

# Research on the Theoretical Model of Enterprise Entrepreneurship Based on Complexity System

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**Keywords:** Attractor, Complex System, Environmental Change, Corporate Entrepreneurship.

**Abstract:** This paper describes the dynamics of corporate entrepreneurship system by using the principle of complexity system. Put forward the concept of attractor in the evolutionary dynamic system of enterprise entrepreneurship, and divide enterprise entrepreneurship into three states: enterprise recession, stable survival and entrepreneurial development by using different values of attractors. This paper believes that the existence and development of enterprises is a dynamic process, which has an effect and influence on enterprises and their entrepreneurial behaviors and processes.

## 1 INTRODUCTION

### 1.1 System Theory

In 1968, the Austrian scholar L.Von Bertalanffy published the representative work of general system theory *General System Theory: Foundations, Development, Applications*. Bertalanffy defined the concept of general system as "a system is a whole of various components in a certain relationship with the environment" (PETROV A A, RESCONI G, FAGLIA R, et al 1984).

The core idea of system theory is the concept of system as a whole. Bertalanffy emphasized that any system is an organic whole, which is not a mechanical combination or simple addition of various parts. The overall function of the system is a new quality that greater than the sum of parts" to explain the integrity of the system, and opposed the view that the element each element does not have in an isolated state. He used Aristotle's famous saying that "the whole is performance is good, the overall performance must be good, and the overall performance must be good, so as to explain the mechanical theory of the whole in part. At the same time, it is believed that each element in the system does not exist in isolation. Each element is in a certain position in the system and plays a specific role.

### 1.2 Definition of Corporate Entrepreneurship System

Corporate entrepreneurship is a systematic organizational behavior or activity. A number of macro environmental factors and micro environmental factors that affect corporate entrepreneurship are closely related to each other in interdependence, mutual restriction and interaction. They are "an organic whole with specific functions and relationships with the external environment formed by a number of interrelated and interacting components" (HE XIAOLAN 2010). In order to better study the systematic activity of corporate entrepreneurship, this paper applies the principle of system theory, Analyze and study the entrepreneurial activities and processes of enterprise organizations in detail, and reveal the laws of corporate entrepreneurship from the perspective of system theory.

In this paper, "corporate entrepreneurship system" is defined as an organic whole composed of interrelated and interacting macro environmental elements and micro elements, which can promote enterprise entrepreneurship and the generation of new enterprise value (MIAORONG L, GU D2006).

## 2 ANALYSIS OF ENTREPRENEURIAL SYSTEM OF COMPLEX ENTERPRISES

### 2.1 Dynamics Description of Enterprise Entrepreneurship

#### (1) Entrepreneurship Status

If the current state of the enterprise is  $x_0$  and the continuous entrepreneurial state is  $x_1, \dots, x_k, \dots, x_n$ , then the set of enterprise states is:  $I = \{x_0, x_1, \dots, x_k, \dots, x_n\}$ ,  $k \in [0, n]$ . The enterprise status here includes enterprise strategic orientation, share of entrepreneurial resources, organizational management level (HUINING, ZHANG XIAONING 2009), core competitiveness and other internal endowments of the enterprise, as well as external forms such as market opportunities, profit levels, and enterprise size,  $X_k$  is a quantitative description of  $e$  elements,  $x_k = \{x^1_k, x^2_k, \dots, x^i_k, \dots, x^e_k\}$ ,  $i = \{1, 2, \dots, e\}$ . According to the general phenomenon of enterprise evolution, we can get Equation (1):

$$x_k = \begin{cases} x_k \in (x_{k-1} + \delta, +\infty), & x_k \subset A \\ x_k \in (x_{k-1} - \delta, x_{k-1} + \delta), & x_k \subset B \\ x_k \in [0, x_{k-1} - \delta), & x_k \subset C \end{cases}, \quad \begin{matrix} k \in [0, n] \\ A \cup B \cup C = I \end{matrix} \quad (1)$$

In this way, the entrepreneurial status of enterprises is divided into three categories: first, the enterprise has developed more than the previous time, which is defined as status A (LV GUIXING 2006); Second, the enterprise has no significant change compared with the last moment, which is defined as state B; Third, there is a recession compared with the last moment, which is defined as state C. The dynamic system acting in A state is recorded as  $f_A$ , similarly,  $f_B, f_C$ , but  $f_A, f_B, f_C$  are not fixed and can be transformed into each other.

#### (2) Environmental Status and Evolutionary Goals

Because the enterprise is not an isolated system, its entrepreneurial evolution is not only dominated by the dynamic system formed by its own endowment, but also affected by the environment. The external environmental factors that play a key role in enterprise entrepreneurship mainly include government mechanism, social mechanism and market mechanism. Averitt believes that there are two enterprise clusters in the modern economy, namely, the core enterprises and the peripheral enterprises (ZHU Q H, Dou Y J 2007). Hollander pointed out: "The continuous interaction of market and technological changes has created opportunities for

the development of enterprises to make up the gap between mass production and mass circulation, despite the concentration of resources and economic forces to huge enterprises..... Enterprises can give full play to the professional technology and management capabilities formed by 'product differentiation' to find the 'gap' in the market"(LI GENGYIN, HUANG NINGHUI 2001) Translate these qualitative descriptions into mathematical language to define the set M of the whole market:

$$M = M_1 \cup G \quad (2)$$

(2)  $M_1$  is the collection of a large number of markets occupied by core enterprises, and G is the collection of gaps between  $M_1$ . For  $M_1$ , it can be expressed as:

$$M_1 = \{m_1 \cup m_2 \dots \cup m_i \dots \cup m_n\}, i = \{1, 2, \dots, n\} \quad (3)$$

(3)  $M_1$  conforms to the mathematical definition of countable set. When n is finite,  $M_1$  is "finite countable set"; When  $n \rightarrow +\infty$ ,  $M_1$  is "infinitely countable set". Further decompose the set G:

$$G = G_1 \cup G_2 \quad (4)$$

(4)  $G_1$  is the gap between the markets occupied by core enterprises, and  $G_2$  is the gap within the market occupied by a core enterprise. The combination of  $G_1$  and  $G_2$  includes the gap market of these large core enterprises. For the whole market set M, it represents a continuous real number interval, and the mathematical description is "infinite uncountable set". Whether  $M_1$  is "finite countable set" or "infinite countable set", the result of  $M - M_1 = G$  is "infinite uncountable set" (ZUO YALI 2007).

The market of "infinite and uncountable sets" not only explains the soil and realistic possibility of enterprise entrepreneurship, but also infers that the entrepreneurial space of enterprises is huge, which further indicates that in addition to rapid growth, the entrepreneurial evolution goal of enterprises is "stable survival", which is the realistic development status and development goal that most enterprises should establish.

#### (3) Chaos, Criterion and Characteristics of Entrepreneurship Process

There is chaos in the process of entrepreneurship. Chaos has the following basic characteristics: dependence sensitive to initial conditions, internal randomness, irregular order, etc. These features are the basis of various chaotic identification methods (YILANG TAITIAN 1991).

The enterprise conducts entrepreneurial evolution under the role of the dynamic system. The process can be described as follows:  $f: I \rightarrow I$  is the mapping of the entrepreneurial evolution process of the enterprise, where  $f$  is the dynamic system of entrepreneurial

evolution of the enterprise; I is the survival state of the enterprise; The current state set of an enterprise is  $S \subset I$ ,  $S = \{x_0^1, x_0^2, x_0^3, \dots, x_0^c\}$ . This initial state has the characteristics of an uncountable set. It can be inferred that this process meets the following conditions:

$$\lim_{n \rightarrow \infty} \inf (f^n(x) - f^n(y)) = 0, \forall x, y \in S \quad (5)$$

$$\lim_{n \rightarrow \infty} \sup (f^n(x) - f^n(y)) > 0, \forall x, y \in S, x \neq y \quad (6)$$

(5) The economic explanation of the formula is that two initial states of the same enterprise may eventually reach the same state after a long period of entrepreneurial evolution

(6) The formula represents that the same enterprise may eventually reach different states after a long period of evolution under two different initial states.

Through qualitative empirical analysis, it can be concluded that these two conditions are valid in the entrepreneurial evolution process of enterprises. Based on these two conditions and the possible A, B

and C states of enterprises under the action of dynamic system, according to Li—Yorke theorem, it can be determined that the entrepreneurial evolution process of enterprises may be chaotic(TIAN GENG 2013).

## 2.2 Enterprise Entrepreneurship System Model

As shown in Figure 1, Based on the above research on the structure of the corporate entrepreneurship system, according to the characteristics of the corporate entrepreneurship system in China, according to the characteristics of the system, we call the system composed of micro elements such as entrepreneurs, opportunities, resources as the system element system. The external supporting factors of government mechanism, market mechanism and social mechanism will become the environmental system(FAN ZHONGQI, CAO MING 2006).

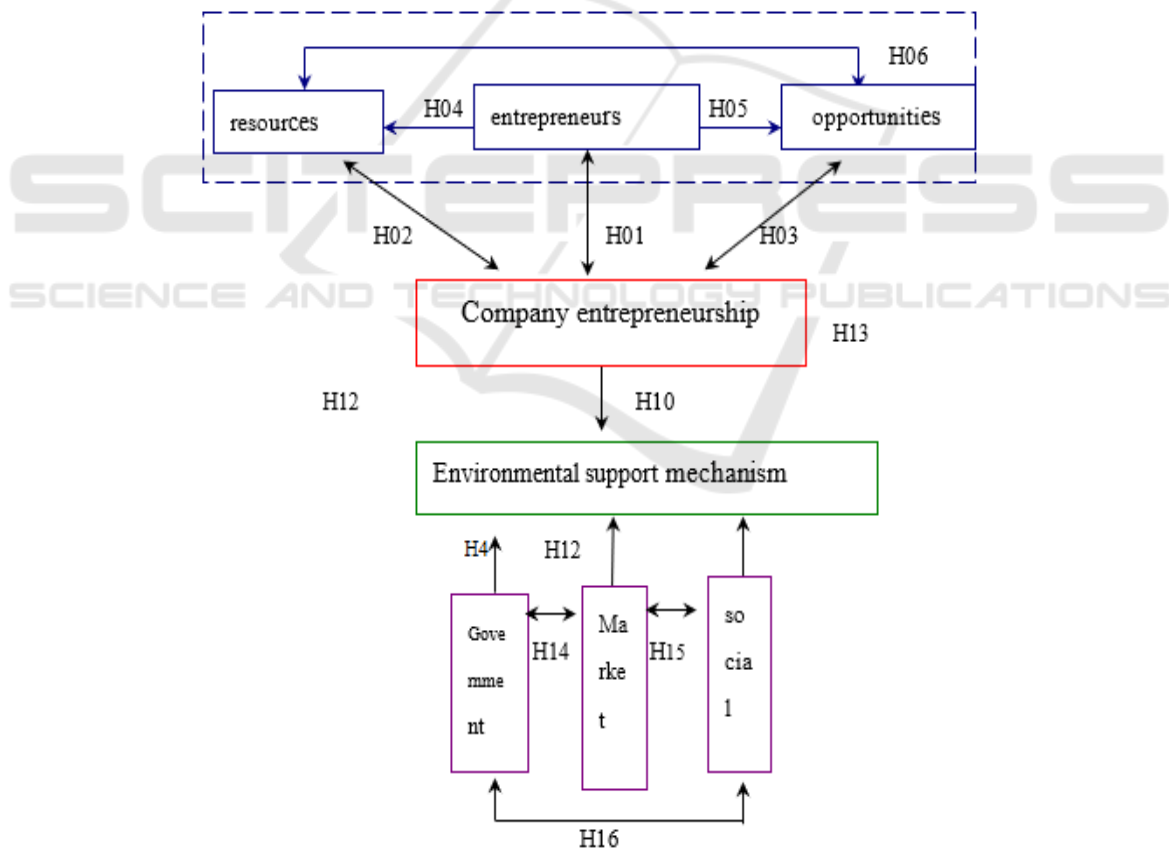


Figure1: Structural model diagram of the company's entrepreneurial system.

Based on the above discussion, a theoretical model and a series of assumptions on the mechanism

of corporate entrepreneurship elements are proposed, as shown in the figure below 2.

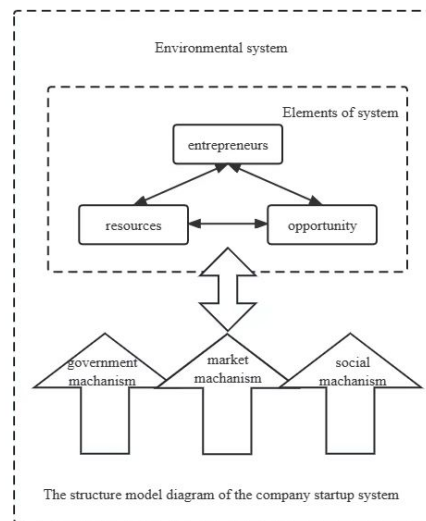


Figure 2: Model and hypothesis diagram of the mechanism of the role of entrepreneurial factors.

H01: Entrepreneurial orientation of entrepreneurs interacts with entrepreneurial behavior of companies, and the two are positively correlated;

H02: Entrepreneurial resources interact with entrepreneurial behavior, and they are positively correlated;

H03: Entrepreneurial opportunities interact with entrepreneurial behavior, and they are positively correlated;

H04: Entrepreneurial resources interact with entrepreneurial orientation of entrepreneurs, and they are positively correlated;

H05: Entrepreneurs' entrepreneurial orientation interacts with entrepreneurial opportunities, and the two are positively correlated;

H06: Entrepreneurial resources and entrepreneurial opportunities interact and are positively correlated;

H10: Corporate entrepreneurial behavior interacts with the environmental support mechanism, and the two are positively correlated.

H11: The government mechanism plays a positive role in the environmental support mechanism, and the two are positively correlated;

H12: The market mechanism has a positive effect on the environmental support mechanism, and the two are positively correlated;

H13: The social mechanism has a positive effect on the environmental support mechanism, and the two are positively correlated;

H14: The government mechanism interacts with the market mechanism, and the two are positively correlated;

H15: Market mechanism and social mechanism interact, and they are positively correlated;

H16: The government mechanism interacts with the social mechanism, and they are positively correlated;

### 3 RESEARCH CONCLUSION

Based on the principle of complex system, this paper describes the dynamics of corporate entrepreneurship system, puts forward the concept of attractor in the evolutionary dynamic system of corporate entrepreneurship, and divides corporate entrepreneurship into three states: corporate recession, stable survival and entrepreneurial development by using different values of attractors. Because attractors are attractive, stable and ultimate, enterprises have a tendency to develop towards attractors under their own conditions and external environment. At the same time, it points out the bifurcation points of the system, at which the entrepreneurial system changes from one equilibrium state to another.

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