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Study and Analysis of the Coupling Between Regional Innovation Ability and Economic High Quality in Anhui Province

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ABSTRACT

This study in Anhui province from 2003-2022, a total of 20 years of regional innovation and economic development of high quality data, through the regional innovation driven ability of measurement, high quality development level, regional innovation efficiency and the correlation of the three aspects, analyze the development of economic quality, based on regional innovation efficiency and high quality economic development data, establish coupling coordination model, empirical research on the coupling relationship between the two. Found in Anhui province in recent years on the economic quality level and scientific and technological innovation ability have been steadily improved, high quality economic development comprehensive level and regional innovation efficiency is obvious coupling effect, present good development trend, however, the level of science and technology and the imbalance between innovation environment optimization, at the same time the growth of economic benefits and economic efficiency between also there is a certain lag. How to make good use of the coupling relationship between the development of regional innovation ability and high-quality economic development in Anhui Province to realize the mutual promotion of development is the top priority. In order to further improve the level of high-quality economic development, this paper finally puts forward relevant countermeasures and suggestions according to the research results.

KEYWORDS

Regional innovation ability; High quality economic development; Coupling relationship

1. INTRODUCTION

The report to the 19th National Congress of the Communist Party of China said: " Chinas economy has shifted from a stage of rapid growth to a stage of high-quality development." Further promoting and implementing innovation-driven development is one of the important links to achieve high-quality development. How to promote high-quality development is the core issue that China will face after it enters the new era. In view of the two problems faced by science and technology and economy, it is urgent to improve the driving force of scientific and technological innovation for high-quality economic development, and realize the "double wheel" progress of scientific and technological innovation and economy. But so far, most of the literature focuses on the relationship between scientific and technological innovation and economic growth, and research on high-quality economic development is in the ascendant. So in this paper in Anhui province, for example, using the coupling coordination model into regional innovation and the economy of high quality coupling research, find out the correlation of the two, help our province and the surrounding cities under the new normal economy more accurately grasp their own positioning, so that they can better seize the development of the new era. Second, through the study on the relationship between the regional innovation-driven development capacity and the economic growth of high-quality development of Anhui Province, it

can increase the understanding of their own advantages and disadvantages in the process of development and transformation, so as to help policy makers to develop more scientific, reasonable and targeted developmentwar.

2. LITERATURE REVIEW

2.1. Related Research on High-Quality Development

The quality of economic development is a high-level index with rich connotation. Kamayev (1983) said that socialist countries should pay more attention to the quality of economic growth, and economic development should not only pay attention to the increase of economic aggregate, but also pay more attention to the quality of economic development. M. N. Chuvashova (2015) believes that the quality of regional economic development is closely related to the utilization of resources in the region, and points out that the quality of regional economic development is evaluated and measured through the three dimensions of regional resource distribution density, the development degree of logistics industry and the technical level of the industrial sector. Yunfu Xu (2019) pointed out that the existing index system for the level of regional economic development is too simple, to evaluate the coordination of regional economic development, and regional economic development coordination largely reflects the level of the quality of the regional economic development, so on the connotation of the integration of regional economy, the coordination of regional economic development and the gap of regional economic development of the three angles of the quality of economic development between a country measurement and evaluation. Li Xiaofei et al. (2018) pointed out that to achieve high-quality economic development, we must adhere to the principles of green innovation, environmental friendliness and resource conservation, while taking into account the two important aspects of innovative development and environmental protection. He daxinget al. (2020) Exploring the relationship between business environment and high-quality development helps to understand the connotation of high-quality development, and believes that a sound business environment is a prerequisite for achieving high-quality economic development. Huang Ningyang and Huang Juan (2020) from the scientific and technological innovation and education investment, economic growth benefit, the stability of economic operation, economic structure and economic welfare and the sustainability of the development of six aspects selected the 24 indicators analysis, the results show that the stability of economic operation, scientific and technological innovation and education investment to improve the quality of economic development plays a crucial role.

2.2. Related Research on Regional Innovation Drive

Innovation-driven development is a multi-dimensional and comprehensive concept, whose connotation is mainly manifested in promoting the rational allocation of resources, improving the utilization rate of resources, optimizing the industrial structure, breeding the emergence of emerging industries and improving the quality of economic growth. After the famous British scholar Cook (1992) put forward the concept of regional innovation system, the research on regional innovation was gradually enriched. Leydesdorff et al (2000) pointed out that the administrative chain composed of governments at all levels in the region, the industrial chain composed of enterprises and the technology chain composed of universities and research and development institutions influence each other, promoting the gradual capitalization of regional knowledge elements, and making the innovation activities show a spiral development trend. Based on the perspective of innovation chain, Li Yuchen et al. (2019) decomposed the national innovation power into scientific creativity, technology development power and industrial development power, and constructed the national condition support force from the perspective of innovation support, forming a four-dimensional measurement framework of national innovation ability evaluation. Hu Mengna (2020) defines regional innovation as a process in which the innovation subject constantly absorbs knowledge, technology and other factors to promote regional development under specific regional conditions.

Iftekhar Hasan (2010) Research found that economic growth is closely related to the quantity and quality of innovation. A country or region with different economic structures and different stages of economic development will also make it invest in innovationAccess brings different benefits to economic growth. Butova (2020) Research found that innovation drive plays an important role in ensuring social and economic progress and the efficiency of income distribution, and that there is a positive correlation between regional economic growth and the number of researchers. Yuan Hang (2019) clearly defined the two concepts of industrial structure transformation and innovation-driven development, and summarized and analyzed the mechanism of innovation-driven development on the transformation and upgrading of Chinas industrial structure through two aspects of theoretical analysis and mathematical model. Jin Meng (2020) pointed out that the research on regional innovation diffusion capacity is rarely mentioned in the existing research. A region with strong innovation-driven ability should be able to drive the development of surrounding areas while taking account of its own development, so the innovation diffusion capacity should be an important part of the innovation-driven ability.

3. CONSTRUCTION OF INDEX SYSTEM AND RESEARCH METHOD

3.1. Construction of the Index System

The construction of evaluation index system is the key step to evaluate the high-quality development level and regional innovation efficiency of Anhui Province, and also the basis for studying the coupling relationship between the two. Choosing the appropriate indicators has a decisive influence on the results of the empirical analysis. In the process of constructing this index system, this paper follows the principles of scientificity, feasibility and comparability, takes the connotation of high-quality economic development as the core requirement of the construction, and takes the new development concept as the guidance. At the same time, the basic index data used in this paper are all from the government statistical data, which not only ensures the authority of the data sources, but also ensures the unity of the statistical caliber and the convenience of the data operation.

3.1.1. Evaluation index system for high-quality economic development

High quality of economic development, is the innovation, coordination, green, open, Shared development concept, but this paper studies the comprehensive level of economic development and the relationship between regional innovation efficiency, so the innovation indicators need to build regional innovation efficiency evaluation index, in addition, also need to add indicators reflect the comprehensive level of economic development. Therefore, based on the five development concepts of Li Silian and Wang Aimin (2019), this paper sets up five first-level evaluation index system of green development, innovative development, coordinated development, open development and shared development, and 18 second-level indicators.

Table 1. Evaluation index system for high-quality economic development

Level 1 indicators	Secondary indicators	symbol	plus-minus
innovative development	GDP rate of rise	x1	+
	R & D investment intensity	x2	+
	efficiency of investment	x3	-
	Technology trading activity	x4	+
harmonious development	demand structure	x5	+
	Urban and rural structure	x6	+
	industrial structure	x7	+
	Government debt burden	x8	-
green development	energy consumption elasticity coefficient	x9	-
	Wastewater per unit of output	x10	-
	Waste gas per unit of output	x11	-
Open development	Foreign trade dependence degree	x12	+
	The proportion of foreign investment	x13	+
	The degree of marketization	x14	+
Shared development	The proportion of workers remuneration	x15	+
	Housing income growth flexibility	x16	+
	Urban-rural consumption gap	x17	-
	The proportion of government spending on peoples livelihood	x18	+

3.1.2. Regional innovation ability evaluation index system of Anhui Province

In the process of constructing the evaluation system of regional innovation ability, domestic scholars have carried out a lot of research, and put forward a variety of index selection methods. Among them, the Regional Innovation Ability Evaluation Report in China is jointly compiled by the China Science and Technology Development Strategy Research Group and the China Innovation and Entrepreneurship Management Research Center of the University of Chinese Academy of Sciences. The first-level indicators include knowledge creation, knowledge acquisition, enterprise innovation, innovation environment and innovation performance. Therefore, in this report, knowledge creation is used to measure the ability of a region to create new knowledge; knowledge acquisition is used to measure the ability of a region to use external knowledge and industry-university-research cooperation; enterprise innovation is used to measure the ability of enterprises to use a region to apply new knowledge, develop new technologies, use new technologies and manufacture new products; innovation environment is used to measure the ability of a region to provide corresponding environment for the generation, flow and application of technology; and innovation performance is used to measure the benefit of innovation to the economic and social development of a region. According to the availability, representativeness and comparability of the indicators, this paper finally sets 5 first-level indicators and 20 second-level indicators to build the evaluation system. The specific indicators are shown in Table 2.

Table 2. Evaluation index system of regional innovation ability

Level 1 indicators	Secondary indicators	Level 1 indicators	Secondary indicators
Knowledge Creation	Comprehensive index of research and development investment	Innovation environment	Innovation of infrastructure comprehensive indicators
	Comprehensive index of patent		Comprehensive index of market environment
	Comprehensive index of scientific research papers		Comprehensive index of laborer quality
knowledge acquisition	Comprehensive indicators for scientific and technological cooperation		Comprehensive indicators of the financial environment
	Comprehensive index of technology transfer		Comprehensive index of entrepreneurial level
	Comprehensive index of investment of foreign-funded enterprises	Innovative performance	Macroeconomic comprehensive indicators
Enterprise innovation	Comprehensive index of enterprise research and development investment		Comprehensive index of industrial structure
	Comprehensive index of design capability		Comprehensive index of industrial international competitiveness
	Comprehensive index of technical improvement ability		Comprehensive employment indicators
	New product sales revenue comprehensive index		Sustainable development and environmental protection comprehensive indicators

3.2. Data Sources

The original data of the indicators are all from Anhui Statistical Yearbook and 2001-2023 China Regional Innovation Ability Evaluation Report, and some of the missing data are supplemented by interpolation method or smoothing method.

3.3. Data Preprocessing

In this paper, we construct the comprehensive indicators of regional innovation ability and high-quality economic development, and use the entropy weight method to empower these two comprehensive indexes respectively to obtain the final comprehensive score. The specific steps of the entropy weight method are as follows:

3.3.1. Undimensionless treatment

Considering the positive and negative situation in the evaluation system, this paper selects the fuzzy membership function to normalize the data less. Now is assume that the timing range of the data sample in this study is n years and the total number of indicators is m.

Forward pointer:

$$x_{i,j} = \frac{a_{ij} - mina_{ij}}{max_{ij} - min_{ij}} \quad (1)$$

Negative indicators:

$$x_{i,j} = \frac{maxa_{ij} - a_{ij}}{max_{ij} - min_{ij}} \quad (2)$$

Among, $x_{i,j}$ is the value after normalization (i=1, 2, ..., n; j=1, 2, ..., n), $x_{i,j}$'s maximum and minimum values of j within n years are expressed using the common character max and min.

3.3.2. Entropy weight method to determine the index weight

In this paper, the entropy weight method (TOPSIS) is introduced to weight the above standardized data in four steps.

(1) Calculate the proportion of the item j index in region i:

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}} \quad (3)$$

(2) Calculate the entropy value of item j index:

$$e_{ij} = \frac{-1}{lnm}\left[\sum_{i=1}^{m} lnp_{ij}\right] \ (j = 1,2, \ldots . n) \quad (4)$$

(3) To determine the entropy right of each index:

$$w_j = \frac{(1-e_j}{\sum_{j=1}^{n}(1-e_j)} \quad (5)$$

(4) Determine the final comprehensive score:

$$Z_{ij} = \sum_{j=1}^{n} w_j x_{ij} \quad (6)$$

3.4. Construction of a Coordination Model Between Regional Innovation and High-Quality Economic Development

After using the entropy weight method to obtain the comprehensive score of regional innovation ability and economic high-quality development level, this paper draws on the coupled coordination degree model of applied physics to calculate the coupling coordination degree level.

$$C_{ds}^{t} = \frac{2\sqrt{u_d^t \times u_s^t}}{(u_d^t + u_s^t)} \quad (7)$$

C_{ds}^{t} It represents the integration level of regional innovation capacity and high-quality economic development capacity level in phase t, the development level of regional innovation capacity level in phase t, and the development level of high-quality economic development capacity level in phaset. u_d^t u_s^t.

$$D_{ds}^{t} = \sqrt{C_{ds}^{t} \times T_{ds}^{t}}, T_{ds}^{t} = \alpha u_d^t + \beta u_s^t \quad (8)$$

In formula (8), it represents the integration of regional innovation capacity and high quality development capacity level in year t; the coordination of regional innovation capacity and high quality development capacity level; and the weight of regional innovation capacity and high quality development capacity level respectively. The fusion value D of the level of regional innovation ability and high-quality economic development ability obtained in this paper is distributed between 0 and 1. The larger the value is, the higher the integration level of regional innovation ability and high-quality economic development ability is. Generally, the level of integration is divided according to the following categories.

When $0 < D \leq 0.4$, the regional innovation ability and high-quality economic development ability are in low integration state;

When $0.4 < D \leq 0.5$, the level is in moderate integration state;

When $0.5 < D \leq 0.8$, the regional innovation ability and high-quality economic development ability are in high integration state;

When $0.8 < D \leq 1$, the regional innovation ability and high-quality economic development level are in extremely integration state. Based on this, this paper divides the coupling coordination level and divides it into ten levels, as shown in Table 3:

Table 3. Grade table of coupled coordination analysis

Coupling phase	Coordination degree	R	grade
Extremely uncoupled	Low degree coordination	(0, 0.15]	Extreme disorder
		(0.15, 0.25]	major maladjustment
Moderate coupling	Moderate coordination	(0.25, 0.35]	Moderate dysregulation
		(0.35, 0.45]	Mild dysregulation
		(0.45, 0.55]	On the verge of dysregulation
Benign coupling	Highly coordinated	(0.55, 0.65]	Forced coordination
		(0.65, 0.75]	Primary coordination
		(0.75, 0.85]	Intermediate coordination
High level coupling	Extreme coordination	(0.85, 0.95]	Good coordination
		(0.95, 1]	Quality coordination

4. INTERPRETATION OF RESULT

4.1. Weight Analysis of High-Quality Economic Development and Regional Innovation Indicators

After determining the method of measure the high-quality economic development and regional innovation capacity, the entropy method was used to obtain the index weight of high-quality economic development and regional innovation capacity, as shown in Tables 4 and 5, respectively. According to the results in Table 4, the three secondary indicators of shared development (0.22852), coordinated development (0.226673) and innovative development (0.2162052) have a large weight in high-quality economic development, while coordinated development and green development occupy a relatively small weight. For the regional innovation ability index system, this paper measures from five aspects: knowledge creation, knowledge acquisition, enterprise innovation, innovation environment and innovation performance, among which the weight of enterprise innovation (0.25) and innovation environment (0.25) accounts for a high proportion.

Table 4. The weight of the first-level indicators of high-quality economic development

aggregative indicator	Level 1 indicators	Indicator weight
High-quality economic development	innovative development	0.2162052
	Harmonious development	0.226673
	green development	0.1725195
	Open development	0.1560823
	Shared development	0.22852

Table 5. Index weight of each level of regional innovation capacity

aggregative indicator	Level 1 indicators	Indicator weight
Regional innovation ability	Knowledge Creation	0.15
	knowledge acquisition	0.15
	Enterprise innovation	0.25
	Innovation environment	0.25
	Innovative performance	0.20

4.2. Analysis of the Calculation Results of High-Quality Economic Development and Regional Innovation Capacity in Anhui Province

This paper uses the entropy value method, through formula (1) to formula (6), calculates the comprehensive level index of high-quality economic development and regional innovation ability in Anhui province, and obtains the comprehensive score of high-quality economic development and regional innovation ability in Anhui province in 2003-2022. The specific results are shown in Table 6.

Table 6. Comprehensive Index of High-quality Economic Development and Regional Innovation Capacity of Anhui Province from 2003 to 2022

A particular year	High-quality economic development	Regional innovation ability
2003	0.429	0.217
2004	0.442	0.251
2005	0.459	0.270
2006	0.466	0.250
2007	0.478	0.279
2008	0.489	0.285
2009	0.497	0.319
2010	0.515	0.286
2011	0.514	0.278
2012	0.519	0.301
2013	0.535	0.298
2014	0.545	0.305
2015	0.559	0.299
2016	0.561	0.300
2017	0.564	0.284
2018	0.564	0.287
2019	0.565	0.287
2020	0.560	0.307
2021	0.554	0.327
2022	0.550	0.333

In order to more intuitively show the changing trend of high-quality economic development and regional innovation capacity in Anhui Province in 2003-2022, this paper reflects the trend chart shown in Figure 1,

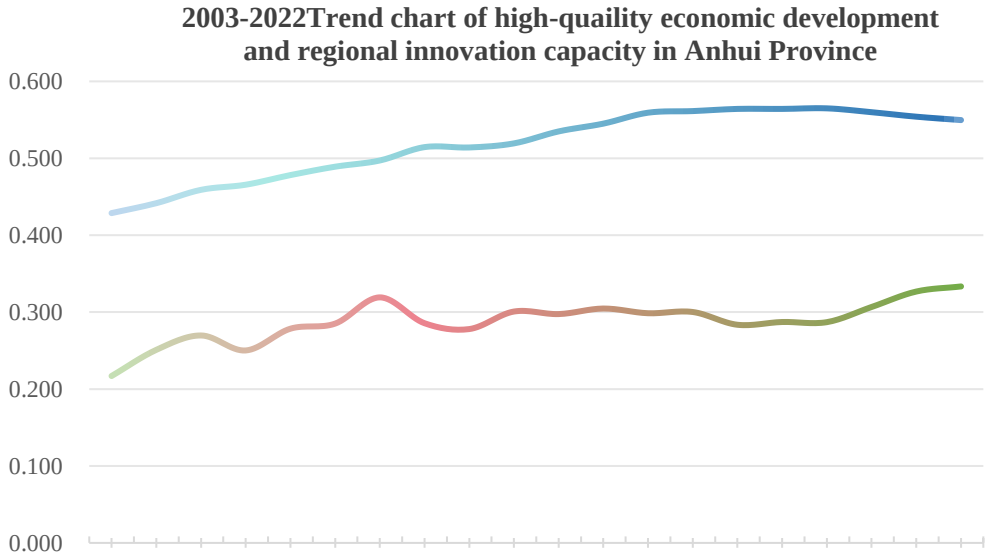

Figure 1. Trend chart of high-quality economic development and regional innovation capacity

4.2.1. Comprehensive level index analysis of high-quality economic development in Anhui Province

On the whole, the Anhui economic growth quality overall situation is good, high quality economic development index in slight fluctuations, from 0.429 in 2003 to 0.550 in 2022020 short-term fall, index fell to 0. 560, after 2021, start a new round of growth cycle, showing the characteristics of long-term upward trend, Anhui economic growth quality.

According to Table 6, we can divide the economic development of Anhui province into two significant stages. In the first stage, from 2003 to 2012, during this period, the comprehensive index of high-quality economic development in Anhui province showed a slow upward trend, with a growth rate of 20.98%. The growth at this stage may benefit from the gradual improvement of the infrastructure and the initial adjustment of the industrial structure, laying the foundation for the subsequent rapid development.

In the second stage, from 2013 to 2022, the high-quality economic development in Anhui province has entered a period of rapid growth. In particular, in 2019, the composite index of high-quality development reached 0.554, showing the positive results of economic structure optimization and industrial upgrading. However, the outbreak of COVID-19 in 2020 has had a profound impact on the global economy, and the economic development of Anhui province has also been impacted to a certain extent, leading to a decline in the high-quality economic development index. However, with the effective control of the epidemic and the implementation of economic stimulus policies, the economic index rebounded in 2021, indicating that the economy of Anhui province has good resilience and resilience.

In order to maintain the sustainable and healthy development of the economy, Anhui province needs to pay more attention to the quality and efficiency of economic growth while pursuing the quantity of economic growth. This means further promoting the optimization of the economic structure, strengthening innovation-driven, increasing the added value of industries, while paying attention to environmental protection and sustainable development to achieve high-quality economic development. Through such a strategy, the economic vitality of Anhui province will be continuously enhanced, bringing more benefits to the people, and providing a solid foundation for the future economic development.

4.2.2. Comprehensive level Index analysis of regional innovation ability in Anhui Province

For the regional innovation ability, its change trend is consistent with the overall change trend of high-quality economic development. From 0.217 in 2003 to 0.333 in 2022, the composite index of regional innovation capacity grew to nearly 54%. This growth trend is closely related to the continuous investment in human resources, material resources and financial research in Anhui Province. Especially, since 2019, the significant improvement of regional innovation ability is closely related to the talent policies of the "Ten Thousand Talents Plan" and the Innovative Talent Promotion Plan implemented in Anhui Province. In 2021, the innovation score reached a record high, indicating that the provinces innovation capacity is constantly improving.

According to Chinas Regional Innovation Capacity Evaluation Report 2021, Anhui province ranked 8th in Chinas comprehensive ranking of regional science and technology innovation, up two places from the previous year. The jump from the 23rd place in 2010 to the 8th place in 2021 is a significant progress that reflects the phased achievements of Anhui provinces innovation-driven development strategy. However, according to the Evaluation Report of Chinas Regional Innovation Capacity, there are significant differences in the ranking between the input and output of scientific and technological activities in Anhui Province. Specifically, although Anhui province ranked fifth in terms of investment in scientific and technological innovation in 2020, its output effect only ranked 17th in China. Compared with Hubei province, the latter ranks ninth in both input and output, showing a more balanced trend of technology development. This comparison reveals the imbalance of the development between the input and the output of scientific and technological activities in Anhui Province, especially in the output efficiency, which needs to be solved urgently.

The economic development and the improvement of innovation ability in Anhui province are due to the government’s great importance to and continuous investment in scientific and technological innovation. In 2023, the investment in research and experimental development (R & D) in Anhui Province will continue to maintain a rapid growth, and the investment intensity will continue to improve, providing strong support for the construction of a high-level innovative province. The increase of enterprise R & D investment, especially the contribution rate of enterprises to the whole social research and experimental development (R & D) expenditure growth, reached 84.1%, exceeding the national average level and becoming the main force to promote the development of scientific and technological innovation in the province.

In addition, Anhui province has implemented a series of policies, such as "Ten Science and Technology Innovation", "triple and one innovation" and the construction of a strong manufacturing province, which has further stimulated the innovation vitality of enterprises and promoted the development of high-tech industry. The implementation of these policies has not only enhanced the innovation capacity of enterprises, but also accelerated the transformation and application of scientific and technological achievements, providing a new impetus for the sustained growth of the economy.

4.3. Analysis of the Coupling and Coordination Degree of Regional Innovation Ability and High-Quality Economic Development in Anhui Province

After obtaining the comprehensive score of high-quality economic development and regional innovation ability in Anhui Province in 2003-2022, in order to further verify the coupling and coordination of high-quality economic development and regional innovation, this paper uses the comprehensive score for coupling and coordination, and obtains the results shown in Table 7.

Table 7. Results of coupling and coordination of high-quality economic development and regional innovation capacity in Anhui Province from 2003 to 2022

year	Coupling results	Coordination results	Coupling coordination degree
2003	0.945	0.323	0.552
2004	0.961	0.346	0.577
2005	0.966	0.364	0.593
2006	0.954	0.358	0.584
2007	0.965	0.378	0.604
2008	0.965	0.387	0.611
2009	0.976	0.408	0.631
2010	0.958	0.400	0.619
2011	0.955	0.396	0.615
2012	0.964	0.410	0.629
2013	0.958	0.416	0.632
2014	0.959	0.425	0.638
2015	0.953	0.429	0.639
2016	0.953	0.431	0.641
2017	0.944	0.424	0.632
2018	0.946	0.426	0.634
2019	0.945	0.426	0.635
2020	0.956	0.433	0.644
2021	0.966	0.440	0.652
2022	0.970	0.442	0.654

In order to more intuitively show the coupling and coordination relationship between high-quality economic development and regional innovation capacity in Anhui Province from 2003 to 2022, this paper reflects the trend chart shown in Figure 2,

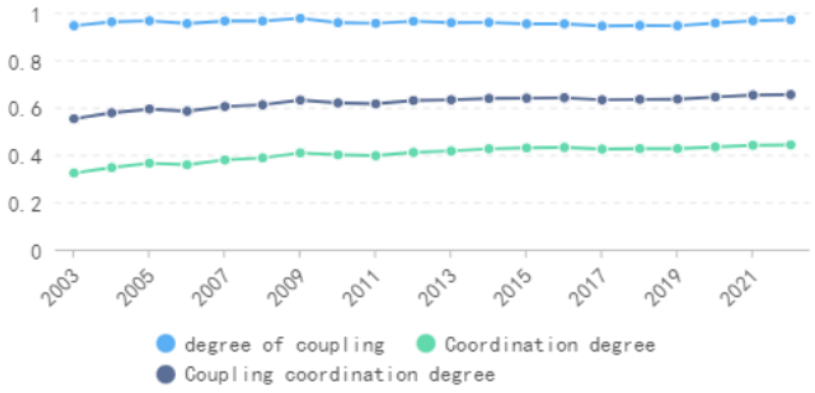

Figure 2. Trend results of coupling coordination degree in 2003-2022 in Anhui Province

As can be seen from Table 7, the coupling and coordination degree in Anhui province showed a positive increase, from 0.552 in 2003 to 0.654 in 2022. From moderate coordination to rise to high coordination. It shows that the comprehensive level of high-quality economic development and regional innovation efficiency are obviously coupled, showing a good development trend. The coupling degree results increased from 0.945 in 2003 to 0.970 in 2022, indicating an increasing interaction and coordination between the two. The coordination results also increased from 0.323 in 2003 to 0.442 in 2022, indicating that the matching degree and synergies between high-quality economic development and regional innovation capacity are steadily improving.

The improvement of coupling and coordination degree reflects that Anhui Province, while promoting high-quality economic development, is also actively promoting the improvement of regional innovation ability. The strengthening of this coupling relationship, This paper considers that it can be analyzed from five aspects, In terms of policy orientation and implementation effect, In the process of promoting the high-quality economic development, On the implementation of the innovation-driven development strategy, Through a series of policies and measures, Such as increasing investment in scientific research, optimizing the environment for innovation, and strengthening intellectual property protection, Effectively promoted the promotion of regional innovation ability; Industrial structure optimization, With the continuous optimization of the economic structure, Anhui province has gradually reduced its dependence on traditional industries, To develop high-tech industries and modern services, These industries have a higher demand for and reliance on innovation, Thus promoting the development of regional innovation ability; In addition to the talent strategy, Through the implementation of the "Ten Thousand Talents Plan" and the innovative talent promotion plan, Attracted a large number of high-quality talents, It provides human resources guarantee for regional innovation. The gathering and flow of talents promote the exchange of knowledge and technology, and accelerate the generation and transformation of innovation achievements. At the same time, Anhui province emphasizes the transformation of scientific and technological achievements, strengthens the cooperation between industry, universities and research institutes, promotes the transformation and application of scientific and technological achievements, and improves the contribution of science and technology to economic development rate. The improvement of this transformation mechanism not only enhances the regional innovation ability, but also promotes the high-quality economic development; In the process of regional coordinated development, in the process of promoting the coordinated development of all regions in the province, Anhui Province emphasizes the sharing of regional innovation resources and complementary advantages, forms the regional innovation network, and improves the overall innovation ability and economic quality

Therefore, the improvement of the coupling and coordination between the high-quality economic development and the regional innovation ability in Anhui province is the result of the joint action of many factors. The strengthening of this coupling relationship not only enhances the economic competitiveness of Anhui Province, but also provides a reference experience for other regions. In the future, Anhui province should continue to deepen the innovation-driven development strategy, strengthen policy support, optimize the innovation environment, cultivate and attract more innovative talents, so as to achieve the sustainable and coordinated development of high-quality economic development and regional innovation ability.

5. CONCLUSIONS AND COUNTERMEASURES

In recent years, Anhui province has made steady improvement in the high-quality economic level and scientific and technological innovation ability, and regional innovation has played a long-term driving role in the high-quality economic development. However, there is an imbalance between the improvement of the input and output level of science and technology and the optimization of the innovation environment, and there is also a certain lag between the growth of economic benefits and the improvement of economic efficiency. In order to further improve the level of high-quality economic development, how does Anhui Province make good use of the coupling relationship between the development of regional innovation ability and high-quality economic development, and realize the mutual promotion of development is the top priority. The following are the specific countermeasures and suggestions based on the development characteristics and advantages of Anhui Province:

Firstly, Strengthen the efficient transformation of scientific and technological input and output: through accurate allocation of scientific and technological resources and optimization of project

management, ensure the efficient transformation of scientific research input into innovative achievements, improve the quality and efficiency of scientific and technological output, and make the scientific research work twice the result with half the effort. Anhui province can set up special funds to support the research and development of key technologies and the transformation of achievements. At the same time, a platform for the transformation of scientific and technological achievements will be established to provide technology evaluation, market analysis and financing services to promote the commercialization of scientific research achievements. In addition, the implementation of science and technology project performance evaluation system, the investment of scientific research funds and scientific research equipment should not be stingy, improve the treatment of talents, strengthen the management of scientific research funds and the construction of talent team, to ensure the effective use of scientific research funds, so as to realize the efficient transformation of science and technology input to innovation output.

Secondly, Accelerate the improvement of economic efficiency and innovation ability: promote the optimization and upgrading of industrial structure, improve production efficiency and resource allocation efficiency, and promote high-quality economic development driven by innovation. In order to continue to improve the development level of economic quality in Anhui Province, it is necessary to accelerate the improvement of economic efficiency and innovation ability. It is suggested to implement industrial upgrading plan, support traditional industries to adopt new technologies and new processes, and improve production efficiency. We will encourage enterprises to establish technological innovation centers and increase investment in research and development to promote the development of the industry with high added value. At the same time, we will promote lean production and intelligent manufacturing, improve the efficiency and flexibility of the production process, and enhance the market competitiveness of enterprises.

Thirdly, Deepening industry-university-research cooperation and knowledge and technology integration: establish a close industry-university-research cooperation mechanism, promote knowledge sharing and technology transfer, and realize the seamless connection between the transformation of scientific and technological achievements and industrial upgrading. Universities, institutes, research institutions and research institutions should be encouraged to carry out in-depth cooperation with enterprises, support enterprises in increasing investment in scientific and technological innovation and industrial integration, establish long-term cooperative relations with universities and research institutions, jointly carry out research projects, and promote knowledge sharing and technology transfer. At the same time, we should vigorously support enterprises and colleges and universities to jointly train talents, to set up practice and training bases, to provide practical opportunities for students, and to provide high-quality talents for enterprises. In addition, regular industry-university-research matchmaking meetings are held to promote the effective connection between scientific research achievements and the needs of enterprises, and accelerate the transformation and application of scientific and technological achievements.

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