Disparity of Chinese Regional S&T System

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1.The Object of our work

- To comprehend the speed ,scale and trend of the development of S&T in different regions.
- To analyze the advantages and disadvantages of different regions in the development of S&T, and whether the development of S&T, economy and society is harmonious.
- To provide valuable reference data for framing S&T policy
- To provide materials for international comparison and reference

1.The Object of our work

- It is necessary to point out that the intention of our work is not to simply compare advantages and disadvantages of different regions, but, based on the current level of economy and society, to analyze whether the whole structure of S&T development is reasonable, whether the speed of regional S&T development is matching the speed of national development, and whether the development of S&T is harmonizing with economy and society .

2. S&T Index framework and the data source

- The regional S&T index framework comprises 5 first-level,22 second-level and 90 third-level indicators. The 5 first-level indicators include S&T human resource input, S&T expenditure, S&T activities output, industry innovation capability, S&T and society.

The structure of S&T index framework

First-level indicators	Second-level indicators
S&T human resource	Condition of S&T human resource
	S&T personnel
	R&D personnel
	Others
S&T expenditure	R&D activity
	Project analysis
	Investment in instrument equipment and fixed assets
S&T activities output	Patent
	Paper
	Technology trade

The structure of S&T index framework

Industry innovation capability	Large and medium-sized enterprises
	Hi-tech industry
	High and new technology industry
	Hi-tech products imports and exports
S&T and social	Economy
	Energy consumption
	Labor productivity
	Inhabitant quality of life
	Education
	Recycling economy
	Popular science
	Information channels

the data source

- Statistical data of S&T, economy and society mainly come from “China Statistical Yearbook 2004”, “China Statistical Yearbook on Science and Technology 2004”, “China Statistics Yearbook on Hi-Tech Industry 2004”, “ China Inspection Report on Science and Technology Progress 2004 ”
- Because of insurmountable difficulties, the data of Taiwan, Hongkong and Macao are not involved.

3. Analysis on the regional difference

- Using Correlation Analysis Method, Structure Analysis Method, Gini-Coefficient Diagram, S&T Location Quotient Analysis etc., we analyze the regional difference of S&T system.

3.1Analysis on the regional difference—Correlation analysis

- Analysis object: To analyze the correlation of S&T input with S&T output in the level of large and medium-sized enterprises, hi-tech industries, S&T input with economy and society, and the difference between regions.
- Analysis contents: We selected 18 groups from 90 indicators. Using correlation coefficient and Plot methods, the linearity correlation degree of S&T, economy and society is analyzed , furthermore, the difference of regions is compared.

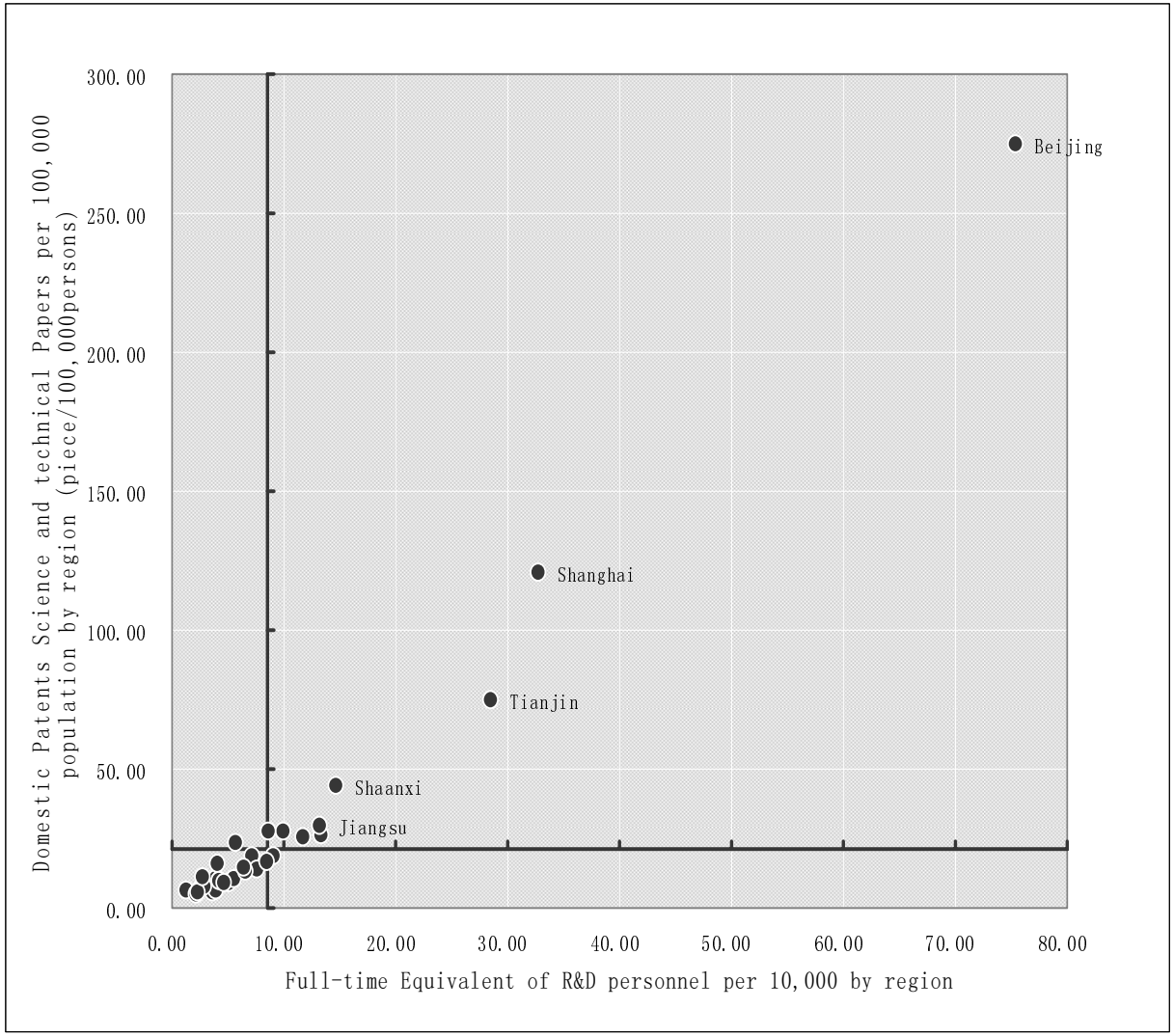


Fig.1 High correlation: Full-time equivalent of R&D personnel per 10,000 population by region and domestic patents S&T papers per 100,000 population by Region（0.989）

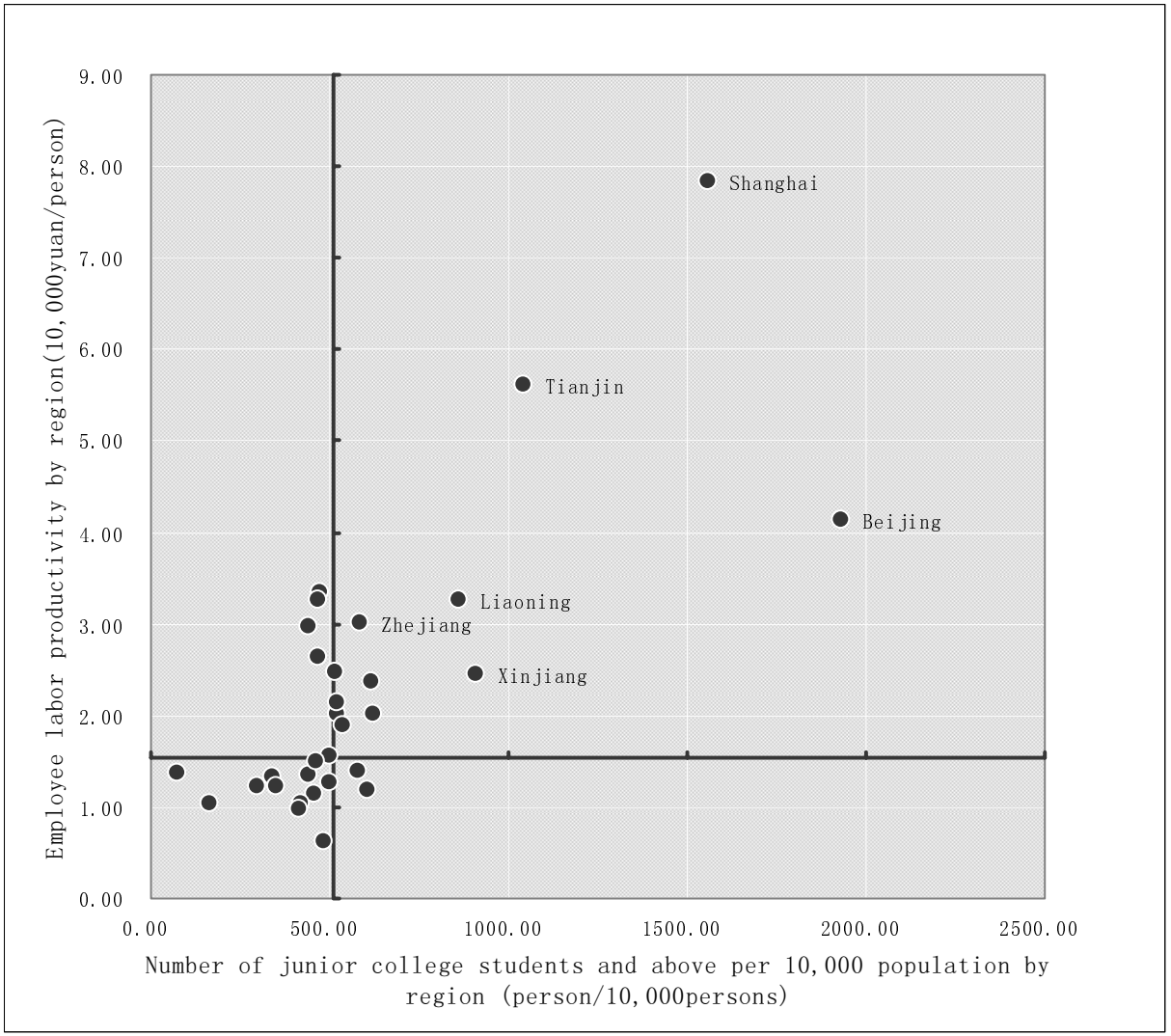


Fig2. Moderate correlation: Number of junior college students and above per 10,000 population by region and Employee labor productivity by region（0.747）

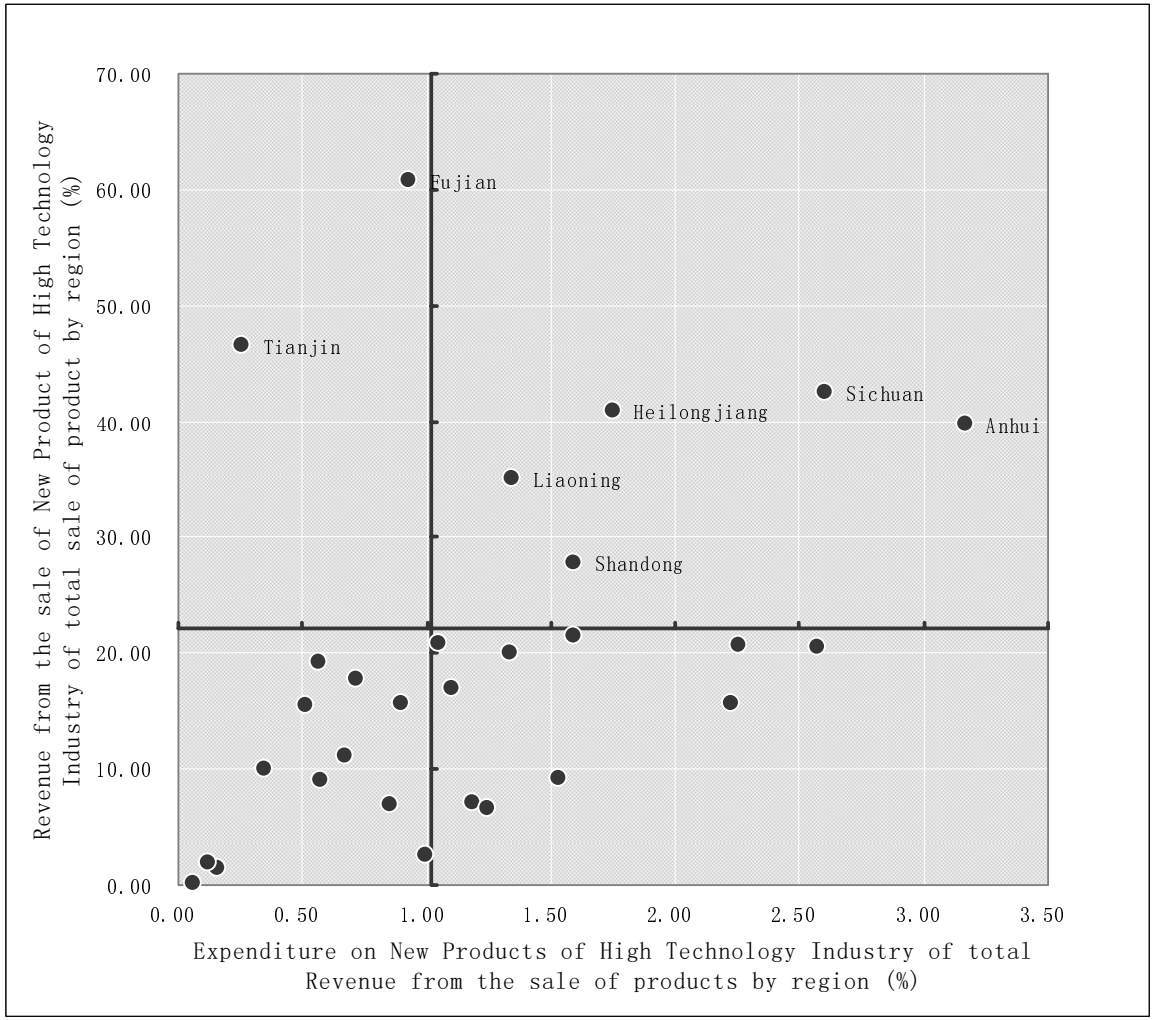


Fig3. Low correlation: Expenditure on new products of hi-tech industry of total revenue from the sale of products by region and Revenue from the sale of new product of Hi-tech industry of total sale of product by region（0.415）

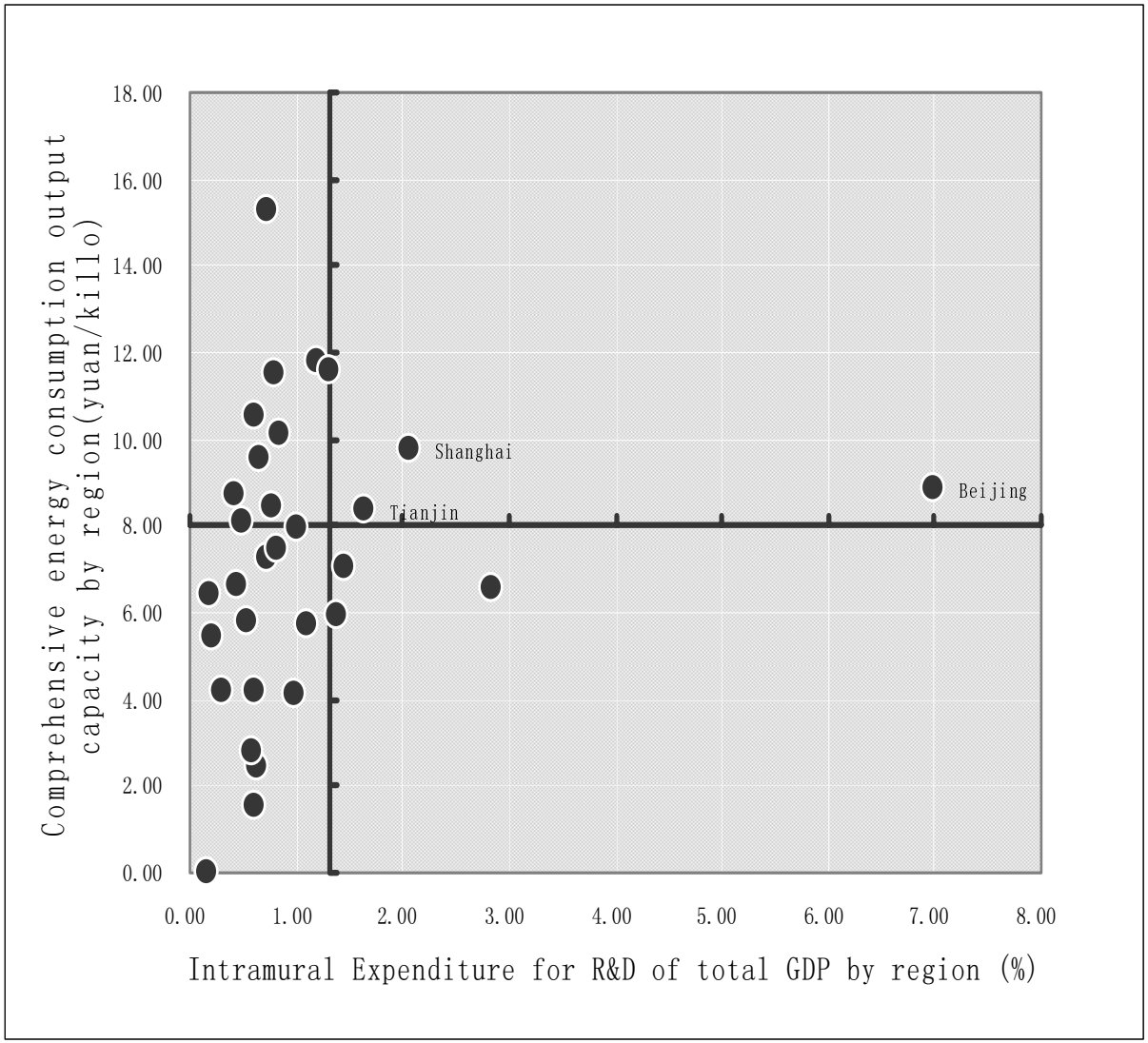


Fig4. No Correlation: Intramural expenditure for R&D of total GDP by region and Comprehensive energy consumption output capacity by region （0.197）

The 18 group indexes and their correlation

No.	Index	Coefficient	Degree
1	Full-time equivalent of R&D personnel per 10,000 population by region and patent applications per 100,000 population by region	0.858	high
2	Full-time equivalent of R&D personnel per 10,000 population by region and number of papers taken by SCI、EI、ISTP per 100,000 by region	0.976	high
3	Full-time equivalent of R&D personnel per 10,000 population by region and domestic patents Science and technical papers per 100,000 population by region	0.989	high
4	Full-time equivalent of R&D personnel per 10,000 population by region and value of contractual inflows in technical markets of total GDP by region	0.922	high
5	R&D intramural expenditure for every R&D personnel by region and patent applications per 100,000 population by region	0.861	high
6	R&D intramural expenditure for every R&D personnel by region number of papers taken by SCI、EI、ISTP per 100,000 by region	0.685	moder ate
7	R&D intramural expenditure for one R&D personnel by region and domestic patents science and technical papers per 100,000 population by region	0.713	moder ate
8	Intramural expenditure for R&D of total GDP by region and value of contractual inflows in technical markets of total GDP by region	0.887	high
9	Intramural expenditure for R&D of total GDP by region and value of imports of high-tech products of total imports of products by region	0.589	moder ate

The 18 group indexes and their correlation

No.	index	Coefficient	Degree
10	Number of junior college students and above per 10,000 population by region and employee labor productivity by region	0.747	moderate
11	Intramural expenditure for R&D of total GDP by region and per capita gross domestic product（GDP）by region	0.566	moderate
12	Intramural expenditure for R&D of total GDP by region and comprehensive energy consumption output capacity by region	0.197	unrelated
13	R&D expenditure of medium-sized industrial enterprises of total value added by region and average patent applications of medium-sized industrial enterprises by region	0.311	unrelated
14	R&D expenditure of medium-sized industrial enterprises of total value added by region and revenue from the sale of new products in medium-sized industrial enterprises of total revenue from the sale of products by region	0.410	low
15	Expenditure on new products in medium-sized industrial enterprises of total revenue from the sale of products by region and revenue from the sale of new products in medium-sized industrial enterprises of total revenue from the sale of products by region	0.533	moderate
16	Expenditure of R&D on high technology industry of total value added by region and average patent applications of high technology industry by region	0.321	unrelated
17	Expenditure on new products of high technology industry of total revenue from the sale of products by region and revenue from the sale of new product of high technology industry of total sale of product by region	0.415	low
18	Full-time equivalent of R&D personnel of high technology industry of total R&D personnel’s by region and value added of high technology industry of total manufacturing by region	0.547	moderate

Result analysis

- The **high correlation** of two indicators indicates that there is no evident regional difference in the rate of input and output. For example most of the nine groups indexes used for analyzing the relationship of S&T input and output are more highly correlated than others. Six groups are highly correlated. Three groups are middle-degree correlated.
- The **low correlation** of two indicators indicates that there is evident regional difference in the rate of input and output. For example most of the indexes, which are used for analyzing the relationship of S&T input and economy and society, the relationship of S&T input and output in the large and medium enterprises, and in the hi-tech industries, are slightly correlated. Four groups are middle-degree correlated. Two groups are slightly correlated. Three groups have no correlation.
- In fact, the direct effect of increasing S&T human resource and capital input is increasing S&T output. Because the development of society, economy and enterprise lags behind increasing of S&T input, the correlation of them is lower.

3.2Analysis on the regional difference—structure analysis

- Analysis object: To analyze the structural difference of S&T indexes , to compare the S&T difference of different regions.
- Analysis contents: Using structure charts illustrates the proportion structural characters of part of S&T indexes. We selected 8 groups indexes:

（1） Full-time equivalent of R&D personnel of implemental department of total R&D personnel's (%)

（2） Intramural expenditure for R&D of implemental department of total R&D expenditure (%)

（3） Three types patents of total patent applications (%)

（4） Three types patents of total patents granted (%)

（5） Domestic patents science and technical papers by field(%)

（6） International patents science and technical papers by field(%)

（7） Intramural Expenditure for R&D of different industries by industries in the fields of High-tech industry(%)

（8） Value of Exports of High-tech Products of total exports of Products by field (%)

Fig.5 Full-time equivalent of R&D personnel of implemental department of total R&D personnel's (%)

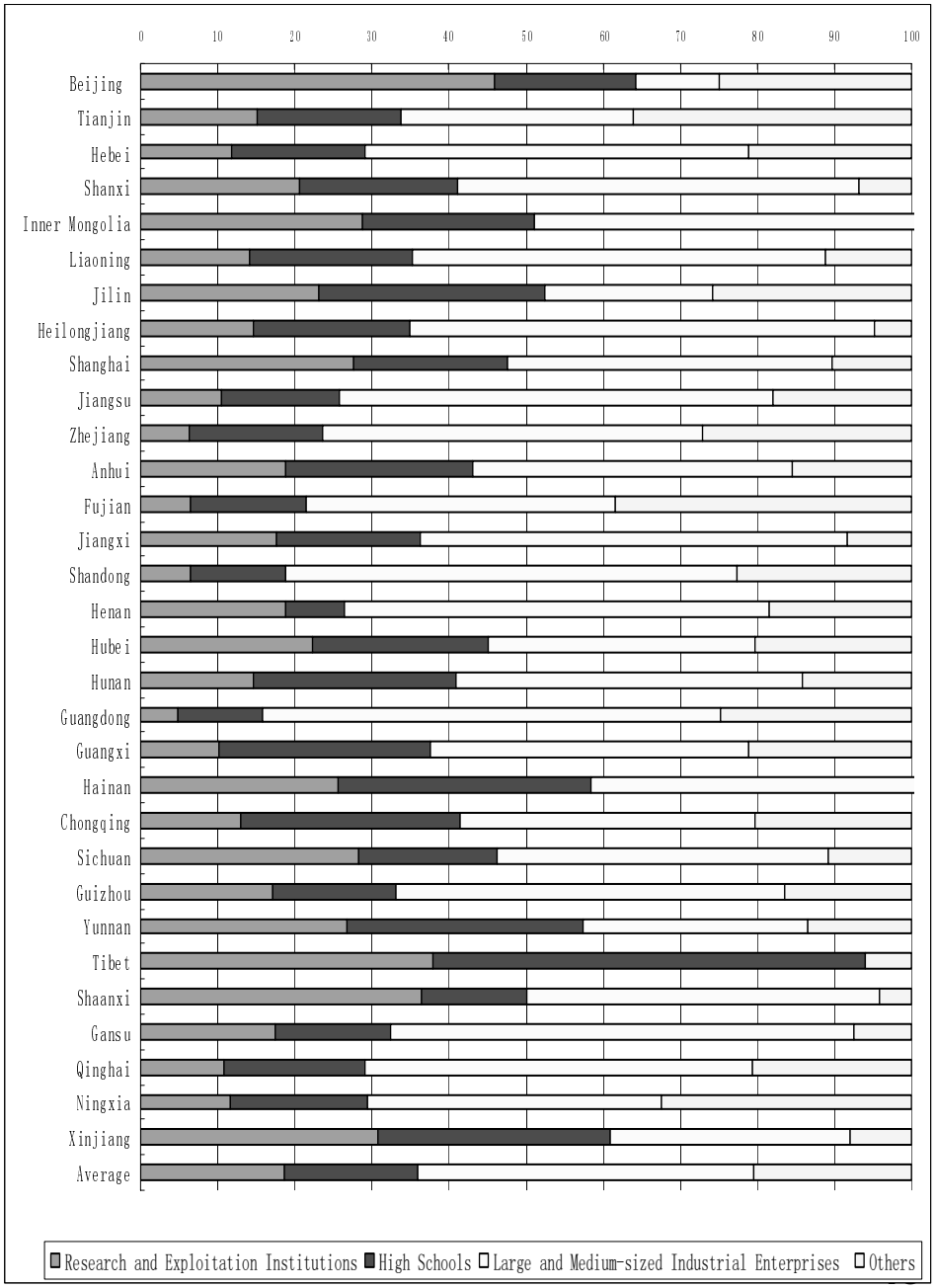
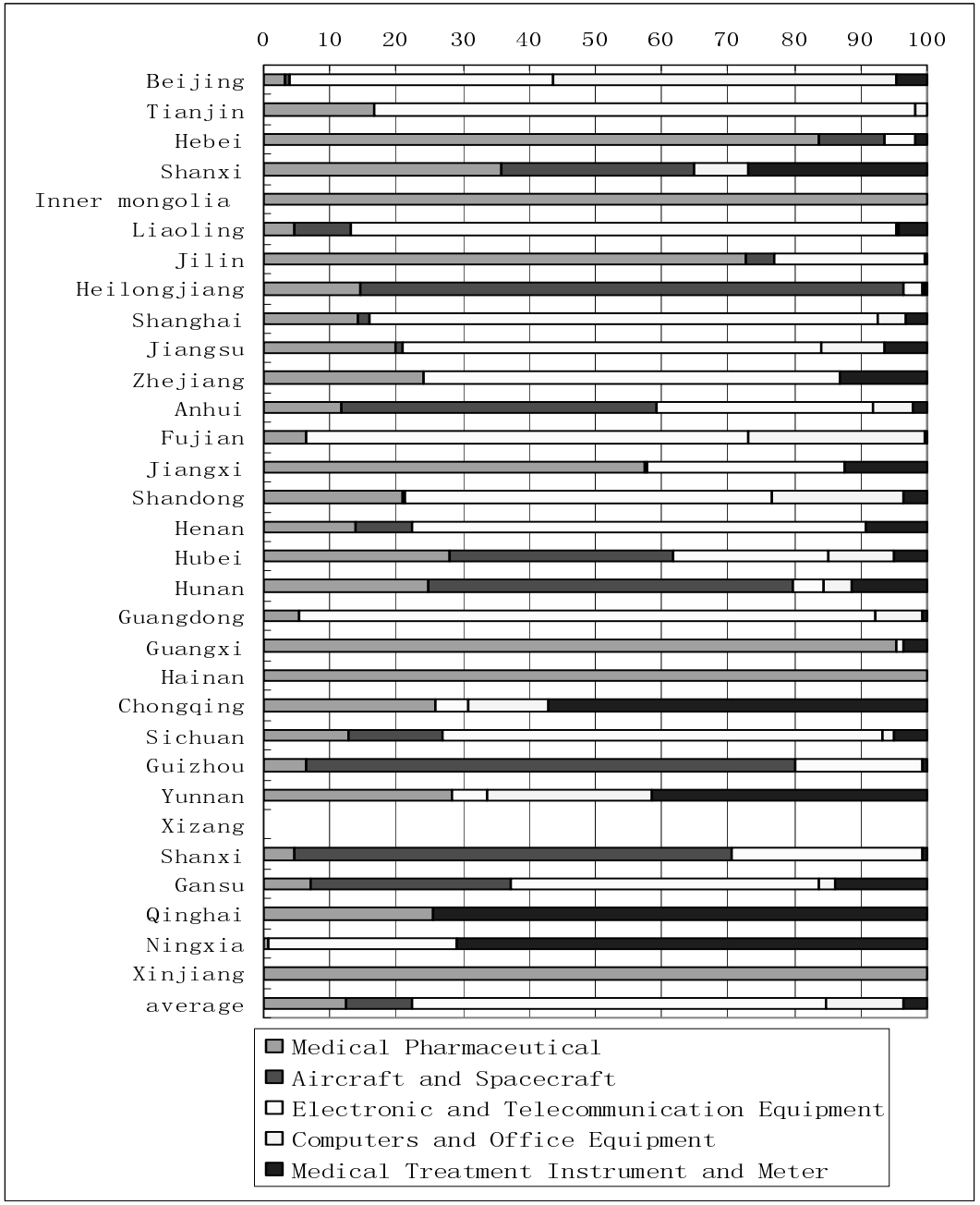


Fig.6 Hi-tech industry of total R&D intramural expenditure by industry (%)



3.2Analysis on the regional difference—structure analysis

- By use of the structure chart the collectivity difference situation of sub-index and the distributing difference of any index by region can be compared.
- The structure chart of full-time equivalent of R&D personnel of implemental department of total R&D personnel's (%) indicates that the full-time equivalent of R&D personnel of large and medium-sized enterprises accounts for 43.7percent.
- The structure chart of intramural expenditure for R&D of different industries in the fields of hi-tech industry indicates that the proportion of R&D expenditure of medication manufacturing is 100 percent in Inner Mongolia , Hainan and Xinjiang.
- The structure of some indexes is obviously different by regions, which indicates the difference of S&T indicators in different region. The high value of indicator indicates this field may be the advantageous field of this region.

3.3Analysis on the regional difference— Gini coefficient analysis

- Analysis object: To analyze the equilibrium status of the S&T resource collocation
- Analysis method: Gini coefficient is an indicator of measuring the inequality degree of Income allotment . In this paper we use it to measure the collocation status of S&T resource
- Based on Gini coefficient the collocation status of S&T resource is divided into 5 sections.

classification	standard	meanings
The first section	0.0 ⩽ Gini coefficient <0.2	High equilibrium
The second section	0.2⩽ Gini coefficient <0.3	Basic equilibrium
The third section	0.3⩽ Gini coefficient <0.4	Smaller gap
The fourth section	0.4 ⩽ Gini coefficient <0.5	Bigger gap
The fifth section	0.5 ⩽ Gini coefficient	Biggest gap

Section	Indicator	G.C
The first section (High equilibrium)	Number of junior college students and above per 10,000 population by region (person/10,000persons)	0.199
	Scientists and engineers of total S&T personnel by region (%)	0.048
	Scientists and engineers of total full-time Equivalent of R&D personnel by region（%）	0.034
	R&D intramural expenditure for every R&D personnel by region (10,000yuan/person)	0.178
	Industries enterprises of total service patent applications by region (%)	0.161
	Industries enterprises of total service patents granted by region (%)	0.176
	S&T institutes in large and medium-sized industrial enterprises by region (unit/enterprise)	0.141
	R&D personnel in large and medium-sized industrial enterprises of total employees by region (%)	0.184
	Expenditure on new products in medium-sized industrial enterprises of total revenue from the sale of products by region (%)	0.176
	Value of Imports of high-tech Products of total imports of Products by region (%)	0.151
	Proportion of rural per capita net income and urban per capita disposable income by region(%)	0.116
	Educational fund of total GDP by region(%)	0.149

Section	Indicator	G.C
The second section (Basic equilibrium)	Student enrollment in high education per 10,000 population by region (person/10,000persons)	0.219
	Appropriation for S&T by Local finance of total local expenditure by region (%)	0.240
	Funds arranged for three industrialization program of total GDP (%)	0.248
	R&D expenditure of medium-sized industrial enterprises of total value added by region (%)	0.202
	Expenditure on new products in medium-sized industrial enterprises of total revenue from the sale of products by region (%)	0.253
	Expenditure of R&D on high technology industry of total value added by region (%)	0.238
	Expenditure on new products of high technology industry of total revenue from the sale of products by region (%)	0.264
	Revenue from the sale of new product of high technology industry of total sale of product by region (%)	0.264
	Value added on high technology industry of total value added on manufacturing by region (%)	0.230
	Value of exports of high-tech products of total exports of products by region (%)	0.282
	Per capita gross domestic product（GDP）by region (yuan/person)	0.273
	Output value of the three wastes comprehensive utilization of gross value of industrial output by region(%)	0.285

Section	Indicator	G.C
The third section (Smaller gap)	Number of S&T personnel per 10,000 population by region (person/10,000persons)	0.332
	Full-time equivalent of R&D personnel per 10,000 population by region(man-year/10,000persons)	0.377
	Intramural expenditure for R&D of total GDP by region (%)	0.349
	Average patent applications of medium-sized industrial enterprises by region (unit/ unit)	0.331
	Average owning inventive patents by medium-sized industrial enterprises by region (unit/ unit)	0.342
	Value added of high technology industry of total manufacturing by region (%)	0.376
	Full-time equivalent of R&D personnel of high technology industry of total R&D personnel's by region (%)	0.375
	Average patent applications of high technology industry by region (piece/unit)	0.362
	Average owning inventive patents of high technology industry by region (piece/unit)	0.394
	Internet user number per 10,000 population by region(10,000persons/10,000persons)	0.309

Section	Indicator	G.C
The fourth section (Bigger gap)	Domestic patents science and technical papers per 100,000 population by region (piece/100,000persons)	0.436
	Average invention patent applications of medium-sized industrial enterprises by region (unit/ unit)	0.468
	Number of enterprises in hatching of S&T per 10,000 population business incubator by region (unit/10,000persons)	0.437
The fifth section (Biggest gap)	Patent applications per 100,000 population by region (piece/100,000persons)	0.521
	Patents granted per 100,000 population by region (piece/100,000persons)	0.545
	Number of papers taken by SCI、EI、ISTP per 100,000 by region (piece/100,000persons)	0.630
	Value of contractual inflows in technical markets of total GDP by region (%)	0.510
	Foreign direct investment for every personnel by region (dollar/person)	0.624
	Popular science museum receive number of per 10,000 by region(person/10,000persons)	0.535

Fig7. Number of junior college students and above per 10,000 population (person/10,000persons)
Geordie Coefficient = 0.199

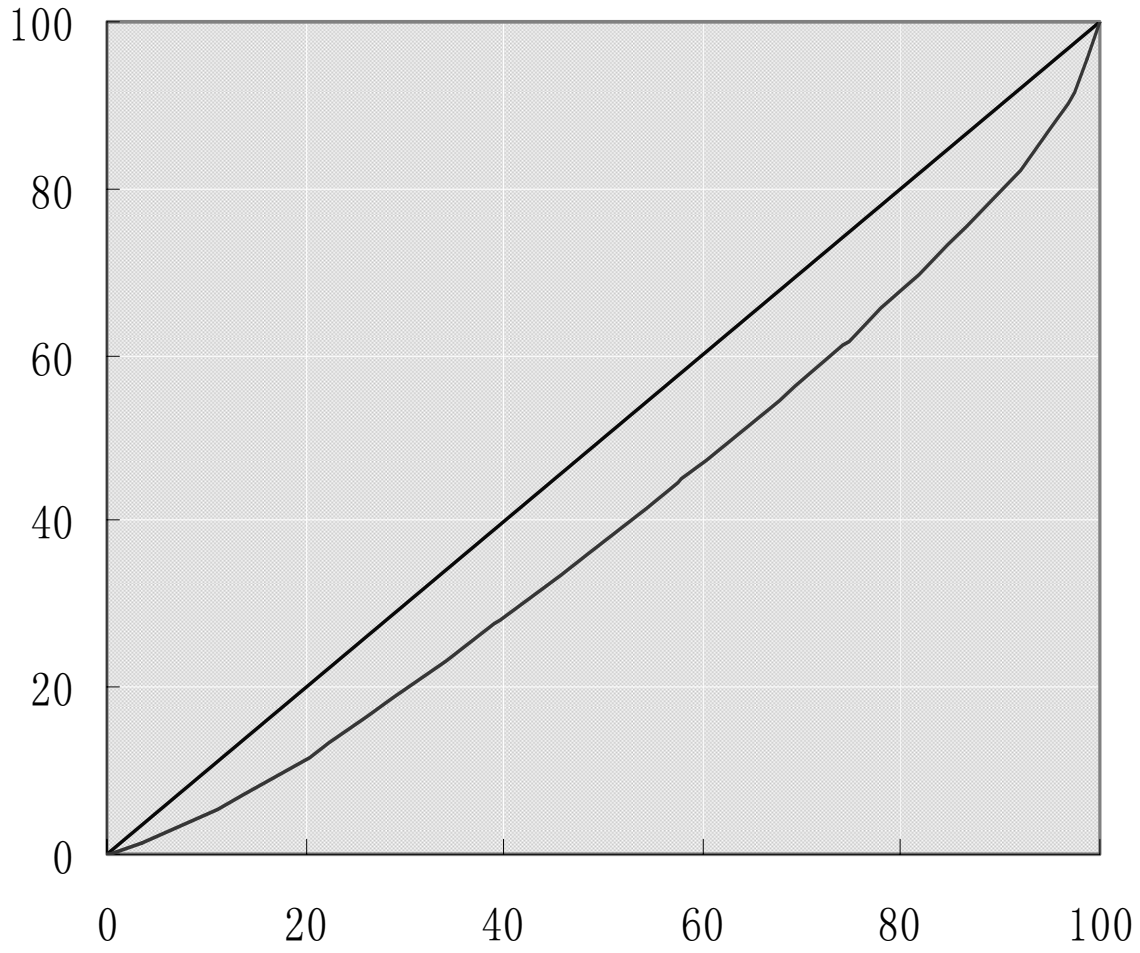
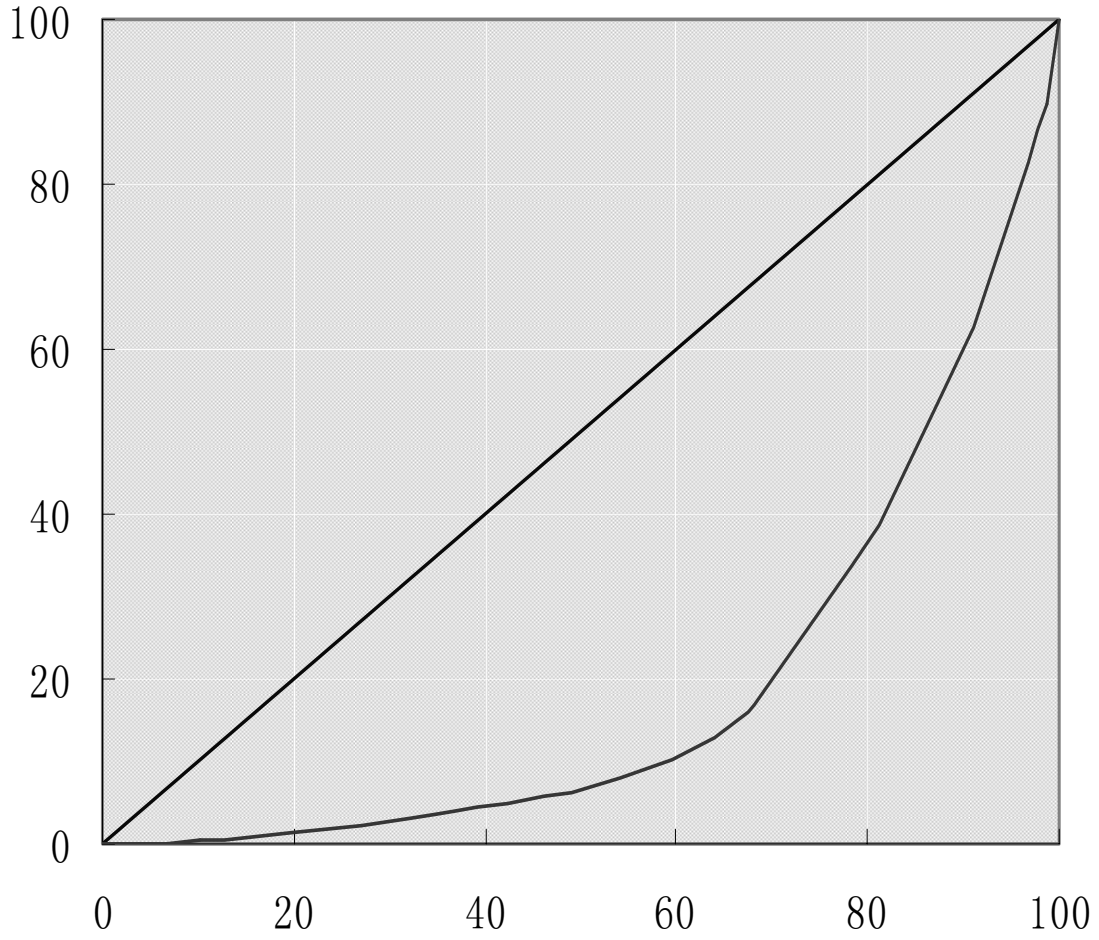


Fig.8 Foreign direct investment for every personnel
by region(dollar/person)
Geordie Coefficient = 0.624



3.3Analyzing on the regional difference—result of Gini coefficient analysis

- The Gini coefficient analysis result shows: 12 indicators are in high equilibrium, 12 indicators are in basic equilibrium, 10 indicators are in low equilibrium, 3 indicators are in disequilibrium, 6 indicators are in high disequilibrium.
- The analysis result shows that the distributing of a majority of S&T indicators are balanced, while the distributing of a few of indicators is not good enough.
- The unbalanced indicators are mostly S&T output indicators, such as Patent Applications for every personnel , Patents Granted for every personnel , International papers for every personnel , Value of Contractual inflows in Technical Markets of total GDP, Foreign direct investment for every personnel, Receive number of Popular science museum.

3.4Analysis on the regional difference— S&T location quotient analysis

- Analysis object: to indicate the distribution situation of a S&T indicator in the whole country, and the relative position of a region in the whole country.
- Analysis method: ranking S&T indicators according to their values, calculating S&T location quotient and illustrating it by square diagram and maps.

Serial Number	Region	Value	Ranking	tion Quot
1	Beijing	87.27	1	111
2	Tianjin	78.54	17	100
3	Hebei	82.73	6	105
4	Shanxi	79.18	16	101
5	nner Mongoli	82.04	8	104
6	Liaoning	80.96	12	103
7	Jilin	84.56	5	107
8	Heilongjiang	79.58	15	101
9	Shanghai	81.07	11	103
10	Jiangsu	75.13	26	95
11	Zhejiang	76.28	22	97
12	Anhui	76.82	20	98
13	Fujian	76.32	21	97
14	Jiangxi	71.30	29	91
15	Shandong	78.33	18	99
16	Henan	75.26	25	96
17	Hubei	80.58	14	102
18	Hunan	80.88	13	103
19	Guangdong	82.30	7	105
20	Guangxi	81.48	9	103
21	Hainan	86.73	3	110
22	Chongqing	84.92	4	108
23	Sichuan	76.03	23	97
24	Guizhou	75.30	24	96
25	Yunnan	74.97	27	95
26	Tibet	76.82	20	98
27	Shaanxi	65.07	30	83
28	Gansu	74.77	28	95
29	Qinghai	81.15	10	103
30	Ningxia	77.89	19	99
31	Xinjiang	86.75	2	110
	whole country	78.74		100

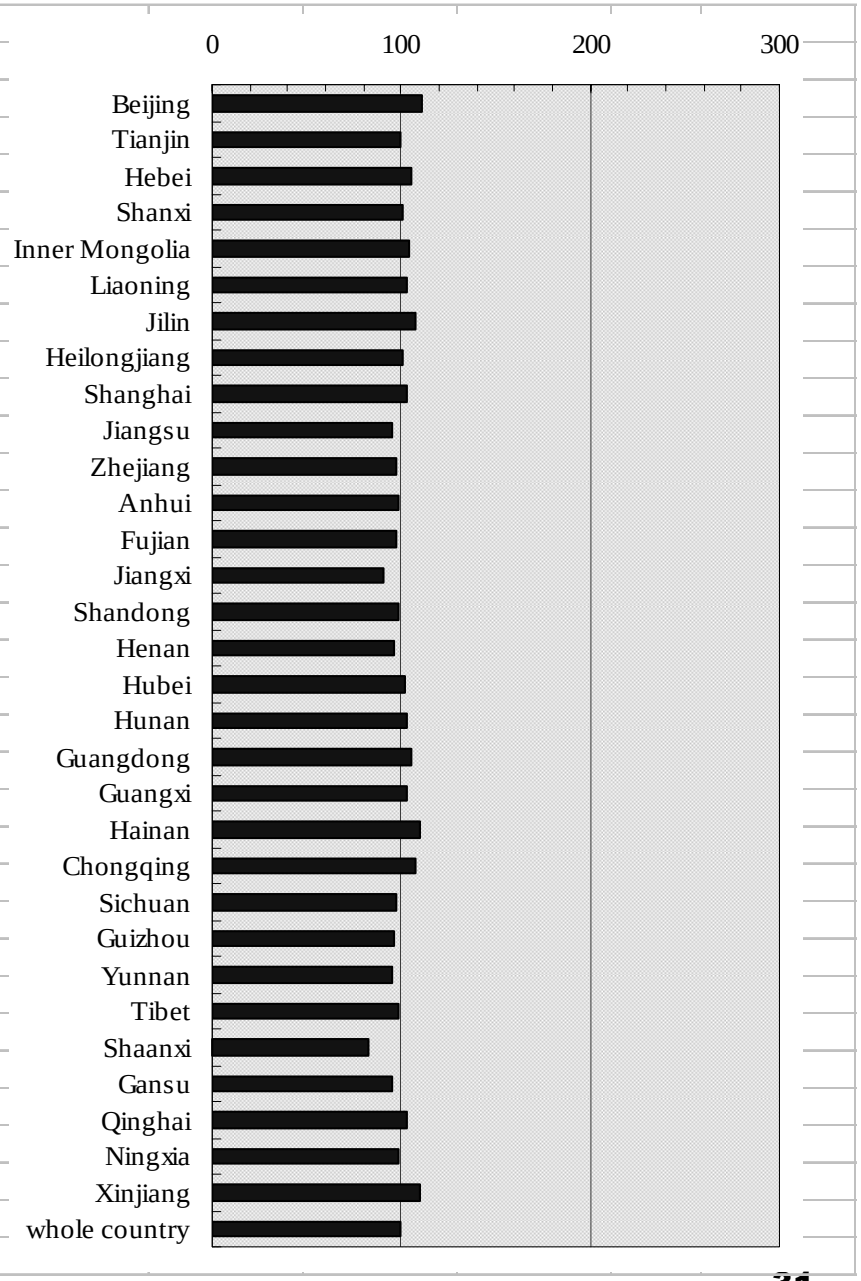


Fig.9a Scientists and engineers of total full-time equivalent of R&D personnel by region（%）

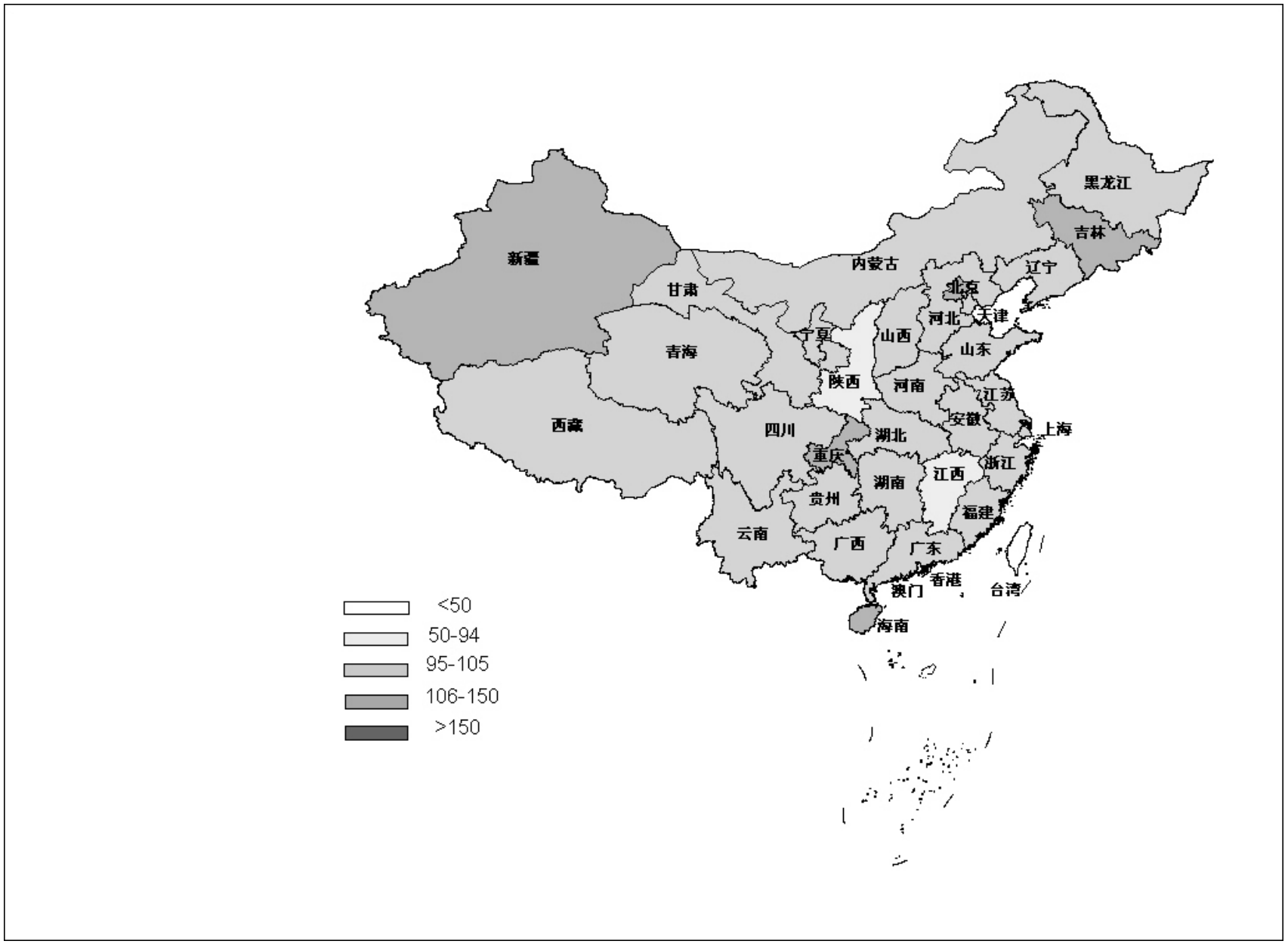


Fig.9b Scientists and engineers of total full-time equivalent of R&D personnel by region（%）

Serial number	Region	Value	Ranking	tion Quot
1	Beijing	75.51	1	891
2	Tianjin	28.49	3	336
3	Hebei	5.09	18	60
4	Shanxi	5.58	17	66
5	Inner Mongolia	3.65	25	43
6	Liaoning	13.31	5	157
7	Jilin	7.20	13	85
8	Heilongjiang	9.08	9	107
9	Shanghai	32.85	2	388
10	Jiangsu	13.24	6	156
11	Zhejiang	9.95	8	117
12	Anhui	3.92	24	46
13	Fujian	7.63	12	90
14	Jiangxi	4.00	23	47
15	Shandong	8.58	11	101
16	Henan	4.21	21	50
17	Hubei	8.65	10	102
18	Hunan	4.05	22	48
19	Guangdong	11.79	7	139
20	Guangxi	2.72	28	32
21	Hainan	1.28	31	15
22	Chongqing	5.67	16	67
23	Sichuan	6.65	14	79
24	Guizhou	2.23	30	26
25	Yunnan	2.96	26	35
26	Tibet	2.29	29	27
27	Shaanxi	14.70	4	173
28	Gansu	6.49	15	77
29	Qinghai	4.24	20	50
30	Ningxia	4.69	19	55
31	Xinjiang	2.76	27	33
	whole country	8.47		100

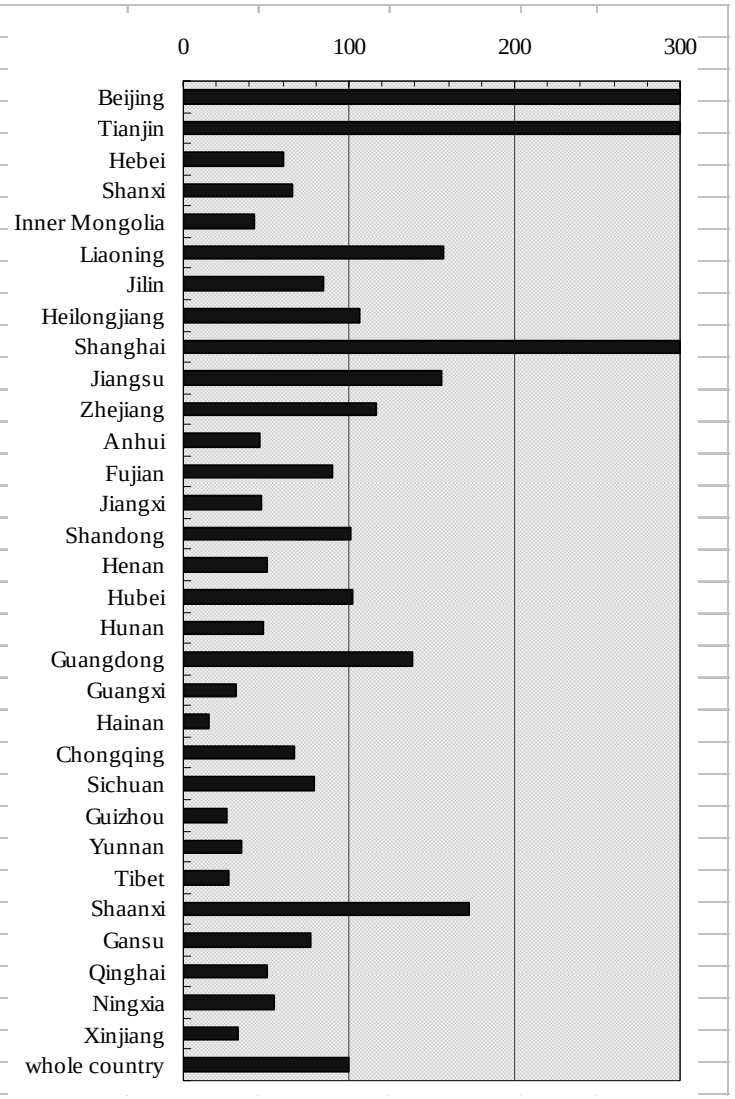


Fig.10a Full-time Equivalent of R&D personnel per 10,000 population by region (man-year/10,000persons)

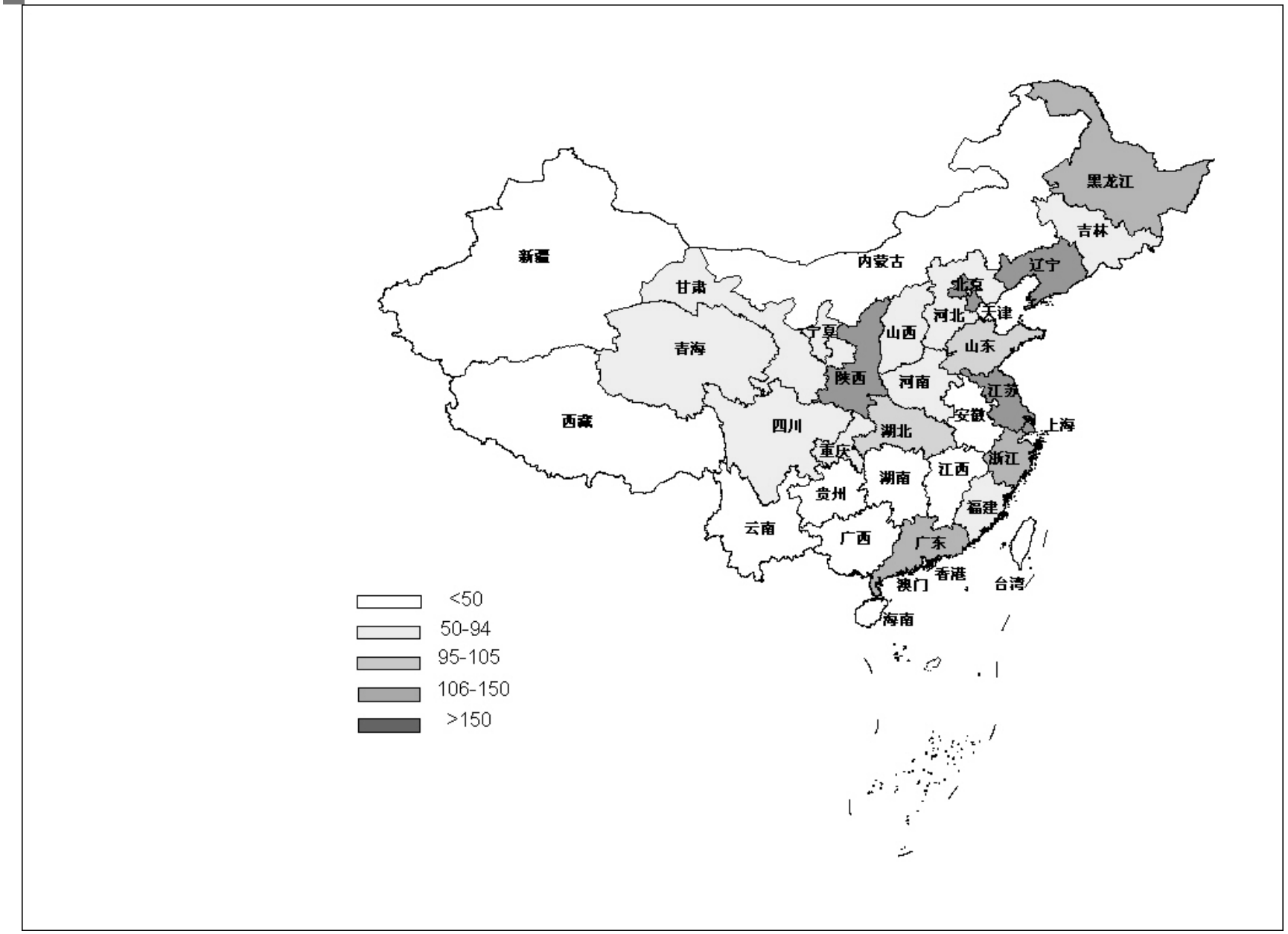


Fig.10b Full-time equivalent of R&D personnel per 10,000 population by region (man-year/10,000persons)

3.4Analysis on the regional difference—S&T location quotient analysis

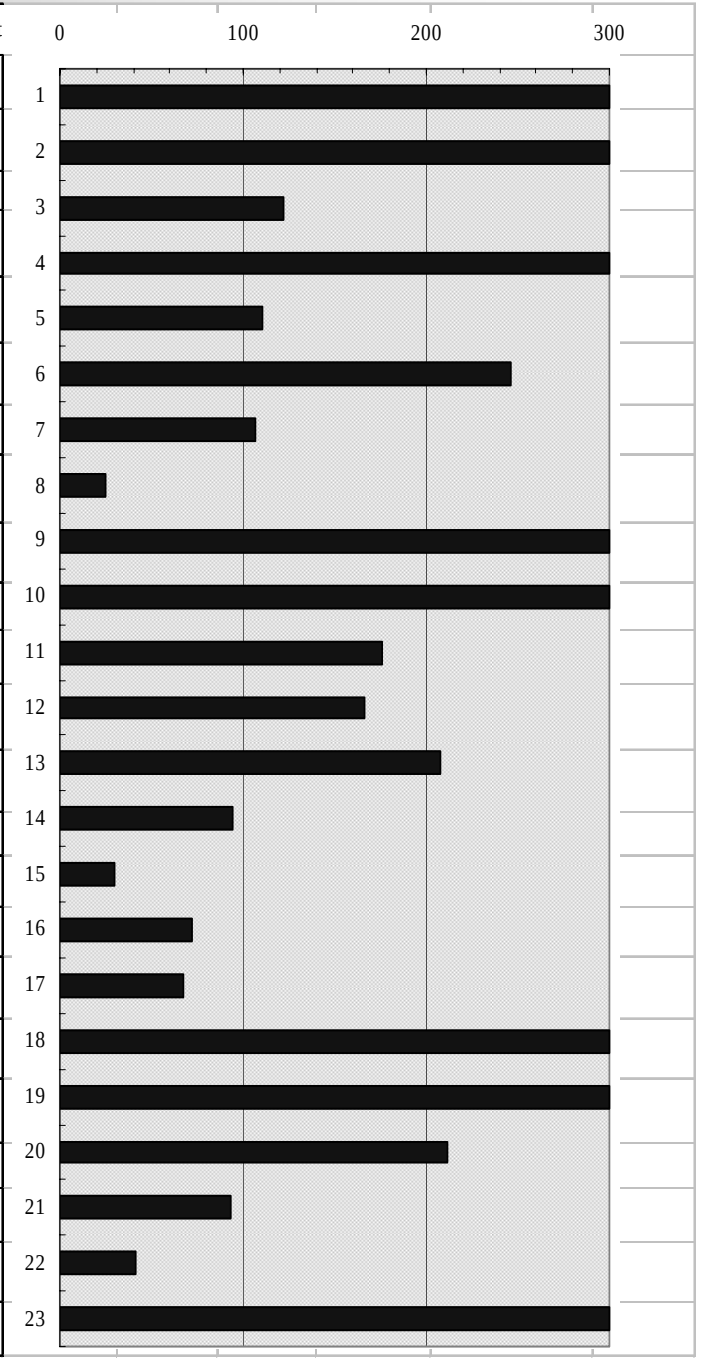
- According to the value of location quotient, the S&T indicators can be classified into 3 sorts: The first group are balanced-distributing indicators, which are intensively impacted by policy. The second group are unbalanced-distributing indicators, presenting polarization. The third group lie in the intermediate situation, few of which exceed the double level of national average.

3.4Analysis on the regional difference—S&T location quotient analysis

- Through location quotient analysis, the disparity of different indicators in the same region can be presented, then the advantages and disadvantages of one region can be discovered.
- Meanwhile, we can also compare the S&T indicators of different regions, in order to find out the superior and inferior areas.
- Given that both of Beijing and Chongqing are directly governed city，the essential data of them are comparable, we selected them as the examples to analyze.

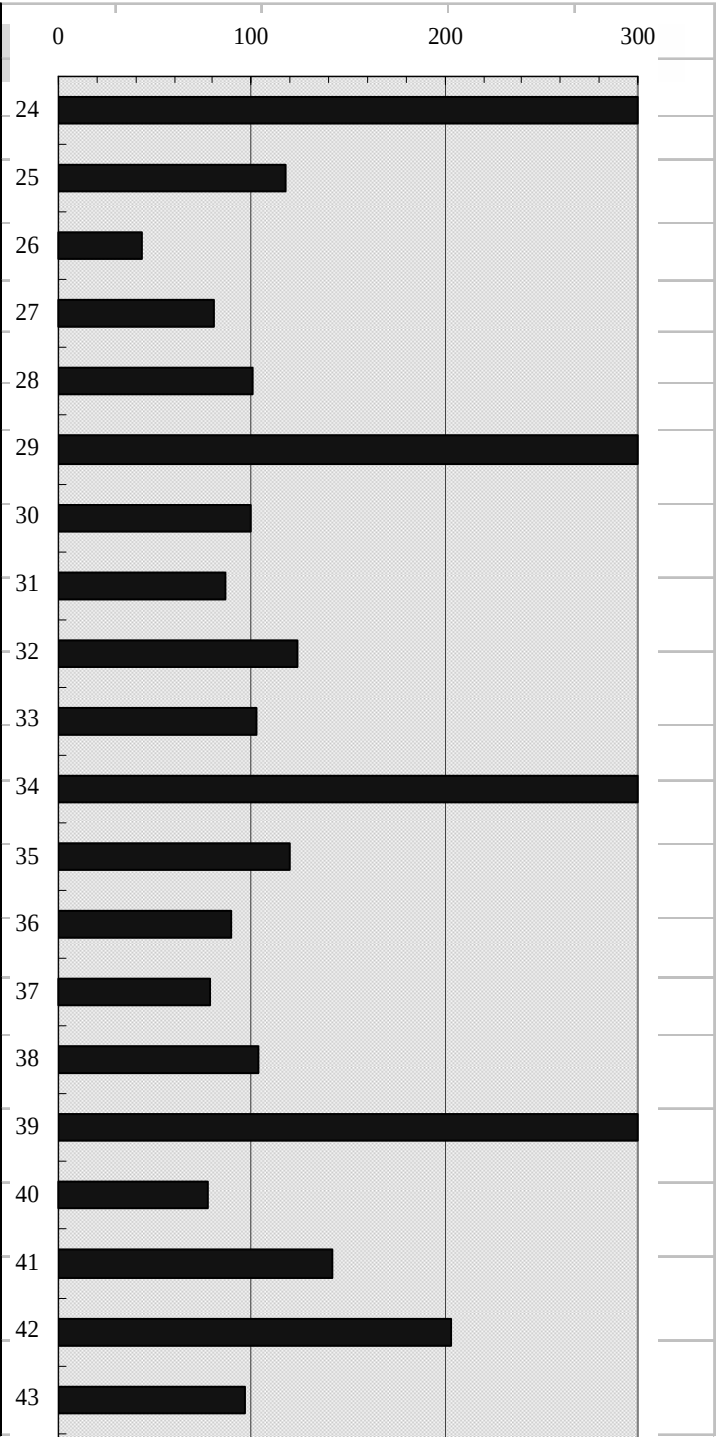
Beijing

sn	index	index value	order of cas	location quotient
1	Number of junior college students and above per 10,000 population (person/10,000persons)	1928.95	1	377
2	Number of S&T Personnel per 10,000 population (person/10,000persons)	186.07	1	732
3	Scientists and engineers of total S&T personnel (%)	83.52	1	122
4	Full-time Equivalent of R&D personnel per 10,000 population (man-year/10,000persons)	75.51	1	891
5	Scientists and engineers of total full-time Equivalent of R&D personnel (%)	87.27	1	111
6	Research Institutions of total full-time Equivalent of R&D personnel (%)	45.85	1	246
7	High schools of total full-time Equivalent of R&D personnel (%)	18.43	18	107
8	Large and Medium-sized Enterprises of total full-time Equivalent of R&D personnel (%)	10.82	30	25
9	Student Enrollment in High Education per 10,000 population (person/10,000persons)	312.14	1	364
10	Intramural Expenditure for R&D of total GDP (%)	7.00	1	533
11	Appropriation for S&T by Local finance of total Local Expenditure (%)	3.42	1	176
12	R&D Intramural Expenditure for every R&D personnel (10,000yuan/person)	23.31	1	166
13	Research and Exploitation Institutions of total Intramural Expenditure (%)	53.89	2	208
14	High school of total Intramural Expenditure (%)	9.92	17	94
15	Large and Medium-sized Enterprises of total Intramural Expenditure (%)	14.03	30	30
16	Funds Arranged for Three Industrialization Program of total GDP (%)	0.49	14	72
17	Increase cost of instrument equipment of every R&D personnel (10,000yuan/person)	3.26	20	67
18	Increase fixed assets for Scientific research and synthesis technical service of total social (%)	2.72	1	425
19	Patent Applications per 100,000 population (piece/100,000persons)	116.78	2	652
20	Invention Patents of total Patent Applications (%)	46.07	2	212
21	Utility Model Patents of total Patent Applications (%)	39.20	24	93
22	Design Patents of total Patent Applications (%)	14.73	27	41
23	Patents Granted per 100,000 population (piece/100,000persons)	56.65	2	536



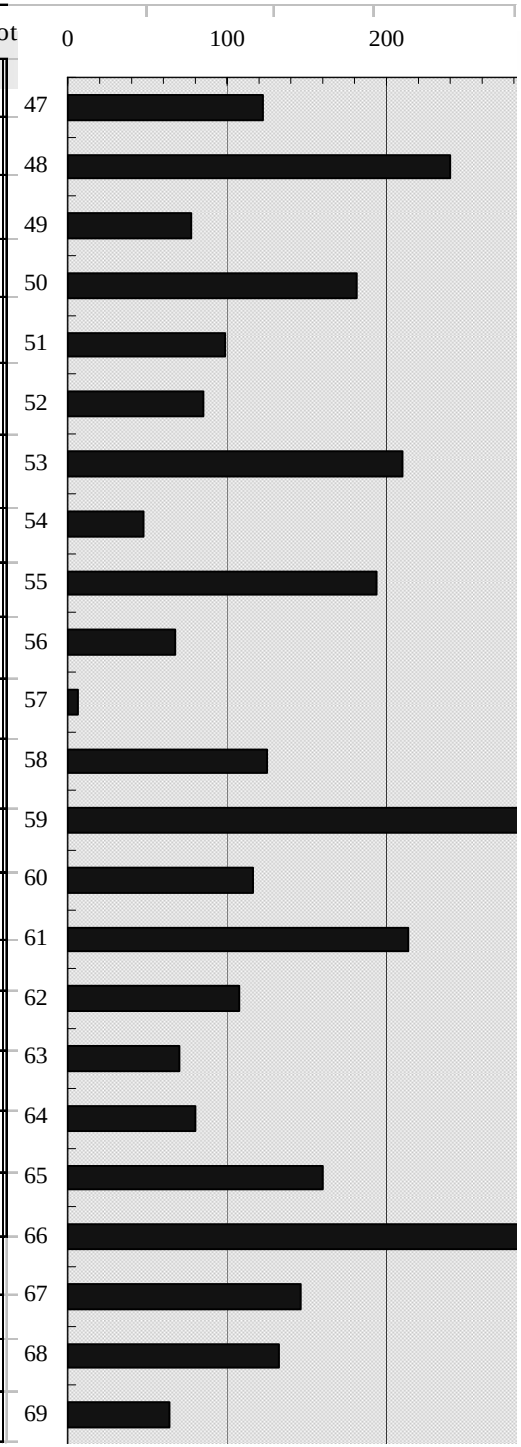
Beijing

sn	index	value	order	l q
24	Invention Patents of total Patents Granted (%)	27.41	1	363
25	Utility Model Patents of total Patents Granted (%)	51.45	19	118
26	Design Patents of total Patents Granted(%)	21.13	24	43
27	Industries Enterprises of total Service Patent Applications (%)	45.78	22	81
28	Industries Enterprises of total Service Patents Granted by region (%)	43.75	14	101
29	Number of Papers Taken by SCI、EI、ISTP per 100,000 (piece/100,000persons)	146.93	1	2357
30	Basic Disciplines of total Papers Taken by SCI、EI、ISTP (%)	46.31	19	100
31	Medical Care of total Papers Taken by SCI、EI、ISTP (%)	5.56	14	87
32	Agriculture,Forestry,Animal Husbandry and Fishery of total Papers Taken by SCI、EI、ISTP(%)	0.81	12	124
33	Manufacturing Technology of total Papers Taken by SCI、EI、ISTP by region (%)	46.14	10	103
34	Domestic Patents Science and technical Papers per 100,000 population (piece/100,000persons)	274.80	1	1293
35	Basic Disciplines of total Domestic Patents Science and technical Papers (%)	20.74	10	120
36	Medical Care of total Domestic Patents Science and technical Papers(%)	32.31	18	90
37	Agriculture,Forestry,Animal Husbandry and Fishery of total Domestic Patents Science and technical Papers (%)	5.11	24	79
38	Manufacturing Technology of total Domestic Patents Science and technical Papers (%)	39.60	10	104
39	Value of Contractual inflows in Technical Markets of total GDP by region (%)	7.24	1	783
40	R&D personnel in Large and Medium-sized Industrial Enterprises of total Employees(%)	0.24	15	78
41	R&D personnel in Large and Medium-sized Industrial Enterprises of total Employees (%)	2.18	3	142
42	R&D Expenditure of Medium-sized Industrial Enterprises of total Value added (%)	5.04	1	203
43	Expenditure on New Products in Medium-sized Industrial Enterprises of total Revenue from the Sale of products (%)	0.64	12	97
44	Revenue from the sale of New Products in Medium-sized Industrial Enterprises of total Revenue from the Sale of products (%)	19.76	7	135



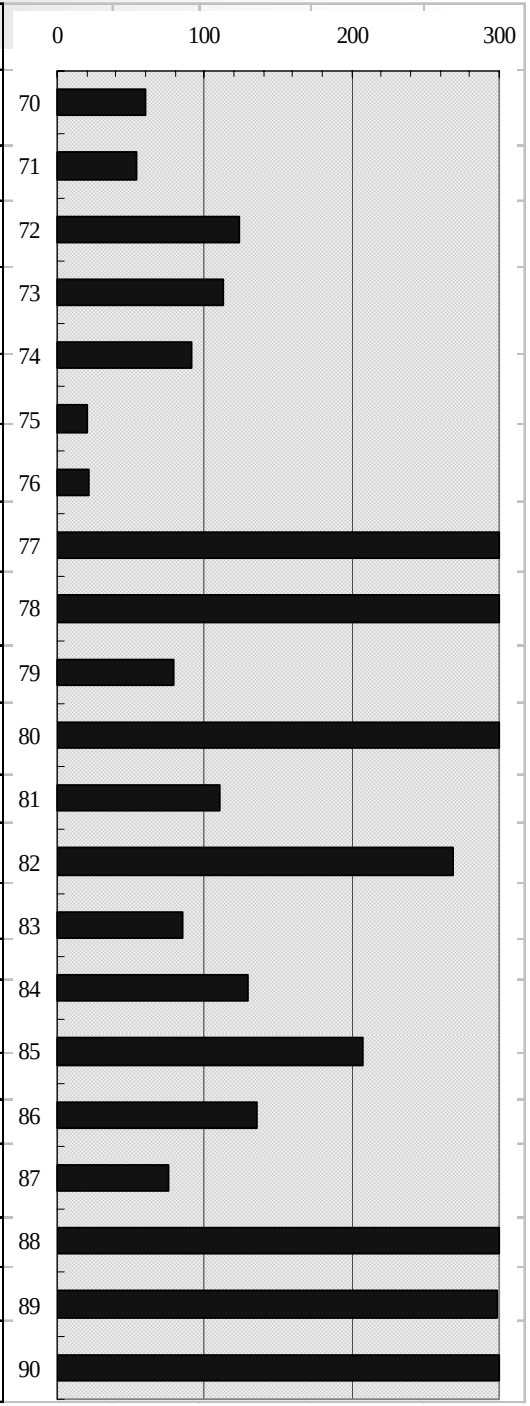
Beijing

sn	index	index value	order	ion quot
47	Average Ow ning Inventive Patents by Medium-sized Industrial Enterprises (unit/ unit)	0.849537	7	123
48	Value added of High Technology Industry of total Manufacturing (%)	28.731989	1	240
49	Medical Pharmaceutical Products Manufacturing of total Value added of High Technology Industry (%)	15.763783	27	77
50	Aircraft and Spacecraft Manufacturing of total Value added of High Technology Industry (%)	5.076997	12	181
51	Electronic and Telecommunication Equipment Manufacturing of total Value added of High Technology Industry (%)	50.467483	7	99
52	Computers and Office Equipment Manufacturing of total Value added of High Technology Industry (%)	17.221228	5	85
53	Computers and Office Equipment Manufacturing of total Value added of High Technology Industry (%)	11.470506	6	210
54	Full-Time Equivalent of R&D personnel of High Technology Industry of total R&D personnel's (%)	5.6472664	20	48
55	Expenditure of R&D on High Technology Industry of total value added (%)	8.5552038	3	194
56	Expenditure of R&D on Medical Pharmaceutical Products Manufacturing of total value added (%)	1.8100741	18	67
57	Expenditure of R&D on Aircraft and Spacecraft Manufacturing of total value added (%)	1.0203114	17	6
58	Expenditure of R&D on Electronic and Telecommunication Equipment Manufacturing of total value added (%)	6.7188391	6	125
59	Expenditure of R&D on Computers and Office Equipment Manufacturing of total value added (%)	25.70519	2	1020
60	Expenditure of R&D on Medical Treatment Instrument and Meter Manufacturing of total value added (%)	3.4914595	12	116
61	Average Patent Applications of High Technology Industry (piece/unit)	1.4336	1	214
62	Average Ow ning Inventive Patents of High Technology Industry (piece/unit)	0.2928	7	108
63	Expenditure on New Products of High Technology Industry of total Revenue from the sale of products (%)	0.7140492	19	70
64	Revenue from the sale of New Product of High Technology Industry of total sale of product (%)	17.77732	14	80
65	Value added on High Technology Industry of total value added on Manufacturing (%)	35.00198	5	160
66	Number of Enterprises in hatching of S&T per 10,000 population Business Incubator(unit/10,000persons)	1.49	2	612
67	Value of Exports of High-tech Products of total exports of Products (%)	36.85	3	146
68	Value of Imports of High-tech Products of total imports of Products(%)	38.28	1	132
69	Exports of Products of total Exports and Imports of High-tech Products (%)	30.96	14	64



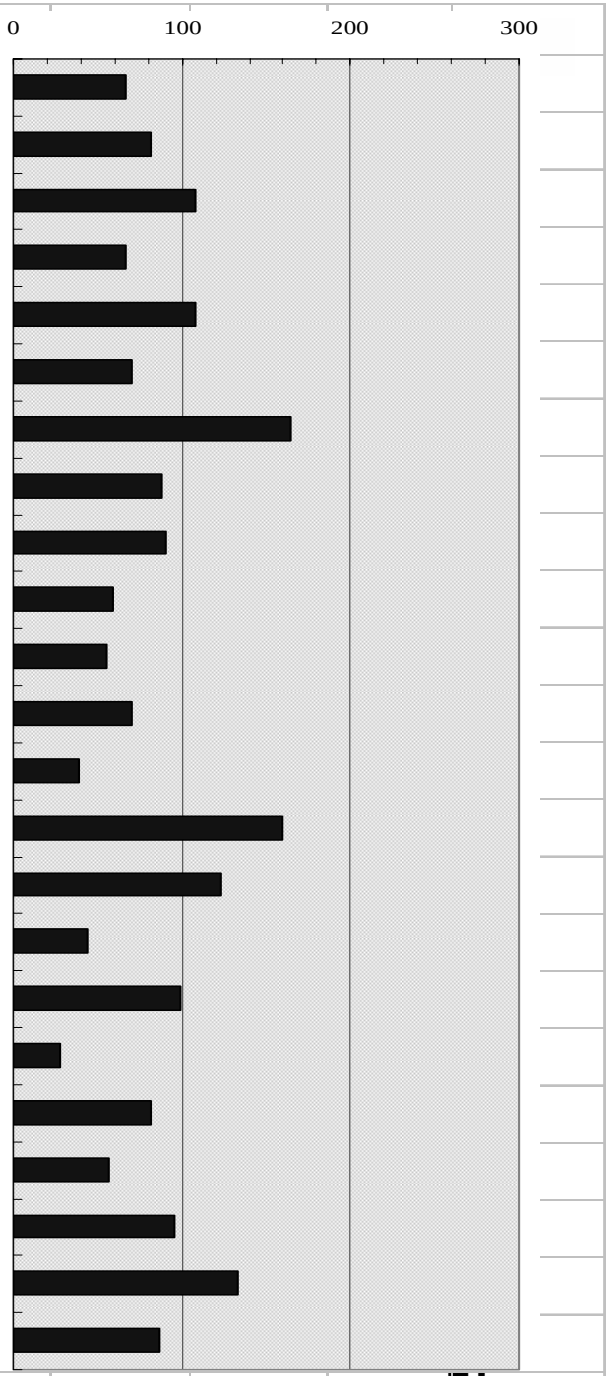
Beijing

sn	index	index value	order	location quotient
70	Export amount of high and new technology products total volume of imports and exports in field of compunication technology(%)	41.92	14	60
71	Export amount of high and new technology products total volume of imports and exports in field of life sciences technology(%)	24.42	21	54
72	Export amount of high and new technology products total volume of imports and exports in field of material technology(%)	21.80	12	124
73	Export amount of high and new technology products total volume of imports and exports in field of computer integrated manufacturing technology(%)	9.36	8	113
74	Amount of high and new technology products total volume of imports and exports in field of aerospace engineering technology	11.05	13	91
75	Export amount of high and new technology products total volume of imports and exports in field of electrooptical technology(%)	8.98	16	20
76	Export amount of high and new technology products total volume of imports and exports in field of biotechnology technology(%)	14.26	12	22
77	Export amount of high and new technology products total volume of imports and exports in field of material technology(%)	70.59	5	488
78	Per capita gross domestic product （GDP） (yuan/person)	32061	2	352
79	Append GDP of every hundred million investment (100,000,000yuan/100,000,000yuan)	0.22	16	79
80	Foreign direct investment for every personnel (dollar/person)	150.50	3	367
81	Comprehensive energy consumption output capacity (yuan/killo)	8.83	9	110
82	Employee labor productivity (10,000yuan/person)	4.14	3	269
83	Engel's coefficient of towner (%)	31.70	27	85
84	Proportion of rural per capita net income and urban per capita disposable income (%)	40.35	6	130
85	Educational fund of total GDP (%)	9.66	1	207
86	Years of person being educated (year/person)	9.20	1	136
87	Output value of the three wastes comprehensive utilization of gross value of industrial output (%)	0.63	19	75
88	Popular science museum Receive number of per 10,000 (person/10,000persons)	7833.23	1	1320
89	Telephone subscriber number per 100 population by region(door/100persons)	123.12	1	299
90	Internet user number per 10,000 population by region(10,000persons/10,000persons)	0.27	1	444



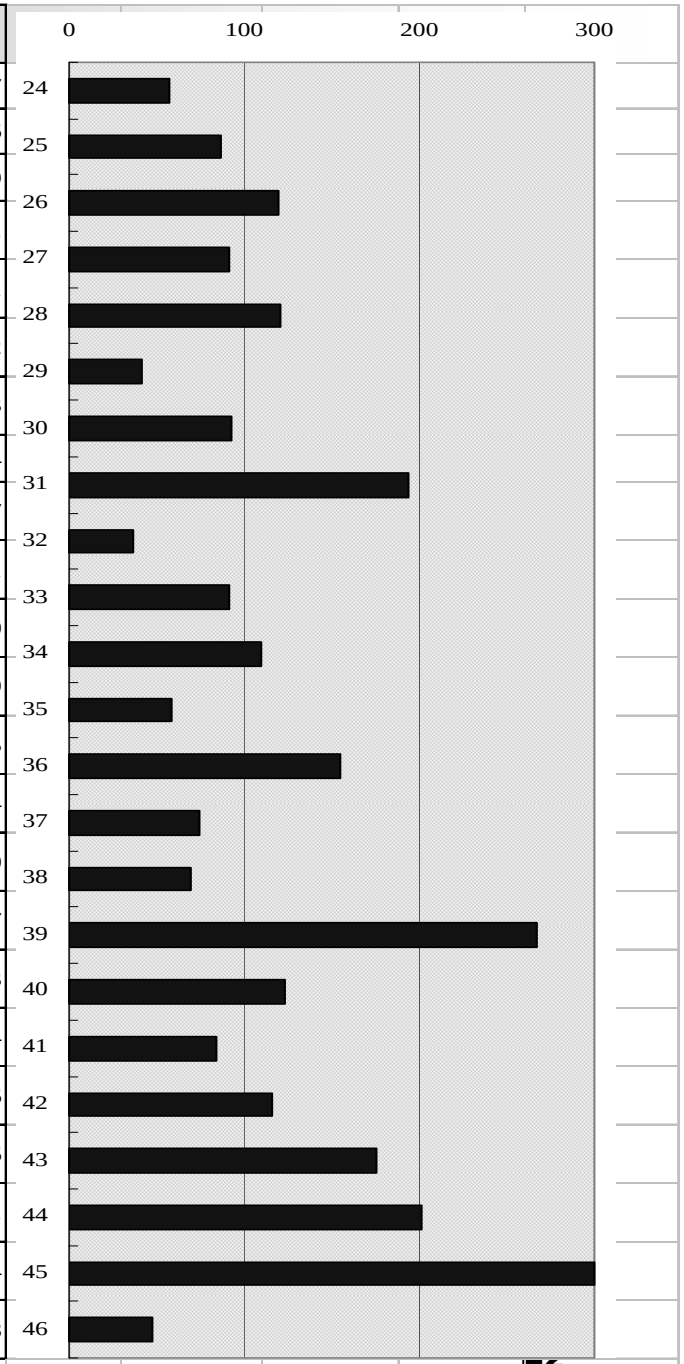
Chong qing

sn	index	value	order	lq
1	Number of junior college students and above per 10,000 population (person/10,000persons)	339.99	28	67
2	Number of S&T Personnel per 10,000 population (person/10,000persons)	20.82	15	82
3	Scientists and engineers of total S&T personnel (%)	74.16	4	108
4	Full-time Equivalent of R&D personnel per 10,000 population (man-year/10,000persons)	5.67	16	67
5	Scientists and engineers of total full-time Equivalent of R&D personnel (%)	84.92	4	108
6	Research Institutions of total full-time Equivalent of R&D personnel (%)	12.97	22	70
7	High schools of total full-time Equivalent of R&D personnel (%)	28.42	6	164
8	Large and Medium-sized Enterprises of total full-time Equivalent of R&D personnel (%)	38.30	23	88
9	Student Enrollment in High Education per 10,000 population (person/10,000persons)	76.84	16	90
10	Intramural Expenditure for R&D of total GDP (%)	0.77	15	59
11	Appropriation for S&T by Local finance of total Local Expenditure (%)	1.08	22	55
12	R&D Intramural Expenditure for every R&D personnel (10,000yuan/person)	9.83	20	70
13	Research and Exploitation Institutions of total Intramural Expenditure (%)	10.15	23	39
14	High school of total Intramural Expenditure (%)	16.75	4	159
15	Large and Medium-sized Enterprises of total Intramural Expenditure (%)	57.52	11	123
16	Funds Arranged for Three Industrialization Program of total GDP (%)	0.30	21	44
17	Increase cost of instrument equipment of every R&D personnel (10,000yuan/person)	4.81	10	99
18	Increase fixed assets for Scientific research and synthesis technical service of total social (%)	0.17	25	27
19	Patent Applications per 100,000 population (piece/100,000persons)	14.66	11	82
20	Invention Patents of total Patent Applications (%)	12.20	30	56
21	Utility Model Patents of total Patent Applications (%)	39.99	22	95
22	Design Patents of total Patent Applications (%)	47.81	4	133
23	Patents Granted per 100,000 population (piece/100,000persons)	9.21	10	87



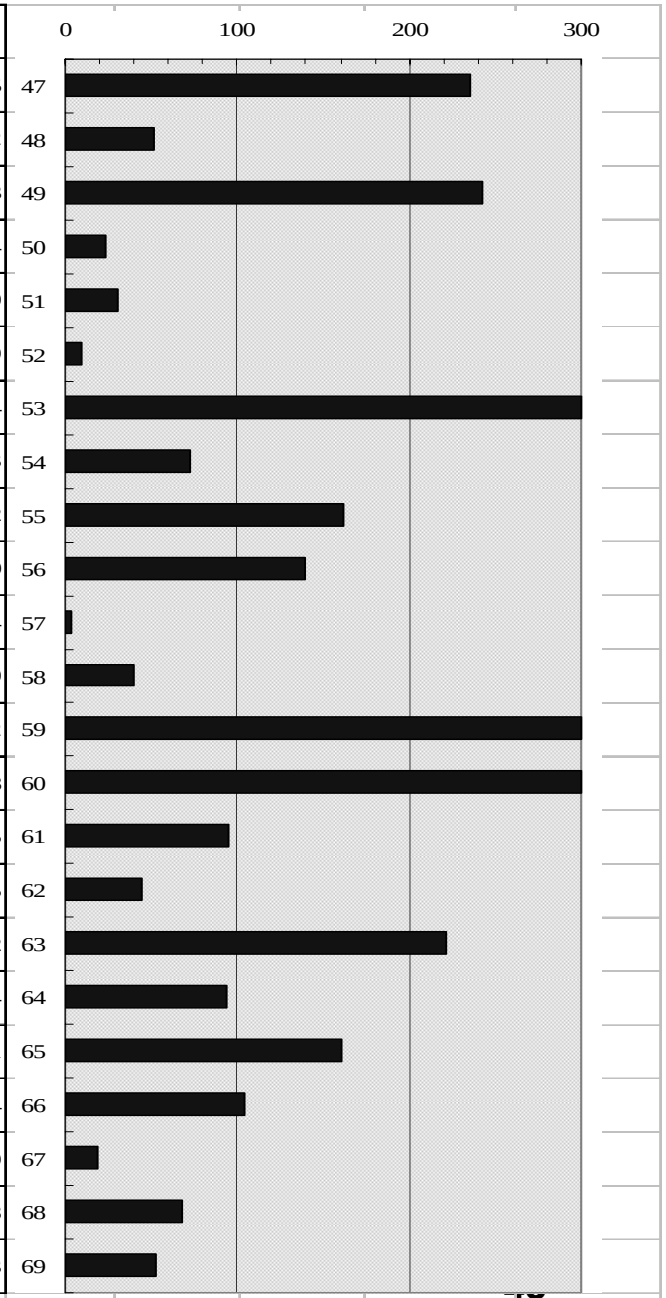
Chongqing

sn	index	value	order	lq
24	Invention Patents of total Patents Granted (%)	4.34	28	57
25	Utility Model Patents of total Patents Granted (%)	37.74	25	86
26	Design Patents of total Patents Granted(%)	57.93	5	119
27	Industries Enterprises of total Service Patent Applications (%)	51.38	17	91
28	Industries Enterprises of total Service Patents Granted by region (%)	52.63	12	121
29	Number of Papers Taken by SCI、EI、ISTP per 100,000 (piece/100,000persons)	2.62	19	42
30	Basic Disciplines of total Papers Taken by SCI、EI、ISTP (%)	43.10	23	93
31	Medical Care of total Papers Taken by SCI、EI、ISTP (%)	12.45	3	194
32	Agriculture,Forestry,Animal Husbandry and Fishery of total Papers Taken by SCI、EI、ISTP(%)	0.24	23	37
33	Manufacturing Technology of total Papers Taken by SCI、EI、ISTP by region (%)	40.54	16	91
34	Domestic Patents Science and technical Papers per 100,000 population (piece/100,000persons)	23.47	10	110
35	Basic Disciplines of total Domestic Patents Science and technical Papers (%)	10.24	30	59
36	Medical Care of total Domestic Patents Science and technical Papers(%)	55.74	3	155
37	Agriculture,Forestry,Animal Husbandry and Fishery of total Domestic Patents Science and technical Papers (%)	4.79	26	74
38	Manufacturing Technology of total Domestic Patents Science and technical Papers (%)	26.67	22	70
39	Value of Contractual inflows in Technical Markets of total GDP by region (%)	2.47	2	267
40	R&D personnel in Large and Medium-sized Industrial Enterprises of total Employees(%)	0.38	6	123
41	R&D personnel in Large and Medium-sized Industrial Enterprises of total Employees (%)	1.29	15	84
42	R&D Expenditure of Medium-sized Industrial Enterprises of total Value added (%)	2.88	7	116
43	Expenditure on New Products in Medium-sized Industrial Enterprises of total Revenue from the Sale of products (%)	1.16	1	176
44	Revenue from the sale of New Products in Medium-sized Industrial Enterprises of total Revenue from the Sale of products (%)	29.32	2	201
45	Average Patent Applications of Medium-sized Industrial Enterprises(unit/ unit)	4.56	2	324
46	Average Invention Patent Applications of Medium-sized Industrial Enterprises (unit/ unit)	0.20	13	48



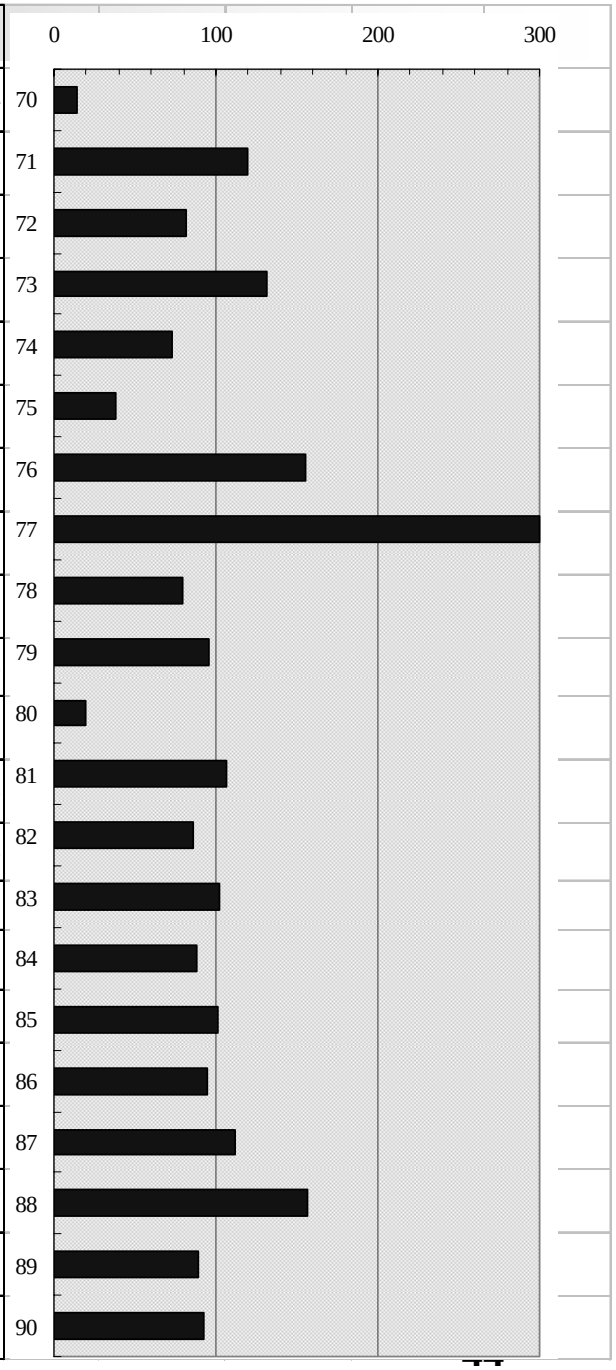
Chong qing

sn	index	value	order	lq
47	Average Owning Inventive Patents by Medium-sized Industrial Enterprises (unit/unit)	1.62	1	235
48	Value added of High Technology Industry of total Manufacturing (%)	6.26	18	52
49	Medical Pharmaceutical Products Manufacturing of total Value added of High Technology Industry (%)	49.46	14	243
50	Aircraft and Spacecraft Manufacturing of total Value added of High Technology Industry (%)	0.68	19	24
51	Electronic and Telecommunication Equipment Manufacturing of total Value added of High Technology Industry (%)	15.50	21	30
52	Computers and Office Equipment Manufacturing of total Value added of High Technology Industry (%)	1.89	18	9
53	Computers and Office Equipment Manufacturing of total Value added of High Technology Industry (%)	32.46	2	594
54	Full-Time Equivalent of R&D personnel of High Technology Industry of total R&D personnel's (%)	8.58	14	73
55	Expenditure of R&D on High Technology Industry of total value added (%)	7.14	5	162
56	Expenditure of R&D on Medical Pharmaceutical Products Manufacturing of total value added (%)	3.75	4	139
57	Expenditure of R&D on Aircraft and Spacecraft Manufacturing of total value added (%)	0.68	18	4
58	Expenditure of R&D on Electronic and Telecommunication Equipment Manufacturing of total value added (%)	2.14	21	40
59	Expenditure of R&D on Computers and Office Equipment Manufacturing of total value added (%)	46.19	1	1832
60	Expenditure of R&D on Medical Treatment Instrument and Meter Manufacturing of total value added (%)	12.55	2	418
61	Average Patent Applications of High Technology Industry (piece/unit)	0.64	10	95
62	Average Owning Inventive Patents of High Technology Industry (piece/unit)	0.12	13	45
63	Expenditure on New Products of High Technology Industry of total Revenue from the sale of products (%)	2.25	4	222
64	Revenue from the sale of New Product of High Technology Industry of total sale of product (%)	20.70	10	94
65	Value added on High Technology Industry of total value added on Manufacturing (%)	35.40	4	161
66	Number of Enterprises in hatching of S&T per 10,000 population Business Incubator(unit/10,000persons)	0.25	12	104
67	Value of Exports of High-tech Products of total exports of Products (%)	4.87	14	19
68	Value of Imports of High-tech Products of total imports of Products(%)	19.73	11	68
69	Exports of Products of total Exports and Imports of High-tech Products (%)	25.58	19	53



Chong qing

sn	index	value	order	lq
70	Export amount of high and new technology products total volume of imports and exports in field of compunication technology(%)	10.00	26	14
71	Export amount of high and new technology products total volume of imports and exports in field of life sciences technology(%)	53.91	11	120
72	Export amount of high and new technology products total volume of imports and exports in field of material technology(%)	14.33	19	82
73	Export amount of high and new technology products total volume of imports and exports in field of computer integrated manufacturing technology(%)	10.88	6	131
74	Amount of high and new technology products total volume of imports and exports in field of aerospace engineering technology	8.78	15	73
75	Export amount of high and new technology products total volume of imports and exports in field of electrooptical technology(%)	17.08	12	38
76	Export amount of high and new technology products total volume of imports and exports in field of biotechnology technology(%)	100.00	1	155
77	Export amount of high and new technology products total volume of imports and exports in field of material technology(%)	87.50	3	605
78	Per capita gross domestic product（GDP）(yuan/person)	7209	21	79
79	Append GDP of every hundred million investment (100,000,000yuan/100,000,000yuan)	0.27	13	96
80	Foreign direct investment for every personnel (dollar/person)	8.33	18	20
81	Comprehensive energy consumption output capacity (yuan/killo)	8.47	11	106
82	Employee labor productivity (10,000yuan/person)	1.32	20	86
83	Engel's coefficient of towner (%)	38.00	13	102
84	Proportion of rural per capita net income and urban per capita disposable income (%)	27.36	24	88
85	Educational fund of total GDP (%)	4.74	13	101
86	Years of person being educated (year/person)	6.46	23	95
87	Output value of the three wastes comprehensive utilization of gross value of industrial output (%)	0.93	14	112
88	Popular science museum Receive number of per 10,000 (person/10,000persons)	929.57	5	157
89	Telephone subscriber number per 100 population by region(door/100persons)	36.83	18	89
90	Internet user number per 10,000 population by region(10,000persons/10,000persons)	0.06	9	92



3.4Analysis on the regional difference—S&T location quotient analysis

- There are disparities between S&T indicators of Beijing. Beijing have predominance in level indicators , whereas it must have disadvantages in structure indicators.
- Chongqing (in the west of China) doesn’t have advantages in level indicators, while the structure indicators have evidence on disparities.
- By contrast with Chongqing , Beijing has many advantages in S&T indicators.

4.Conclusion and advice

- 1.Imbalance and difference exist in the distribution of natural resource and social resource. In order to advance the coordinated development of the whole society, it is necessary to constitute the national strategy to explore West Area.
- 2. There is disparity between the level of different S&T. A district is also an economy area and a S&T area. It is very important to discuss how to exert advantage, improve the level of S&T, then adjust the layout of S&T and economy.
- 3. The final aim of S&T input is to improve the capability of S&T serving society and economy , and then to realize the fast development of S&T, society and economy. Exploring the relationship of S&T input and the development of economy and society is the next topic of our research.

Thanks