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Research on Synergistic Development of New Industrialization and Scientific and Technological Talents

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Abstract. The research on the coordinated development of new industrial and technical talents has important practical significance. This paper constructs the index system of the two major systems, and uses the coupling model to conduct an empirical analysis in Jiangxi Province. The results show that: (1) Jiangxi Province's new industrialized scientific and technological talents two systems comprehensive development index u1 (except 2014) and u2 steadily improved. (2) The optimization trend of the coordination degree of the two systems is obvious, and the mutual promotion of the two systems is becoming more and more strengthened; (3) The development of scientific and technological talents in Jiangxi Province has a large fluctuation and a significant decline in the role of the new industrialization construction. And proposed: Jiangxi Province should simplify the process of talent entry and improve the industry's foresight ability.

Introduction

General Secretary Xi Jinping pointed out: The key link in building an ecological civilization is to transform the economic development mode and lower the consumption, low pollution, high efficiency and intensive new industrialization road. The construction of a new industrialized road must rely on technological progress and technological innovation. The key is to rely on human resources. The report of the 19th National Congress pointed out: "Efforts will be made to accelerate the construction of an industrial system of solid economy, technological innovation, modern finance, and coordinated development of human resources." How to realize the deep integration and development of human resources and industrial economy and promote the construction of new industrialization roads is an important issue that needs to be explored in the new era.

At present, scholars have carried out various positive and enthusiastic discussions on the relationship between the construction of scientific and technological talents and one or several aspects of industrial development. Measuring from a single perspective has certain limitations. There is still a lack of research on how to judge and promote the coordinated development of the scientific and technological talent team and the new industrialization. Therefore, this paper will take Jiangxi Province as an example, and use the coupling model in physics to empirically study and promote the coordinated development of scientific and technological talents and industrial economy, in order to provide useful reference for industrial development in other regions.

Literature Review

The relationship between talents and industrial economic development has become a research hotspot for scholars at home and abroad[1].The rapid development of the new economy urgently requires the support of new engineering talents[2], and scientific and technological talents are important driving factors for industrial progress[3].

First, the research on the relationship between scientific and technological talents and the industrial economy mainly has the following views: talents and the economy as two systems are not independent but interdependent. Second, research on the coordinated development of industrial talents, industrial technology innovation, ecological environment and other industrial factors. For example, Xiaohong Chen et al. (2009) found that the more technical personnel invested, the more investment in technological innovation, the higher the efficiency of innovation and transformation, the higher the number of executives with technical background and the number of patents, the stronger their technological innovation ability[4]. Third, research on the coordinated development of scientific and technological talents and industry. Runping Li (2008) based on Solow's theory of economic growth, established a coupled model of human resources and economic growth, and found that the number of industrial talents in Heilongjiang Province is incompatible with the development of industrial economy[5].

In addition, with the continuous deepening of the new industrialization concept, Wei Yan[6] and Jian Li[7] began to pay attention to the connotation and measurement of new industrialization. The measurement method mainly uses the analytic model, from economic benefits, scientific and technological content, and industrial sustainability. Development and the use of human resources together measure new industrial systems.

Research Design

Model Establishment

The capacity coupling coefficient model in physics is used to analyze the coupling degree between the scientific and technological talent system and the industrial economic system. The multi-system coupling degree model is as follows:

$$C_n = n \times [(u_1 \times u_2 \times \dots u_n)/\Pi(u_i + u_j)]\ 1/n \quad (1)$$

Establish a coupling model of scientific and technological talents and industrial economy:

$$C_2 = 2 \times [(f \times g)/(f + g)]\ 1/2 \quad (2)$$

Among them, C_2 represents the coupling degree between scientific and technological talents and industrial economy, and f and g respectively represent the comprehensive evaluation index of the construction of scientific and technological talents and industrial economy. Because the scientific and technological talent system and the industrial economic system have certain differences in their respective developments, there may be deviations from the actual situation where the level of development of both technologies is low, but the degree of coupling is high. Drawing on the research results of relevant scholars[8], construct a coupling coordination degree model:

$$T = \alpha u_1 + \beta u_2 \quad (3)$$

$$D = \sqrt{C \times T} \quad (4)$$

Table 1 Coordination degree evaluation criteria

D	[0.0, 0.1)	[0.1, 0.2)	[0.2, 0.3)	[0.3, 0.4)	[0.4, 0.5)
Coordination level	Extreme imbalance	Serious imbalance	Moderate imbalance	Mild imbalance	On the verge of imbalance
D	**[0.5, 0.6)**	**[0.6, 0.7)**	**[0.7, 0.8)**	**[0.8, 0.9)**	**[0.9, 1.0)**
Coordination level	Reluctant coordination	Primary coordination	Intermediate coordination	Good coordination	Quality coordination

Data Source and Indicator Establishment

The data in this paper are from 2012-2018 "Jiangxi Statistical Yearbook", "China Science and Technology Statistical Yearbook", "China Labor Statistics Yearbook", "China Environmental

Statistics Yearbook", "China Industrial Statistics Yearbook" and "National Data Network Statistics Database".

The construction of the scientific and technological talent system index system is based on the requirements of “large scale, reasonable structure and high quality” mentioned by General Secretary Xi Jinping, combined with the existing research results[9], and obtained expert opinions. The construction of the new industrial system indicator system, based on the connotation of new industrialization, combined with existing research results, consulted experts[10].

Determining Indicator Weights

In this paper, the entropy method is used to determine the index weight (the limited length of the specific process is omitted), and the results are shown in Table 2.

Table 2 New industrialization and scientific and technological talent index weights

System	Primary indicator	Secondary indicator	Weight [%]
NI	Industrialization level and structure	Per capita GDP	3.14
		Industrialization rate	4.07
		Agricultural added value as a share of GDP	4.24
	Economic benefit	Cost rofit margin	2.05
		Product sales rate	2.39
	Scientific and technological content	R&D expenditure as a percentage of industrial GDP	3.97
		Technical market turnover accounted for GDP	5.98
	Human resource utilization	Full labor productivity	5.74
		Labor growth rate	2.97
	Energy consumption	Unit GDP power consumption	3.10
		Million GDP water consumption	2.23
	Environmental protection	Environmental pollution control investment accounts for the proportion of industrial added value	2.56
		10,000 yuan industrial added value wastewater discharge	3.53
STT	scale	R&D activity staff full time equivalent	5.24
		Number of R&D projects	4.00
		Number of valid invention patents	5.16
	structure	R&D personnel ratio	6.26
		Proportion of valid invention patents and the number of applications	2.51
	Quality	Number of patents per person valid for R&D personnel	4.07
		R&D personnel per capita technology market turnover	4.16
		Industrial new product contribution rate	4.75
	education	Education solid investment accounts for the proportion of GDP	2.47
		Number of students in ordinary higher education institutions	2.66
		Number of faculty and staff in ordinary institutions of higher learning	3.17
	Research investment	Scientific research investment as a share of GDP	3.86
		Industrial enterprises develop new product funds to account for the proportion of industrial added value	5.72

Coupling Result Analysis

According to the coupling coordination degree model, the comprehensive evaluation index u_1, u_2 and coupling coordination degree of the new industrial and scientific talent system in Jiangxi Province from 2011 to 2017 are calculated, and the coupling type is divided by this, as shown in Table 3.

Table 3 Jiangxi coupling status

Year	u1	u2	c	t	d	Level
2011	0.353	0.036	0.580	0.195	0.336	Mild imbalance
2012	0.377	0.140	0.888	0.258	0.479	On the verge of imbalance
2013	0.429	0.300	0.984	0.364	0.599	Reluctant coordination
2014	0.438	0.305	0.984	0.371	0.604	Primary coordination
2015	0.376	0.496	0.990	0.436	0.657	Primary coordination
2016	0.466	0.666	0.984	0.566	0.747	Intermediate coordination
2017	0.742	0.866	0.997	0.804	0.896	Good coordination

The Level of Development

From the development of the new industrial system development index, u_1 is on the rise, rising from 0.353 in 2011 to 0.742 in 2017.The comprehensive development index of science and technology talents has grown steadily year by year, from 0.036 in 2011 to 0.866 in 2017. The development of scientific and technological talents in Jiangxi Province is stable.

Coupling Coordination Analysis

In 2011-2017, the mutual promotion of the science and technology talent system and the new industrial system in Jiangxi Province is strengthening, and the coupling and development trend between the two is becoming more and more obvious. Overall, the coupling level can be roughly divided into three stages. The first phase is the 2011 offset period with a coupling coordination level of 0.336. The level of development of new industrialization and scientific and technological talents is low, and mutual promotion is not obvious. The second phase is the end of 2012, with a coupling coordination of 0.479. The coupling between science and technology talents and new industries in Jiangxi Province has changed slowly. The third phase is the coordination period from 2013 to 2017. The coupling coordination degree has grown from 0.599 in 2013 to 0.896 in 2017. The coupling and coordination degree between science and technology talents and the new industrial economy has been steadily increasing year by year.

According to the relationship between u_1 and u_2, each coupling coordination degree can be divided into new industrial development lag type ($u_1<u_2$), scientific and technological talent development lag type ($u_1>u_2$) and new industrial and scientific talents synchronous type ($u_1=u_2$). In 2011-2014, the coupling degree of scientific and technological talents and new industrial systems in Jiangxi Province was lagging behind for scientific and technological talents, while in 2015-2017, it was a lagging type of new industrial development. On the one hand, this shows that Jiangxi Province as a whole is a new type of industrial development that cannot meet the needs of the development of scientific and technological talents. The rapid development of scientific and technological talents leads and "forces" the accelerated development of new industrialization in Jiangxi Province; On the other hand, according to the requirements of "talented countries", scientific and technological talents have a leading role in the new industrialization construction, but this effect has problems such as large fluctuations and obvious declines. Its leading role has risen from 0.12 in 2015 to 0.2 in 2016. And in 2017 it fell to 0.124.

Discussion

This paper draws the following main conclusions: (1) Jiangxi u1 (except 2014) and u2 have steadily improved from lower water; (2) The coupling coordination degree of new industrial and scientific talents in Jiangxi Province has gradually developed from mild disorders in 2011 to near-disordered, reluctant coordination, primary coordination, intermediate coordination and good coordination; (3)The transition from the development of scientific and technological talents in Jiangxi Province to the lag of new industrial development, the leading role of the development of scientific and technological talents in the new industrialization construction has fluctuated greatly and declined significantly.

Based on the above conclusions, the recommendations are as follows:

Simplify the talent entry process and realize the dynamic and accurate docking of the collaborative development of talents and industry in space. Affected by some systems and the environment, the problem of unbalanced distribution of Chinese talents for a long time is still serious. The dynamic and precise connection between talents and industrial industries exists between regions, industries, systems, personnel systems and many other issues. It is necessary to further streamline procedures and liberalize policies in terms of household registration, education, and transfer of personnel relations, and promote rational and orderly flow of human resources and efficient allocation, so as to facilitate the flow of talents across regions, industries, and systems.

Improve the industry's foresight ability, and realize the dynamic and accurate docking of talents and industrial synergies in time. Plan the talent reserve in advance, focus on solving the problem of asymmetry between talent and industrial development needs, the goal of talent training in colleges and universities, and the asymmetry of information on employment needs. Accelerate the promotion of school-enterprise cooperation, integration of production and education, achieve complementary advantages, resource sharing, mutual benefit and win-win, and promote the coordinated and sustainable development of talents and emerging strategic industries. Innovate institutional mechanisms to stimulate the vitality of running a university. Accelerate the introduction of operational policy basis and regulations, encourage qualified regions to explore and develop joint-stock systems and mixed ownership systems, and construct internal systems and mechanisms that are compatible with mixed ownership and allow various elements to participate in school and enjoy corresponding rights. Provide security for the deep cooperation of political and school enterprises.

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