Research on the Efficiency of Universities Technology Transfer in Shaanxi

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Abstract. Shaanxi province is a big province of education in China. It has rich science and technology resources.And its technology output level is very high. However, the efficiency of technology transfer is very low. This paper first studies the present situation of Shaanxi province university technology transfer , next take the 7 universities in Shaanxi province as samples, using DEA method to measure the efficiency of technology transfer.Through empirical Study result we obtained the conclusion that the technology transfer efficiency about Shaanxi universities is not high.

Introduction

Shaanxi is a major province of education in China,there are 81 ordinary colleges and universities of which there are 7 schools with 211 projects, and 3 schools of 985. They have trained highly qualified personnel in all walks of life for the country. Although it is located in Northwest China, universities in Shaanxi   have always paid more attention to the improvement of scientific research level.In 2015, the Shaanxi private science and Technology Service Center established in 1993 was officially renamed the Shaanxi technology transfer center,.It is an international demonstration center for technology transfer.These universities, on the one hand, make use of their own talents and resources to carry out technical cooperation with relevant enterprises.Enterprises providing funds, equipment, training venues, the school is responsible for the research achievements of science and technology and related personnel training. the other hand, they, through intermediaries for technology transfer.At the same time, the government also attaches great importance to the transfer of technology in universities.However, Shaanxi Province, like other provinces in China, the efficiency of technology transfer is not high.

Index system and model design

Model selection

As for the empirical analysis methods of technology transfer efficiency in universities, DEA and SFA are widely adopted in china.Compared with other methods, such as entropy weight grey relational analysis, SPA and AHP, the DEA method is not affected by subjective factors. It is very objective and simple to operate.DEA model is divided into C2R model and B2C model, the former to "scale pay the same" as the premise, but for technology transfer, it will certainly involve changes in technology, resulting in changes in the size of the remuneration.So this paper using the scale of

compensation Change the B2C model.In this model, if the comprehensive efficiency value is equal to 1, then DEA is valid, if the efficiency value is not equal to 1, then DEA invalid.

Index system

The scholar circles on government funding and funding for science and technology differences, so we put these two items are included in the input index system .We used university science and technology expenditures to illustrate the amount of investment for science and technology. Because the staff and funds are matching so the R & D personnel into the target as an input.where R&D includes both full-time and including part-time researchers; As for output index, science and technology activity is mainly in order to obtain benefits, we set the following index system with the number of technology transfer contracts, the actual transfer of income and the number of papers published as the output indicators.Combined with the availability of real data and the index system selected by related scholars we establish the following index system:

Table 1 Index system

First level index	Secondary index	Third index
Input index	Personnel input	R&D personnel input
	Funds input	Government funds input
		Expenditure of science and technology
Output index	Output	Number of contracts signed
		Actual transfer income
		Number of papers published

Empirical Study

In order to make the results comparable, we selected 2015 of the data to calculate, the original data are as follows:

Table 2 original data

	Number of contracts signed	Actual transfer income	Number of papers published	R&D personnel input	Government funds input	Expenditure of science and technology
Xi`an Jiaotong University	82	35398	6295	2147	784066	693343
Northwestern Polytechnical University	66	1910	4869	1441	756631	1023192
Xidian University	6	142	3335	1070	370128	492830
Chang'an University	191	28610	773	402	235977	614829
North West Agriculture and Forestry University	4	490	3820	1445	567676	316489
Shaanxi Normal University	5	5110	1800	371	107343	90997
Northwest University	0	0	1425	568	252394	195828

Efficiency analysis

According to the data in Table 3.3, using the DEAP software, we obtained the following results.

Table 3 Results of DEA

	Comprehensive efficiency	Technical efficiency	Scale efficiency	
Xi`an Jiaotong University	0.956	1	0.956	drs
Northwestern Polytechnical University	0.743	1	0.743	drs
Xidian University	0.621	0.941	0.683	drs
Chang'an University	1	1	1	-
North West Agriculture and Forestry University	0.61	1	0.61	drs
Shaanxi Normal University	1	1	1	-
Northwest University	0.517	0.614	0.843	drs

According to the above data, the average of the technical transfer value of the Seven colleges in Shaanxi Province is 0.781.which indicates that the technology transfer efficiency of colleges and universities in Shaanxi Province is still not high, and it has not yet reached DEA valid, and there is still a lot of room for improvement.Among these seven universities only Chang'an University and Shaanxi Normal University, have achieved a comprehensive efficiency DEA effective.While the remaining five universities have not reached DEA effective.This shows there is a lot of room for improvement in resource allocation, and execution in that the 5 universities.However, from the fact that DEA is not equal to 1 is definitely good.For example, the Shaanxi Normal University in the above table, although its DEA value is 1, but in fact the actual technology transfer income only 5110 thousand dollars.In the DEA as long as the input unit is low enough, even if the decision unit value is very low, it also can achieve DEA effective.Some universities, such as Xi'an Jiao Tong University and Northwestern Polytechnical University, although the efficiency of DEA did not reach DEA effective, but the actual transfer of income in Shaanxi ranking is relatively forward.The delay of technology transfer will also cause the efficiency of technology transfer to be inefficient to a certain extent.We know that sometimes the input and output of the elements are often not produced in the same year.And some technologies from capital investment to transformation may take several years, which to some extent makes the technology transfer efficiency is not high.

From the specific technical efficiency and scale efficiency：Technical efficiency is the maximum output that can be obtained by a decision unit under the given input portfolio.As can be seen from the above table, Xi'an Jiao Tong University, Northwestern Polytechnical University, Chang'an University, Northwest Agriculture and Forestry University, Shaanxi Normal University technical efficiency reached technical efficiency effective.Universities with inefficient technical efficiency should strengthen the management of personnel and funds to improve the output level, so as to improve the efficiency of transfer.Some universities are affected by their scale efficiency, although their technical efficiency is effective, the comprehensive efficiency is not DEA effective.Scale efficiency, also called scale profit, examines whether the provinces and autonomous regions carry out technology transfer activities at the most appropriate scale of investment under the conditions of a certain level of Technology.From this point of view, only two universities, scale efficiency reached DEA efficient.This shows that the two universities have reached the best point of scale income, so these schools should maintain their existing scale for technical transfer.The remaining few universities are in the scale of diminishing returns.According to the model results, we conclude that the input and output do not match, so these universities should reduce the existing

scale or adjust the input and output on the basis of the existing scale to improve the efficiency of DEA.

Projection analysis

Table 4 Projection results

	Number of contracts signed	Actual transfer income	Number of papers published	R&D personnel input	Government funds input	Expenditure of science and technology
Xi`an Jiaotong University	0	0	0	0	0	0
Northwestern Polytechnical University	0	0	0	0	0	0
Xidian University	29	16729	210	-9	0	-167930
Chang'an University	0	0	0	0	0	0
North West Agriculture and Forestry University	0	0	0	0	0	0
Shaanxi Normal University	0	0	0	0	0	0
Northwest University	0	0	898	0	-53854	0

It can be seen from the above table, the Xidian University, research and development personnel expenditure appears relative redundancy in 2015.In theory the number of technology transfer contract, actual transfer income and papers published should be increased on the basis of the existing 29, 16729 and 210 units in order to achieve DEA efficiency.As for Northwestern University can be reduced by 53 million 854 thousand yuan of government capital investment or increase 898 papers to achieve effective DEA efficiency . Represented by these universities, it illustrates the low efficiency of technology transfer in Shaanxi Province because of r input redundancy and the lack of output.

Conclusions

From the above empirical analysis, we know that the technology transfer efficiency of "211" universities in Shaanxi Province, which is rich in manpower and capital, is not particularly high.Judging from the results of DEA, Shaanxi University of technology transfer efficiency is not high, partly because in a given level of technology, the output could not reach the maximum, on the other hand is due to unsuitable for technology transfer in the existing scale.The transfer of technology in universities is a complex process.All parties need to work together to improve the efficiency of technology transfer.

Acknowledgments

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