

Table 3
A horizontal Comparison of the Technology Transaction Turnover Between Jinan and the Top 5 Cities in China
 (Unit: billion yuan)

	2010	2011	2012	2013	2014	2015
Jinan	17.7	24.83	26.37	27.68	37.14	30.99
Beijing	1,579.5	1,890.3	2,458.5	2,851.72	3,137.19	3,453.89
Shanghai	431.4	480.8	518.75	531.68	592.21	663.78
Xian	98.3	204.5	300.22	471.76	567.25	657.82
Wuhan	89.3	113.9	132.40	254.79	368.21	440.93
Shenzhen	83.0	91.6	153.05	285.98	144.07	372.16

Data source: Torch High Technology Industry Development Center, Ministry of Science & Technology.

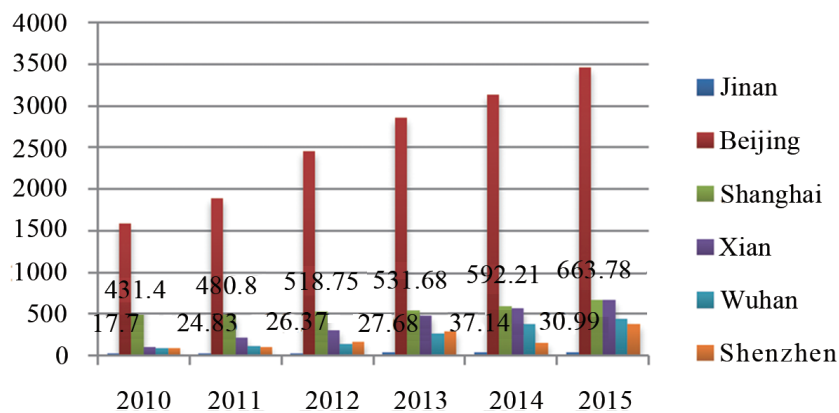


Figure 5
A Horizontal Comparison of the Technology Transaction Turnover Between Jinan and the Top 5 Cities in China

Data source: Jinan Science & Technology Bureau Torch High Technology Industry Development Center, Ministry of Science & Technology.

In Table 3 and Figure 5, compared Jinan technology transaction turnover with the top 5 cities' technology transaction turnover in China, there is still a big gap. Jinan technology transaction turnover accounted for a part of 1.1% and 21.3% of Beijing's and Shenzhen's relatively in 2010. By 2015, however, the technology transaction turnover of Jinan accounted for a part of 0.9% and 8.3% of Beijing's and Shenzhen's, respectively.

The starting point of Jinan technology market is very low, and then the growth rate is also far less than the technology transaction market originally developed

relatively mature cities such as Beijing and Shanghai.

Table 4 and Figure 6 compare the situation between Jinan and the top five cities in technology transaction volume. There is still a big gap. In 2010, the proportion of Jinan technology transaction volume accounted for 5.8% of Beijing's technology transaction volume, for 11.4% of Shanghai's, for 31.7% of Xian's, for 46.3% of Wuhan's, and for 57.4% of Shenzhen's; however, the proportion declined in different extent in 2015, the technology transaction volume of Jinan accounted for 5%, 14.5%, 16.8%, 21.2% and 37.5% of five cities' respectively.

Table 4
A Horizontal Comparison of the Technology Transaction Volume Between Jinan and the Top 5 Cities in China

	2010	2011	2012	2013	2014	2015
Jinan	2,956	2,947	3,113	3,459	3,327	3,594
Beijing	50,847	53,550	59,969	62,755	67,284	72,306
Shanghai	25,945	29,005	27,649	25,952	22,199	24,859
Xian	9,320	10,783	16,793	18,463	25,169	21,395
Wuhan	6,391	6,822	10,239	12,278	15,096	16,953
Shenzhen	6,894	9,108	10,077	10,334	10,290	9,580

Data source: Torch High Technology Industry Development Center, Ministry of Science & Technology.

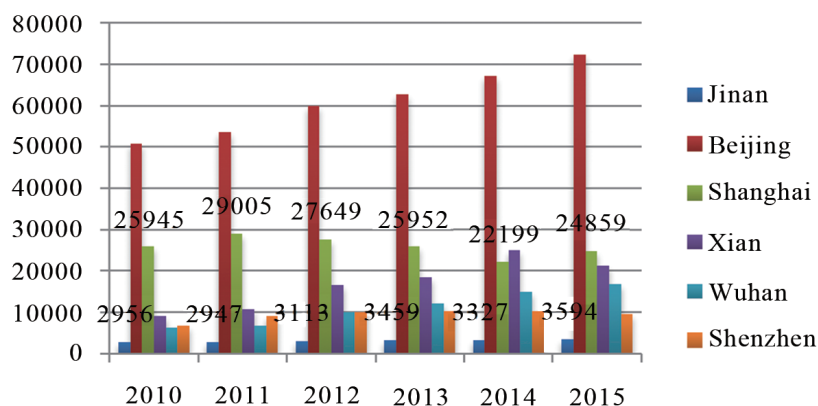


Figure 6
A Horizontal Comparison of the Technology Transaction Volume Between Jinan and the Top 5 Cities in China
 Data source: Jinan Science & Technology Bureau Torch High Technology Industry Development Center, Ministry of Science & Technology.

From a perspective of whether technology transaction turnover or volume, it is evident to view that Beijing owns the dominant statue in Chinese technology transaction market. In recent years, many scholars think that China has basically formed a “Beijing-Shanghai” the double centers structure. However, from the technical production capability aspect, Beijing still has more obvious advantages. Beijing has Chinese largest number of scientific research institutions, so with its own geography, personnel and policy advantages, the technology transaction market activities are also the most active. Hubei Province and Shanxi Province are the centers of education, technology and culture in the central and western regions of China respectively. In this process, Wuhan University, Huazhong University of Science and Technology, Xian Jiaotong University and other “985”

“211” key universities and research institutions play a very important effect. Shenzhen is just rely on enterprises, “to seize the market of listed companies and the venture capital market,” and to create a “venture capital - technology property rights trading - GEM or motherboard market” chain. The five cities all rely on their respective regional characteristics, and then explore the timely and appropriate development road of technology market actively. Jinan has put the goal of “Build regional science and technology innovation center”, so we must take more actively to explore and create the suitable economic development characteristics, the “Jinan model”.

3.2 Analysis on the Current Situation of Independent Innovation of Science and Technology in Jinan

Table 5
Jinan Invention Patent Statistics During 2012 to 2015

	2012	2013	2014	2015
Application	23,094	22,527	23,512	28,944
Year-on-year growth		-2.56%	4.37%	23.10%
Authorization	14,367	12,403	11,737	15,537
Year-on-year growth		-13.67%	-5.37%	32.38%

Data source: Shandong Statistical Yearbook 2015.

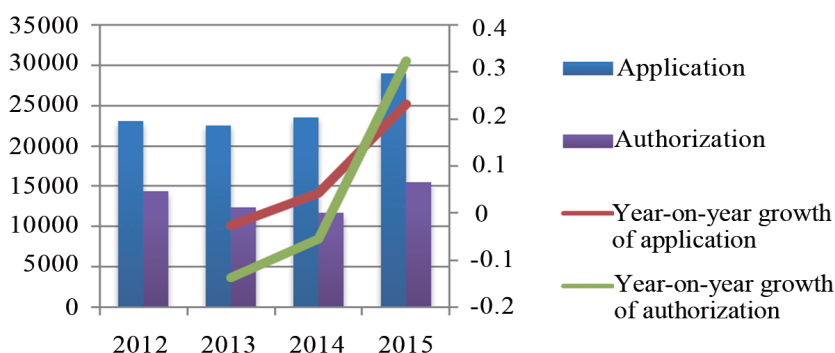


Figure 7
Jinan Invention Patent Statistics During 2012 to 2015
 Data source: Shandong Statistical Yearbook 2015.

The reaction of invention patent is the intermediate output of technology innovation. Table 5 and Figure 7 show the present situation about Jinan independent innovation through the application and authorization of invention patent in Jinan, in recent four years.

For a long time, the number of application for invention patents in Jinan has risen. From 23,094 in 2012 to 28,944 in 2015, the total amplification is more than 25%. On the contrary, the authorization volume has a fluctuant tend, from 14,367 in 2012 to 15,537 in 2015, but the negative growth came in 2013 and 2014. The number of applications of patents rises clearly, but the authorization did not have obvious changes. On the one hand, this phenomenon connects with the

more standardized government audit, on the other hand, these also reflect that many innovations are immature and unstable, the level of technology output needs to be improved.

Table 6 and Table 7 horizontal compare the invention patents output of Shandong 16 cities, in order to analyze the overall situation of scientific and technological innovation in Jinan. Through Table 6 and Figure 8, the amplification of invention patent appears overall upward trend in the Shandong 16 cities. The top six cities are Qingdao, Jinan, Weifang, Yantai, Zibo, and Weihai. Qingdao, Jinan, Weifang, Linyi, the four cities' overall momentum of development is well, and the speed of development is also much faster.

Table 6
The Statistics of Invention Patent Application in Shandong 16 Cities During 2012 to 2015

	2012	2013	2014	2015
Jinan	23,094	22,527	23,512	28,944
Qingdao	27,009	48,607	55,174	63,691
Zibo	10,120	8,552	8,347	9,654
Zaozhuang	2,759	3,467	3,036	3,973
Dongying	3,434	4,254	4,219	4,828
Yantai	9,571	9,131	8,734	9,285
Weifang	11,115	15,582	13,711	18,571
Jining	6,909	7,610	7,429	8,699
Taian	8,586	5,780	5,038	5,619
Weihai	4,982	5,296	6,241	9,344
Rizhao	2,157	2,480	2,098	2,784
Laiwu	1,980	2,197	2,552	2,813
Linyi	3,696	4,774	4,543	7,658
Dezhou	3,671	4,196	3,561	4,120
Liaocheng	2,303	2,947	3,154	4,068
Binzhou	4,971	4,185	3,434	4,871
Heze	3,157	3,585	3,836	4,298

Data source: Shandong Statistical Yearbook 2015.

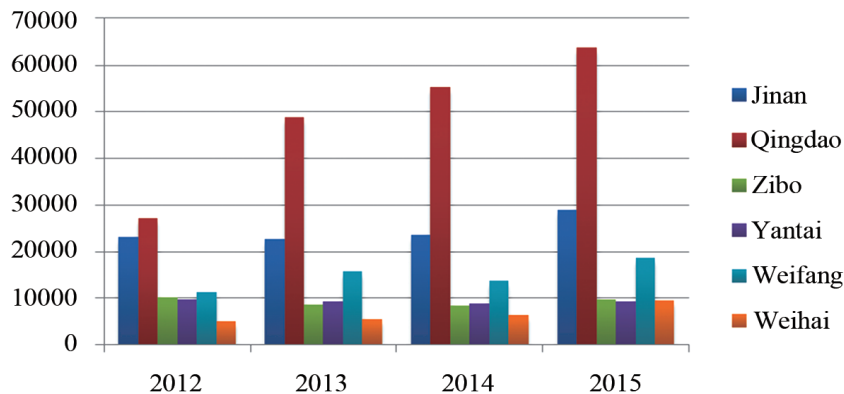


Figure 8
The Statistics of Invention Patent Application of Top Six Cities in Shandong During 2012 to 2015

Data source: Shandong Statistical Yearbook 2015.