Research on the Impact of University-Industry Collaboration on Xi'an Construction of Innovation City

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Abstract. At present, the innovation capacity of Xi'an is still insufficient compared with first-tier cities, and the innovation ability of a city is closely related to University-industry collaboration. Based on this, this paper uses the Analytic Hierarchy Process (AHP) and the fuzzy comprehensive evaluation method to measure the influence degree of the university-industry collaboration in Xi'an in 2010-2015 on the construction of innovative city. It was found that the university-industry collaboration in Xi'an affected the construction of innovative cities, and the degree of influence is increasing year by year. Among them, the influence of cooperative innovation output is the biggest, the cooperation basic resources are the second, and the cooperation innovation process is the weakest. Therefore, to build a high level and high innovation capacity innovative cities, we must attach importance to university-industry collaboration.

Introduction

With the development of science and technology, innovation has been an inexhaustible driving force for the economic development of a country. At present, all countries in the world rely on scientific and technological innovation to enhance their scientific and technological strength. As the basic unit of an innovative country, the quality, direction and level of the construction of an innovation city will directly affect the construction of an innovation country. In the increasingly competitive trend and the shortage of resources, university-industry collaboration has become the effective use of the countries to improve the level of R & D, transformation of mode of production, increase productivity, improve resource and promote the economic development .So this paper using AHP and fuzzy comprehensive evaluation to analysis the influence of university-industry collaboration on innovation city. The results show that the degree of influence is increasing year by year, among which the influence of cooperative innovation output is the biggest, the basic resources of cooperation is the second, and the cooperation innovation process is the weakest.

Index system and model design

Index system. According to the previous part of the theory and the above analysis of the evaluation index system, combined with the indicators used by most scholars, this paper established the following evaluation index system: Table 1

Table 1 Index system

	Criteria layer	Index layer
The impact of University-industry collaboration on innovation city	Cooperative basic resources	Cooperative infrastructure
		Other resources
	Cooperation and innovation process	Number of staff input
		Funds input
		Scope of cooperation
	Cooperative innovation output	Industrial innovation ability
		System innovation ability
		Scientific and technological innovation ability
		Environmental innovation ability
		Service innovation ability

Selection of model and method. At present, there are SFE and DEA and so on to evaluate university-industry collaboration. The methods used in the evaluation of innovative cities are AHP, fuzzy comprehensive evaluation method, PCA, Factor Analysis and ANOVA . According to the index system selected in this paper, we first use the AHP determine the weight of each index, combined with the fuzzy comprehensive evaluation method to analyze the impact of university-industry collaboration on the construction of innovation city in 2010-2015. Fuzzy comprehensive evaluation is not affected by the set of evaluation objects in the evaluation of objects, so it has strong applicability.

Empirical Study

The determination of the weight. Based on the existing research results, we use the most common importance scaling method:

Table 2 Importance scale

Importance scale	Meaning
1	means that two elements are equally important
3	indicates that the former is slightly more important than the latter
5	indicates that the former is more important than the latter
7	indicates that the former is more important than the latter
9	indicates that the former is extremely important than the latter
2,4,6,8	represent intermediate values between 1-9 scales
1/K,K=1,2,…..9	indicate the degree of less important

This article uses yaahp software, visited the relevant experts and scholars, combined with the actual elements of the important degree of scale, the specific results are as follows:

Table 3 Criteria layer

Criteria layer	Cooperative basic resources	Cooperation and innovation process	Cooperative innovation output
weight	0.2	0.2	0.6

Table 4 Index layer

Index layer	weight	Index layer	weight
Cooperative infrastructure	0.1	industrial innovation ability	0.1046
Other resources	0.1	System innovation ability	0.0526
Number of staff input	0.05	Scientific and technological innovation ability	0.2218
Funds input	0.05	Environmental innovation ability	0.1176
Scope of cooperation	0.1	Service innovation ability	0.1035

Fuzzy comprehensive evaluation. First, we must determine the fuzzy comprehensive evaluation factor set: U = cooperative innovation resources, cooperative innovation process, cooperative innovation output.

Then build the evaluation set: V = very high 60, high 50, higher 40, medium 30, low 20, lower 10, very low 0, were recorded as 1,2,3,4,5,6,7 level.

Because the original data dimension is different, so first we standardized the original data and established a single factor fuzzy matrix R:

$$R = \begin{bmatrix} X11 & \cdots & X1n \\ \vdots & \ddots & \vdots \\ Xn1 & \cdots & Xnn \end{bmatrix}$$

Every factor in each layer has weight $W = \begin{bmatrix} W1 & \cdots & Wn \end{bmatrix}$

Evaluation results for each factor and layer B=W*R, And so on we can get the final evaluation results.

Results analysis

From the comprehensive results of Table 5, from 2010 to 2015 in Xi'an , university-industry collaboration have high impact on the construction of innovation city overall.2010 and 2011, the

degree of impact is moderate, the impact of 2012-2014 Is higher, the degree of impact in 2015 is high, and from the table can be seen the impact of production and research cooperation on the innovation city is basically increasing year by year, the overall upward trend in the existing rating of the previous level of membership is gradually increased.

In particular, from the evaluation of the basic resources of cooperation, the impact of the basic resources of the production and research cooperation on the innovation city has not changed much in the past six years. And the influence degree is relatively stable. In general, it is in a higher degree of influence. And the university-industry collaboration's basic resources, environment and others have played an important role in constructing the innovation city. Xi'an is rich in science and technology resources, science and technology environment is good, which are conducive to the implementation of university-industry collaboration, so as to serve the construction of innovation city.

From the point of view of cooperation and innovation process, the membership degree is relatively low, which is at the lower level of evaluation grade, which shows that the overall efficiency in the process of cooperative innovation in Xi'an is not high, there is a large efficiency loss. But can be seen from Table 6, although the overall level of cooperation and innovation process is low, but in the fifth level of membership is increased, indicating that there is still a lot of room for improvement. The impact of the process on the innovation city will increase in the future.

From the evaluation results of the cooperative innovation output, the trend of the comprehensive rating is consistent with the results. The level of the impact level has increased from grade 4 in 2010 to grade 2 in 2015, and the membership degree in 2015 has reached 0.39, which shows that the degree of the impact of cooperative innovation output is higher than that of cooperative basic resources and cooperative innovation process on innovation city.

Table 5 Comprehensive evaluation results

	degree of membership							
	1	2	3	4	5	6	7	Evaluation results
2010	0.0000	0.0026	0.0963	0.1530	0.1093	0.0570	0.0218	4
2011	0.0000	0.0020	0.1448	0.1489	0.0705	0.0621	0.0117	4
2012	0.0000	0.0102	0.2356	0.0686	0.0605	0.0603	0.0049	3
2013	0.0000	0.0401	0.2535	0.0138	0.0767	0.0529	0.0031	3
2014	0.0000	0.1064	0.1893	0.0282	0.0706	0.0444	0.0011	3
2015	0.0000	0.2366	0.0586	0.0453	0.0646	0.0350	0.0000	2

Table 6 Evaluation results of three aspects

	cooperation basic resources	Evaluation	cooperative innovation process	Evaluation	collaborative innovation output	Evaluation
2010	0.0961	4	0.0925	6	0.2230	4
2011	0.0855	3	0.1136	6	0.2434	4
2012	0.0907	3	0.1177	6	0.3546	3
2013	0.0990	3	0.1288	6	0.3786	3
2014	0.1000	3	0.1248	6	0.2775	3
2015	0.0972	3	0.1048	6	0.0578	3

Conclusions

In general, the, university-industry collaboration will affect the construction of innovation city. The influence comes from three aspects: cooperation basic resources, cooperative innovation process, cooperative cooperation followed the weakest is cooperation and innovation process. However, To improve the innovation output, the largest power is the cooperative innovation output basic resources of cities cannot be separated from the basic resources and the process. The influence is basically increasing year by year, and the degree of influence is gradually improved with the

university-industry collaboration. In fact, there are a large amount of scientific research institutes, high-tech enterprises in Xi'an, science and technology and educational resources are very rich. But from the *China's regional innovation capacity report 2015* we can know that Shaanxi Province's innovation capacity in 2015 ranked only 14, but its development potential ranked No. 6,which indicating that the level of science and technology in Shaanxi Province and economic development does not match. And Xi'an as the capital city of Shaanxi Province and the main gathering place of resources, shouldering the main tasks and responsibilities of innovation. Xi'an should unswervingly accelerate the pace of cooperation, optimize the mode of cooperation and deepen the depth of cooperation to promoting the construction of innovative cities.

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