in China, and these children generally have low living standards, low educational level, and mental health problems, as a result of a violent collision between the current social livelihood system and the rapid rate of population urbanization. The path to high-quality urbanization has emerged as a defining feature of China's social development.

Similarly, a reasonable and acceptable population distribution is a necessary requirement for modern sports development [11]. The continued development of central regional cities, which have high concentrations of high-quality medical care, education, infrastructure, information resources, and capital, attracts additional high-quality resources from surrounding towns, i.e., the "siphon effect" of cities [12], exacerbating the imbalance of sports development, which includes large-scale stadium facilities, large-scale sporting events, and high-level sporting talent. However, the large population concentration in key regional centers will create significant obstacles for the growth of sports, which will be detrimental to the long-term, high-quality development of sports.

6. Significant Improvements in the Quality of the Population and an Increase in Human Capital

The population's quality is the precondition and basis for human beings to know and transform the world, and it can be measured in terms of a group's education level, school attendance rate, and numerous physical quality

indicators. In 2020, mainland China had a university education rate of 15,467 per 100,000 inhabitants (**Table 1**), and the number of graduates from higher education and high school is increasing. Human capital has expanded dramatically, as has the proportion of skilled labor in the entire population, unleashing the "talent dividend". It is critical to leverage the talent dividend to mitigate the negative effects of China's dwindling demographic dividend on the economy, further promoting industrial transformation and upgrading, as well as promoting sustainable, coordinated, and healthy economic and social development. Creating new impetus and vitality is also critical to ensuring that China's sports industry continues to develop at a high level and becomes a new economic growth center.

7. Analysis of Correlations between Various Demographic Trends and the Sports Industry

The normality test for the value added of the sports industry in China from 2006 to 2019 revealed a significant level of 0.063 ($p > 0.05$), indicating that the dependent variable value added per capita of the sports industry is a normal variable that can be analyzed for regression. As illustrated in **Table 2**, the degree of correlation between various demographic changes and the sports industry varies. The value added per capita of the sports industry is significantly and positively correlated with the total population, urbanization rate, elderly population proportion, and number of graduates from general higher education institutions, with correlation coefficients of the proportion of elderly members of the population (0.986), urbanization rate (0.936), and number of graduates from general higher education institutions (0.878), in that order of magnitude. The sex ratio is inversely proportional to the value added per capita of the sports industry.

Table 2. Analysis of correlations between various demographic trends and the sports industry.

Indicators	Value Added per Capita of the Sports Industry	Sex Ratio	Urbanization Rate	Elderly People Aged 60 and Above	University Education
Value added per capita of the sports industry	1				
Sex ratio	−0.821 *	1			
Urbanization level	0.936 *	−0.861 *	1		
Elderly people aged 60 and above	0.986 *	−0.842 *	0.977 *	1	
University education	0.878 *	−0.868 *	0.982 *	0.933 *	1

8. Modeling by Multiple Regression

* denotes significant correlation at the $p < 0.01$ level.

The regression results are shown in **Table 3**. The adjusted R^2 value is 0.996, indicating that 99.6% of the independent variables can account for the dependent variable and that the model fits well. However, the P-values for X1, X2, X3, X4, and X5 are all more than 0.05, indicating that none of the variables pass the significance test. Additionally, the Durbin–Watson value and the VIF value are too high, indicating that the autocorrelation between the model's variables is strong and cointegration exists, necessitating further model modification.

Table 3. The results of a multiple regression analysis.

Model	Non-Standardized Regression Coefficients (Beta)	Standardized Regression Coefficients (Beta)	t-Value	p-Value	VIF
Correlation	7.488	\	0.284	0.783	\
X1	−3.823	−0.030	−0.688	0.509	4.221
X2	2.147	0.290	1.080	0.308	164.094
X3	2.862	0.564	3.301	0.009	66.443
X4	0.475	0.129	0.999	0.344	37.927
R^2 = 0.994; Durbin-Watson = 2.03					

The main idea behind stepwise regression analysis is to gradually add or subtract a variable from all available independent variables until the ideal regression model is produced. As illustrated in **Table 4**, the variables were screened using a stepwise regression model, and the variables X1 and X2 were eliminated to obtain the optimal model. Each variable had a p-value less than 0.05, the VIF and Durbin–Watson values were ideal, and there was no multicollinearity between the variables and the arithmetic. The model is regarded as being well-fitted.

Table 4. The results of the stepwise regression model.

	Model	Non-Standardized Regression Coefficients (Beta)	Standardized Regression Coefficients (Beta)	t-Value	p-Value	VIF
1	Correlation	−21.707	\	−23.417	0.000	\
	X3	7.455	0.994	31.882	0.000	1.000
2	Correlation	−13.952	\	−6.779	0.000	\
	X3	4.222	0.563	5.069	0.000	28.146
	X4	2.228	0.439	3.952	0.02	28.146
	R^2 = 0.994; Durbin-Watson = 2.052					

As indicated in **Table 4**, model 2 is the ideal model, and the proportion of elderly people aged 60 and above has the biggest impact on the value added per capita of the sports industry, followed by the university education. Thus,

the proportion of elderly people aged 60 and above and the university education have a more direct effect on the expansion of the sports industry as it develops. The optimum linear regression equation with the value added per capita of the sports industry (Y) as the dependent variable and the proportion of elderly people aged 60 and above (X3) and university education (X4) as the independent variables is Y= −13.952 + 4.222X3 + 2.228X4. As can be observed, for every log increase in the proportion of elderly people aged 60 and above, the value added per capita of the sports industry grows by 4.222 logarithms. The university education has a positive relationship with the value added of the sports industry, i.e., for each log increase in the university education, the value added per capita of the sports industry grows by 2.228 logarithms.

In conclusion, China's economy has shifted from "rapid" to "quality" growth, and traditional economic dynamics have shifted dramatically, with the demographic structure becoming a significant factor affecting economic growth. As a new starting point, actively addressing the negative impact of demographic changes while seizing potential development opportunities, transforming demographic changes into a driving force for high-quality sports industry development, and achieving long-term sustainable sports industry development.

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