

FIS 2010 Beijing ,China ;

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A Brief Analysis on Dissipative Structure Characteristics of Virtual Community and Its Orderly Method

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Abstract: This paper analyzes the concept of virtual community, a brief analysis of the dissipative structure theory and its four characteristics, the analysis of virtual community shows that it has the characteristics of the dissipative structure: virtual community is a dynamic and open network social system, is a non- balanced system, the nonlinear mechanism of virtual communities and the effect of the fluctuations in the nonlinear effect. Finally, the author proposes to use the endogeneity and external stipulation to achieve orderliness of the virtual community.

Key words: virtual communities , dissipative structure , information society , orderly

Acknowledgement: I would like to extend my deepest gratitude to my fatherr who has given me much help especially in sprirt .

1. Virtual Community

1.1 concept of virtual community

Community as the basic concepts of sociology does not exist in the ancient Chinese. Sociological researchers generally agreed that the concepts of community was initially proposed by the German social thinker Ferdinand · Toennies in his Famous masterpiece as "Gemeinschaft und Gesellschaft" in 1887. This German word "Gemeinschaft" can be translated as "community" which means any form of organization based on cooperative relations. But it is generally agreed that the two key concepts of Teonnies Sociology are still in the untranslated state, since the translations of the 'Community' and 'Society' still have some vague and uncertain meanings. In 1940, when the American C.P Lu Smith translated this masterpiece of Toennies into English for the first time, he could not find corresponding words but had to translate the title as "Basic Concepts of Sociology". In 1955, when published in the UK, the English version of this book was entitled to "Community and

Asslciation" (communities and associations). It is until the reissue of Lu Smith's translation by University of Chicago in 1957, did the title be set as "Community and Society". Since then, it has become the usual translation of Toennies' book¹.

1.2 Virtual Community

At that time, the conception of the community proposed by Toennies did not gain the academic attention and recognition. Later with the development of the society, the conception of communities gained more and more attention of scholars, but in the development process, the concept was adopted according to researchers' own directions and interests, which also increases the localization of the concept of virtual community. In accordance with Toennies's view: "All the intimate, private and exclusive living, as we suggest, can be understood as the community life. The social life is public, it is the world

¹ Zhou Xiaohong: "History and System of Western Sociology", Shanghai People's Press, 2006, p 291.

itself." ²(Tonnises, F., 1998, p33)For example, the Chicago School especially adopted the urban communities as the main focus of their research. Lu Xueyi , Chinese scholars who interpreted the community as: "community generally refers to gather in a certain geographical range of social groups and social organizations, norms and systems under a combination of social entities."³ (Lu Xueyi , 1996) It can be said that the concept of regional community-based also has its scientific rationality, but this reformed concept of "community" has been a relatively big difference from "community" of Toennies which has always stressed that community is a common sense of belonging to social groups, its essence is the will and a dynamic organism. Its main forms are kinship, neighborhood, friendship and relationships. It is essentially different from the concept of society.

With the rapid development of science, technology and computer technology, human civilization comes into 1980s, a new social force for change – the Internet t technology rapidly rises worldwide, and they have a profound effects on all aspects of society in an unprecedented way, including people's lifestyles, ways of thinking, communication methods, etc.. According to the survey of China Internet Network Information Center, as to June 30, 2009, China's Internet users reached 338 million people, only in six months it has the growth of the 40 million; national Internet penetration rate, 25.5%, exceeds the world average.⁴(CNNIC)With the rise of the network, it is associated with the inevitable emergence of virtual communities.

2 Tonnises, F., Community and society, New Brunswick: Transaction Books, 1998, p33.

3 Lu Xueyi: "Sociology." Beijing Knowledge Press, 1996. Cited from Pi Wei: "The reality of virtual communities", Journal of Wuhan Institute of Technology in 2006 fifth.

4 China Internet Network Information Center (CNNIC): "24th China Internet Development Statistics Report."

Initially, people who proposed the concept of virtual community are not sociologists but the network technology developers who borrow sociological concept of "community" and then put forward, and at last, this concept is accepted by the majority of Internet users. Of course, there are many kinds of the definitions of the concept of virtual community which are defined by domestic and foreign scholars, which are not identical to their own. They often determine their own focus of the study according to their own research needs or research interests. I think the concept of virtual community was truly originated from Rheingold Howard's book named it as "virtual community" in 1993. ⁵ From the perspective of information philosophy, this article mainly uses Stuart Barnes's definition of virtual communities. In his view, a "virtual community is a group of people who organize an open discussion on the internet, exchange in chat rooms and other similar online garden and make humane information exchange and transmission about certain issues of common interest, so as to establish a social set of critical mass of interpersonal relationships."⁶(Koh J, Kim Y G., 2004, (26): 155 ~ 166) The author believes that virtual communities not only have the basic elements of the concept of reformed community but also have some features that its confrontation "reality community" doesn't do, such as the virtual, interactive, anonymous across time and space, interactive equality etc.. It is the development of the conception of the community in the information age, and is also a return to Toennies's concept of community.

2 Dissipative structure and its properties

⁵ Rheingold, Howard, Virtual Community: Finding Connection in a Computerized World, London: vintage, 1993.

⁶ Koh J, Kim Y G. Knowledge Sharing in Virtual Communities: an E-Business Perspective. Expert Systems With Applications.2004, (26): 155 ~ 166.

2.1 Dissipative Structure

Theory of Dissipative Structures(theory of dissipative Structures, synergetics and catastrophe theory referred to as the "New Three", which are the enrichment and development of systems science) is a self-organizing systems theory proposed by the Belgian scientist I. Prigogine in 1969 for non-equilibrium thermodynamics and statistical physics research proposes. Prigogine thought the so-called "dissipative structures" as: "in the conditions of far from equilibrium, we may get changes from the disorder, chaos to order and may have new mechanical state of some materials which shows an interaction state between a given system and its environment. We called these new structures dissipative structures. "⁷(Zeng Qinghong, 2005, P.14) It uses non-equilibrium statistical physics and thermodynamics as the basic tool, and focused on the research how open systems which are far from equilibrium achieve the transformation from disorder into order in time, space and function by the constant exchange of material and energy with outside.

Prigogine named this kind of ordered structure in the non-equilibrium state as "dissipative structure", and dissipative structure theory is to study its nature and evolution of science. Since then, the dissipative structure theory is no longer limited to natural sciences, but is widely used in natural sciences, social sciences, engineering sciences and other fields. Meanwhile, in order to solve the conflicts caused by two opposite evolution trends which lay in the respective use of the second law of thermodynamics and Darwinian evolution in the physical world and biological

⁷ Belgium, I. Prigogine; France, Iraq Stang hot, and Zeng Qinghong, M.: "From chaos to order: a new dialogue between man and nature", the Shanghai Translation Publishing House, 2005, P.14.

world, dissipative structures theory argue that each system is divided into three categories: first, an isolated system which has neither the material and energy exchange with the outside world; Second, a closed system which only has the energy exchange but not the material exchange with the outside world; third an open system which has both the energy and material exchange with the outside world.

2.2The characteristics of dissipative structures

In fact, dissipative structure is a giant fluctuation when an open system is far from equilibrium which achieves its orderliness from disorder to order through fluctuations. In systems science, the so-called orderliness refers to the regular link or change among each element within the system; disorder refers to the chaotic and irregular combination among elements within the system and the irregularity of moving transformation. There are two main orderly phenomena of the nature: one is the static order which forms the structure called balanced structure; another is the dynamic order, they form a structure called the non-equilibrium structure. Therefore the support of the dissipative structure theory that the system is sequential must have the following four characteristics: First, the system must be in an open state and points out that an open system has three possible existing ways: the first is the thermodynamic equilibrium state; the second is linear non-equilibrium (or near equilibrium); third is non-linear non-equilibrium (or far from equilibrium). Second, the system must stay away from equilibrium which means the interaction among elements of the system is no longer affected by the responding interactive linear mechanism but affected by the interactive non-linear mechanism among many variables. Third, non-linear of influences and interacts with each other; Fourth, the giant fluctuation caused by the

non-linear interaction of elements within the system will affect the whole system. In essence, these four conditions are mutually inclusive and interactive but not isolated existing. Dissipative structure is a structural state that the system maintains its non-linear interaction at non-equilibrium conditions by the constant exchange of material, energy and information so as to ensure its dynamic order.

3 Characteristics of dissipative structures of virtual communities

Since 1950s, some important social theorists predicted that the development of technology will bring the "brave new world", which was exactly proved to be true afterwards. Today, their forecasts in the society of the information and communication technology (ICT, Information and Communication Technologies) became more and more persuasive; this "brave new world" came to be generally known as the "information society." If the existing properties of dissipative structures are applied to the information society and network era, we can find that the inevitable outcome of information society-virtual community actually has the characteristics of dissipative structures as well.

3.1 The virtual community is a dynamic and open network social system.

Openness is the premise that the system becomes dynamic and orderly and a fundamental condition for the formation of dissipative structures. A dynamic and orderly system must be an open self-organizing system and be a self-organizing system able to exchange material, energy and information with outside of the system and each element within the system. American sociologist Manuel Castells proposed in his "Rise of the Network Society" that, as a historical trend, the main function and methods information era are composed of network which constitutes a new social form and is the source

dominating and changing our society. A web-based social structure is a highly dynamic and open system; without affecting its balance, it is much easier to innovate.⁸(Manuel Castells, 2001, p. 11-12) The nature of informatization is the reorganization of information space (he also called it "virtual space" and "mobile space" and "network society"). Mobile space has three levels: the interconnection of electronization forms the first material base (corresponding to technology) of mobile Internet space; nodes and cores constitute the second level (corresponding to the site) of mobile space; the space organization of managing elites who play dominant role makes up the third level (corresponding to one) of mobile space.

In the virtual community, all the nodes, as long as they have common encoding information (including the shared values and common achievement goal), can achieve a common interconnect. This web-based social structure is highly dynamic, and open social system. The emergence of Virtual Community with network society means great changes in human experience and profound changes in human behavior, thinking and communication methods. The characteristics of this change are timeless time and placeless place.

3.2 The virtual community is a network social system with non-equilibrium.

Dissipative structure theory proposed that non-equilibrium is the source of Order. Non-equilibrium is not the imbalance and is not balanced, but is far from equilibrium before giant fluctuations and is a steady state which is in the vicinity of the critical point of instability but does not exceed the critical

⁸ Manuel Castells: "The rise of network society", Xia Zhujiu, M., Social Sciences Academic Press, 2001. Quoted from Hu Yong: "Public Clamor - Network's personal expression and public discussion", Guangxi Normal University Press, p. 11-12.

point. Correspondingly, instability includes two aspects: first, the balance becomes unbalanced so as to reach instability, for example, when pH in the extra cellular is too high or too low, it will result in alkalosis or acidosis; and second, unbalance tends to be balanced so as to reach instability, for example, the increase of concentration of potassium in the extra cellular will render hypertension. Non-equilibrium means that there are differences between various elements within the system and is very uneven. Only within the dynamic structure, differences, differentiation and contradiction between the elements and the self-organization of the system can ensure the vitality of the system. When a structure and system are in a stable equilibrium, there is a high disorder and the differences between each element constituting the system is very small; such a superficially balanced system will ultimately decline.

For an open virtual community, virtual community is composed of the basic elements - each of them is an individual with differences and differentiation. For the topics or public affairs appeared in the community people are interested in, their discussion and opinion could be totally different or even very oppositional, which, on the contrary, ensure the further development of virtual communities.

3.3 Net system of virtual community has nonlinear mechanism.

Nonlinear mechanism is relative to the linear mechanism. Linear refers to the proportional and linear relationship between quantities and represents the regular and smooth movement in space and time. And non-linear refers to the disproportional and non-linear relationship between quantities and represents irregular movement and mutation. Linear relationships are independent to each other. But non-linear interacts with each other; because of this interaction, the whole is no

longer equal to the sum of each part and may appear gain or loss which is different from "linear superposition".

So far, the concept and nature of non-linear have not been clearly and completely understood; and its philosophical meanings also have not been explored adequately. A given system generally has the properties of linear and nonlinear at the same time: first, in a given nonlinear system, its nonlinear nature determines its balanced structure or whether and where the stable mechanism exists; second, the linear nature of the system determines its pattern of small vibrations on its equilibrium point (stable structure) that is the property of linear expansion near the stable points of the system.

A most important physical mechanism of non-linear is the interaction.⁹ For members of virtual community communicate and interact with each other in an equal way and express their own opinions about public affairs of the virtual community, many complicate factors, such as emotions, attitudes and opinions of members of community, interact with each other, which is the presentation of the non-linear function of virtual community.

Net discussion of virtual community will become more and more profound and objective, because of individual's acquirement of mass information in unprecedented access, an increasingly frequent communication of information and the cross-national and cross-regional spread of information. They are not the simple superposition, but develop according to sequences: from the simple to deep, from emotional to rational, from disorder to order and from the emotional to the objective.

⁹<http://www.91tech.net/Article/MathsBase/200605/3884.html>.

3.4 Virtual communities also have giant fluctuation effects that are due to the non-linear interaction.

Fluctuation effects usually refer to the state of fluctuation of each element of the system at some time of "threshold". Usually, fluctuation effects are the premise of the order of the system. Any elements of the system are likely to change at any time, and any subtle change of any elements could change any other elements of the whole system and eventually form a new relatively stable state. In the era of increasingly developed net spread, as a representative virtual community, network forum plays an increasingly important role in the process of social spread. With the interference of traditional news media or the opinion of authorities and government or the view of internet opinion leader, fluctuation effects of virtual communities embody in that the chaos in a community caused by the introduce of stimulating information will tend to be rational, objective and sequential again and so as to come to a new state of dynamic order.

"Opinion leaders", first proposed by Lazarsfeld, in his book the "people's choice" published in 1948, refers to a small group of people. They are active in the dissemination activities, very concerned with the development of some affairs and know them very well, so they can provide relative information for the general public groups around them and make relevant explanations.

4. Orderly methods of virtual communities

4.1 Native and endogenous factors of virtual communities come to an orderly state.

By the author's above statement, virtual community also has four properties that dissipative structures come to dynamic order: dynamic and open, non-balanced, non-linear mechanism and fluctuation effects caused by non-linear effects, which is the native factors

to ensure the virtual community to be in a state of dynamic order. Such native factors don't need the help of strong intervention of external factors but has their own potential to achieve dynamic order. It is one of ways to keep virtual communities in order.

Recent years, with the popularity of the Internet and spontaneous development of technical system, a so-called autonomy model theory appeared in academia. This theory strongly opposes the State Government of manage the electronic space and establishes a representative theory which is called cyberspace anarchism. Network Autonomy is closely related to the network itself.

4.2 External and control factors of the virtual communities achieve its state of dynamic order

The privacy of personal identity in the virtual community, to some extent, eases fears, such as being isolated, being humiliated, being revenged, harming others, being against or being hated, which are caused by words in reality. Patricia Wallace said: "If people believe their actions will not be held to the individual, they become less subject to the constraints of social customs and commandments."¹⁰ (Wallace, Patricia, 1999, pp124-125)

In the virtual community, once a network groups is formed by the recognition of identity, thoughts and feelings will shift to a common direction by the effects of suggesting and mutual transmission and immediately change the suggesting view to the action tendency, which is the main characteristics of individuals who constitute groups. He is no longer himself but a doll who can't dominate himself. Furthermore, just the fact that he becomes a member of organic group could make him step backward from the civilization.

¹⁰ Wallace, Patricia, *The Psychology of the Internet*, Cambridge: Cambridge University Press, 1999, pp124-125.

He as an individual may be a educated one, but in his group he becomes a barbarian-an animal whose behaviors are controlled by the instinct.¹¹ Because of the complicated psychological changes caused by the transformation from individual to groups and some other external factors, to strengthen the supervision on the order of the Internet has become a global consensus. But the problem is that the existing law is not able to the problems appeared in the network society. According to the characteristics of regional customs and laws, the control of the Internet could be divided into the following types: Europe and the United States representing the weak control, Southeast Asian countries and regions representing appropriate control and Islamic countries representing a strong religious control.

By certain laws and regulations, the Internet security can be achieved, to some extent, which would maintain the security and orderliness of the Internet and virtual communities.

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¹¹ [French], Gustav Le Pen: "rabble - the Popular Mind," Ping Keli's translation, Guangxi Normal University Press, 2007 edition, p. 51.

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