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Research Article

Research on Human-Simulated Management Hierarchy Model of the Complex Social Large System

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Abstract: In order to guide the research on theory and practice of complex social system management, make clear research focus and direction, a human-simulated management hierarchy model based on the growth mechanism of human body is established. Four layers of the operation and management of complex social system are discussed in the model. Finally, the concept of management gene is described in detail. And the directions for the deep research on the related problem of the human-simulated management hierarchy model are introduced.

Keywords: Complex social large system, human-simulated hierarchy model, management

INTRODUCTION

With the rapid development of science and technology, a variety of economic organization and management activities and structures have been changed into an increasingly complex style. Organizations are increasingly connected; they are mutually dependent on the degree of interaction. The relationship of mutual influence is growing stronger and stronger. Some elements or the environment of the organization is also showing the randomness, uncertainty and non-linear characteristics, such organizations are called complex social large system. Since the 1990s, there has been a new science-named complex science. It is the study of the science of complex systems (including biological, physical, social, economic, etc.). Complex scientific management is the integration of complex science and management science. Now research on the complex scientific management has become an important field of study in forefront of scientific theories.

Complex social large system's characteristics and the development of modern information technology produce new challenges to the traditional organizations and conventional management theories (Stanislaw, 2013). Traditional management theories usually focus on how to improve efficiency and achieve organizational goals through planning, organizing, leading and controlling, while ignoring the needs of organizations exist, stability and development. For complex social large system management, the most important work should be maintain the existence of itself, establish the abilities of self-coordination, self-correcting among system, than conside how to achieve the organization's mission and goals. Therefore, the research on hierarchy model of complex social system management is significance. It will be used to guide the research on theory and practice of complex social system management, make clear research focus and direction.

In this study, we concentrate on the important point of complex social systems management research and describe the control mechanism, the coordination and control structure of human body.

CONNOTATION OF COMPLEX SOCIAL LARGE SYSTEM AND RELATED RESEARCH

According to the definition of Hao (1998), the system in human society which has large scale, complex structure, diverse goals, influenced by many factors and with the randomness is known as a big system. Qian (2005) once said: "If the subsystem has many paralyzed types and the relationships among them are very complex, this is the complex system. For examples: the biological system, the system of the human brain, the human system, geographic information systems (GIS), social system and galaxy system" (Qian, 2005). The complex social large system described here is focus on the human social organization which has the above mentioned characteristics. Complex social large system is human social organization system which has a large and complex structure with diverse goals, many impact factors. Such as a group enterprise, an association, a city, a region, a country or even human organization, even management of the Earth.

Complex social large system includes four features: complexity of goals, structure, condition and uncertainty of methods and means. Among them, complexity of goals is the most important characteristics of Complex social large system. For example, enterprises have

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effective goal, market goal and cost goal, etc (Ricardo *et al*., 2001). Government organizations have construction goal, people's satisfactory goal, economic goal, environmental goal, cultural goal and so on. According to the level of goals, there are overall goal, part goal and individual goal. Sometimes these goals are affected by many factors and can be quantified and changed dynamically. Under different conditions and mechanisms, the relationships among the individual targets, part goals and overall goals are different. As Barnard stressed out that: "the organization's goals are not only the direction of struggle but also the soul of entire organization, the common goal of the organization is not static, it should alter as the size of the organization changes, personnel changes and changes in the external condition."

The establishment of the Santa Fe Institute in 1984 raises enthusiasm of researchers in complex systems. Holland's Complex Adaptive Systems theory, Qian (2005) open complex giant system and its methodology etc. made further promotion to the understanding of complex systems. According to professor Warfield's summarization, there are five schools of thought existing in complex systems research, i.e., theory of complex system dynamics research, complex adaptive system theory, chaotic system theory, structural basis theory and ambiguous theory. Among them, Forrester, Meadows, Senge etc (Lin, 1992) studied on learning organization theory, Cowen, Kauffman, holland etc. Payed attention to economic, biological and cognitive systems research, Warfield, Vickers, Piece stressed on interactive management theory (Cheng, 1999), Hazy (2008) focused their research on the leadership of complex systems, Hiroshi (1998) studied the rules of interaction among agent. Thus far, most previous studies were major focusing on connotation and characteristics of complex systems and on method of control and decision theory of complex systems. But the studies on the overall operation mechanisms and the theory architecture of complex systems are still nascent. The study of complex social large systems theory still belongs to the initial stage (Wang, 2001).

MANAGEMENT HIERARCHY MODEL OF THE COMPLEX SOCIAL LARGE SYSTEM

Since the diversified and dynamic characteristics of complex social large system's goals, traditional management theories can not solve the problem of self-improve in organization's goals. In addition, traditional management theories pay more attention to goals realization, but not to the steady and existence of system. In fact, for complex social large system, the first thing is to keep the system existence and development, then to operate the system to achieve the organization's goals and perform the given tasks. So it should promote co-ordination among the various elements, to make the whole system self-learning, adaptive, self-improved and become a continuous development and steady progress system (Wei *et al*., 2013).

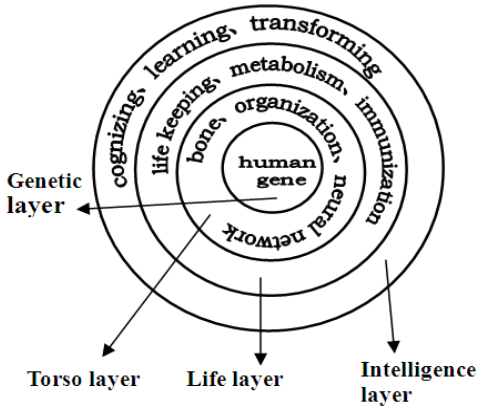

Fig. 1: Hierarchical model of the human body

Among complex systems of nature, human body is a complex and highly intelligent system. There are many similarities between the operation of the complex social large system and the growth mechanism of human body. In order to achieve more effect in complex social large system management, it is a practical significance to modeled complex social large system management depends on the characteristics of the human body. In fact, Tichy has proposed the concept of corporate DNA in 1993. In 1996, the improvement of species level in business process and the concept of "co-evolution" have been proposed by Professor Moore. In 1998, Professor Baskin pointed out that "The important thing is not the company DNA to accurately reflect the structure of biological DNA; the key is to make a small, simple element into large, complex elements. Professor Li Baoshan gave the concept of management biological engineering in 2003.

In the human body there are four basic levels of organization, i.e., Cells, Tissues, Organs and Organ systems. Cells are the building blocks of the body and compose us (they are everywhere: muscles, bones, nerves, etc.). Tissues are groups of cells (muscle tissue, bone tissue, etc.) that compose organs (the heart, the liver, the brain and so forth). Organ systems are systems of organs that work together (like blood vessels and the heart work to form the circulatory organ system). Contrast to the four basic levels, we divide the growth patterns and construction features of the human body into four levels, namely genetic layer, torso layer, life layer and intelligence layer. As shown in Fig. 1.

Genetic layer imply the common features of the human gene, although each person's genetic difference, but humans have a common genetic characteristics that determine the attributes of humans, determine the structure and the shape of the body. These common genetic characteristics distinguish humans from other features, there are the binding force of the existence and growth of the human body and they are not subject to the control of the human brain.

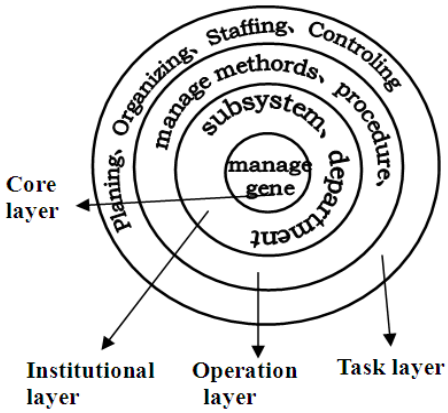

Fig. 2: Complex social large system management hierarchical model

The torso layer represents entity section, which includes human bones, tissues and organs. It consists of 206 bones, epithelial tissue, nerve tissue, muscle tissue, connective tissue, heart, lung, liver, spleen and so on. Its structure and shape are controlled by genetic layer; it is the carrier of life, the "machine" to complete the target task. Without torso, life can not be attached, no life, torso will lose soul and power trunk.

Life layer is the torso with soul. It includes eight systems: the movement system, nervous system, endocrine system, circulatory system, respiratory system, digestive system, urinary system, reproductive system. The coordination of these systems makes the body a variety of complex life to function correctly. Life layer indicates the presence of a dynamic, it is torso persistently guarantees.

Intelligent layer is major in cognizing world, transforming the world by various actions of learning, analysis, decision-making, judgment, self-improvement and self-transcendence. The more intelligent layer developed, the stronger their cognitive ability to transform the world. The intelligent layer is the highest level of the system as a whole, but also to achieve the critical level of complex human movement. However, each layer must base on the previous layer.

Correspond to the levels of the human system, the operation and management of complex social large system is divided into four levels: the core layer, institutional layer, operation layer and task layer. As shown in Fig. 2.

Core layer of complex social large system is a "gene" layer. It contains mechanism that can ensure the system to be self-organizing, adaptive, self-learning. It maintains a complex social large system with order, that determines the traits of the system and can effectively prevent the internal contradictions of the system from going to the extremes and constraints management unit or manager's behavior to impel their target being as consistent as possible with the goal of the overall system. Just as the human gene is not controls by people's brain, human genes control human attributes that determine the structure and shape of mankind. Complex social large system "genes" are not subject to control by the system administrator, it sustains the existence of complex social large systems with sustainable development and it can be transmitted and copied in a different era of management and replication, Such as the Constitution, criminal law, company law, accounting and law. In 1988, Hayek emphasized the central position of the "rules" and pointed out that the transfer of the new regulation can copied those organizations through the use of rules successfully.

Institutional layer is a "torso" layer of complex social large system; it is the entity representation of complex social large system management gene. It involve departments or subsystems such as institutional separation of powers, legal institutions, supervisor institutions, military institutions, diplomacy institutions, government institutions that are set up in accordance with the idea of complex social large system gene. Its composition and shape individually will not transfer to top manager. Government institutions is modeled according on human body, it consists of five parts, which are decision center, information center, supervision center, administrative examination and approval center, comprehensive law enforcement center and public construction and service centers to contrast "brain", "organ" and "neural network", it is human-simulated organization (Wei *et al*., 2005a) institutions.

The human-simulated organization is a centralized administrative organization under the "limited powers". It is a fully integrated digital organization with layered characteristics of hierarchical structure which mimic the body control system and characteristics of adaptability, flexibility, agility and intelligence, etc. In function, it applies the use of modern computer technology, information and management technology and artificial intelligence technology to achieve a unified command, the overall optimization and complete separation (Wei *et al*., 2005b) between decision-making and implementation.

Running layer is a guarantee layer for complex social large system's operation and management. It includes not only organizations, but also processes, rules and institutions. Such as department coordination systems, logistical systems, human resources systems (selection, appraisal, rewards and punishments, etc.), information management systems, internal monitoring system, correspond to the human brain, circulatory system, digestive system, nervous system, immune system. The coordination of these systems can greatly reduce the cost of the operation and management of the complex social large systems; develop the ability of responsive, decision and anti-corruption.

Task layer is a collection of related elements in the management process to adapt to the environment and

transform the environment, which includes decision-making system, implement system, social supervision system and social information systems. The integration method by combination of qualitative and quantitative which Professor Qian Xueshen put forward belongs to this layer.

MANAGEMENT GENE OF THE COMPLEX SOCIAL LARGE SYSTEM

According to the biological definition, gene is a nucleotide sequence that contains specific genetic information in a DNA molecule. It is the smallest functional unit of genetic material. Gene is the basic factor that determined characters and shape of a living species. Likewise, management gene is the key factor determined management trait of a complex social large system. Professor Li Baoshan considered management gene is the smallest unit for enterprise to acquire its resources, classification, organizes, access, use, share, update and innovation. Here, what he stressed is that the management personality traits and substance of genes (Li and Qian, 2003).

Just as the human gene is not equivalent to a specific human gene, all healthy people have common characters in their gene, whether adults or children, man or woman. So management gene of the complex social large system is not the genes of a specific enterprise's management. It is the common management features of the complex social large systems management which is in sustainable development. It includes management methods, means, rules or forms. Here, the emphasis is on the management of the common characteristics and manifestations of the gene. The management rules, means and methods refined from a series of excellent system which determined the traits and shape of complex social large systems are called Management gene of complex social large system.

Definition 1: Management gene of complex social large system is lies in the minds of individual manager, control the individual manager to work according to division of labor and collaboration, it is a series of common management philosophy, law, institutional style and basic institution to maintain the shape and structure of the system as well as sustainable existence and development. Good management genes can prevent fragmentation and disintegration of the system and promote system to be self-adaptation and self-improvement.

Complex social large system management gene:
Management agency model of management concepts management mechanism and the basic system: There are some common management philosophies, such as equality concept, democratic ideals, systematic philosophy and the minority subsystem (including departments or individuals) can not do harm to the overall system, but the combination of majority subsystem (including departments or individuals) can transform the whole system of philosophy, etc.

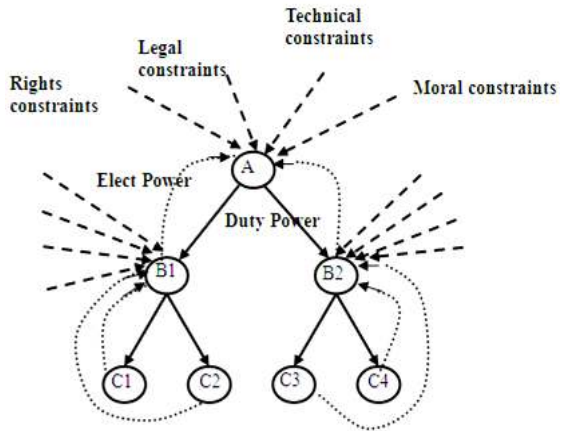

Fig. 3: Directed graph of chain rights

There are two major management mechanisms. The first is constraint mechanism of power; there are five constraints mechanism of power. They are rights constraints, interest constraints, legal constraints, technical constraints and moral constraints (Chen, 2005).

The second is separate mechanism of power; that means decision-making rights, implement rights and supervision rights must de separated severally. Manager should not hold posts in multi-organizes with deferent rights.

Figure 3 is the directed graph of rights chain. In node A, B1, B2 (mean managers) have two categories edge, imaginary and solid. Solid lines imply the duty right from administrative authority. Imaginary lines imply five categories constraints representing different levels and external constraints of power. Such as rights constraints, interest constraints, legal constraints, technical constraints and moral constraints. In order to prevent the abuse of power, guarantee the capacity to achieve the goal of system, the five categories of constraints must be harmonized, integrated applications.

CONCLUSION AND PROSPECT

Human-simulated management hierarchy model describes the order and hierarchy of the complex social large system management and development. For a complex social large-scale system management, the first priority is to establish or improve management gene and replicated in its subsystem and then the traditional management, namely planning, organizing, leading and controlling.

In complex social large system management, the first step is to guarantee the existence, stability and development of the system by seting up and improving

the management Gene; and then you can consider how to achieve organizational goals. Management gene is not set up by managers, but by the public.

For example, the government's management of enterprises and institutions, the first step is to set up and improve the management genes in these units, such as company law, accounting law, institutions regulations of directors and supervisors, generation and recall mechanism of legal representative, etc. Used the common measures constrain managerial power, realize the separation of decision-making, execution and supervision, so the unit can be self management, self correction and improve, to make up for the lack of government management ability.

This study only briefly elaborated on the concept of the model. The completeness, feasibility, criterion and evaluation of the model and the detail of management gene and human-simulated organization (Wei *et al*., 2005a) will be discussed in the other research writing (Wei *et al*., 2004).

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