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# **Coping with System Sustainability: A Sociocybernetics Model for Social-Economic System Architecture**

## **ABSTRACT**

This paper proposes an epistemological model based on cybernetic principles and activity theory to interpret two levels of problems that are intertwined in our social-economic system, namely the liveability and sustainability problems. In the first part of the paper, important principles and concepts from related fields of cybernetics and activity theory are introduced for later construction of a model. In the second part, a model is constructed based on the introduced concepts. To validate the proposed model, the current economic crisis is studied in the third part. An important contribution of the proposed model is a theoretical understanding of the two levels problems, and how to construct macro social-economical policies to avoid similar crisis in the future.

Key Words:

Feedback; Social Activities; Liveability; Sustainability; Autopoiesis.

## **INTRODUCTION**

The global economic crisis has led to a need for solutions, such as a systems approach and deeper analysis of what could be done to avoid such a future global crisis. Discussions in many forums and mass media have mostly focused on the first order casual-effects such as bank loan systems, bonus problems, and credit systems. This is what referred to as a “liveability level problem” which is defined as related to the contentment with life in particular location of an individual or set of individuals (de Chazal, 2010). The second order problem about fundamental structure and social sub-systems relationships will be the focus of this paper. The problems of structure and relationship of social sub-systems will be defined in this paper as the sustainability level problem.

We propose the application of the systems approach to our world social-economic system can yield benefits. Cybernetics as one of the important parts of system paradigm offers a comprehensive understanding to current sociological challenges and problems. Churchman (1950) proposed the essential understanding of the cybernetics in social science and psychology, and warned of the risk of the two becoming separated:

*The psychologist and social scientist are aware of the complexities of phenomena in their own field and may look upon the metaphors and analogies of the cyberneticians with scepticism. The danger is that eventually some cybernetician goes astray and makes proposals which to the psychologist and social scientist are completely outrageous. The end point of the process may come when each field returns to its own work and ignores the potential contribution of other disciplines. The real danger is the complete loss of integration which at the present time seems essential in the study of purposive behaviour. (p33)*

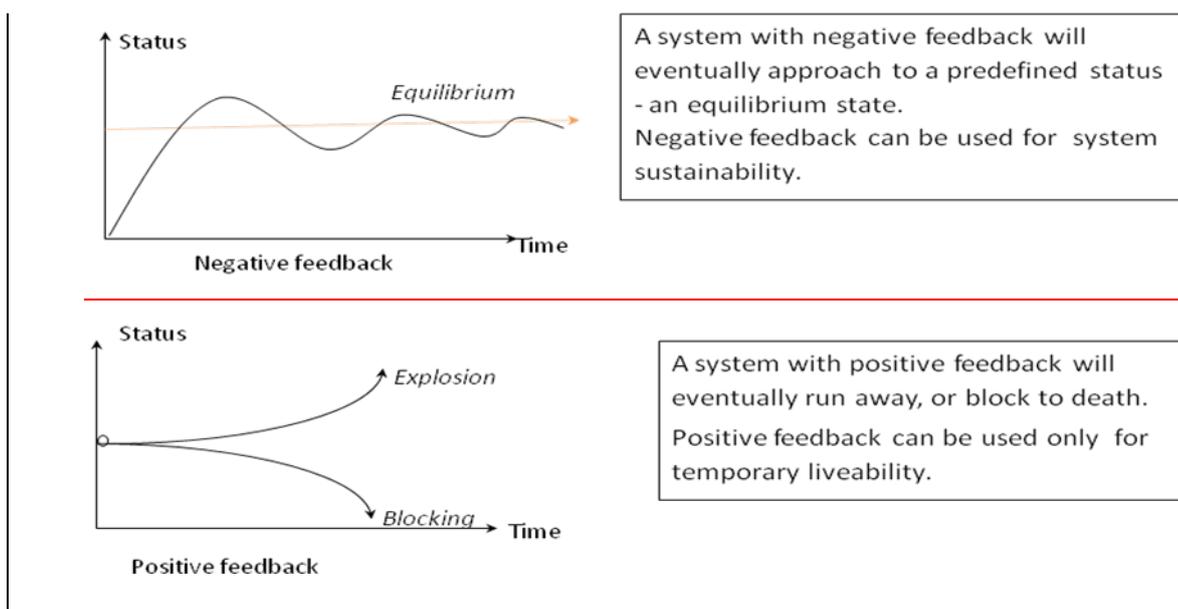
To be aware of the risk as warned by Churchman, this paper proposes an epistemological model by integrating the two related fields of cybernetics and social psychological studies. The model can coherently integrate the liveability and sustainability of human activity systems, and provide a systemic interpretation to the current economic crisis and faced problems

## **CYBERNETIC PRINCIPLES OF FEEDBACK AND PURPOSEFUL BEHAVIOURS**

Cybernetics has been traditionally applied in areas of engineering control. In recent years, the Research Committee 51 on Sociocybernetics (RC51) within the International Sociological Association (ISA) has made great efforts in applying some of the high level principles of Cybernetics in studying various social and cognitive problems. For example, feedback and feed forward are important embodiments of purposeful behaviour in cybernetic systems. In control theory, there are three fundamental different types of control mechanisms, namely, negative feedback, positive feedback, and feed forward (Skyttner, 2000).

Negative feedback is to minimize a deviation between actual output of the system from the predefined goal(s). It is the most common type of control in a system for maintaining an equilibrium – a status of a system in which competing forces are balanced. Negative feedback works only when there exists a goal/status (such as equilibrium) for the system and the deviations of the actual output from the goal/status are identified or measured, i.e., it works against a deviation. All tracking systems, speed control systems, such as a thermostat, are all based on the negative feedback. Classical economists such as Adam Smith (1776) claimed that the “free market” would tend towards economic equilibrium through the price mechanism, in which demand and supply are negative forces against each other to an equilibrium price. This view now is questioned from current practices such as problem of unemployment, bank credit system, bonus class, monopoly market.

Positive feedback, however, amplifies a deviation so the end result of a positive feedback is often "explosive" or 'blocked'. Thus, this type of feedback works normally as a temporary control in some dynamic systems, such as nuclear fission based explosives, world population system, stock markets, bank run and bankruptcy, economic recessions or expansions.



*Figuer 1. Negative feedback and Positive feedback*

The above two kinds of feedbacks (figure 1) require the output of the system must be frequently measured against a predefined status in order to decide next input. Feed-forward, however, is differently from the above two kinds of feedbacks that it works only on its own pre-defined way without responding to how the output reacts.

Two prerequisites are needed for a reliable feed-forward: the external environment must remain predictable, and the effect of the output of the system should be known. Apparently the two prerequisites can hardly be met in real world situation, especially for a socio-economic system. Therefore feed-forward is normally used as a complementary to feedback.

Another important principle of cybernetics is goal seeking. It is embedded in all the above three kinds of controls, and is an important purposive behavior, which defined by Churchman (1950) as an intensive function of a system. A system has an intensive function if it consists of objects that accomplish their goals by changing their behaviour according to changes in the environment. This accomplishment requires that the system can measure the changes in the environment and compare the changes with its goal(s). In many social studies, however, this requirement is either impossible, or undesirable. Therefore the intensive function is primarily studied by the so called first order cyberneticians. The second order cybernetics or sociocybernetics is more interested in studying higher level purposeful behaviour, namely purpose. A system has purpose if it accomplishes its objectives by exhibiting different types of behaviour, even though the environment remains constant or unknown. All human involved systems are purposeful systems, especially socio-economic systems.

## **THE ACTIVITY THEORY**

Activity theory is a philosophical and cross-disciplinary framework for studying various forms of human behaviours and social practices. It uses the category 'activity' as 'a system of its own structure' or the minimal unit (Leontèv, 1981) to approach the relationship of subjective minds with the social context. Some important concepts and models of the activity theory from the work of (Davydov, 1982), (Vygotsky, 1978), (Leontèv, 1981), and (Engeström, 1987) are introduced in the following as building components for the sociocybernetics model in the next section of the paper.

### **Activity –The Most Basic Unit of Social System**

An activity is a basic process that a human being or a collective carries out or participates in by virtue of being alive. It is also the most basic unit for human or collective performing any specific function or obligation. No one can survive without participating in various social activities. Activity is 'the non-additive, molar unit of life' (Leontèv, 1981).

An important departure point of activity theory from many other sociological studies is that activity theory regards social properties as emergent properties instead as properties deducted from or a sum of an individual's properties. In a certain sense, many other sociological studies take the individual human being as the ontologically given starting point from which everything else can be deducted (Smith, 1776). Consequently, socialisation, norms, values and culture are popular means for explaining why individuals unite into something called society (Qvortrup, 1996). Activity theory, however, takes the activity interactions between people and their social cultures, norms, values to be then identified as a basic unit of a social system. Activity is an emergent property and synergy of 'collective intentionality'. This collective intentionality is not the sum of singular intentionality, but a new emergent property of collectives (Searle, 1995).

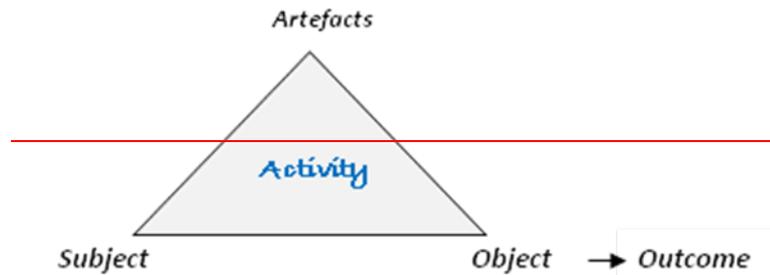


Figure 2. An Individual Activity Based on Leontèv (1981)

In modelling an activity, a triangle model is proposed by Leontèv (1981) to include three fundamental elements and relationships in an activity (figure 2). In this model an activity is defined as the ‘middle link’ in a three-part scheme in which a *subject* interacts with an *object* via *artefacts*. A subject in an activity is a conscious actor or a group of conscious actors. An object is some part of the real world that the subject acts upon. ‘If I act, there is something in front of me, an object (Schwarz, 1997).’ The object manifests itself only if there is an interaction with a subject. The object and subject are non-separable. Activity theory encompasses social, historical, and cultural properties to be as objective as physical and biological properties. An object (objective) is always held by a subject, a person or a group of persons who is or are engaged in an activity. An object provides motives for the activity, and gives the activity specific direction. ‘Behind the object, there always stands a need or a desire, to which the activity always answers (Leontèv 1981) ’.

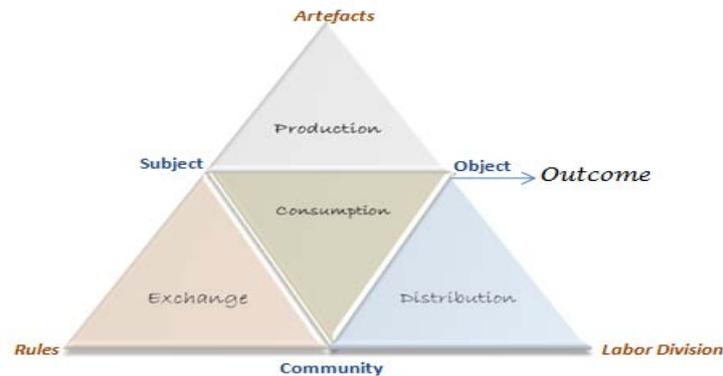
A subject cannot act on an object directly, but only through artefacts as mediators. The introduction of artefacts as mediators in mediating the very classical ‘mind-body/subject-object’ paradox or contradiction is a major contribution of activity theory. ‘Mediator objects connect humans not only with objects, but also with other people’ (Leontèv, 1981). In particular, artefacts are understood as objective transmitters for the internalisation process and externalisation process. The internalisation process is the process in an activity that transforms the object in focus into its subjective forms or images (mental models, theories, skills, consciousness, etc.). Through this process the object in focus will be ‘generalised, verbalised, abbreviated, and most importantly, becomes susceptible to further development that exceeds the possibility of external activity (Leontèv, 1981). The externalisation process is the process that internal process manifests itself in external actions performed by persons, and is converted into objective results and products (Davydov, 1982; Vygotsky, 1978; Leontèv, 1981).

### **Community Based Activity System**

Based on the first activity model from Leontèv, Engeström (1987) introduced three more components, namely Community; Rules (including laws, norms and cultural traditions); and Labour Divisions into the triangle model (see figure 3). He then expanded the concept of contradiction and mediating principle into community level.

Contradiction is an important concept in activity theory to interpret the initial point of a development process. Contradictions manifest themselves as problems, ruptures, breakdowns, and clashes. Activity theory sees contradictions as sources of development (Bai & Lindberg, 1998, Turner P. & S. Turner 2001). Activities are virtually always in the process of working through contradictions (Kuutti, 1996). To resolve a contradiction which normally involves two mutual opposite parts, there needs always a mediator. In figure 3, together with the

classical contradiction of 'subject-object' mediated by artefact, two new contradictions are identified after the introduction of community, namely the contradiction 'subject-community', and the contradiction 'object-community'. In a similar manner as the instrument/artefact is introduced as the mediator of the contradiction 'subject-object', Engeström introduces 'norms, rules' as the mediator of the contradiction 'subject-community', and 'division of labour' as the mediator of the contradiction 'object-community'. Based on Marx's terminology of social production, exchange, distribution, and consumption, he further maps those four human fundamental activities as four sub-triangles. In the next, those fundamental activities will be applied as components to the sociocybernetic model of feedback economic-subsystem.



*Figure 3. Community Based Activity on Engeström Y. 1987)*

According to figure 3, the development of economic production, exchange, distribution, and consumption activities are accordingly driven by four kinds of contradictions, i.e. contradictions of Subject-object, subject-community, object-community and production-consumption. Firstly, *production* activity is driven by the contradiction 'subject-object'; namely, by using instrument ('tool' in the terminology of Vygotsky, or artefacts in figure 2 by Leontèv) the subject works and produces the objects that correspond to the given need or an outcome. Secondly, the *exchange* activity is driven by the contradiction 'subject-community', namely, the subject exchanges his/her labour value (exchange value) within the community to obtain his/her needs (use value) according to the community's rules and social law (second mediator). Thirdly, the *distribution* activity is driven by the contradiction 'object-community'; namely, the outcome of the object is distributed for social re-production among members (organisations, companies) of the community according to the principles of the division of labour (third mediator). Finally, the total social *economic activity system* (the whole triangle) is driven by a new kind of contradiction: '*production-consumption*', namely, by the paradox that we produce output and simultaneously we consume the output in order to re-produce it. The contradiction of 'production-consumption' provides an inner and never-ending energy that drives an accumulating cycle of consumption and production. 'Were it not for the paradox that consumption necessitates production, and vice versa, activity would not exist (Holt, 1993).' This implies that the relationship of 'production-consumption' forms a positive feedback according to cybernetics and it will be applied for construction of the sociocybernetics model, which will be described later in this paper.

### **Activity is an Autopoietic and Self-referential System**

Autopoiesis is a concept developed in the 1970s by Maturana and Varela (1972) in describing cells systems. The basic definition of autopoiesis is that a system self-reproduces the

components that produce it (Mingers, 1995). Although no biological system can maintain itself without resources from the environment, only matter and energy, not elements and not unity can be imported from or exported to the environment. A biological system is organisationally closed but communicatively opens. Luhmann (1986) generalised the concept of autopoiesis to cover not only organic systems, but also social systems. However, one question has to be answered then: what elements or units in our social autopoietic system are self-produced and not imported from the environment? According to Luhmann (1986, 1995), social systems are autopoietic systems in which only communication is the reproduction unit.

*“Social systems use communication as their particular mode or autopoietic reproduction. Their elements are communication which are recursively produced and reproduced by a network of communications and which cannot exist outside of such a network. .... For a theory of autopoietic systems, only communication is a serious candidate for the position of elementary unit of the basic self-referential process of social systems. Only communication is necessarily and inherently social.”*

(Luhmann 1986, p.174 - 177).

The crucial role of communication is no doubt one of the most significant elements in any social system. Any system must include the communication channels to knit units or parts together as one coherent whole. However, communication may not be the only kind of unit that is autopoietic in a social system. In fact, communication is only meaningful when an activity is constructed and by which it is mediated. Activities which include always communication are always socially self-produced and reproduced within its recursive network.

An autopoietic system, while organisationally closed (no elements or units imported outside of the system); nevertheless it must be referred to an environment, background, or context. Obviously, a system cannot distinguish itself if it cannot differentiate itself from something which is not. Also a system can never expand or develop itself without referring its embedded environment. This is especially important when talking about humanity and social systems as an autopoietic system. The idea of autopoiesis is applicable to society only regarding the social humanity system as whole. This means that social subsystems as units of the whole society must be properly regulated and harmonised. The *labour division* in our social system has distanced the dependence of each other and from its environment. This distanced dependence can lead to an illusion of independent autopoiesis. This will be discussed in the following about labour division or functional subsystems.

### **Labour Division or Functional Subsystems**

Societies today are organized into many functional subsystems such as economical system, political system, education system, to which Activity theorists call labour division, and what Luhmann calls “differentiated function systems”. A function system is said to be functional in that it achieves its identity through the fulfilment of a function of the entire system. It has been argued that one of the prominent features of the modern society has been the extent of its differentiation or division of labour and therefore to lead to increased collective productivity. Obviously, the more differentiation there is, the more specialised the roles that are played by actors, and therefore the more important became intercellular and inter-divisional communication and control (Corning, 1994).

However, according to Luhmann, each functional system is closed and creates its own domain allowing only certain operations. As a consequence of this organizational closeness, it is impossible to observe - or to handle - society as a whole. As a further consequence it is

impossible to talk about what is rational for society as a whole, or what will benefit society as a whole (Thyssen, 1995). A serious consequence of this labour division and closeness of self-organization is that it can resemble a self-interested and strongly liveable cancer cell which in the end will destroy the whole system sustainability including itself liveability. The problem of over emphasising the selfhood of labour divisions (liveability), such as banks, stock market, and credit system, will eventually lead to system crisis as whole (sustainability problem).

To let each labour division associate its own interest with the overall system of humanity has long been a dilemma for sociologists and system thinkers. The authors in this paper supports that functional subsystems cooperate not based on consensus or a religious value, but on their mutual benefits and complementary principle(s) (Bai, 1999). The functional benefits of the subsystems are so vital that no society can afford to make social system dependent on consensus (Thyssen, 1995). Even democracy is based on majority principle not consensus. All subsystems must share a vision of the whole system in which its identity is identified by its contributions to the whole, not by itself. Therefore the paper is contributing a sociocybernetic model of the whole system for achieving such a vision. The model will be later validated through analysis of the financial crisis (c.f. Wikipedia for a comprehensive explanation on [http://en.wikipedia.org/wiki/Late-2000s\\_financial\\_crisis](http://en.wikipedia.org/wiki/Late-2000s_financial_crisis)).

### **A SOCIOCYBERNETIC MODEL**

In order to build up a model, we need first to identify the most basic units for the relevant system. Put another way, what exactly is being reproduced in the society if the society is an autopoietic or self-reproducing system? What is or are the most basic unit(s) for conducting social problem analysis? There have been several proposals and suggestions. The unit could be, e.g., the individual (Mingers, 1995, Miller, 1978), the unit of action (Hutchins, 1994; Suchman, 1987; Lave 1988), and communication (Luhmann, 1986). In this paper, however, activity is the recommended unit of social reproduction or social autopoiesis. Human activity systems in this paper are categorised as social economic activities of production, consumption, exchange, distribution, and social political activities of human inquiring of goals and learning, legal control, military action, and democratic movement. Communication such as mass media, reports, and statistics are links that tie all the social activities as whole. Based on the activity theory, feedback/feed-forward principles, and social autopoiesis, the author constructed a social activity model – a sociocybernetic model as shown in figure 4.

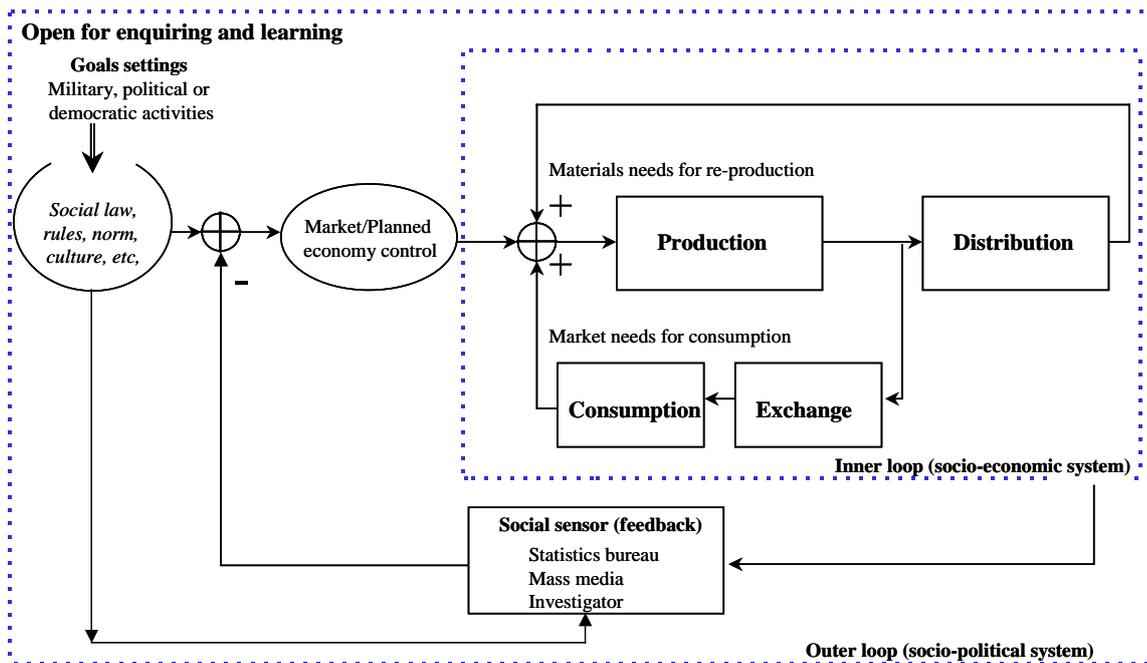


Figure 4. Social Activity System (Double Loop Sociocybernetics)

In figure 4, the sociocybernetic system as whole is constructed as two loops, i.e., the inner-loop of social economy activities and outer-loop of social political activities. The inner-loop refers to the social economic activities of social re-production, consumption, distribution and exchange based on the activity theory model in figure 3 and principle of contradiction (Bai & Lindberg, 1998). The outer-loop refers to the social political activities such as human inquiring of goals and learning, legal control, military action, and democratic movement.

### The Positive Feedback of Social Economic Systems

As described in the activity theory, social re-production and consumption are the most basic human activities. The two compose a fundamental contradiction which drives a society forward - a paradox that we produce products and, simultaneously, we consume products in order to re-produce new products. Consumption necessitates production, and vice versa. This indicates that the production and consumption form a positive feedback loop in the sense that the more consumed the more we have to produce or the vice versa. The exchange activity, before the consumption in figure 4, is a marketing process, and it is through media which a product becomes an object of an individual's consumption. The marketing process is a value exchange process that individuals (groups) purchase their needs (use value) by the market value (exchange value).

Focusing at the loop of production-distribution in the inner loop as shown in figure 4 we identify a positive feedback loop. Some products that are produced in the production process will not be consumed directly by members of a society to which we may call them semi-products. Those semi-products will be sent back to re-production. Those semi-products must be distributed through distribution activity to each differentiated sub-unit or labour division. The more products produced the more semi-products will have to be distributed. So production and distribution compose another positive feedback loop in figure 4.

Generally speaking, the inner-loop of social economic system is an unstable system based on positive feedback. We all experience the wild economic-turbulence and bankruptcies, such as the IT bubble in early 2001 and now the economic crisis, which started in 2008. Therefore the

inner-loop cannot be free of control. No matter if the economic system is a free market system or a centrally planned economic system. Regulation and control, which are located outside the loop, must be applied, such as rate adjustment through banks or even political interference by central government, e.g., political interference happened in Argentina (1990s) and currently in the USA (2009). The issue of political regulations on economic systems will be discussed in the next part of outer-loop.

Though the sub-systems of production, consumption, exchange, and distribution are located in the inner loop of social subsystems, they are not, however, autopoietic and closed. Each subsystem is not self-reference in the strict sense. Instead, they are mutually referential.

### **Negative Feedback and Feed-forward of Social Political Systems**

Though the social economic system is wild and unstable, it is however harnessed quite well (mostly) through some control mechanism in the outer-loop of socio-political system which applies negative feedback and feed forward mostly.

The feedback function of social sensors, statistic bureaus, reporters, investigators, juridical departments, etc. are extremely important for regulating society from any deviation of norms, rules or laws – both humanistic and institutional. This feedback must be objective and without any bias. Therefore it is important that this feedback should be free from economic interest, political interference, and even more important the reporters must have moral obligation.

The feed forward function is the never-ending human activity of inquiring and learning activities that will enable to challenge the contemporary values and social goals, and meanwhile to establish new values and social goals for social development. The continuous constructing of social goals is often manifested as political, democratic even military actions. Therefore the world is not absolutely stable. When such unstable situation occurs, the inner loop of social economic system will not be stable, namely the social production, consumption, exchange and distribution activities will be interrupted, destroyed, and reformed.

It should be clear that the outer loop of socio-political system is self-referential and autopoietic. It is self-referential since the laws, norms, rules are created by human beings (no matter by how and whom) and in turn are applied to regulate human beings self. It is autopoietic in the sense that all activities inside the system as whole are reproduced by the network of the activities themselves.

### **MODEL VALIDATION: THE CASE OF GLOBAL ECONOMIC CRISIS**

As an example we use the case of the ongoing economic crisis to validate the model if it can provide a systemic explanation or interpretation of what has gone wrong and why. The facts and viewpoints are based on the interview and analysis from Frontline (<http://www.pbs.org/wgbh/pages/frontline/meltdown/>).

There have been many detail descriptions, analyses and discussions in the mass media about situations which may have caused the ongoing global economic crisis. Mostly, the mass media focus on facts, details, and reflections. This paper is to analyse and interpret the crisis from a macro relationship of the social economical system by applying the proposed socio-cybernetic model.

A well accepted fact is that the root of the crisis started already in the so called shadow banking system during 2000 to 2007. Unregulated house loans and high risk mortgages have created a mentality in USA that house prices could only go up, for example the price of a typical American house increased by 124% from 1997 and 2006 (Economist). Buying a house was a matter of getting a loan, selling the house and then making a profit, no matter whether if the borrower had the income or means to pay back the loan. The creation of profit is viewed as making money by selling a house by means of borrowing money. This business model concept is similar to a game like rolling up a snow ball (a positive feedback phenomenon) down a hill. For example, the investment banks began with or had backed up for one billion dollars of subprime loans then to support 10 billion worth of structured products. Later the investment banks created these 10 billion credit default to support 100 billion worth of investment elsewhere. The Wall Street investors took this “stuff”, which was debt (bubbles of air) and used it as credit or the building blocks on which their financial empires were built. The whole financial system is similar to that of a castle in the air. Due to such an unhealthy structure of financial system, USA’s economy in 2008 reached a critical sensitivity. Ultimately a rumour that ‘Bear Stearns was running out of cash’ caused an economical tornado that swept the whole world – ‘a butterfly’s effect’. We can conclude that in the very beginning of the crisis, there were serious systemic problems or structure problem embedded within the whole system. This is a problem of sustainability of the whole economic system. When the crisis was a reality, the administration had no choice but fighting for liveability.

There were two kinds of risks that US President George Bush’s administration had to deal with in the beginning of the crisis, namely moral risk or moral hazard and systemic risk. When Henry Paulson, the secretary of Treasury decided not to intervene and rescue Bear Stearns and Lehman Brothers for reason of defending the free market principle and avoiding a moral hazard, a systemic risk that a melt down of the whole economy system would become later a payoff. Today when the system risk has become a reality we may wonder why so many experts and talented economists did not stand up and say ‘Wait a minute; this is a lot bigger than Bear and Lehman. You let them go, they will drag down Fannie Mae, Freddie Mac, AIG, GM, Ice Land, England, China and the whole world’. The decision made by Bush’s administration, and Paulson especially, was based upon a belief that one must let the market wash itself out, and that the best government is a “laissez-faire” type. Believing absolutely in a free mark system and holding it as a moral principle, Paulson could not see that every corner of Wall Street is now connected to another as a huge web and stretched to the whole world. Hoping that the cases of Bear Stearns, Lehman Brothers, etc. were only a “one-off”, Paulson could not see the system risk which can lead to a collapse of the whole financial system. Even though warned by Ben Bernanke (Chairmen of Federal reserve bank), Tim Geithner (Central Bank of New York) that if there was no immediate government intervention then the whole financial system of this country and the world will melt down in a matter of days, due to the fears being crossed over the borders of the free market system. Paulson was finally driven to make a series of decisions that eventually led to a global contagion of economic recession.

After many helpless reactions to the crisis, Paulson was finally forced to agree direct government intervention - the state capital injection. He said: “We regret what we have to take this action. Today’s action is not whatever we want to do, but today’s action is what we must do to restore our confidence of financial system.” Ironically, Paulson the capitalism warrior who spent his life perusing and defending free market was in the end the biggest interventionist treasury secretary since the great depression in 1920s.

## **A Sociocybernetic Interpretation to the Crisis**

Based on the above described case, this part is to apply the proposed model to verify its applicability. From the model in figure 4 we know that economic system (Inner loop) its self (production, consumption, exchange and distribution) is based on positive feedback. A system based on positive feedback is an unstable system that always runs either exponential growing just like house loan leverage in USA 2000 to 2007 or descending just like we are now in an ever deep economic crisis. A system risk is a risk that a nation builds up its economic and financial system without macro regulation or monitoring. A totally free market is equally idealistic and destructive as totally planned economy system. No country in the world could build its economic system based on free market totally.

Therefore the socio-economic system (inner loop) must be regulated. The introduction of market/planned economy control in the sociocybernetic model is a regulation mechanism to the inner loop for interacting and smoothing economic turbulence. Normally, national treasuries, federal or government reserves and central banks can serve this purpose. When a case happens, such as the house loans and mortgages (growing) or the Bear Stearns crisis, this regulation must be actively and effectively enforced. An unleashed force from the inner loop can be very destructive and delayed actions will result in losing control of the whole system.

We can never over emphasize the role of mass media, investigators, reports, etc. as feedback mechanism of social economic system. An example is that of CNBC's report of interview Bear Stearns' CEO Alan Schwartz which was intended to restore confidence of public to Bear Stearns, turned out a dead trigger not only to Bear Stearns, also starting the Domino chain reaction of the whole financial system. We are living in a media driven world and somehow the world is connected by media. It is crucial that this feedback should be objective, trusted, and telling real facts what is going on in our social economic system. An infected feedback by manipulated news, reports, or statistics will lead the decision makers to make wrong decisions. The crucial role of mass media including moral obligation of reporters in our social system must be well recognized beyond the economic and political interest.

From the perspective of autopoietic social system, the self reference of various regulations, such as laws, moral obligations are socially constructed and then used as social reference to reflect what is socially right and wrong. The process of construction and application of various social regulations is an open learning and systemic inquiring approach. The process of building up and executing social regulation is sometimes painful and brutal. Human understanding is perhaps the most challenging thing. We as humans are always seeking out goals and reasons. In many cases, the problem of searching such goals and reasons becomes a religious approach about finding the wish of God, like Churchman said:

*The nature of the human system depends most of all on whether a perfect being exists. ...If it does, then our main attention as systems researchers should be how our planning relates to its existence. If it does not, then we not only have a lot of explaining to do in terms of our values, but we also have to find a whole set of godless values to guide us.*

*(Churchman, 1988, P39)*

## **CONCLUSION**

After the world wide economic crisis started in 2007 the concepts of liveability and sustainability have been often discussed in different cases. For example, in a special issue of the journal *System Research and Behavioral Science*, Shaw (2010) discussed the liveability

and sustainability from cybernetic concept of gain in a system. This paper constructed a sociocybernetic model based on both cybernetic principles and the social Activity Theory. The model provides with an epistemological explanation of social activities and their embedded relationships between social function systems. Based on this model, liveability and sustainability are systemically interrelated as one coherent unit. The double loops of social activity systems are mutually inter-dependent and cannot be separated. Liveability and sustainability of our social-economic system are mutual parts of a contradiction, and they should be regarded as a balance of risk and opportunity.

The principles of feedback and purposive behaviours from cybernetics have been introduced as fundamental relationships of our social economic systems structure. Concepts from social activity theory, such as social economic activities (production, consumption, exchange and distribution), labour divisions or functional subsystems (autopoiesis), are introduced as fundamental elements of the social economic systems.

Using the global economic crisis as a case study we were able to verify the usefulness of the model. The model has provided a theoretical explanation to the crisis, and also how to construct macro social-economical policies to avoid the similar crisis in the future. The authors believe that a systemic view as proposed in this paper is very crucial to decision makers not only in macro level (national), but also to business managers and decision makers in companies.

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