Research on Evaluation of Entrepreneurial Environment for College Students Based on Business Ecology Perspective

GOU Linna[a],*; WANG Anmin[a]

[a]School of Economics and Management, Xidian University, Xi'an, China.
*Corresponding author.

Abstract

Based on Moore's business ecosystem theory, combined with the existing research of entrepreneurial environment, this paper expounds the connotation of college students' entrepreneurial environment for business ecosystem, constructing the evaluation index system of college students' entrepreneurship environment, adopting the evaluation method of Vague set and multi-criteria decision-making. Based on the case study of colleges in Shaanxi, the paper proposes the countermeasures and suggestions on optimizing the environment of college students' entrepreneurship.

Key words: Business ecosystem; Entrepreneurial environment for college students; Evaluation; Vague set and multi-criteria decision-making

INTRODUCTION

In recent years, with the rapid development of China's economy, the scale of college enrollment is also expanding. The number of 2010 national ordinary university graduates is 5.75 million, it will break through 7.5 million in 2015. And it is expected to reach 7.7 million in 2016, adding unemployed graduates and overseas returned students, in 2016 the number is expected to reach 10 million. All of them will participate in employment competition. In terms of employment direction, public institutions are difficult to receive a large number of college graduates. Due to the adjustment and optimization of industrial structure, state-owned enterprises are difficult to provide adequate employment opportunities. Because of cold environment in manufacturing trade etc. industries, the employment situation of college students is becoming more and more serious. In order to relieve the pressure of employment pressure, all levels of government departments actively introduce a series of policies to provide a better business environment for college students. At the same time, colleges and universities try to guide students to change their employment ideas, encourage students to start their own business, and create good environment for college students. To college students, it is the first time to start a business. There are lots of differences from other groups of entrepreneurship. College students have higher requirements in the policy, capital, technology, personnel services and other aspects of the business environment.

1. REVIEWS

Entrepreneurial environment plays an important role in entrepreneurial behavior, domestic and foreign scholars carry out the relevant research from different angles. This paper mainly reviews from the two aspects of the entrepreneurial environment and entrepreneurial environment evaluation.

The research on the business environment is earlier, mainly concentrated in the concepts and elements of the entrepreneurial environment. In terms of the concept of entrepreneurial environment, entrepreneurial environment is the object of their own perception (Child, 1972). Entrepreneurial environment is the external conditions that enterprise must adapt to (Aldrich, 1979). Entrepreneurial environment is a kind of institutional

environment including specification system, regulation system and the cognitive system (Desai, Gompers, Lerner, 2003). In terms of the elements of entrepreneurial environment, entrepreneurial environment is all factors influencing the people to carry out business activities and access to possibility to get business help, consisting of many aspects, also is the elements of the portfolio which play an important role in the entrepreneurial activity (Zhang, 2004). Entrepreneurial environment is the surrounding environment for entrepreneurs, a complex social system composed of entrepreneurial culture, policy, economy, technology and other elements. Entrepreneurial environment is the foundation of the entrepreneurial enterprises to survive and developt (Chi, 2002). The elements of Entrepreneurship environment include resource availability, the concept of entrepreneurship, the surrounding universities, research institutions, government intervention, etc. (Gartner,1985). Entrepreneurship environment has four key elements, which are core technology, profitable business opportunities, entrepreneurs' knowledge and entrepreneurial motivation (Vesper, 1990). Entrepreneurial environment refers to a whole entirety which contains a series of external factors and impact during the process of entrepreneurs starting businesses (Cai, 2007).

On the entrepreneurial environment evaluation index system of research, scholars have more fruitful research results around the world. The most influential classical models are five dimensional models and GEM model. In five dimensional models, the constituent elements of the five dimensions of entrepreneurship environment are entrepreneurial and management skills, social and economic conditions, government policies and work procedures, financial support, and the financial support for entrepreneurship (Gnyawali & Fogel, 1994). GEM (globe entrepreneurship monitor) is raised by the British London business school and Babson college based on a designed project of entrepreneurial activity in the world. In the GEM model, model of entrepreneurship environment include nine dimensions, which are financial support, project support of government policy, education and training, research and development, professional business environment and infrastructure, domestic market openness, availability of physical infrastructure, cultural and social norms. However, these studies limited to micro entrepreneurship environment itself, and all is around entrepreneurial opportunities, entrepreneurial willingness and ability to build business environment. With the change of the competition rules, competition is no longer a single enterprise itself, becoming the competition between the business ecosystem. Therefore, from the perspective of business ecosystem, this paper put forward college students entrepreneurial environment evaluation index system and evaluation model, collecting a university students' entrepreneurship data, based on the application research of evaluation model.

2. THEORETICAL BACKGROUND

Moore, an American management expert, first proposed the concept of business ecosystem competition in Harvard Business Review. In the book The Death of Competition, through the development of high-tech companies' experience, he explained the interdependent symbiosis in commercial population coevolution and competition of the phenomenon of the same business system, established a preliminary theoretical framework of business ecosystem, the leadership of the business ecosystem strategy, the use of commercial ecological perspective to explain the commercial operation. He believes that enterprises under the background of business ecosystem are no longer alone self-development, but members of the business ecosystem coevolution.

A business ecosystem includes consumers, major producers, competitors and other stakeholders. Power & Jerjian emphasized the importance of the network. The commercial ecosystem is a worldwide network system, containing the real world, and at the same time form the entity system with the abiotic factors of the environment. According to the tightness and the importance of membership in business ecosystem, business ecosystem can be divided into core business ecosystem, competition system, support system, social and natural environment. The paper uses business ecosystem theory to college students' entrepreneurship environment, building a college students' business ecosystem structure.

In past research, scholars pay more attention to the micro start-ups and the importance of the business enterprise's own advantage. But based on the perspective of the business ecosystem for college students' entrepreneurship research, it needs to jump out of the previous analysis of a single enterprise or individual industries and pay attention to the role of the entrepreneurial environment in the whole ecosystem. Business ecosystem gives students a more profound connotation of entrepreneurship environment.

Entrepreneurship value-added brings the continued vitality of the system. As a core element of business ecosystem, entrepreneurial environment itself value will bring the entire system robustness and innovative. If entrepreneurship is not effective value-added, will enable the core system of entrepreneurs and the loss of customers, so as to weaken the government agencies, financial institutions, training institutions and research institutes of positive influence, it is difficult to attract other businesses to join the system, thus the system will lose vitality.

The four dimensional synergy of entrepreneurship environment promoted the evolution and development of the enterprise system. The theoretical perspective of the business ecosystem is derived from the real natural ecological system. According to the theory of ecology, species in the system have the ability of

evolutionary interdependence. College student starts up with other institutions or entrepreneurial teams to share knowledge. The way of knowledge transfers and the way of gaining information needs to be clear. Driven by innovation of entrepreneurial development, the institutional environment is an important part that includes both the national level, regional level, industry level and enterprise level of innovation. Entrepreneurship policy also contained knowledge broker, protection policy in the process of innovative entrepreneurial knowledge production. In addition, from the point of space distribution, college students' entrepreneurship has the spatial distribution of unbalanced phenomenon. Because of the space distribution of regional differences, the entrepreneurial environment resource allocation and entrepreneurial team have obstacles to exchange and cooperate. Business environment requires the collaborative knowledge, cooperative organization, coordination system, the ability of the collaborative space to promote entrepreneurial enterprises to evolute and develop in the whole system.

Entrepreneurial environment has the ability to restore the system to maintain sustainable development. Even organization has reasonable and perfect structure; it may be in a harsh environment by infection or damage. These crises maybe come from the regional financial environment or damage caused by wrong decisions. In addition, resilience, also known as resistance, refers to the system in the presence of internal and external forces to combat damage after the self-repair capacity. The ecological system with restoring force is balanced, robust, and sustainable.

The positive effect of the auxiliary system builds stability of entrepreneurial environment. Students' business is different from other groups of social entrepreneurial behavior, because college students have to receive non-financial support as a backing. This kind of support system supports from the government's preferential policies, the University's innovation and entrepreneurship guidance and entrepreneurship culture. The strength of the support system will have a positive effect on the stability and sustainability of the entrepreneurial environment for college students.
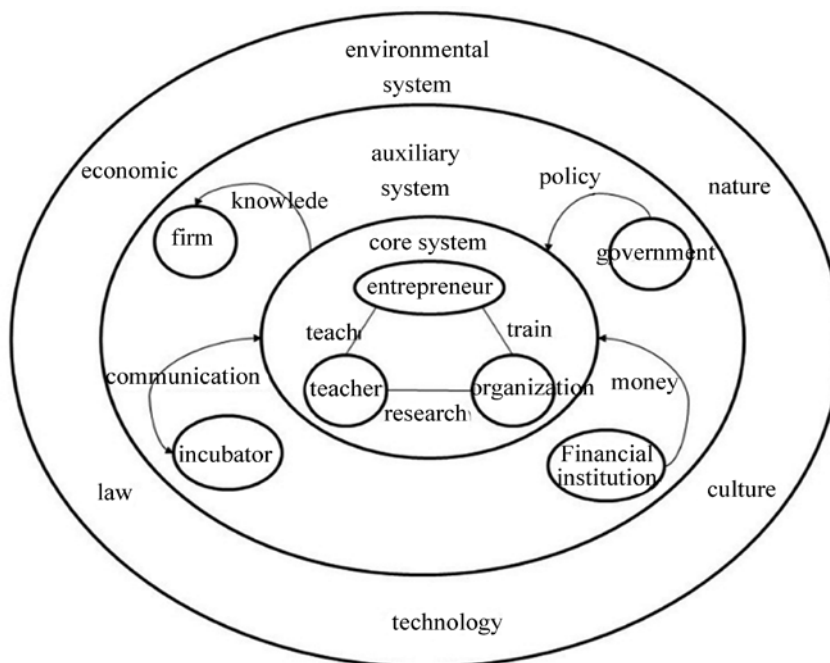

Figure 1
College Entrepreneurial Ecosystem

3. METHODOLOGY

Considering the business environment playing a leading role in the system, the author based on the perspective of business ecosystem and combined scholars' theory of the college students' entrepreneurship environment, built a preliminary evaluation system. Value evaluation system of first indicators is value of environment, coordination,

restoring force and financial support. Questionnaire is divided into five grades, which are very important, important, not clear, not too important, not important, giving 5-1 point scores respectively. According to their own cognitive to quantify the indexes, the respondents fill out the questionnaire in the process of research.

First indicators	Secondary indicators
Value of environment	Innovation ability
	Money input
	Market development
Coordination	Knowledge coordination
	Organization coordination
	System coordination
	Space coordination
Restoring force	Sustainable development
	Strain capacity
Financial support	Entrepreneurship education
	Entrepreneurship policy
	Entrepreneurial culture

The author uses a comprehensive evaluation method that is Based on Vague set and multi-criteria decision-making.

Set $M = \{m_1, m_2, \cdots m_m\}$ is a solution set, $P = \{P_1, P_2, \cdots P_n\}$ is evaluation criteria set. Set meeting the evaluation criteria P_j 'plan m_i can be represented as Vague $A_{ij} = [t_{ij}, 1 - f_{ij}]$, in the evaluation criteria P, plan m_i can be represented

$\{(P_1[t_{i1}, 1 - f_{i1}]),(P_2[t_{i2}, 1 - f_{i2}]),\cdots,(P_n[t_{in}, 1 - f_{in}])\}$. t_{ij} represent m_i the degree of meet the evaluation criteria P_j, f_{ij} represent m_i the degree of meet the evaluation criteria P_j, $t_{ij}, f_{ij}, t_{ij} + f_{ij} \in [0,1], i = 1,2,\cdots, m, j = 1,2,\cdots,n$.

If the decision maker want to choose an evaluation set P which can satisfy all the evaluation of the evaluation in the set M, this paper uses a weighted evaluation method based on the score function is proposed. Defining $S(A_{ij}) = S([t_{ij},1-f_{ij}]) \in [-1,1]$ is score function which is from the Vague set to the real number set $[-1,1]$.

The comprehensive evaluation value of each set is

$$W_P(u_i) = \sum_{j=1}^{n} w_j S(A_{ij}) , \qquad (1)$$

$w_1, \cdots, w_j, \cdots, w_n$ is the evaluation criterion. $P_1, \cdots, P_j, \cdots, P_n$ is the degree of importance. $w_j \in [0,1], j = 1,2,\cdots, n$ and

$\sum_{j=1}^{n} w_j = 1$.

If $W_P(m^*) = \max\{W_P(m), i=1,2,\cdots,m\}$, set m^* is the best set.

OWA is ordered weighted averaging operator, which is to sort the data in accordance with the order from big to small, and according to the location of the data to the right to gather.

OWA f is mapping from $R^n \to R$. Associated with it, n is a dimension weighted vector $W: W = \{w_1, w_2, \cdots, w_n\}$, $w_j \in$

$[0,1]$ and $\sum_{j=1}^{n} w_j = 1$, OWA is Formula (2).

$$f(a_1, a_2, \cdots, a_n) = \sum_{j=a}^{n} w_j b_j , \qquad (2)$$

$(a_1, a_2, \cdots, a_n) \in R^n$, b_j is the number of j from big to small sort in a_j.

OWA operator weight algorithm is Formula (3).

$$w_j = e^{-\frac{\left(j-\frac{n+1}{2}\right)^2}{2\sigma n^2}} \Big/ \sum_{k=1}^{n} e^{-\frac{\left(k-\frac{n+1}{2}\right)^2}{2\sigma n^2}}, j = 1,2,\cdots,n , \qquad (3)$$

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(i-\mu_n)^2} , \mu_n = \frac{1+n}{2}.$$

The score In the middle position is given a higher weight, while the highest score and the lowest level are given a lower weight, reducing the impact of the maximum and minimum values on the results of the decision. In this paper, we use OWA to integrate the scores in each criterion.

4. CASE PRESENTATIONS

The author selected XIDIAN University as an example. The author chooses the teacher in charge of innovation and entrepreneurship, college students in entrepreneurial team and the potential entrepreneurial students to do a survey. In this survey, 100 questionnaires were sent out, 80 questionnaires were recovered. The recovery rate was 80%, among which 66 questionnaires were valid, and the effective recovery rate was 66%. According to answer score which were endowed with score to judge the for school where the entrepreneurial environment of college students in attitude, if the answers have higher scores, it indicates that answer give statement more recognition.

The evaluation of the questionnaire was very important and important for scoring 5 and 4, which was supported by the t_{ij}, express the degree of satisficing evaluation criteria P_j. Evaluation of the score is not clear for scoring 3, in the data processing directly removed. The evaluation of

Table2
Vague Estimation Under Each Criterion of Xidian Entrepreneurial Environment

Indicators	Xidian university
Innovation ability	[0.9302,0.9302]
Money input	[0.8605,0.9070]
Market development	[0.6279,0.8605]
Knowledge coordination	[0.7209,0.8837]
Organization coordination	[0.7674,0.8837]
System coordination	[0.7442,0.8605]
Space coordination	[0.6512,0.7907]
Sustainable development	[0.8140,0.8837]
Strain capacity	[0.8372,0.9070]
Entrepreneurship education	[0.7209,0.8837]
Entrepreneurship policy	[0.8837,0.9070]
Entrepreneurial culture	[0.8372, 0.9070]

the questionnaire was not too important and not important for scoring 2 and 1, which was supported by f_{ij}, express the degree of not satisficing evaluation criteria P_j. P_j express 12 indicators on evaluation of entrepreneurial environment. Based on this, vague ste can be built, which is $A_{ij} = [t_{ij}, 1 - f_{ij}]$.

Using the score function to calculate the fuzzy value. Rating function is Formula (4).

$$Q(A) = \begin{cases} 0, t_A = f_A = 0 \\ \dfrac{1}{2}S(A) + J_\infty(A) - \dfrac{1}{2} = \dfrac{t_A - f_A}{2} \\ + \dfrac{t_A - f_A}{2(t_A + f_A)}, or \end{cases} \quad (4)$$

The fuzzy values of each index are calculated and the results are shown in Table 3.

Table 3
Evaluation Scores Under Each Criterion of Xidian Entrepreneurial Environment

Indicators	Fuzzy value
Innovation ability	0.8605
Money input	0.7862
Market development	0.5624
Knowledge coordination	0.6634
Organization coordination	0.6940
System coordination	0.6444
Space coordination	0.4777
Sustainable development	0.7238
Strain capacity	0.7721
Entrepreneurship education	0.6634
Entrepreneurship policy	0.8001
Entrepreneurial culture	0.7721

Based on OWA aggregation operator and Vague set and multi-criteria decision- making, the author make a comprehensive evaluation with the entrepreneurial environment of Xidian University, using the two level indicators. The two indicators OWA weights 0.0353, 0.0538, 0.0752, 0.0968, 0.1144, 0.1245, 0.1245, 0.0968, 0.0752, 0.1144, 0.0538, 0.0353. The weighted value is 0.676

5. DISCUSSION AND IMPLICATIONS

From the results, comprehensive evaluation value was 0.676. It can be seen in the entrepreneurial environment of XIDIAN University is good, mainly embodied in scored higher on four aspects which are innovation ability, entrepreneurship policy, capital investment, entrepreneurial culture and space cooperation, market development is lower. Specifically, due to Xidian university has a strong background in researching, basic engineering and innovative education and teaching. Secondly, in recent years, the country's entrepreneurship policy, entrepreneurship support from school and financial funds has a positive effect on college students. Through the analysis of the data, it can also be seen, that entrepreneurial culture takes an important part in the entrepreneurial environment in Xidian university.

From the perspective of business ecosystem, Xidian university has a lack of synergy, which is mainly reflected in the spatial coordination and institutional coordination. The development of the future needs to take more attention on universities cooperation and exchange, technology sharing, information exchange to promote common development and evolution of entrepreneurial enterprises.

CONCLUSION

Combining with the basic data of the domestic college students employment environment, the existing literatures about entrepreneurship are analyzed. Using the five dimensional model and GEM entrepreneurship environment influence factors model, no longer constrained by analysis of microscopic view of a single enterprise or a single industry, the author put college students entrepreneurship environment in macro environment system and redefine its role in the environmental system. This paper not only consider the competition system, financial institutions, training institutions, government agencies, research institutes and other auxiliary system core system, but also consider the influence of entrepreneurship for college students' entrepreneurship collaborative, role in the system of the business environment and entrepreneurship environment restoring force value factors. This paper put forward the evaluation index system of college students' entrepreneurship environment, using Vague set and multi-criteria decision-making and select colleges in Shanxi Province to analyze. Based on this, the author gives suggestions on optimizing college students' entrepreneurial environment.

REFERENCES

Aldrich. (1979). *Organization and environment* (pp.2-14). Fort Worth: Harcourt College Publishers.

Cai, L., Cui, Q. G., & Shi, L. (2007). Entrepreneurship Environment Research Framework. *Jilin University Journal Social Sciences Edition,* (47), 50-57

Chen, S. M., & Tan, J. M. (1994). Handling multicriteria fuzzy decision-making problems based on vague set theroy. *Fuzzy Sets and Systems, 67*(2), 163-172.

Chi, R. Y. (2002). A comparative study on entrepreneurship environment in the US and Japan. *Foreign Economy and Management,* (9), 13-19.

Child, J. (1972). Organizational structure, environment and performance: The role of strategic choice. *Sociology,* (3), 1-22.

Desai, M., Gompers, P., & Lerner, J. (2003). *Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe.* NBER Working Paper No.10165, Issued in December.

Duan, L. M., & Du, Y. P. (2012). The impact of entrepreneurial environment on entrepreneurial intention of college students: Are examination of GEM model. *Technical and Economic Management,* (31), 64-72.

Gao, J., Jiang, F. Y., & Li, X. B. (2006). *Global entrepreneurship 2005 China report* (pp.1-4). Beijing: Tsinghua University Press.

Gartner, W. B. (1985). A conceptual frame work for describing the phenomenon of new venture creation. *The Academy of Management Rreview, 10*(04), 696-709.

Gnyawali, D. R., & Fogel, D. S. (1994). Environment for entrepreneurship development: Key dimensions and research implications. *Entrepreneurship, Theory and Practice*, (4), 43-62.

James, F. M. (1993). *A new ecology of competition*. Harvard Business Review.

James, F. M. (1996). *The death of competition: Leadership and strategy.* Beijing: Beijing Press.

Liu, G. Q. (2013). Research on the development of college students' entrepreneurship from the perspective of ecosystem. *Journal of Hunan Business College,* (20), 19-24.

Liu, W. G., Zhao, T., & Bian, W. J. (2012). Evaluation of regional science and technology entrepreneurship ecosystem: A framework and an example. *Scientific Technological Progress and Countermeasures,* (30), 43-50.

Pan, J. Y., & Wang, C. M. (2012). Review and prospect on the theoretical model of business ecosystem. *Foreign Economy and Management,* (14), 51-58.

Power, T., & Jerjian, G. (n.d.). *Ecosystem living the principles of new worked business.* Pearson Education.

Vesper, K. H. (1990). *New venture strategies* (pp.1-27). N. J.: Prentice Hall.

Wang, H. H., Xie, F. J., & Zhou, S. G. (2014). "Four dimensional" collaborative framework of implementing innovation driven development strategy in China under the perspective of innovation ecosystem. *Scientific Technological Progress and Countermeasures,* (31), 7-12.

Wang, Y., Liu, X. Y., & He, J. (2014). Research on the competitiveness evaluation of e-commerce service platform based on the perspective of business ecosystem. *Information Science,* (6), 39-44.

Xu, Z. S. (2005). An overview of methods for determining OWA weights. *International Journal of Intelligent Systems, 20*(8), 843-865.

Zhang, E. Y., Wang, J., Zhang, Q., Zheng, Y. H., & Wang, S. Y. (2015). Supported by National Natural Science Foundation of China, the comprehensive evaluation of the project: Multi criteria decision making based on Vague set. *Journal of Management Science,* (18), 76-85.

Zhang, Y. L., & Chen L. X. (2004). Analysis on the core elements and entrepreneurial environment of small and medium sized enterprises. *Economic Circle,* (3), 29-34.

Zhong, G. S., & Cui, Z. Z. (2009). Business ecosystem theory and its development direction. *Dongyue Review,* (06).