Research on the Evaluation of the Implementation Effect of the Policy of Scientific and Technological Achievements Transformation in Colleges and Universities in Shaanxi Province

Yongyi Ma, Nan Hu[Corresponding author]

1.Shaanxi Provincial College Technology Transfer Center, Xi'an, Shaanxi,710003;

2.Shaanxi polytechnic institute, Xianyang, Shaanxi,712000.

Abstract: The paper analyzes the scientific and technological achievement transformation policy in universities from the year 2014 to 2020,with three main perspectives including supply-oriented policy,demand-oriented policy and environmental policy,constructs an evaluation index system of the implementation effect of the policy of transforming scientific and technological achievements in Shaanxi universities,and uses the entropy method and fuzzy comprehensive evaluation to consider the influence of the administration of the policy.By using the triple helix theory.

Keywords: Transformation of scientific and technological achievements;Shaanxi university;Effect evaluation of policy

1. Review of Research

The connotation of the policy of scientific and technological achievements transformation generally refers to the relevant measures taken by the government departments to promote the development of technological innovation and improve the level of social productivity,as well as to promote the follow-up tests,developments,applications and promotions of R&D achievements until they form new technologies,new processes,new materials and new products.

2. Policy sorting and construction of an evaluation index system of the implementation effect

2.1 Policy sorting of scientific and technological achievement transformation in colleges and universities in Shaanxi Province

In recent years,Shaanxi Province has seized the important opportunity of innovation and development,and gradually built a relatively complete policy system including support and guidance,talent introduction,platform construction,financial support,tax preferences,science and technology finance and legal protection.In order to ensure the collection and sorting of relevant policies completely and accurately,this paper sorts out the policies according to the following three principles.First,the Shaanxi Provincial Government and its various directly affiliated departments,such as the Shaanxi Provincial Party Committee,the Provincial Government,and Shaanxi Department of Science and Technology,Shaanxi Department of Education are determined as the main policy issuers,and the policies issued by the municipal governments and their relevant departments in the province are not included in the research scope.Second,in order to comprehensively and accurately analyze the implementation effect of policies in various

periods,this paper does not propose policy documents that have expired,and excludes policies with low relevance.Third,the policies evaluated in this paper mainly include laws,regulations,regulations,opinions,methods,plans,etc.,eliminating other industry standards or initiative documents.

From the perspective of the types of policy tools used,the proportion of supply-oriented policies,demand-oriented policies and environmental-oriented policies in the 246 policy provisions is 33.74%,24.39%and 41.87%respectively.We can see that the environmental policy tools is used mostly by the government,indicating that the government hopes to release the vitality and momentum of the transformation of scientific and technological achievements in universities by creating a good environment.

2.2 Selection of evaluation method

Weight determination methods can be divided into subjective and objective categories,including variation coefficient method,principal component analysis,and subjective experience method.The entropy value method can be used to determine the evaluation index system,which can reflect the differences and discreteness of the data in the index system of the implementation effect of the policy of scientific and technological achievements transformation,and objectively determine the proportion of each indicator. Therefore,this paper also selects the entropy value method.

2.3 The basis for selecting the indicator system

According to the research of Rothwell and Zegveld,the evaluation of the implementation effect of the policy of scientific and technological achievements transformation can be studied from three policy tool dimensions:supply-oriented type,environmental type and demand-oriented type.Supply tools focus on the supply of science and technology achievement transformation,accelerate the transformation of scientific research achievements into practical productive forces by strengthening the supply of funds,scientific and technological talents,etc;demand tools focus on the demand of science and technology transformation,mainly including strengthening patent protection,consumer subsidies,public technology procurement and other measures;environmental tools are the soil for the transformation of science and technology achievements,mainly through policies and regulations to support elements,optimize the business environment,cultivate the technology market,and construct the service system for science and technology transformation,which have an indirect impact on the whole process and all links of the transformation of science and technology achievements.

3. Analysis of the Implementation Effect of the Policy

With the evaluation of the implementation effect of the policy of scientific and technological achievements transformation in colleges and universities in Shaanxi Province,this paper uses entropy value method and fuzzy mathematics evaluation method to calculate the relevant data of Shaanxi universities from 2015 to 2021,and evaluates and analyzes the implementation effect of Shaanxi policies according to the scoring results.

3.1 Data selection and processing

The sources of relevant data are"Compilation of Statistics on Science and Technology of Higher Education Institutions of the Ministry of Education","Statistical Yearbook of Shaanxi Province","Statistical Yearbook of Shaanxi Science and Technology",and official websites such as Shaanxi Provincial People's Government,Shaanxi Provincial Department of Science and Technology,and Shaanxi Provincial Bureau of Statistics.

3.2 Empirical analysis of policy implementation effects based on fuzzy comprehensive evaluation

Based on the calculation,this paper obtains the evaluation score results of the implementation effect of science and technology transformation policies in Shaanxi universities,and processes the data trend chart based on the score to analyze the implementation effect of the policies.

From the overall ranking of scores over the years,it can be seen that the implementation effect evaluation scores of the policy of scientific and technological achievements transformation in colleges and universities in Shaanxi Province show a steady upward trend.In 2021,the total score was 89.17 points,with an average annual growth rate of 50.22%.This fully shows that the policy of scientific and technological achievements transformation in colleges and universities in Shaanxi Province have achieved remarkable results in promoting university scientific and technological innovation,technology transfer and transformation,and innovation-driven development,especially since 2019,the scores have increased significantly.In 2014,the Shaanxi provincial government and its relevant functional departments introduced or revised 5 policy documents on science and technology achievement transformation in universities and used 17 policy tools.However,in 2017,the number of relevant policies introduced or revised reached a peak,with 21 policy documents introduced or revised and 65 policy tools used throughout the year.At the same time,considering the hysteresis of policy implementation effects,generally,it takes 1 to 2 years for the implementation effects of policies to appear after their introduce.

Therefore,the introduce of the policy of scientific and technological achievements transformation in colleges and universities in Shaanxi Province is in line with the evaluation of policy implementation effects.

4. Optimizate suggestions for the Policy of Scientific and Technological Achievements Transformation in Colleges and Universities

With the rise of the knowledge economy,the production and dissemination of knowledge has broken through the boundaries of organizations and institutions,leading to the innovation subjects more dynamically integrated.The traditional national innovation system theory has difficulty effectively explaining the complex relationships among various elements in the knowledge-based innovation system,thus giving birth to new innovation theories[1].In 1995,Henry Etzkowitz and Leydesdorff firstly proposed the use of the triple helix to analyze the relationship between government,industry and university.The triple helix theory emphasizes the synergy and interaction among universities,enterprises and governments in the innovation process.Innovation resources flow and diffuse horizontally between them and vertically integrate and enhance.Its essence is to form a joint force through enhancing the effective interaction among the three to promote the continuous integration of innovation resources and the spiral rise of the innovation system,forming a complex network with overlapping,overlapping and compatible relationships[2].This indicates that in addition to performing their respective functions,the universities,enterprises and governments also play some of the functions of the other two innovation subjects in promoting the transformation of scientific and technological achievements.In addition,there are interface organizations at the interface between government,industry and university,such as technology transfer agencies,incubators and venture capital institutions.These organizations play a positive role in enabling the efficient collaboration of government,industry and academia innovation subjects and the efficient operation of the triple helix innovation system.

4.1 Intensify the policy guarantee of strategic integration among universities,enterprises,and the government

The examples of"academic-industry"and"government-industry"relationships confirm the traditional bilateral model of technology and knowledge transfer.With the continuous high-quality development of the economy and society,the innovation system is constantly evolving and upgrading.Different roles of universities,enterprises,and governments have emerged in the innovation system cross and convergence phenomena.While playing their own roles,they also undertake the functions of the other two.However,as the main body of the innovation system in the triple helix,universities,enterprises,and governments each have different innovation resources,innovation capabilities,and realistic interests,which directly leads to different organizational cultures and behavioral norms among each subject and potential opposition.Therefore,establishing policies to strengthen the strategic integration of universities,enterprises,and governments,strengthening the collaborative innovation of government,industry,and academia in the innovation system,and promoting the joint implementation of scientific and technological achievements transformation by universities,enterprises,and governments will be able to better promote the transformation of scientific and technological achievements and achieve innovation-driven development.

4.2 Deepen the reform of policies related to government-industry-university collaborative innovation

Strengthen the technological research and development based on demand and problems.Focusing on the 23 key industrial chains,the government can organize experts in the industry to find out the bottlenecks and problems that restrict the transformation and upgrading of Shaanxi's industries,sort out the list of technical requirements.At the same time,relevant government departments and"chain leaders"in the industrial chain jointly establish government-enterprise joint projects,focusing on the common technical needs of the industry and the needs of future industrial development,organize universities and enterprises to carry out technical research and development through"open bidding"and"horse racing system",then to deepen the integration and development of government,industry,academia and research.The science and technology department and the education department jointly establish a system for the registration and disclosure of scientific and technological achievements,take the lead in establishing a shared platform for the information of enterprises and universities and research institutes to disclose patent technology information to the society.Encourage social institutions to build interconnected technology trading platforms in a market-oriented manner,and provide professional services and guidance for the transfer and transformation of scientific and technological achievements in universities.

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