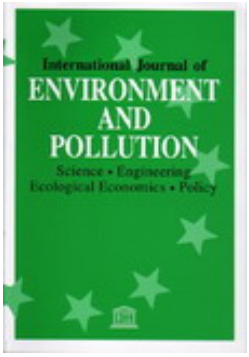
INDERSCIENCE PUBLISHERS
Linking academia, business and industry through research



International Journal of Environment and Pollution

ISSN online: 1741-5101 - ISSN print: 0957-4352
https://www.inderscience.com/ijep

A performance evaluation method of innovation and entrepreneurship policy based on DPSIR model

Liuqing Shi

Article History:

Received:	23 June 2022
Last revised:	08 August 2022
Accepted:	17 October 2022
Published online:	18 July 2023

A performance evaluation method of innovation and entrepreneurship policy based on DPSIR model

Liuqing Shi

Xingzhi College of Xi'an University of Finance and Economics,
Xi'an, 710038, China
Email: shiliuqing2022@163.com

Abstract: This paper proposes an innovation and entrepreneurship policy performance evaluation method based on DPSIR model. Under the construction principles of evaluation index system such as operability principle, conciseness principle and standardisation principle, the innovation and entrepreneurship policy performance evaluation system is constructed through DPSIR model, and the evaluation index is obtained. According to the obtained evaluation index, a multi-level fuzzy comprehensive evaluation factor set is established, and the weight of each level of innovation and entrepreneurship policy performance evaluation index is calculated by analytic hierarchy process, and the innovation and entrepreneurship policy performance evaluation is carried out according to the weight calculation results. The simulation results show that the accuracy of the proposed method for the performance evaluation of innovation and entrepreneurship policy is up to 100%, and the evaluation time is within 9.06 s. The evaluation accuracy is high and the evaluation time is short.

Keywords: DPSIR model; innovation and entrepreneurship policy; performance appraisal; analytic hierarchy process; industrialisation; evaluation.

Reference to this paper should be made as follows: Shi, L. (2022) 'A performance evaluation method of innovation and entrepreneurship policy based on DPSIR model', *Int. J. Environment and Pollution*, Vol. 71, Nos. 1/2, pp.58–70.

Biographical notes: Liuqing Shi received her Master's degree in Social Security from Guizhou University in 2013. She is currently a Lecturer in the College of Management of Xingzhi College of Xi'an University of Finance and Economics. Her research interests include human resource management, innovation ability research, and performance management.

1 Introduction

With the development of international industrialisation, innovation and entrepreneurship have become the main driving force of China's economic development, specifically reflected in the transformation of traditional industry informatisation of enterprises, the innovation of technology and the development of high-tech industries (Xiong et al., 2019). Local governments' investment in policies to encourage enterprises' innovation

and entrepreneurship is increasing, measures are improving and following up, which effectively promotes the agglomeration of innovation elements to enterprises and provides a fundamental guarantee for the innovation and development of enterprises. Their innovation and entrepreneurship policies have become a core tool to support the innovation and development of enterprises. Therefore, the evaluation of innovation and entrepreneurship policy performance is the main problem to be solved (Yu et al., 2019).

Xu et al. (2019) proposes the performance evaluation method of China's innovation and entrepreneurship policy based on literature measurement, constructs the performance evaluation system of China's innovation and entrepreneurship policy, obtains the performance evaluation indicators of innovation and entrepreneurship policy, calculates the weight of performance evaluation indicators, constructs the performance evaluation model of China's innovation and entrepreneurship policy through literature measurement, and obtains the evaluation results. Wang (2020) puts forward the policy performance evaluation method of university innovation and entrepreneurship projects. By constructing the policy performance evaluation system of university innovation and entrepreneurship projects, we can obtain the KPI indicators for the policy performance evaluation of university innovation and entrepreneurship projects such as system construction, team cultivation and project guidance, determine the weight of the policy performance evaluation indicators of university innovation and entrepreneurship projects, and carry out the policy performance evaluation of university innovation and entrepreneurship projects according to the weight determination results. However, the performance evaluation accuracy of the above two methods is low, resulting in poor evaluation effect. Gao and Qiao (2019) proposes an innovation and entrepreneurship policy performance evaluation method based on the improved ebm-dea three-stage model, analyses the factors affecting the innovation and entrepreneurship policy performance, constructs an innovation and entrepreneurship policy performance evaluation system according to the analysis results, obtains innovation and entrepreneurship policy performance evaluation indicators such as local decentralisation, government competition and local economic development level, and calculates the weight of the obtained evaluation indicators. According to the weight calculation results, Using the improved ebm-dea three-stage model to evaluate the performance of innovation and entrepreneurship policy. Tian et al. (2022) proposes an innovation and entrepreneurship policy performance evaluation method based on analytic hierarchy process, analyses the problems and factors affecting the innovation and entrepreneurship policy performance, constructs an innovation and entrepreneurship policy performance evaluation system based on actual needs, obtains evaluation indicators such as innovation motivation, influence and innovation ability, and uses analytic hierarchy process to calculate the weight of innovation and entrepreneurship policy performance evaluation indicators. According to the weight coefficient, Combined with the fuzzy evaluation method, the performance evaluation model of innovation and entrepreneurship policy is constructed, and the evaluation results are output. However, the above two methods take a long time to evaluate the performance of innovation and entrepreneurship policy, resulting in low evaluation efficiency.

In view of the problems existing in the above methods, this paper proposes an innovation and entrepreneurship policy performance evaluation method based on DPSIR model, and verifies that this method can quickly and accurately evaluate the innovation

and entrepreneurship policy performance through simulation experiments, laying a certain foundation for promoting national economic development. The specific research path of this method is as follows:

1 According to the construction principles of the evaluation index system, the innovation and entrepreneurship policy performance evaluation system is constructed through the driving force layer, pressure layer, state layer, influence layer and response layer of the DPSIR model, and 15 evaluation indexes such as policy adaptability, policy overlap, policy formulation process and policy objectives are obtained;

2 According to the above obtained innovation and entrepreneurship policy performance evaluation indicators, a multi-level fuzzy comprehensive evaluation factor set is established;

3 After the index judgement matrix is established under the scale of 1–9, the square root method is used to calculate the weight of the innovation and entrepreneurship policy performance evaluation index. According to the weight calculation results, the innovation and entrepreneurship policy performance evaluation is carried out, and the total score of the innovation and entrepreneurship policy performance evaluation index is obtained by using the efficacy coefficient method.

2 Performance evaluation method of innovation and entrepreneurship policy

2.1 Construction principles of evaluation index system

When constructing the performance evaluation index system of innovation and entrepreneurship policy, the following four principles should be followed:

1 *Principle of operability*

That is, the design of indicators should take into account the feasibility of realisation, and the indicators should adapt to the evaluation method and the acceptance and judgement ability of evaluators. China's entrepreneurship policy research is still in the exploratory stage. According to the public statistical data, the actual data such as policy input and policy output related to college students' entrepreneurship are rarely published, which brings great difficulty to the policy evaluation (Liu and Wang, 2020).

2 *Principle of conciseness*

The index system should reflect the basic characteristics of the evaluation object, have clear meaning, and avoid tedious or repeated, which will affect the accuracy and rationality of the evaluation.

3 *Normative principle*

That is, normative indicators should be used as much as possible when selecting indicators. The basic objectives and evaluation criteria of entrepreneurship policy

performance evaluation are of universal significance. Therefore, the designed evaluation indicators should be universal and applicable to the evaluation of College Students' Entrepreneurship Policy in different regions and at different policy times.

4 *Dynamic optimisation principle*

When establishing indicators and indicator systems, it is necessary to have long-term strategic thinking, predict the future development of entrepreneurship, promote the optimisation and upgrading of indicator systems, and make policy evaluation continuous (Zhao et al., 2019).

2.2 Construction of innovation and entrepreneurship policy performance evaluation system based on DPSIR model

The DPSIR model consists of five parts, namely, driving forces, pressure, state, impact and responses, which in turn refer to driving forces, pressure, state, impact and responses. In the economic field, 'driving force' is a kind of demand, which is the deep-seated cause of economic change; 'Pressure' refers to the impact of human activities on economic development and is the direct cause of economy; 'State' means the state of the economy under such pressure; 'Impact' refers to the impact of the state of the economy on human beings and society; 'Response' refers to the measures taken by human beings in response to such changes. The overall analysis idea of DPSIR model is as follows: the continuous development of economy and society generates driving force, which causes pressure on innovation and entrepreneurship, and changes the status of innovation and entrepreneurship. These changes are fed back to humans and nature. When humans are aware of this impact, they will generate feedback to society, which in turn will have an impact on driving force, pressure and even innovation and entrepreneurship (Bao et al., 2019). The model basically contains several major elements of economy, population, resources and social development, and organically connects these elements to reflect the causal and internal logical relationship between human economic and social activities and innovation and entrepreneurship in a systematic, flexible and dynamic way. Because the joint dynamic mechanism leads to the fact that the five parts of the DPSIR model are not static, there is a complex causal relationship and feedback relationship between them. Therefore, DPSIR model better reflects the influencing factors of innovation and entrepreneurship policy performance through five parts: driving force, pressure, state, impact and response (Xu, 2019).

In order to consider the integrity of the index system, under the principles of operability, conciseness and standardisation, this paper adopts the literature method, based on the questionnaire survey of relevant experts, teachers and supervisors, and constructs the performance evaluation system of innovation and entrepreneurship policy through the driving force layer, pressure layer, state layer, influence layer and response layer of DPSIR model, as shown in Table 1.

According to the above-mentioned innovation and entrepreneurship policy performance evaluation system based on DPSIR model, 15 evaluation indicators such as policy adaptability, policy overlap, policy formulation process and policy objectives are obtained (Fang et al., 2022).

Table 1 Performance evaluation system of innovation and entrepreneurship policy based on DPSIR model

Target layer	*Standard layer*	*Index layer*
Performance evaluation system of innovation and Entrepreneurship Policy U	Driving force layer u_1	The importance of policies in promoting innovation and Entrepreneurship u_{11}
		Urgency of policy formulation and Implementation u_{12}
	Pressure layer u_2	Political, economic and cultural feasibility of policy implementation u_{21}
		Whether the policy plan has been fully demonstrated u_{22}
		Whether the policy plan is flexible u_{23}
	State layer u_3	Policy adaptability
		Policy overlap u_{31}
		Policy making process
		Policy objectives u_{32}
	Influence layer u_4	Management of policy implementation organisation u_{41}
		Construction and implementation of policy implementation measures u_{42}
		Policy fund management u_{43}
	Response layer u_5	Policy output u_{51}
		Policy effect u_{52}
		Policy long-term mechanism management u_{53}

2.3 Multi level fuzzy comprehensive evaluation factor set

According to the above obtained innovation and entrepreneurship policy performance evaluation indicators, a multi-level fuzzy comprehensive evaluation factor set is established (Xin et al., 2020).

Set the first level innovation and entrepreneurship policy performance evaluation factor set as:

$$U = \{u_1, u_2, \ldots, u_m\} \tag{1}$$

The corresponding weight set of each innovation and entrepreneurship policy performance evaluation factor is:

$$W = \{\mu_1, \mu_2, \ldots, \mu_m\} \tag{2}$$

The second level innovation and entrepreneurship policy performance evaluation factor set is:

$$U_i = \{u_1, u_2, \ldots, u_m\} i = 1, 2, \ldots, m \tag{3}$$

The corresponding weight set of each innovation and entrepreneurship policy performance evaluation factor is:

$$W_i = \{\mu_{i1}, \mu_{i2}, \ldots, \mu_{ik}\} i = 1, 2, \ldots, m \tag{4}$$

The corresponding single factor fuzzy relation evaluation matrix is:

$$R_i = (r_{lj})_{k*n} \tag{5}$$

Set the evaluation grade assignment vector as:

$$\mathrm{D} = \{d_1, d_2, d_3, d_4, d_5\} \tag{6}$$

Through two-level comprehensive evaluation, the following results are obtained:

$$B = W_i * \begin{Bmatrix} W_1 * R_1 \\ W_2 * R_2 \\ \vdots \\ W_m * R_m \end{Bmatrix} \tag{7}$$

2.4 Performance evaluation of innovation and entrepreneurship policy based on analytic hierarchy process

According to the established multi-level fuzzy comprehensive evaluation factor set, this paper uses the analytic hierarchy process to calculate the weight of each level of innovation and entrepreneurship policy performance evaluation indicators, and carries out innovation and entrepreneurship policy performance evaluation according to the weight calculation results (Zhao, 2019). The specific steps are as follows:

1 *Building a hierarchical hierarchy*

In this paper, the hierarchical structure of DPSIR model is established through five levels: driving force, pressure, state, influence and response.

2 *Construct judgement matrix*

Then the evaluation indexes in the hierarchical structure are compared in pairs, and the judgement matrix $A = (a_{ij})_{n*m}$ is established under the scale of 1–9. The meaning of each scale is shown in Table 2.

3 *Weight determination*

The square root method is used to calculate the weight of innovation and entrepreneurship policy performance evaluation indicators, and its expression is:

$$W_i = n\sqrt{\prod_{j=1}^{n} a_{ij}} \tag{8}$$

where a_{ij} represents the coefficient of judgement matrix.

Use the following formula to solve formula (8), whose expression is:

$$AW = \gamma_{max} W \tag{9}$$

where W represents the weight vector (Xu and Sun, 2021).

Table 2 1–9 scale and its meaning

Scale value	*Meaning*
1	Indicates that two elements are of equal importance compared to each other
3	Indicates that one element is slightly more important than the other when compared with two elements
5	Indicates that one element is significantly more important than the other when compared with two elements
7	Indicates that one element is more important than the other element
9	Indicates that one element is more important than the other than two elements
2,4,6,8	If the difference between paired things is between the two, the median value of the above adjacent judgements can be taken
Reciprocal of the above numbers	If the importance ratio of element *I* to element *j* is a_{ij}, then the importance of element *j* and element *i*. The ratio is $a_{ij} = 1 / a_{ij}$

After normalising the weight vector, the maximum eigenvalue γ_{max} of the judgement matrix A can be approximated by the following formula:

$$\gamma_{max} = \frac{1}{n}\sum_{i=1}^{n}\frac{(AW)_i}{w_i} \tag{10}$$

4 *Conformance test*

Since there will be errors in the process of calculating the index weight of innovation and entrepreneurship policy performance evaluation, it is necessary to test the consistency of the index weight (Tang, 2021).

$$CI = \frac{\gamma_{max} - n}{n-1} \tag{11}$$

Calculate the random consistency ratio CR :

$$CR = \frac{CI}{RI} < 0.10 \tag{12}$$

When $CR > 0.1$, it indicates that the inconsistency of the weights of the performance evaluation indicators of the innovation and entrepreneurship policy is acceptable, otherwise the original weights must be adjusted (Wang, 2021).

5 *Comprehensive evaluation*

$$Y_i = WX' \tag{13}$$

where Y_i is the comprehensive evaluation of the *i*th sample; X' is the rectangle of standardised innovation and entrepreneurship policy performance evaluation indicators.

6 *Evaluation score calculation*

The efficacy coefficient method, also known as the efficacy function method, is an index scoring method commonly used in economic policy evaluation. This paper uses the

efficacy coefficient method to calculate the total score of innovation and entrepreneurship policy performance evaluation indicators (Bao et al., 2019).

Let d_{ij} be the single evaluation score of phase j of the i innovation and entrepreneurship policy performance evaluation index, and the calculation formula is:

$$d_{ij} = \frac{x_{ij} - x_i^{(s)}}{x_i^{(h)} - x_i^{(s)}} \tag{14}$$

where x_{ij} is the actual value of the i innovation and entrepreneurship policy performance evaluation index in the j period, $x_i^{(s)}$ is the disallowed value of the i innovation and entrepreneurship policy performance evaluation index, $x_i^{(h)}$ is the satisfactory value of the i innovation and entrepreneurship policy performance evaluation index, and 40 and 60 are the given constants (Luo, 2019; Huang and Li, 2019; Wang, 2019).

Calculate the total score of n -period performance evaluation index of innovation and entrepreneurship policy, and the formula is:

$$P_j = \frac{\sum_{j=1}^{n} d_{ij} w_{ij}}{\sum_{j=1}^{n} w_{ij}} \tag{15}$$

where P_j is the performance evaluation value of the comprehensive innovation and Entrepreneurship Policy in phase j ; d_{ij} is the single evaluation score of the *i*th index in the *j*th period, w_{ij} is the weight of the innovation and entrepreneurship policy performance evaluation index m in the *j*th period, and *P* is the arithmetic mean of the *n*th period, that is, the final score.

3 Simulation experiment analysis

In order to verify the effectiveness of the innovation and entrepreneurship policy performance evaluation method based on DPSIR model in practical application, a certain innovation and entrepreneurship base is selected as the experimental object for a simulation experiment analysis. In order to ensure the reliability and accuracy of the experimental results, we carried out several iterative experiments. 15 evaluation indicators, such as policy adaptability, policy overlap, policy formulation process and policy objectives, are used as initial simulation parameters. Taking the performance evaluation accuracy and evaluation time of innovation and entrepreneurship policy as experimental indicators, the performance evaluation method of innovation and entrepreneurship policy based on DPSIR model proposed in this paper, the evaluation method based on improved ebm-dea three-stage model proposed in Gao and Qiao (2019) and the evaluation method based on analytic hierarchy process proposed in Tian et al. (2022) are used for testing.

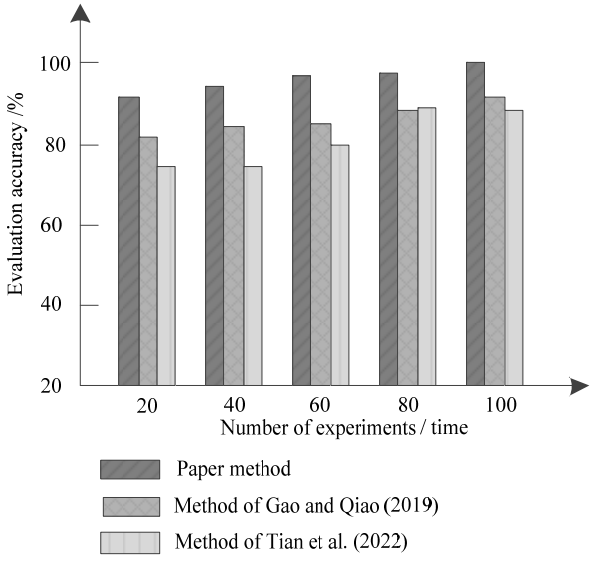
3.1 Experimental data

In 2020, there were 506 innovation and entrepreneurship projects, 305 successful innovation and entrepreneurship projects, and 114 continued innovation and entrepreneurship projects at the end of the year. In 2021, there were 476 innovation and entrepreneurship projects, 311 successful innovation and entrepreneurship projects, and 95 continued innovation and entrepreneurship projects at the end of the year. The incubation of innovation and entrepreneurship bases in Zone A is shown in Table 3.

3.2 Comparison results of performance evaluation accuracy of innovation and entrepreneurship policies

According to the above data, the performance evaluation method of innovation and entrepreneurship policy based on DPSIR model proposed in this paper, the evaluation method based on improved ebm-dea three-stage model proposed in Gao and Qiao (2019) and the evaluation method based on analytic hierarchy process proposed in Tian et al. (2022) are used to compare and analyse the performance evaluation accuracy of innovation and Entrepreneurship policy. The comparison results are shown in Figure 1.

Figure 1 Comparison results of performance evaluation accuracy of innovation and entrepreneurship policies



According to Figure 1, the accuracy of the innovation and entrepreneurship policy performance evaluation method based on DPSIR model proposed in this paper can reach up to 100%, while the evaluation method based on improved ebm-dea three-stage model proposed in Gao and Qiao (2019) and the evaluation method based on analytic hierarchy process proposed in Tian et al. (2022) have the highest accuracy of only 90% and 88%, The innovation and entrepreneurship policy performance evaluation method based on DPSIR model proposed in this paper has the highest accuracy for innovation and entrepreneurship policy performance evaluation.

Table 3 Incubation of innovation and entrepreneurship base in zone A

Innovation and entrepreneurship base	*2020 year*					*2021 year*				
	Amount at the beginning of the year	*Newly added this year*	*Successful innovation and Entrepreneurship*	*Failure of innovation and Entrepreneurship*	*Year end balance*	*Amount at the beginning of the year*	*Newly added this year*	*Successful innovation and Entrepreneurship*	*Failure of innovation and Entrepreneurship*	*Year end balance*
Xinlianfang	13	4	7	2	8	8	13	10	4	7
Suhehui	0	10	5	5	0	0	10	5	5	0
Xinhua dingchuang	6	21	10	10	7	7	26	30	3	0
Idea factory	0	10	5	5	0	0	10	5	5	0
i Dream	5	35	30	5	5	5	64	59	5	5
A new algebra	8	35	34	0	9	9	46	49	0	6

3.3 Time comparison results of innovation and entrepreneurship policy performance evaluation

In order to further verify the effectiveness of the method in this paper, the performance evaluation method of innovation and entrepreneurship policy based on DPSIR model proposed in this paper, the evaluation method based on improved ebm-dea three-stage model proposed in Gao and Qiao (2019) and the evaluation method based on analytic hierarchy process proposed in Tian et al. (2022) are used to compare and analyse the time used in the performance evaluation of innovation and entrepreneurship policy. The comparison results are shown in Table 4.

Table 4 Time comparison results of innovation and entrepreneurship policy performance evaluation/s

Number of experiments/time	*Paper method*	*Gao and Qiao* (2019) *method*	*Tian et al.* (2022) *method*
10	5.23	13.02	20.22
20	5.65	13.58	21.02
30	6.01	14.03	21.85
40	6.34	14.62	22.65
50	6.88	15.06	23.04
60	7.02	15.85	23.45
70	7.62	16.22	23.68
80	8.42	16.84	24.25
90	8.94	16.99	24.86
100	9.06	17.85	25.05

According to the data in Table 4, the time taken to evaluate the performance of innovation and entrepreneurship policies by using the DPSIR model based innovation and entrepreneurship policy performance evaluation method proposed in this paper is 9.06 s, while the time taken to evaluate the performance of innovation and entrepreneurship policies by Gao and Qiao (2019) method is 17.85 s, and the time taken to evaluate the performance of innovation and entrepreneurship policies by Tian et al. (2022) method is 25.05 s, The innovation and entrepreneurship policy performance evaluation method based on DPSIR model proposed in this paper takes the shortest time to evaluate the innovation and entrepreneurship policy performance and has the highest evaluation efficiency.

4 Conclusion

Because the traditional method takes a long time to evaluate the performance of innovation and entrepreneurship policy, resulting in poor evaluation effect, this paper proposes an innovation and entrepreneurship policy performance evaluation method based on DPSIR model. Based on DPSIR model, according to the construction principles of evaluation index system such as operability principle, conciseness principle and standardisation principle, build the evaluation system, obtain the performance evaluation

index of innovation and entrepreneurship policy, establish a multi-level fuzzy comprehensive evaluation factor set, use analytic hierarchy process to calculate the weight of each level of innovation and entrepreneurship policy performance evaluation index, evaluate the innovation and entrepreneurship policy performance according to the weight calculation results, and use the efficiency coefficient method, Obtain the total score of the innovation and entrepreneurship policy performance evaluation indicators. The simulation results show that the accuracy of the innovation and entrepreneurship policy performance evaluation method based on DPSIR model proposed in this paper is up to 100%. The evaluation accuracy is high and the evaluation effect is good; The time taken to evaluate the performance of innovation and entrepreneurship policy is within 9.06 s. The evaluation time is short and the evaluation efficiency is high.

Acknowledgements

This work was supported by the Social Science Foundation of Shaanxi (No. 2020R020; 2021ZX22), and the Scientific Research Program of Shaanxi Provincial Education Department (No. 19JK0329).

References

Bao, H., Lei, M., Zhao, H., Ouyang, B. and Peng, P. (2019) 'Evaluation of the efficiency of college student innovation and entrepreneurship training program based on ER-DEA', *Economic and Trade Update*, Vol. 2019, No. 27, p.879.

Bao, H., Lei, M., Zhao, H., Du J. and Xu, B.X. (2019) 'Evaluation of the efficiency of college student innovation and entrepreneurship training program based on ER-DEA', *Economic and Trade Update*, Vol. 2019, No. 27, pp.91–94.

Fang, Z., Razzaq, A., Mohsin, M., Feng, G. and Qin, C. (2022) 'Spatial spillovers and threshold effects of internet development and entrepreneurship on green innovation efficiency in China', *Technology in Society*, Vol. 68, pp.101844–101848.

Gao, J. and Qiao, G. (2019) 'Performance evaluation of financial guidance policies for innovation and entrepreneurship: empirical test on mass maker spaces by regions', *Research on Financial and Economic Issues*, Vol. 2019, No. 3, pp.75–82.

Huang, M. and Li, Z. (2019) 'Study on performance appraisal and incentive strategy of 90s knowledge worker based on intuitionistic fuzzy hierarchy model', *Mathematics in Practice and Theory*, Vol. 49, No. 23, pp.243–259.

Liu, Z. and Wang, Y. (2020) 'Evaluation research on the platform development of "Mass innovation space" for the youth to innovate and start a business', *Social Science Edition*, Vol. 36, No. 1, pp.30–35.

Luo, X. (2019) 'Performance evaluation of knowledge workers based on intuitionistic fuzzy hierarchy model', *Statistics and Decision*, Vol. 2019, No. 19, pp.176–179.

Tang, X. (2021) 'Construction of performance evaluation system of government venture capital guidance fund -- a study based on principal component and analytic hierarchy process', *Contemporary Economics*, Vol. 2021, No. 10, pp.34–39.

Tian, J., Liu, Y., Zhou, K., and Kang, M.Y. and Hu, C. (2022) 'Construction of evaluation index system and evaluation method for scientific and technological talents in Shaanxi province', *Science and Technology Management Research*, Vol. 42, No. 4, pp.89–96.

Wang, D. (2020) Research on the quality management and performance evaluation of college innovation and entrepreneurship projects', *The Theory and Practice of Innovation and Entrepreneurship*, Vol. 2020, No. 2, pp.16–20.

Wang, F. (2021) 'Construction of performance evaluation index system of new energy vehicle enterprises from the perspective of value chain', *Undertaking and Investment*, Vol. 2021, No. 20, pp.165–168.

Wang, L. (2019) 'On the performance evaluation of government investment funds', *Chinese Engineering Consulting*, Vol. 2019, No. 9, pp.68–72.

Xin, L., Xu, Z., Chen, N., He, Z.C. and Luo, J. (2020) 'Innovation and entrepreneurship policy chain of environmental protection industrial park based on the interpretative structural modeling', *IOP Conference Series: Earth and Environmental Science*, Vol. 598, No. 1, pp.012080–012080.

Xiong, Z., Li, K. and Zhou, J. (2019) 'Construction and application of innovation and entrepreneurship teaching performance evaluation index system in colleges and universities', *Journal of Innovation and Enterprise Education*, Vol. 10, No. 1, pp.5–10.

Xu, H., Yin, L. and Zhong, Z. (2019) 'Research on performance appraisal of innovation and entrepreneurship policy in China under the guidance of public policy', *Pioneering with Science and Technology Monthly*, Vol. 32, No. 10, pp.1–5.

Xu, X. (2019) 'The structural VPR model for the evaluation of innovation and entrepreneurship education', *Educational Research*, Vol. 40, No. 7, pp.83–90.

Xu, Z. and Sun, H. (2021) 'Combing the context of performance evaluation methods of small and medium-sized enterprises on GEM – visual research and analysis based on CiteSpace and Vosviewer', *Modern Business*, Vol. 2021, No. 26, pp.69–72.

Yu, C., Yu, Z. and Chu, Y. (2019) 'Performance evaluation of college students' entrepreneurship based on knowledge acquisition–taking innovation as the medium', *Journal of Xinyu University*, Vol. 24, No. 1, pp.133–138.

Zhao, K., Song, Y., Zhang, C., He, Q. and Huang, J. (2019) 'Research on the performance evaluation of technological innovation fund project of SciTech small and medium-sized enterprises: a case study of Hubei province', *Strategy for Innovation and Development of Science and Technology*, Vol. 3, No. 6, pp.26–34.

Zhao, L. (2019) 'Performance evaluation of "mass entrepreneurship and innovation" education in applied undergraduate universities in the "Internet+" era --a case study of universities in Jiangxi Province', *Journal of Innovation and Enterprise Education*, Vol. 10, No. 5, pp.21–30.