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Data-driven Regional Defense Technology Collaborative Innovation Visualization Research of The Development Situation

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Abstract: Innovation-driven development strategy as China's national strategy, it is of strategic significance for China to form a new international competitive advantage and enhance the long-term driving force for development. This paper constructs an index system the for the evaluation of regional defense technology collaborative innovation , with eight innovation reform experimental area and cities and states as a research object, using big data technology and methods to collect index data online, and at the same time based on AHP level comprehensive evaluation and the "normalization" processing methods of network search heat value, to conduct an in-depth analysis of the development trend of national defense and national defense science and technology collaborative innovation in the region, and form a visual image display. Research results show that: in the process of coordinated development of regional defense science and technology, the pilot zone for innovation and reform in urban areas, including Beijing-Tianjin-Hebei, ChengDeMian and other aeras, are enjoying good momentum of collaborative innovation in defense science and technology. Chengdu, Mianyang and other urban defense science and technology collaborative innovation development trend is good, which provides data support for the regional defense science and technology collaborative innovation research and promote the in-depth development of defense science and technology collaborative innovation.

Keywords: Big data, Defense technology collaborative innovation, Development trend, Visualization.

1. Introduction

With the deepening development and promotion of the innovation-driven strategy, scientific and technological innovation plays an important role in the national social productive forces and comprehensive national strength, which requires us to be deeply aware of the role of scientific and technological innovation and put it at the core of the overall national development. At the same time, big data has become a national resource, and data science has gradually become the mainstream technology, and many countries have successively launched big data research and development plans.Big data analysis technology provides a new means for scientific and technological innovation research. In recent years, the development of big data technology has provided a new perspective for the related research of scientific and technological innovation evaluation, and used visual analysis[1] data mining and other technologies can combine regional defense technology collaborative innovation and big data, to use big data technology acquisition full data involving regional defense technology collaborative innovation. Besides, establish mathematical model, through big data calculation method of valuable data analysis and calculation,which intuitively reflects the current development of regional defense technology collaborative innovation from the macro and micro level,and provides a new perspective and thinking for the government and related enterprises and institutions to make decisions.

As for the definition and connotation of big data, many experts and scholars have put forward their own opinions from multiple perspectives, including Narita Zhenqin[2]and Xu Zipei[3]. From the nature of data, the definition of big data is relative to traditional data. Gandomi A (2015) integrates the conceptual definition of big data made by many practitioners and scholars, and defines big data from the perspective of characteristics[4], Hilbert (2016) points out that big data analysis is different from traditional statistical analysis, where exploratory data mining and machine learning methods are not theoretically guided and do not provide any interpretation of the results[5] . Cheng Xueqi (2014) believes that big data serves as a link, connecting the physical world, information space and human society[6]. Complex data resources are often converted into visual content through scatter map, histogram, tree diagram, etc[7]. Cukier, Kenneth (2011) believes that individuals, businesses and governments can be the subjects of owning data[8]. The importance of big data to contemporary society is obvious. Some scholars point out that the era of big data will bring us great changes. Big data can help governments and enterprises improve social production efficiency and reduce the measured risks. Big data is the oil and gold mine in the next social stage [9]. It is of great significance to promote the development of the information society [10]. As a hot spot in recent years, collaborative science and technology innovation has attracted wide attention. In terms of collaborative innovation, the Gloor P A [11] And Li Zuchao[12] both point out that the goal of collaborative innovation is to achieve common goals. Zhen Xiaofei [13], Xu Hui [14], Wang Ruixin [15] The characteristics and stages of collaborative innovation are illustrated separately. Starting from the method of collaborative innovation of defense science and technology, some scholars point out that the key to promoting the collaborative innovation of national defense science and technology is to build a scientific collaborative innovation mode [16]. Zhang Longpeng et al. (2016) learned from the actual data that in terms of collaborative innovation of defense technology, large enterprises compared with small and medium-sized enterprises are more able to carry out research and innovation, and are more willing to carry out research and innovation through cooperation[17]. Zhang Jihai

et al. (2017) have defined the meaning and components of the national defense science and technology collaborative innovation system from the perspective of national defense [18].

By combing the research status of home and abroad, it is found that there are relatively many related researchs on big data and regional scientific and technological collaborative innovation evaluation, but the research on big data is more focused on technology and methods, lacking the management strategy research of implementation. and the research on local defense technology collaborative innovation evaluation is more focused on theoretical research and lacks quantitative analysis; there are relatively few researches on the degree of technological innovation, and most of them are qualitative researches, and relatively few researches using related technologies and methods are used.

This paper form data collection-data collation-data processing-data conversion-data evaluation-data visualization as one of the research ideas, build an evaluation index system for the development trend of regional national defense science and technology collaborative innovation based data to obtain the relevant data and conclusions according to the index system, implement the storage, transformation, cleaning, and denoising of structured and unstructured data. Then, use the mathematical modeling, association analysis, machine learning, deep learning and other methods combined with the multi-index comprehensive decision method to calculate the final situation results, Eventually, using the data-drilling technology, through maps, tables, maps and other visual methods, the development trend of regional defense technology collaborative innovation is vividly displayed from a multi-dimensional perspective.

2. Construction of An Evaluation Index System for Regional National Defense Science and Technology Collaborative Innovation

Scientievaluate the level of regional defense science and technology collaborative innovation, apply scientific methods to select evaluation objectives, set the level of evaluation index system, and formulate evaluation rules, etc. Many experts and scholars have carried out relevant research on the evaluation of regional science and technology collaborative innovation. For example, Xie Shiquan et al. (2014) has built an evaluation index system with four independent and interdependent indicators: innovation action synergy, collaborative innovation ability, collaborative innovation effect and collaborative innovation environment[19], The performance evaluation index system of regional science and technology collaborative innovation established by Liu Zhihua et al. (2014) includes four indicators: collaborative input, collaborative process, collaborative output and collaborative influence[20]. Cen Xiaoteng (2019) and others have constructed the evaluation index system of urban national defense science and technology collaborative innovation system from four first-level indicators: innovation environment, innovation effect, innovation input and collaborative capability[21]. Through the study of literature at home and abroad and the experts and scholars interview, this paper using hierarchical analysis of fuzzy comprehensive evaluation, build secondary cost function, such as comprehensive social, environment, service, overall innovation, overall benefit and some micro indicators, from the perspective of military enterprises and civil enterprises, built covering three primary index, 25 secondary indicators and multiple tertiary indicators of national defense technology collaborative innovation evaluation index system (as shown in Table 1). The first-level indicators include "scientific and technological innovation of military enterprises", "scientific and technological innovation of civil enterprises", "collaborative innovation", Secondary indicators include financial basis, material, human resources, openness, civilian, economic benefit, enterprise competitiveness, potential benefits, enterprise technology, enterprise talent, foreign talent, product operation, enterprise indicators, civil enterprise scale and strength, the enterprise effectiveness, service ability, regional resources participation, regional collaborative innovation heat, defense industry scale and strength, military enterprise scale and strength,civil enterprise scale and strength, emergency integration, regional collaborative innovation economic and social results, military system economic and social results, non-military enterprise economic society effect, The three-level indicators include the special fund of enterprise investment projects, the team engaged in special technology research, the number of product invention patent applications, etc.

Table 1. Evaluation index system of regional Defense Science and Technology Collaborative innovation

Regional level of scientific and technological innovation index system for military enterprises		
Military Industrial Enterprise Industry Science Technology Innovation Innovation	Secondary indicators	Level 3 indicators
	Financial foundation	Special funds for projects invested by enterprises; Enterprises invest in research and development funds; Enterprises invested in production funds; Funds absorbed by enterprises from outside countries;
	material basis	The number of units obtained for enterprise weapons and equipment investment in scientific research and production license; Projects that the enterprise has already been put into production; Production lines that have been put into production;
	Human resources base	The number of talents introduced by enterprises from cooperative enterprises; Enterprise research team engaged in special technology research;
	Open degree	The number of private enterprises that enterprise has obtained cooperation; The number of cooperative research institutions that the enterprise has obtained cooperation with;
	Civil degree	Overall number of cooperation projects between enterprises and civil enterprises; Number of number of technological invention patent applications of military enterprises; Special items for civil products in the invention patent obtained by the enterprise; Number of achievements registered by military-civilian enterprise cooperation;

	economic benefits	Annual sales revenue of the enterprise; Enterprise output technology transaction transaction transaction amount;
	Enterprise competitiveness	Enterprise R & D expenditure; Industrial added value of enterprises;
	Potential benefits	Total costs and expenses; The cost reduced after enterprises invest in civil goods production; The number of enterprise new products on the market;
Regional-level, science and technology innovation index database of civil enterprises		
Technology Innovation for Civilian Enterprises	Enterprise science and technology foundation	Number of product invention patent applications; The number of published domestic papers;
	Enterprise talent index	Number of patents granted for technological inventions; Number of awards won for scientific and technological achievements; Publishing scientific and technological works; The proportion of industrial scientific research funds; Number of registered results; Number of application items; Number of cooperative military industry enterprises; The proportion of executives;
	Foreign talent indicators	The number of foreign talents introduced; The number of experts from cooperative military enterprises;
	Product operation indicators	The proportion of product sales volume in the total volume of similar products; Number of new products on the market; rate of cost reduction;
	Enterprise attention indicators	Weibo attention; Wechat public account attention; Other Internet media attention; Blog attention; News attention;
	Scale and strength of civil enterprises	Amount of military product scientific research investment in private enterprises; The proportion of the annual sales revenue of civil enterprises to the annual total revenue of enterprises;
	Enterprise results	Corporate profitability; The proportion of high-tech enterprises; The proportion of military sales revenue of civil enterprises;
	serviceability	The number of civil enterprises promoted by intermediary agencies;
Regional-level collaborative innovation index database		
Collaborative Innovation	Participation level of the regional resources	Annual investment of regional military and civilian enterprises; Proportion of special regional research funds; Number and number of regional civil servants; Number of regional work leaders; Number of regional scientific research projects; Number of new regional infrastructure projects; Number of regional intermediary agencies; Number of regional industrial bases; Number of regional enterprises;
	Regional collaborative innovation heat	Online heat of regional collaborative innovation; Offline heat of regional collaborative innovation; Regional collaborative innovation policy heat;
	Openness of the national defense industry	Number of cooperative research institutions for military enterprises; The ratio of military equipment of military enterprises participating in civilian production; The proportion of dual-use products of military enterprises; The proportion of military-civilian general intellectual property rights of military enterprises; The proportion of wholly state-owned military enterprises in the restructuring of military enterprises;
	The scale and strength of military enterprises	Investment amount of special funds for military enterprise projects; Participation of civil products research by scientific researchers of military enterprises; The ratio of R & d investment in civilian production of military enterprises; Market share of civil goods produced by military enterprises;
	The scale and strength of civil enterprises	The annual sales revenue of regional civil enterprises; Investment ratio of dual-use products for civilian enterprises; Ratio of projects participated by regional civil enterprises;
	Integration level of emergency response	Regional can be mobilized logistics forces; Number of mobilized airports in the region; Number of regional health institutions that can be mobilized; The number of military professionals with the focus on rescue; The number of tasks the army performs in emergency rescue;

	Economic and social results of regional collaborative innovation	The added value of leading industries related to scientific and technological innovation accounts for the proportion of regional economic growth; Share of industrial output value in regional economic growth; The number of regional talents trained through collaborative innovation; Number of scientific research achievements created by collaborative innovation; The proportion of high-tech enterprises; The number of collaborative innovation enterprises facilitated by the Government;
	Economic and social achievements of the military industry system	Proportion of R & D expenditure of military enterprises in industrial added value; Proportion of civilian products output value of military enterprises; The increase ratio of the annual sales revenue of dual-use products of military enterprises; Transaction amount of dual-use military export technology; Military industry system military industry enterprise technology into the "promotion catalogue" number;
	Economic and social achievements of non-military-industrial enterprises	The proportion of R & D expenditure of civil enterprises in the industrial added value; The proportion of sales of dual-use products of civilian enterprises; Cost-benefit of civil enterprises; The number of technologies of civil enterprises of non-military industrial systems entering the "technology and product recommended catalogue";

3. Research Process of The Development Trend of Regional Defense Science and Technology

In regional defense science and technology collaborative innovation evaluation index system construction, on the basis of using AHP level comprehensive evaluation method and network search heat value "normalized" processing method, determine the index weight at all levels. At the same time, build regional defense technology collaborative innovation development trend evaluation model, use big data technology and method, obtain data, through the calculation experiment, to obtain regional defense technology collaborative innovation development trend results, and then through Tableau Software visual display analysis results.

Step1: Build an evaluation system and establish a hierarchical structure, including elements such as decision-making objectives, evaluation criteria and alternatives (as shown in Figure 1).

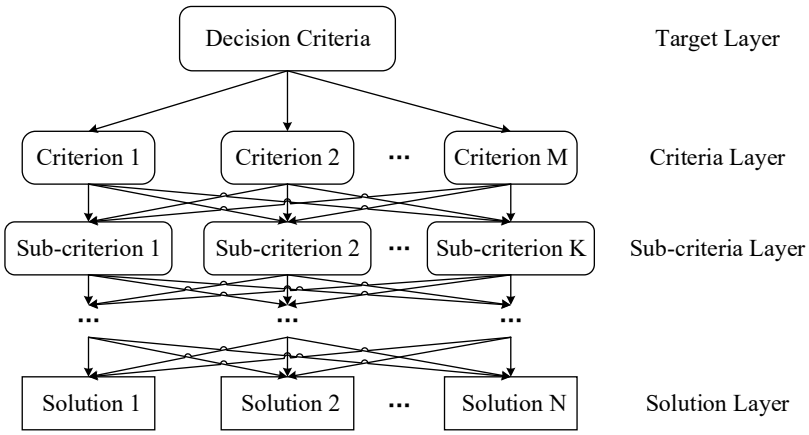

Figure 1. A hierarchical structure diagram of the A H P method

Step2: Establish a judgment matrix based on the results of the pairwise comparison between the importance principles of the elements of the same level and the criteria of the previous level. Under the elements of a criterion layer A a1、a2… Pair comparisons yield a judgment matrix (as shown in Table 2):

Table 2. The Judgment Matrix Building Table

a	a_1	a_2	a_3	a_4
a_1	1	a_1/a_2	a_1/a_3	a_1/a_4
a_2	a_2/a_1	1	a_2/a_3	a_2/a_4
a_3	a_3/a_1	a_3/a_2	1	a_3/a_4
a_4	a_4/a_1	a_4/a_2	a_4/a_3	1

Step3: Calculate the weight of the relative importance of the judgment matrix, and then check for consistency.

C.I After the weight is calculated by calculating the geometric average and normalization of the two steps, the compatibility of the matrix should be calculated next, and the index of measuring the compatibility is (Consistence Index). If B is the maximum eigenvalue of B, otherwise, yes, it can be used to determine the deviation degree. $\lambda_{\max} = n$ $\lambda_{\max} > n$ $\lambda_{\max} - n$ *C.I* The calculation formula is follows:

$$C.I = \frac{\lambda_{\max} - n}{n-1}$$

Then the consistency ratio CR (Coherence Ratio) is calculated using the following formula:

$$CR = \frac{C.I}{RI}$$

If CR 0.10, the judgment matrix is considered to meet the consistency, and the calculated weight is acceptable, otherwise the judgment matrix must be re-determined or adjusted.

Table 3. *R.I.*

Matrix order	1	2	3	4	5	6	7	8
R.I.	0	0	0.52	0.89	1.12	1.26	1.36	1.41
Matrix order	9	10	11	12	13	14	15	
R.I.	1.46	1.49	1.52	1.54	1.56	1.58	1.59	

Step4: Calculate the index weight value a of different levelsij(i = scientific and technological innovation of military enterprises, civil enterprises' scientific and technological innovation and collaborative innovation; j = indicators of index database at different levels), according to the "normalized" network search heat value of defense science and technology collaborative innovation index value bij *l* (k = military enterprise technology innovation, civil enterprise innovation, civil enterprise technology innovation, collaborative innovation; = indicators of different level index database), according to the value of defense technology collaborative innovation value (i, k = military enterprise technology innovation, technology innovation, civil enterprise collaborative innovation; = indicators of different level index database). $K = \sum a_{ij} b_{ij}$ j *l*

Step5: Using the technology and scheme of big data, it collects online and offline data according to the regional evaluation index system of collaborative innovation of national defense science and technology, and uses the "normalized" processing method of network search heat value to classify the data and obtain the calculated data value.

Step6: Combine the data value of each evaluation index obtained with the weight index, the single index in the same test area (cities) and divided by the sum of the index in all test area (cities), get a score, and then multiply the score by the index weight get a heat value, finally will the same test area (cities) all index heat value added to get the situation evaluation results.

Step7: Use Tableau Software to vividly display the development trend of regional national defense technology collaborative innovation from a multi-dimensional perspective through maps, tables, maps and other visual methods.

4. Results Analysis

Through the AHP hierarchical comprehensive evaluation method, the weight of the regional defense science and technology collaborative innovation evaluation index was determined (as shown in Table 4). The study results showed that: first, the biggest weight is the "financial foundation" index under the "technological innovation of military enterprises". Its weight value is 0.09732, then it is found that because the financial foundation is an important basis for the development of "scientific and technological innovation of military enterprises". This is also because the data collected is more, and the correlation is also large; The largest total number of "collaborative innovation" indicators is available, because this index accounts for a large proportion of the national defense technology collaborative innovation index in the whole region, and it is also the key investigation direction of the region; Under the "military enterprise technological innovation", the minimum weight of the "enterprise competitiveness" index is 0.00708, because the index is mainly aimed at enterprises, factors considering the regions together are weak.Second, in the "military enterprise technology innovation" index, "enterprises absorb money from outside" the biggest weight, followed by "enterprise weapons and equipment into scientific research and production license unit quantity", the two indicators respectively with secondary index "financial basis" and "material basis" corresponding, with consistency, a regional enterprise has the ability to become a technology innovation enterprise, not only depends on product sales, but also see the attraction of investors, the basis and proof, of course, is the production license. The smallest weight falls on the "industrial added value".Third, in the "collaborative innovation" index, the weight of "regional collaborative innovation policy heat", "the investment ratio of R & D of dual-use products for civil enterprises" and "the proportion of civil enterprises' expenditure in industrial added value" ranked first, second and third respectively. Since the policy can effectively promote the process of defense technology collaborative innovation, paying attention to the implementation and change of the policy will help military enterprises and civil enterprises to adjust the plan in time, so the weight of "regional collaborative innovation policy heat" is the largest; the latter two indicators are mainly for civil enterprises, and the number of private enterprises compared to military enterprises, so the observation and consideration of private enterprise ability and transformation status is also quite important. On the whole, in addition to the above three prominent indicators, the other indicators are roughly within a certain level, which shows that the indicators of "national defense science and technology collaborative innovation" are of equal importance.

Table 4. Weight distribution table of national defense technology collaborative innovation indicators based on the regional level

war industry stand on tiptoe line of business a branch of academic or vocational study skill	Secondary indicators	Secondary index weight	Level 3 indicators	Level 3 index weight
	Financial foundation	0.09732	Special funds for enterprises invested in projects	0.02784
			Enterprises invest in research and development funds	0.01563
			Enterprises invest in production funds	0.00984
			Funds absorbed by enterprises from outside countries	0.04413

wound new	material basis	0.06273	The number of units obtained by the enterprise weapons and equipment investment in scientific research and production license	0.03726
			Projects that the enterprise has been put into production	0.01116
			The enterprise has been put into the production of the production line	0.01563
	Human resources base	0.02232	The number of talents introduced by enterprises from cooperative enterprises	0.01116
			A team engaged in special technical research of enterprises.	0.01116
	Open degree	0.02088	The number of private enterprises that have achieved cooperation	0.00696
			The number of cooperative research institutions that enterprises have obtained cooperation with	0.01392
	Civil degree	0.0207	Overall number of cooperation projects between enterprises and civil enterprises	0.0045
			Number of technological invention patent applications of military enterprises	0.00435
			The enterprise has obtained the invention patent in the private goods special project	0.00594
			Civil-military enterprise cooperation, the number of registered results	0.00594
	economic benefits	0.03843	Annual sales revenue amount of the enterprise's private products	0.02562
			Enterprise output technology transaction transaction amount	0.01281
	Enterprise competitiveness	0.00708	Enterprise R & D Expenditure	0.00531
			Enterprise industrial added value	0.00177
	Potential benefits	0.03057	Total cost	0.01815
			The reduced cost after the enterprises invest in civilian production	0.0048
			The number of the new enterprise products on the market	0.00762
the people need stand on tiptoe line of business a branch of academic or vocational study skill wound new	Enterprise science and technology foundation	0.057472	Number of product invention patent applications	0.028736
			Number of papers published in China	0.028736
	Enterprise talent index	0.027616	Number of patents granted for technological invention	0.003968
			The number of scientific and technological achievement awards won	0.004704
			Publishing science and technology works	0.001568
			The proportion of scientific research funds	0.002528
			Number of registered results	0.002944
			Number of applied projects	0.005312
			The number of cooperative military enterprises	0.003936
			The proportion of executives	0.002688
	Foreign talent indicators	0.01648	The number of foreign talents is introduced	0.008224
			Number of experts in cooperative military enterprises	0.008224
	Product operation indicators	0.026816	Product sales as a proportion of the total volume of similar products	0.0072
			Number of new products listed	0.01648
			rate of cost reduction	0.003136
	Enterprise attention indicators	0.03456	Weibo attention	0.00288
			Wechat public account of attention	0.005504
			Other Internet media attention	0.012896
			Blog attention	0.00176
			News attention	0.01152
	Scale and strength of civil enterprises	0.066144	Amount of private enterprise military investment in scientific research	0.044096
			The annual sales revenue of civil enterprises accounts for the annual total revenue of enterprises	0.022048
	Enterprise results	0.048352	Corporate profitability	0.026592
			The proportion of high-tech enterprises	0.010144
			The proportion of military sales revenue of civil enterprises	0.011616
	serviceability	0.04256	Intermediaries to promote the number of civil enterprises	0.04256
	Participation level of the	0.080902	Annual investment of regional military and civilian enterprises	0.019646
			Proportion of special regional research funds	0.012312

	regional resources		Number of regional working civil servants	0.004902
			Number of regional work leaders	0.004332
			Number of regional scientific research projects	0.009538
			Number of new regional infrastructure projects	0.00798
			Number of regional intermediaries	0.005662
			Number of regional industrial bases	0.008968
			Number of regional enterprises	0.007562
	Regional collaborative innovation heat	0.072884	Online heat of regional collaborative innovation	0.017518
			Regional collaborative innovation is in the offline heat	0.015276
			Regional collaborative innovation policy heat	0.04009
	Openness of the national defense industry	0.037506	Number of cooperative research institutions for military enterprises	0.014896
			The ratio of military equipment of military enterprises in civilian production	0.007524
			The proportion of dual-use products of military enterprises	0.0176
			The proportion of military-civilian general intellectual property rights of military enterprises	0.003876
			Solowned state-owned military enterprises account for the proportion of military enterprise restructuring	0.004484
	The scale and strength of military enterprises	0.01919	Special fund investment for military enterprise projects	0.010564
			Participation of military enterprise researchers in civilian products research	0.003002
			The R & d investment ratio of military enterprises	0.00342
			Market share of the quantity of civil goods produced by military enterprises	0.002204
	The scale and strength of civil enterprises	0.0342	Annual sales revenue of regional civil enterprises	0.00684
			The ratio of dual-use products for civilian enterprises	0.036
			The ratio of projects participated by regional civil enterprises	0.01368
	Integration level of emergency response	0.019722	Regional mobilizable logistics forces	0.004256
			Number of mobilizable airports in the area	0.003154
			Number of regional mobilizable health facilities	0.004826
			The number of professionals in the military focusing on rescue	0.00247
			The number of emergency rescue tasks performed by the army	0.005054
	Economic and social results of regional collaborative innovation	0.040166	The added value of leading industries related to scientific and technological innovation accounted for a proportion of regional economic growth	0.002888
			Industrial output value accounted for the proportion of regional economic growth	0.0019
			The number of regional talents trained through collaborative innovation	0.014706
			Number of scientific research achievements created by collaborative innovation	0.00589
			The proportion of high-tech enterprises	0.009918
			The number of government-enabled collaborative innovation companies	0.004864
	Economic and social achievements of the military industry system	0.040242	The proportion of R & D expenditure of military enterprises in the industrial added value	0.013794
			Proportion of civil goods output value of military enterprises	0.008208
			Dual-use technology export transaction amount	0.00551
			Increase the ratio of annual sales revenue of dual-use products in military enterprises	0.008094
			The number of military industry enterprise technology into the "military technology to civilian promotion catalogue"	0.004636
	Economic and social achievements of non-military-industrial enterprises	0.035226	The proportion of R & D expenditure of civil enterprises in the industrial added value	0.020558
			The proportion of sales of dual-use products in civilian enterprises	0.00703
			Cost-benefit of civil enterprises	0.004218
			Non-military system civil enterprises technology into the "technology and product recommended catalogue" number	0.00342

On the basis of establishing the evaluation index system of regional national defense science and technology collaborative innovation development trend and setting reasonable weights of each index, this paper collected and

analyzed the specific data of national defense science and technology collaborative innovation in eight innovation and reform experimental areas in China and cities and states in Sichuan province, the results show that Beijing-Tianjin-Hebei rank first in the the eight experimental reform areas , as high as 0.499, into the first gap of 0.244, and Guangdong and the third xi 'an gap has 0.12, xi' an and ChengDeMian gap is smaller. Then it will be found that some data gaps are large, which indicates that the collaborative innovation degree of defense technology gap is large in most pilot areas (as shown in Table 5).

Table 5. Sort list of the collaborative innovation development trend of national defense science and technology in the eight major innovation and reform pilot zones

Eight experimental reform zones	Collaborative innovation value of defense science and technology
1.Beijing,Tianjin and Hebei	0.499
2.ChengDeMian	0.256
3.Xi'an	0.133
4.Shenyang	0.073
5.Anhui	0.037
6.Guangdong	0.013
7.Shanghai	0.013
8.Wuhan	0.011

In order to further make clear the development trend of regional defense science and technology in the eight innovation and reform pilot zones, using the mandatory distribution method, the development trend of regional national defense science and technology collaborative innovation is divided into four levels of excellent, good, moderate and poor, based on the ranking results, the results show that the development trend of regional national defense science and technology collaborative innovation in the innovation and reform pilot zone is excellent in Beijing, Tianjin and Chengdemian; Xi'an and Shenyang ranked the third and fourth to determine the development trend of national defense science and technology collaborative innovation as good; Anhui and Guangdong performed generally; Shanghai and Wuhan are relatively backward (as shown in Figure 3).

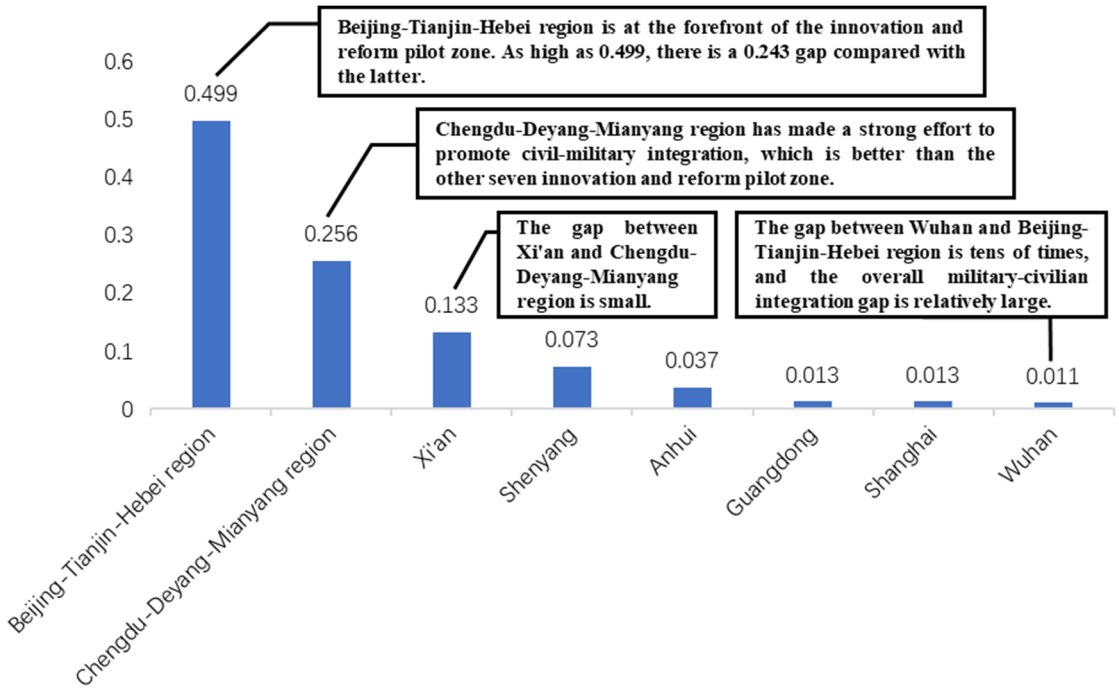

Figure 3. Order of the collaborative innovation trend of national defense science and technology in the innovation and reform pilot zone

With the same research method and process, the specific data of defense technology collaborative innovation in various cities and states of Sichuan Province were analyzed. The research found that the development trend of defense technology collaborative innovation in Chengdu and Mianyang is far ahead (as shown in Table 6).

Table 6. Ranence of development trend of national Defense Science and technology in cities and prefectures of Sichuan Province

Cities and states	Defense science and technology collaborative innovation degree value	Cities and states	Defense science and technology collaborative innovation degree value
Chengdu	0.099	Aba	0.040
Mianyang	0.097	Bazhong	0.038
Neijiang City	0.084	Meishan	0.038
Deyang	0.069	Zigong	0.027
Panzhihua	0.065	Ya'an	0.022
Guangyuan	0.065	GanZi	0.020
Suining	0.065	Yibin	0.019
Leshan	0.064	Dazhou	0.017
Luzhou city	0.059	Ziyang	0.015
Nanchong	0.054	Liangshan	0.006
Guang'an	0.042		

Also using the mandatory distribution method,the collaborative innovation degree of national defense science and technology in Sichuan province is divided into four grades: excellent,good, medium and poor, the results found that Chengdu, Mianyang, Neijiang, Deyang and Panzhihua performed excellentiy, in the first tier; Guangyuan, Suining, Leshan, Luzhou, Nanchong and Guang'an cities performed well, in the second tier; Aba Tibetan and Qiang Autonomous Prefecture, Bazhong City, Meishan City, Zigong City, Ya'an City, the above five cities performed generally in the collaborative innovation degree of national defense science and technology, in the third tier; The five prefectures of Ganzi Tibetan Autonomous Prefecture, Yibin City, Dazhou City, Ziyang City and Liangshan Yi Autonomous Prefecture are relatively backward, in the fourth tier (as shown in Figure 5).

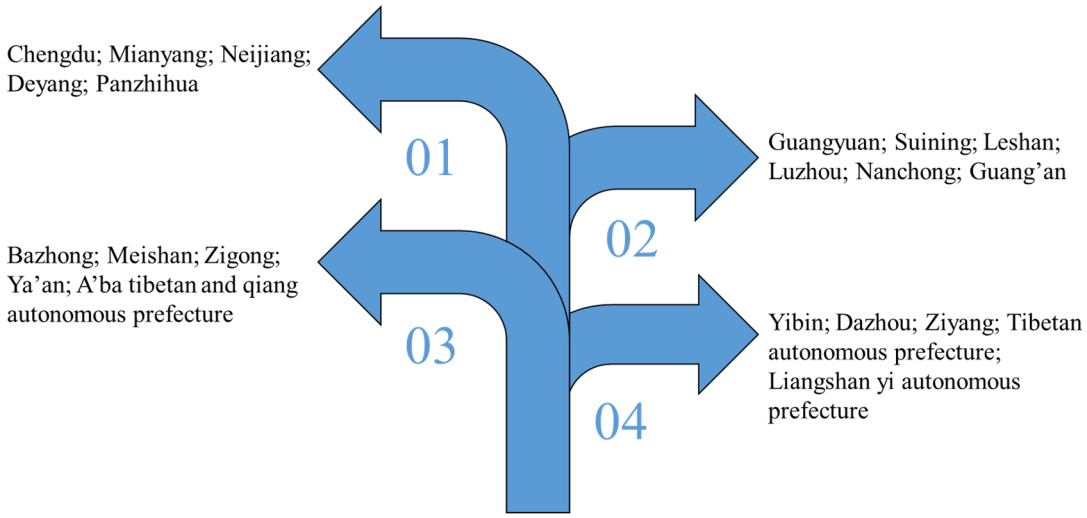

Figure 5. Based on the development ranking of regional collaborative innovation of national defense science and technology at the prefectural and prefectural level at the regional level

5. The Conclusion

This paper constructs the development trend index system of regional national defense science and technology collaborative innovation development from three aspects of "military enterprise science and technology innovation", "civil enterprise science and technology innovation" and "collaborative innovation", collect data by combining online and offline methods, using the AHP level comprehensive evaluation method and the "normalization" processing method of network search heat value, to study the development trend of collaborative innovation of national defense science and technology in the eight innovation and reform pilot zones and the various cities and prefectures in Sichuan Province, and formed a visual chart. It provides a reference to measure the development degree of regional national defense science and technology collaborative innovation. It can effectively improve the scientific nature and accuracy of the regional national defense science and technology collaborative innovation evaluation.

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