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THE UNDERLYING MECHANISM OF EVOLUTION AND REVOLUTION DURING THE PROCESS OF ORGANIZATIONAL DEVELOPMENT

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Abstract

A systematic understanding of organizational development is critical to strategy research because organizational life cycle becomes increasingly shorter. In this paper, a new type of evolving model of organizational knowledge system which is comprises by empirical knowledge subsystem and revolution knowledge subsystem is constructed. The nature between evolution and revolution during the process of organizational development is defined. Based on this, the modes of organizational development are classified. The mechanism of different modes of organizational development is analyzed. The strategies and the opportunities during the process of organizational development are given. Finally, we

verify our proposed theoretical model through the studies of success and failure cases in reality.

Key Words: evolution, revolution, organizational development, knowledge system

Topic Groups: Change management and organizational development, Organizational behavior, Technology and innovation management

INTRODUCTION

Change management is the core and hot issues in the field of organization development and enterprise growth theory, and the related theoretical studies and practices mainly from such three aspects, the change mode of enterprise or organization, the influence factors of change and the strategies of change.

In the research of change mode, Lewin (1951) proposed discontinuous change model, which is syllogism of changes: defrost - change - redefrost. Weick & Quinn (1999) revised Lewin's point of view, divided change mode of enterprise into gradual mode and mutation mode. Larry (1998) proposed evolution and revolution according to the growth of enterprise, the evolution is moderate adjustments in order to keep the growth and the revolution is the great change in the practice of management. Zhang (2000) pointed that the enterprise that both can be integrated organically can be called self-organizing enterprise. Liu (2003, 2004) combined the complex system theory with change management, and put forward that enterprises should be multi-agent organization and the change process should be along with complexity growth in order to adapt to the complexity of external environment.

In the research of the influence factors of change, many studies think internal and external environmental factors affect organizational change, which is completed by the interaction of driving force and resistance force (Hu & Wan, 2005). Natural selection assumes that the internal and external network of the enterprise and the interaction between them influence the change path of the enterprise (Michael & John, 1977; Michael & John, 1984). Jeffrey & Gerald (1978) consider that, the distribution of key resources and the control mode of organization behavior will cause the change in the organizational behavior.

In the research of the strategies of change, there are process reengineering, the change of organization structure, and the establishment of networked organization, living organization, and learning organization. These change practices and theoretical research adapt to the development of the knowledge-based enterprise to a great extent.

However, the high failure rate of change practice demonstrates that the existing theories are lack of guidance and explanatory power. For example, the existing research about the classification of change mode (revolution and evolution) has not revealed the essential characteristics of different change modes. Moreover, it is lack of the research of the influence factors of change and intrinsic mechanism based on the characteristics of knowledge-based enterprise. To be exactly, what is the essential difference of different change modes? What is the decision mechanism of different change modes? What is the occurrence and feedback mechanism when the change process and the change of network structure and knowledge level are connected together? What is the dynamics theory of driving different change modes? These problems are not only the basic problems but also the core problems in the research of change management.

The systematic research of the influence factors of change, change modes and intrinsic mechanisms has theoretical significances and practical application values. Following we will define the essential difference of different change modes, consider the decision mechanism

of different change modes, analyze the occurrence and feedback mechanism when the change process and the change of network structure and knowledge level are connected together, and conclude the dynamics theory of driving different change modes.

In this paper, we mainly reveal the underlying mechanism of evolution and revolution from the aspect of knowledge during the process of organizational development. In section 2, a new type of evolving model of organizational knowledge system which is comprised by empirical knowledge subsystem and revolution knowledge subsystem is constructed. Moreover we analyze the stable state of the knowledge system. In section 3, the dynamic change of knowledge system and the structure of NIL networks are studied. In section 4, the mechanisms of different modes of organizational development are given. In section 5, management suggestions of this paper are pointed. Section 6 concludes the paper.

EVOLVING MODEL OF ORGANIZATIONAL KNOWLEDGE SYSTEM

The dynamic change process of knowledge-based enterprise is always under the co-evolution interaction of revolution force and stability force. The new and heterogeneity knowledge introduced during the growing process of knowledge-based enterprise form the revolutionary knowledge subsystem. And experience knowledge transformed by stocking knowledge after the entering of revolutionary knowledge forms the empirical knowledge subsystem. The revolutionary knowledge subsystem and the empirical knowledge subsystem form the knowledge system of knowledge-based enterprise commonly. The dynamic mechanism of the growth or revolution of the enterprise is determined by the evolution of knowledge organization systems (Park 2005). The revolution force comes from the revolutionary knowledge subsystem and the stability force comes from the empirical knowledge subsystem. Moreover the revolution force and stability force are proportional to the revolutionary knowledge level and the empirical knowledge level respectively. The revolution force and the revolutionary knowledge level form the positive feedback, and the stability force and the empirical knowledge level form the positive feedback either. Meanwhile, as the increase of the empirical knowledge level and the stability force, there will produce inhibiting effect on the revolution force, and the growth rate of the revolutionary knowledge will be reduced. The reduction of the growth rate of the revolutionary knowledge means the decrease of external heterogeneity knowledge which will also leads the decrease of the growth rate of empirical knowledge. When the growth rate of empirical knowledge and the revolutionary knowledge both decrease to zero, the knowledge level of the knowledge system comes to maximum. And the tension force produced by the stability force and revolution force reaches maximum.

Above mentioned knowledge dynamic characteristics corresponding to the change process of knowledge-based enterprise can be described as follows.

Suppose $x(t)$, $y(t)$ denote the empirical knowledge level and the revolutionary knowledge level of the knowledge-based enterprise at time t respectively, and $z(t)$ denotes the heterogeneity knowledge level at time t.

Moreover knowledge could not grow limitlessly, thus the basic dynamic model of knowledge evolution may be defined by the following differential equation:

$$\begin{cases} \dfrac{dx(t)}{dt} = a_1 x(t)(1-\dfrac{x(t)}{K_{\max}^x})(1-b_1 y(t)+c_1 z(t)) \\ \dfrac{dy(t)}{dt} = a_2 y(t)(1-\dfrac{y(t)}{K_{\max}^y})(1-b_2 x(t)+c_2 z(t)) \end{cases}$$

with the initial conditions

$$\begin{cases} x(0) = x_0 \\ y(0) = y_0 \end{cases}$$

where $K_{\max}^x$, $K_{\max}^y$ denote the development limit of the empirical knowledge level and the revolutionary knowledge level of the knowledge-based enterprise respectively, and $a_i, b_i, c_i > 0$ ($i = 1, 2$).

The equilibrium conditions are

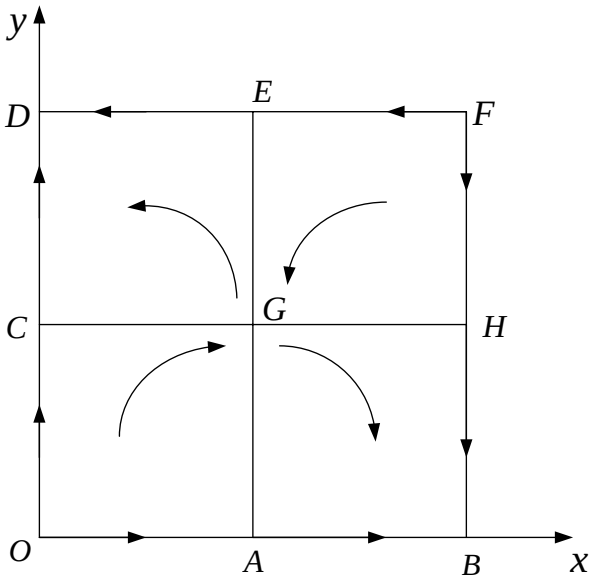
$$\begin{cases} a_1 x(t)(1-\dfrac{x(t)}{K_{\max}^x})(1-b_1 y(t)+c_1 z(t)) = 0 \\ a_2 y(t)(1-\dfrac{y(t)}{K_{\max}^y})(1-b_2 x(t)+c_2 z(t)) = 0 \end{cases}$$

The singular points of the equations are $O(0,0)$, $A(\dfrac{1+c_2 z(t)}{b_2}, 0)$, $B(K_{\max}^x, 0)$, $C(0, \dfrac{1+c_1 z(t)}{b_1})$, $D(0, K_{\max}^y)$, $E(\dfrac{1+c_2 z(t)}{b_2}, K_{\max}^y)$, $F(K_{\max}^x, K_{\max}^y)$, $G(\dfrac{1+c_2 z(t)}{b_2}, \dfrac{1+c_1 z(t)}{b_1})$ and $H(K_{\max}^x, \dfrac{1+c_1 z(t)}{b_1})$.

Following we will analyze the effect of heterogeneity knowledge level on the dynamic evolving process of knowledge system.

(1) When $\dfrac{1+c_2 z(t)}{b_2} < K_{\max}^x$ and $\dfrac{1+c_1 z(t)}{b_1} < K_{\max}^y$, that is $z(t) < \min\{\dfrac{b_2 K_{\max}^x - 1}{c_2}, \dfrac{b_1 K_{\max}^y - 1}{c_1}\}$.

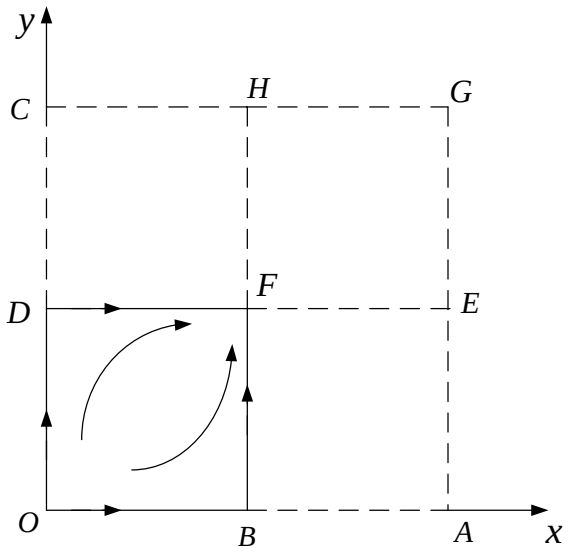
Figure1: The dynamic evolving process of knowledge system (case (1))



From the dynamic evolving process of knowledge system (Fig.1), we can derive that the stable points are B and D.

(2) When $\frac{1+c_2 z(t)}{b_2} > K_{\max}^{x}$ and $\frac{1+c_1 z(t)}{b_1} > K_{\max}^{y}$, that is $z(t) > \max\{\frac{b_2 K_{\max}^{x} - 1}{c_2}, \frac{b_1 K_{\max}^{y} - 1}{c_1}\}$.

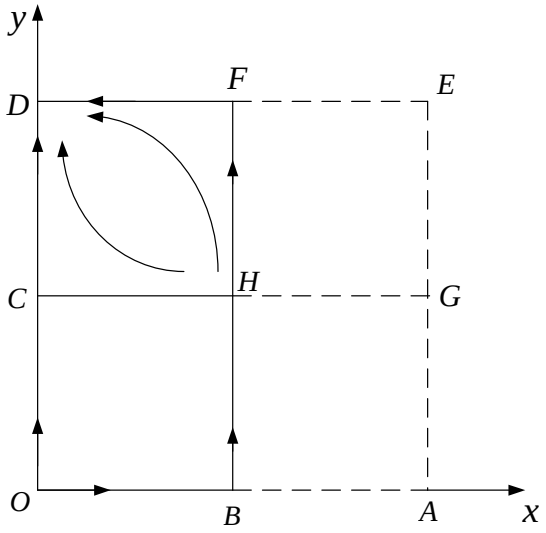
Figure2: The dynamic evolving process of knowledge system (case (2))



From the dynamic evolving process of knowledge system (Fig.2), we can derive that the stable point is F.

(3) When $\frac{1+c_2 z(t)}{b_2} > K_{\max}^x$ and $\frac{1+c_1 z(t)}{b_1} < K_{\max}^y$, that is $\frac{b_2 K_{\max}^x - 1}{c_2} < z(t) < \frac{b_1 K_{\max}^y - 1}{c_1}$.

Figure3: The dynamic evolving process of knowledge system (case (3))



From the dynamic evolving process of knowledge system (Fig.3), we can derive that the stable point is D.

(4) When $\frac{1+c_2 z(t)}{b_2} < K_{\max}^x$ and $\frac{1+c_1 z(t)}{b_1} > K_{\max}^y$, that is $\frac{b_1 K_{\max}^y - 1}{c_1} < z(t) < \frac{b_2 K_{\max}^x - 1}{c_2}$, similarly to case (3), the stable point is A.

THE CHANGE PROCESS AND NIL NETWORKS

Although the dynamic change process of knowledge-based enterprise is always under the co-evolution interaction of revolution force and stability force, people can not only through introducing new knowledge to change the enterprise's management style or strategy (Grieves 2000). To realize change, enterprise's behavior must be checked, the alternative plans will be verified, and the modified patters will be put into practice. To realize organizational revolution and evolution process, the enterprise need to conduct single loop learning to correct and enhance organizational capability and reconstruct double loop learning within the organization based on not changing the basic norms, policy and objectives of enterprise. And organizational learning effectiveness depends on all levels of staff and the interactions and mutual relations between them (Burke 1997). The main bodies between the organization's internal and external, formal and informal interactions and mutual relations construct the perception-strain-decision neural network with the property of optimizing or changing internal and external relations and interactions, and form immune network with the property of distributed autonomy meanwhile.

In order to support the evolution of revolutionary knowledge subsystem and form rapid and intuitive perception and reaction of external change, double loop learning manner is adopted to destruct stability in neural network which has the positive feedback process

characteristics. And in order to support the evolution of empirical knowledge subsystem and keep sustained and healthy development in stable region of evolution, single loop learning manner is adopted to strengthen the stability in immune network which has the negative feedback process characteristics. What is more, neural network and immune network commonly form learning network. The learning mechanism is determined by the synergy impact between single loop learning and double loop learning constantly to realize the collection, share, and integration of internal and external knowledge and generate dynamic knowledge system and core abilities for different stage of organization. Here we define such neural network, immune network and learning network formed during the process of organizational development as NIL networks for short.

At the same time, during the process of knowledge exploration and exploitation in neural network, immune network and learning network, the introduction of external new knowledge and increment of empirical knowledge will produce new interactive relationships and the change of the original connections of the organization, i.e., give rise to the change of structure of neural network, immune network and learning network. The dynamic change of knowledge system and the structure of NIL networks are concomitant.

THE MECHANISM OF DIFFERENT MODES OF ORGANIZATIONAL DEVELOPMENT

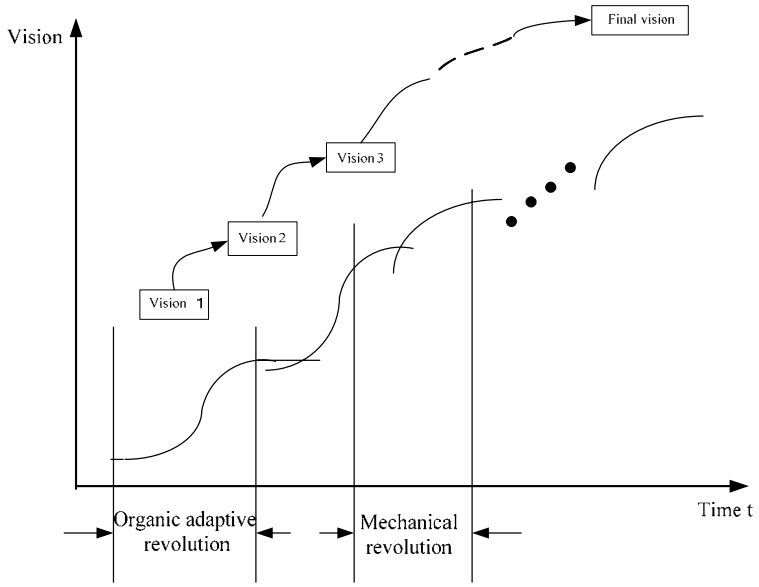
Based on knowledge system, the generation of change strategy in knowledge-based enterprise is determined by the mechanism of foreknowledge, referred as internal model, which is codetermined by organization structure, benefit structure, knowledge structure, subject of internal and external relations and ways of their interactions (John 1998). The internal model is the key to our basic standard, vision and behavior manner, and it also decides how to transform the perceptions of changes of external environment to the adjustment of its own NIL network structure. And the vision is the limit of time series of internal model in the knowledge-based enterprise. The internal model of the knowledge-based enterprise can be divided into explicit internal model and tacit internal model. Based on neural network, the explicit one is the prospective ability and mechanism organized by the effect of the revolution knowledge subsystem, while by assistant of the immune network, the tacit one is the predictive ability and mechanism organized by the effect of empirical knowledge subsystem.

Evolution and revolution are two ways of things development, and the essential difference between them is not the magnitude of the change rate, but whether there occurs new properties hereabout the change point. The change of the knowledge-based enterprise can be classified as evolution, mutation revolution and sliding revolution. The so-called evolution means invariant or minimal optimized changes of the internal model in the knowledge system. And with the domination of the empirical knowledge and the support of the immune network in the organization, the course of the evolution is realized through single loop learning. Meanwhile, revolution is a change process, which is driven by the external and internal innovative knowledge and characterized by changes of internal models and it is realized through double loop learning with the support of the neural network in the organization.

Revolution can be classified as mutation revolution and sliding revolution. Mutation revolution means discontinuous and saltatory changes in the internal model, while sliding revolution means the process of the continuous and non-saltatory changes in the internal model. The change process caused by evolution and mutation revolution has been defined as mechanical revolution mode, while the change process caused by evolution and sliding revolution has been defined as organic adaptive revolution mode. With the structure of the

sliding mode, the sliding movement should have good stability and dynamical quality. Different revolution modes during the change process of knowledge-based enterprise are shown in Fig.4.

Figure4: Different revolution modes of knowledge-based enterprise



PRACTICE IMPLICATIONS

Through the above analysis, knowledge-based enterprise can adopt some strategies and make use of some opportunities during the process of organizational development. Different strategies of knowledge change and different strategies of network change can be combined which will result in mutation revolution or sliding revolution and decide that whether the change mode is organic adaptive mode or mechanical mode.

Secondly, choosing suitable change opportunity is very important. Successful change should be happened at proper time with proper combinations. Proper knowledge change strategy and proper network change strategy should be organic matched. Otherwise if one hand is not matched, that will lead to failure of change.

Thus our proposed theoretical model and analysis can provide some suggestions or verifications during the change processes of knowledge-based enterprise in reality, such as the mode of Chrysler, Xerox Corporation, Haier and so on.

CONCLUSIONS

We have modeled the process of organizational development from the aspect of organizational knowledge system which is comprised by empirical knowledge subsystem and revolution knowledge subsystem. We define the essential difference of different change modes, consider the decision mechanism of different change modes, analyze the occurrence and feedback mechanism of different change modes, give the strategies and the opportunities during the process of organizational development, conclude the dynamics theory of driving different change modes and finally point out some practice implications. In a word, our efforts can explain the increasingly phenomenons of shorter life cycle, guide the behavior of knowledge-based enterprises, enrich the theory of organizational development and so on.

In further study, we will try to confirm our conclusions in practical knowledge-based enterprises and analyze the problem or the model in certain less restricted situations.

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