



Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

The study of the cooperation evolution between school-enterprises on dynamic force model

Tao Yong-qin

College of Engineering, Xi'an International University, Xi'an, Shaanxi, China

ABSTRACT

The paper analyzes the concepts and characteristics of the school-enterprise cooperation evolution, and applies the theory of the competitive advantage and the method of systematic analysis to study the cooperation mechanism based on the dynamic force mechanism, to clarify the basic connotation of the its concept, to elaborate the way of the competitive advantage acquisition of the cooperation, to propose the logic model of cooperation, to clear and to expand the cooperative content, to construct the coevolutionary dynamic force model. This model reveals the essence and connotation of school-enterprise cooperation evolution, It will play a guidance and reference role in obtaining cooperation advantage, development and efficient operation.

Keywords: School-Enterprise; Cooperation Evolution; Dynamic Force Model

INTRODUCTION

School-enterprise cooperation as a new development strategy, has the broad prospects of development [1]. School-enterprise cooperation is based on technology cooperation, takes the enterprise as the main body, takes the market as the guidance, is a new educational model which combines with production, learning and study, and gathers practice, application in one, is the effective ways of higher engineering education mode reform and innovation, and improves the personnel training quality. It is also a self-organization behavior which makes the advantage resource elements coordination and complement based on their purpose and goal as an independent subject and the voluntary combination [2]. Therefore, the school and the enterprise are not a simple combination, but they are a benign interaction and realize mutual benefit and win-win situation. The competition advantages of the school-enterprise will more embody the ability between the school-enterprise internal elements and school-enterprise collaboration operation. To fuse the internal and external resources, to achieve optimal allocation and the maximum effect of the technology has become the attention focus of many scholars. However, the collaboration system of school-enterprise is a complex information system. In our country, a long time because system is the variability, diversity and fuzziness, the research and practice of the school-enterprise focuses on the research and analysis of the definition and theory model of personnel training, there is no relevant research of dynamic force problems which relates the evolutionary advantage of school-enterprise cooperation. In view of this, this paper explores the dynamic force mechanism and model of school-enterprise cooperation evolution, studies the connotation, stability and competitive advantages of cooperation evolution, and actively seeks collaborative problem of mutual connection, interaction, mutual influence, mutual integration between the school and enterprise. So as to enhance the market competitiveness and responsiveness. Finally, it realizes cooperative aim of the "win-win" or even "more win".

EXPERIMENTAL SECTION**The Concepts and Characteristics of School-Enterprise Cooperation Mechanism**

The Connotation of Cooperative Mechanism: The so-called cooperative is the joint action and collective behavior of coordinated, cooperative, or synchronization among the various subsystems. Coordination is the inner expression of system integrity and relationship. Mechanism is the internal dynamic of system evolution, is a special set of binding. It makes them interactions of micro level into orienteering movement of macro level through the control, guide and encourage of the micro level. It is a kind of a no symmetric choice amplifying or attenuating control, can choose, control, coordinate and guide to external or internal relationship and things according to the need of system evolution. Dynamic force mechanism is the mechanism of action which push on the development of the system and the sum of the integrate system which maintains and improves the various economic relations and organization of the motivation mechanism.

The Characteristics of the School-Enterprise Cooperation Mechanism

a. Target: School-enterprise cooperation is to meet the needs of all parties for the purpose of cooperation strategy, the whole cooperative has a long-term goal and makes all subordinate obey the general objective, makes them conjunct and involve each other under this premise.

b. Participation: School-enterprise cooperation as an economic system, compares with other system. The its biggest difference is to has the relatively large affect to human factors on the economic system, such as the will of the people, preference, policy, law and behavior.

c. Integrity: The interdependent relation between system and factors embodies a whole in the system, and can not be separated. In the system any factor cannot leave the whole to be studied, the interaction between the factors cannot be separated from the overall to consider. Numbers of function is not a single feature or function to add in the mathematics, but they are the overall function of the system in qualitative change gain.

d. Hierarchy: School-enterprise cooperation is a multilevel and various levels are highly open system,, and It exchange material, information and large amount of energy with the external environment. All members of the enterprise which participate the cooperation as a secondary system also exchange material, information and energy with the cooperation first system in the internal environment. The external macro system of the subordinate in cooperation action through various channels to the cooperative economic behavior affects the operation and decision of cooperation

e. Dynamic: First, its internal mechanisms ,systems of the school-enterprise cooperation and the subsystem should be adjusted constantly for the needs of development. Secondly, composition and form of cooperation system also changes with the external environment and the evolution of cooperation

f. Complexity: School-enterprise cooperation as a synthesis of a nonlinear, determines that the system has very complex relationship of interdependence and mutual restriction. Between different enterprises, school-enterprise cooperation and environmental interaction, the agents of the system should be parallel to make decisions, each cooperative enterprise or school decision should not only consider the past and current state, but also consider the other subject behavior, The behavior of the whole system roots in the local interaction with the main body of competition and cooperation. The interaction and influence will produce complexity. The its complexity appears structure complexity, diversity of the connection and environment complexity.

Analysis of Cooperative Dynamic Force Mechanism for the School-Enterprise**Dynamic Force Mechanism for Collaborative Advantage Acquisition of the School-Enterprise:**

Dynamic force mechanism for the collaborative advantage acquisition of the school-enterprise is that the dynamic force factors which school-enterprise obtain interact with each other at the evolution process of school-enterprise development, and form the organism with a certain structure and function[3]. Because external power of school-enterprise collaborative advantage, such as institutional, environment, market conditions and other factors must be truly promoted by the internal dynamic force factors of school-enterprise cooperation, dynamic force mechanism of school-enterprise cooperation advantage so obtained should emphasize the internal angle of the system[4]. After induction, dynamic force mechanism for the collaborative advantage acquisition of the school-enterprise is composed of four dynamic force factors. That is knowledge dynamic force factor, innovation force dynamic factor, relationship dynamic force factor and profit dynamic force factor. Other dynamic force factors include into the four dynamic force factors.

a. Knowledge Dynamic Force Factor: Knowledge dynamic force factor is the core factors to obtain the advantages of cooperation, It comes from some factors such as learning ability, cooperation learning culture, collaborative knowledge accumulation factor etc.

b. Innovation Dynamic Force Factor: Innovation dynamic force factor indicates the various innovative power which promote the coordination or the set of a various innovative new strength. It mainly comes from technical ability of school-enterprise cooperation, institution innovation, market innovation, cooperative innovation culture and profit driven factors etc.

c. The Relationship Dynamic Force Factor: The relationship dynamic force factors mainly comes from the accumulation of social capital. School-enterprise cooperation is composed of different schools and different enterprises. It includes the relationship of each cooperation and competition link in the learning, innovation, distribution, exchanges between school and enterprise cooperation. It also includes the relationship among enterprises, schools, governments and other aspects

d. Profit Dynamic Force Factor : Profit dynamic force factor mainly comes from the manufacturing ability and profit ability. Among them, manufacturing ability mainly refers to the efficient product ability from the collaborative product development, manufacturing angle, relatively rapid, production of low cost. Cooperative profit ability refers to the overall profit ability of school-enterprise cooperative. In the process of acquiring collaborative profit, due to the different from the various school-enterprise investment and abilities, It is reflected that the profit of some member is greater than the profit of other members, which need school-enterprise cooperation to provide feasible collaborative mechanism and to strengthen cooperation.

Relationship Between the Dynamic Force Factors: The dynamic force mechanism of School-enterprise cooperation is a complex system, the coordination mechanism is not independent, but it is interrelated, influence each other so as to form a relationship of coupling and interaction in the function. Knowledge flow is one of the most important and most basic form of innovation activities. The innovation is the result of knowledge flow. The essence of knowledge flow is the effective combination of promoting innovation factors. The profit coordination mechanism provides the driving force of material for innovation cooperation, knowledge and relationship cooperation. At the same time it also provides security cooperation for creating competitive advantage, and it provides funding support for the knowledge coordination, technology coordination and care coordination. Relationship coordination create a positive and good environment atmosphere for the train of the knowledge, innovation, dynamic force factors of the profit. The good relations of cooperation lays the foundation for the rational allocation of resources and effective use of the capabilities.

The Process of School-Enterprise Collaborative Advantage Acquisition: To turn the driving force factors of school-enterprise cooperation into competitive advantage must have the ability to integrate the power factor. Collaborative mechanism becomes the basic dynamic force mechanism of promoting cooperation development. Its main function lies in fusing dynamic force factors of cooperative into the dominant competitive advantage. Therefore, mining, having dynamic force factors, culturing cooperation mechanism, transforming power factor into competitive advantage, are the inherent logic of competition advantage acquisition of school-enterprise cooperation. The logic chart is the figure 1 as below. The figure 2 is generation process chart to gain competitive advantage.

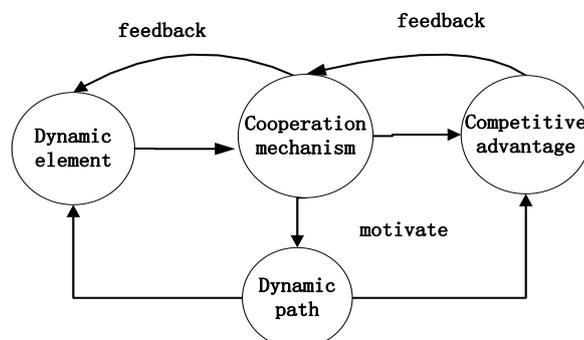


Figure 1. The logic chart of cooperation mechanism.

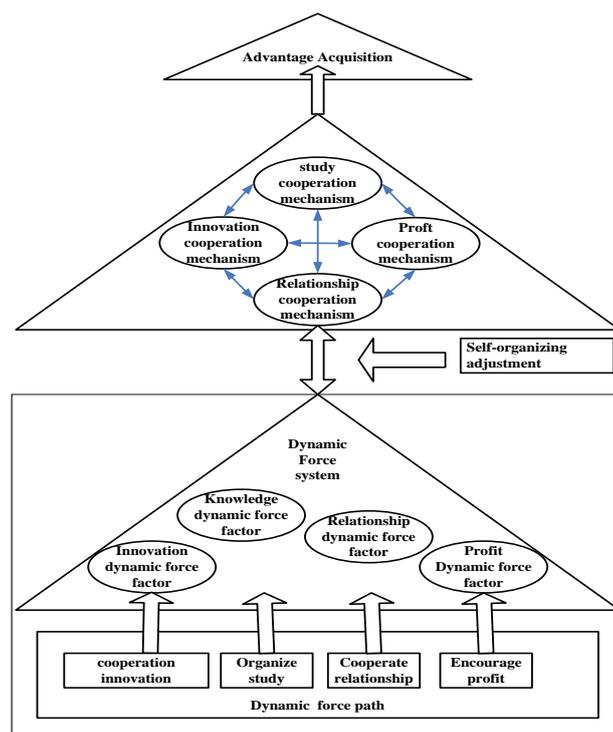


Figure 2. The process of competitive advantage acquisition.

Evaluating indicator of school-enterprise cooperation evolution

Evaluating Indicator of the Chaos Degree: The entropy can be used to measure the degree of the system chaos. The entropy is determined by the number of macroscopic state which can be realized by the system in a macro conditions. Obviously, the more macroscopic state is, the more state distribution of microscopic particles in the system is. The more frequent the arrangement of the particles will be, the more big the degree of confusion is. It is thus clear, entropy should be the size of disorder degree within the system. The bigger entropy is, the more strong cooperation is in the disordered state. The smaller entropy is, the more strong cooperation is. In cooperation the positive entropy implies the disorder, chaos and destruction. It shows orderly, regular management state. Its negative influences enable enterprises to irreversible decline. While the negative entropy means orderly and regeneration, which can overcome the negative results caused by positive entropy, constantly obtain reborn energy, sustainable development. The computational formula of entropy S is as below[5].

$$S = -K_b \sum_{i=1}^m p_i \ln p_i \quad ds = d_e s + d_i s \quad (1)$$

$$d_i S = \sum_{i=1}^m K_i S_i \quad S = -K_b \sum_{i=1}^m p_i \ln p_i \quad (i=1,2,\dots,m) \quad (2)$$

$$d_e S = -\sum_{i=1}^n K_j S_j \quad S = -K_a \sum_{i=1}^n p_j \ln p_j \quad (i=1,2,\dots,n) \quad (3)$$

Amongst them, p_i and p_j is the occurrence probability of n , m state

Evaluating Indicator of the Stability: The kinetics equation of the cooperative evolution, mainly refers to the co-evolution process of reflecting and the mathematical model of fully depicting the system essence[6]. This research uses the order parameter to describe the state of the system in many variables. When the system is in the state of disorder, its value is zero. With the system changes from disorder to order, this variable changes from zero to positive finite value or from small to big, which depicts the order degree of the system. It is known as the order parameter. The research analyzes the solution stability of evolution equation about the order parameter analysis system, and analyzes the causes of order parameter evolution in different ways and cooperative relationship

Supposing the evolution equation for the order parameter is as below.

$$\frac{dq}{dt} = \alpha q - \beta q^3 \quad (4)$$

The equation of the fixed point is :

$$\frac{dq}{dt} = 0, \alpha q - \beta q^3 = 0 \quad (5)$$

α is the controlled quantity. It is decided by the nonlinear control force M of coordination mechanism in the evolution process and control force N which maintains the original state. The q is the state variable. That is order parameter. Formula 4 can be changed into as below:

$$\frac{dq}{dt} = (M - N)q - \beta q^3 \quad (6)$$

The way and stability of order parameter evolution is blow by the formula (6):

(1) When $M-N < 0$, namely, $\alpha < 0$ system control parameter is less than zero. When $q=0$, collaborative system is in a stable state, which indicates that the M is very small, because there is the system recovery force. The original state of the system is maintained.

(2) When $M-N > 0$, namely, system control parameter is greater than zero, the original structure of the system becomes unstable and system bifurcation. The collaborative system is in an unstable state, which indicates that the M is very big, breaks the original state of the system, makes it become very unstable, turns into a new stable and orderly structure, maintains system the original state

The dynamic force model of school-enterprise cooperation evolution

Combining entropy generation analysis of the school-enterprise collaborative evolution, based on the knowledge, innovation, Profit and relationship, the dynamic model of the school-enterprise cooperation entropy has been constructed as shown in Figure 3

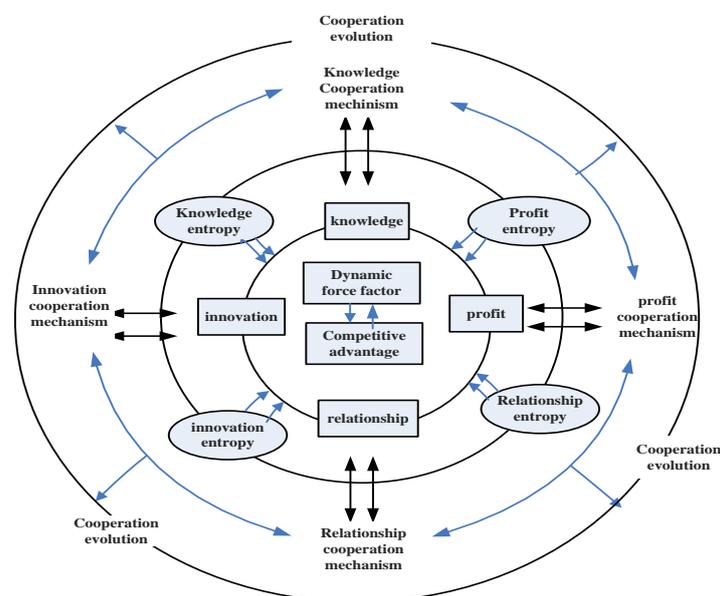


Figure 3. The dynamic force model of the school-enterprise cooperation evolution

CONCLUSION

Based on the school-enterprise cooperative dynamic force problems, firstly the paper analyzes the concept and characteristics of the cooperation. Through the analysis of dynamic force for the cooperative competition advantage, the logical architecture has been researched by the cooperation mechanism of the knowledge, innovation,

relationship and profit etc. Then, the paper gives the evaluation indicator and the calculation formula of the system stability for obtaining the competitive advantage. Finally, the paper puts forward the evolution mode of the cooperation competition advantage of school-enterprise. This mode will play a guidance and reference role in obtaining competitive advantage

Acknowledgment

This work is supported by The Natural Science Research Project of Shaanxi Provincial education Department of china (no: 2013JK1122 and no: 2013JK0428), by the education scientific planning project of Shaanxi province "1025" of china (no: SGH13482), by the research projects in higher education reform(no:2013B47).

REFERENCES

- [1] Wang Y.M. *J. Practice Research*, **2010**, 33(10), pp:70-74 .
- [2] Mao H.Y, Jiang N,K. "A New Model on the School-enterprise Cooperation Curriculum Construction". C, 25th IEEE Conference on Software Engineering Education and Training, **2012**, pp:115-119
- [3] Wang, M. Zhu S.G." *IEEE*, **2012**, pp:1260-1263
- [4] Li D., Qian S.Q. J, *Journal of Henan University*, **2007**, 24(2), pp:228-2367.
- [5] Yang L.H, CUI M G, *J. Applied Mathematics and Computation*, **2006**, 174(2), pp: 942-960.
- [6] Men Q, Han B." the research of cooperation mechanism for enterprise strategy alliance ".M, Harbin, Harbin Industry Press, **2011**.