Social Combustion Theory: Dynamics of Social System Deterioration

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Abstract. Social Harmony Equation (SHE) leads the social system to the evolution direction of social by accumulation of "social combustion substances", i.e., the accumulation of microcosmic entropy increase "basic particles" (individual) in social system from assimilated "basic social energy" to dissimilated one; meanwhile, the catalysis of "social combustion promoter" (social excitation energy) has enhanced the "social temperature" of disordering process of social system and completed the energy accumulation of social entropy increase that can generate the transition. Finally, ignited by the "social trigger threshold", the social system has completed the abrupt change from orderliness to disorderliness. The continuous variation of the above-mentioned three basic non-linear processes has jointly composed the whole contents of social combustion theory. Under the restriction of such conditions of different time (t), different space (α) and different scale (β), it is finally explained as a comprehensive dynamics of social system deterioration.

Keywords: social harmony equation(SHE), social temperature, social physics.

1 Introduction

Social Combustion Theory (SCT) leads the social system to the evolution direction of social entropy increase by accumulation of "social combustion substances", i.e., the accumulation of microcosmic "basic particles" (individual) in social system from assimilated "basic social energy" to dissimilated one; meanwhile, the catalysis of "social combustion promoter" (social excitation energy) has enhanced the "social temperature" of disordering process of social system and completed the energy accumulation of social entropy increase that can generate the transition. Finally, ignited by the "social trigger threshold", the social system has completed the abrupt change from orderliness to disorderliness. The continuous variation of the above-mentioned three basic non-linear processes has jointly composed the whole contents of social combustion theory. Under the restriction of such conditions of different time (t), different space (α) and different scale (β), it is finally explained as a comprehensive dynamics of social system deterioration.

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2 Social System Deterioration

Both I. Prigogine and H. Haken once made brilliant expositions on the change of system from disorderliness to orderliness respectively in Order out of Chaos (Prigogine, 1979) and Synergetics: An Introduction (Haken, 1977). As for the change of system entropy triggered by the self-organized behavior, they put forward the framework for explanation from non-linear dynamics, which is undoubtedly very important for acknowledgement of behavior track of social system. However, though they explained the system recombination and convergence from disorderliness to orderliness triggered by the self-organization in a state far from the balance, it seems that both of them explained only half of the whole track of "system behavior wave". As for the other half, i.e., disintegration of system-organization and deconstruction of system-order, in particular, the dynamics for continuous operation after system formation, i.e., how the social system goes from orderliness to disorderly deterioration, they had a simple understanding. It is out of this reason that the social combustion theory tries to make an academic remedy for this regret.

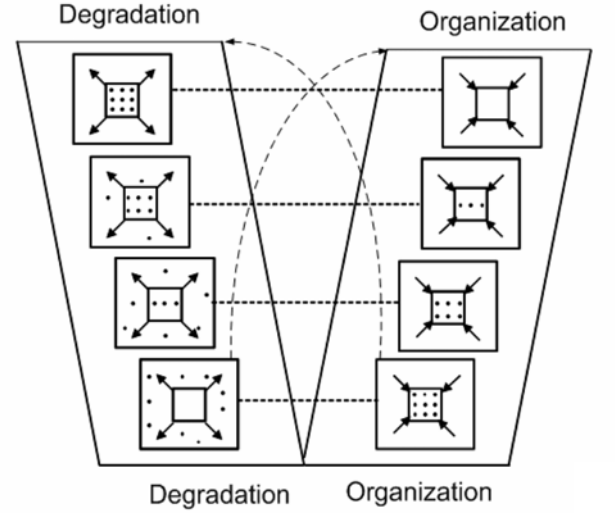

Fig. 1. Deterioration and organization of social msystem

The deterioration of social system is specially referred to the transform of a social body from the orderliness to disorderliness. It is usually understood as deviation or dissimilation extent from the mainstream society, i.e., the damage to the organization and orderliness of the current social system. Meanwhile, it can be understood as prospect and pursuit of the replaceable social system that goes to the future in the "system behavior wave" and the preparation of fostering and accumulation of self-organization capabilities in the new conditions. The coexistence of this duality (deconstruction and construction), i.e., the full-period description of the "system behavior wave", is the core and key point of acknowledgement of social combustion theory (Niu, 2001).

3 Social Combustion Theory (SCT)

It can be regulated that the SCT is a dynamic measurement of the social system from the normal state to abnormal state, from orderliness to chaos, from organization to breakdown in specific time (t), specific space (α) and specific social scale (β):

$$SCT(t,\alpha,\beta) = f_1(M) \bullet f_2(A) \bullet f_3(D). \tag{1}$$

In the formula:

$f_1(M)$ – social combustion substance (basic energy of social system)

$f_2(A)$ –Social combustion promoter (excitation energy of social system)

$f_3(D)$ –Social ignition temperature (trigger threshold of social system)

Directly, indirectly and potentially complicated relations can be established between $SCT(t,\alpha,\beta)$ and the complicated variant group in multi-element state, reflecting the mutually influenced and affected comprehensive measurement among various social forces in the social system. Since the actual social system faced by the social combustion theory can be expressed as both a spontaneous evolution process from orderliness to disorderliness and a conscientious accumulation process from the randomness to organizational functions. It not only includes the multi-directional abandonment of the current system, but also implies the directional selection of new system. This duality overlap explanation (simultaneous or sequential) has described the complexity of social system behavior. It has organically combined the deterioration of old system and the reconstruction of new system for a general recognition of social evolution cycle. The multiple alternation and space-time competition of disintegration of old system (social entropy increase) and reconstruction of new system (social entropy decrease) have jointly embodied that the social system behavior features the idiosyncracy of innovation cycle with time rhythm.

The social combustion substance ($f_1(M)$) is jointly reflected by the comprehensive overlap of the social deviation from the harmonious relation between "humankind and nature" and the deviation from the "inter-person harmonious relation" in the specific "t", "α" and "β" conditions. $f_1(M)$ is subordinated to the mode of Lagrangian's equation for social system change along with the change of time (t), space (α) and social scale (β) and is expressed as:

$$f_1(M)_{t,\alpha,\beta} = \int_t^{t+1} \left\{ 1 - \left[\frac{SK}{SK_0} - (T - T_0) \ln P \right] \right\} dt \cdot \tag{2}$$

In the equation,

SK – Actual control force for maintaining the social system

SK_0 – Optimal control force for realization of "harmony" social system

T – "Social temperature" deviated from the harmonious state

T_0 – "Social temperature" at the harmonious state

P – a micro-existence state deviated from the actual main-stream society. The bigger P is, the more number of individual of the society deviated from the main-stream social system there are. It basically conforms to the principles about the social disorderliness extent and the entropy increase in Boltzmann Principle.

The particular relationship among SK, T and P can be expressed as the following three groups:

Supposing $P =$ a constant, then $SK \nearrow$, $T \searrow$; $SK \searrow$, $T \nearrow$
Supposing $T =$ a constant, then $SK \nearrow$, $P \searrow$; $SK \searrow$, $P \nearrow$
Supposing $SK =$ a constant, then $T \nearrow$, $P \nearrow$; $T \searrow$, $P \searrow$

When $SK = SK_0$, $T = T_0$, $P = 1$

Then $(T - T_0)\ln P = 0$, $f_1(M) = 0$

When $SK = 0$, $T \nearrow \infty$, $P \nearrow \infty$

Then $(T - T_0)\ln P \nearrow \infty$, $f_1(M) \nearrow \infty$

In the study, SK is regarded as a positive restriction variant for maintaining the mainstream society. It is usually composed of "external control force, internal control force, survival supportability as well as sustained development force", respectively representing such social institution, law, armed forces, police, approval, common views, psychology, value as well as material supportability and development satisfaction capability etc. It can be expressed as:

$$SK = \sum_i SK_i \,. \tag{3}$$

Meanwhile, it regards the negative restriction variant (denudation variant ($(T - T_0)\ln P$) that disintegrates the current mainstream social system as the dynamic of a social deterioration process. This dynamic is usually composed of "external interference extent, internal disorderliness extent, social pain extent and development disharmony extent", respectively representing the negative factors influencing the social stability such as invasion, subversion, turmoil, out of control, crisis, complain, trouble, unemployment, poverty and crime commitment etc. It can be expressed as:

$$(T - T_0)\ln P = \sum_i (T - T_0)\ln P_i \,. \tag{4}$$

If $SK / \mathrm{SK}_0 - (T - T_0)\ln P = 1$, it means that the social combustion substances are 0; when $SK / SK_0 - (T - T_0)\ln P \nearrow \infty$, it means that the social combustion substances have been fully filled the society, i.e., arriving the maximum energy

accumulation for disintegration of social system, since the all-round accumulation of basic social energy for social combustion can be formed only when large quantity of basic particles (social individuals) exist and react simultaneously.

The social combustion promoter $f_2(A)$ is usually expressed by the social excitation energy generated by the social psychology level in the particular t, α and β conditions. The social excitation energy is subordinated to Boltzmann distribution of social psychological spectrum, requiring all members of society (N) and the total excitation energy triggered by the psychological state should satisfy:

$$N = \sum_i n_i \ \ and \ \ \mathrm{U} = N\sum_i u_i n_i \ . \tag{5}$$

In accordance to the equiprobability principle, it can be predicted that the differentiable quantum states with the same energy have the same appearance probability. Supposing in the Nondegeneracy conditions, the distribution probability for social excitation energy levels in the state similar to many independent particles (the individual person) can be calculated. Under the premises of admittance of distribution of Boltzmann's social excitation level, the average state of social excitation energy can be expressed as:

$$\overline{U}_u = \overline{U_\bullet} - U_0 . \tag{6}$$

In the formula, $\overline{U}_u$ is the social excitation energy possessed by the social combustion promoter; $\overline{U_\bullet}$ is the accumulated average social excitation energy above the probability of the average states in the distribution of Boltzmann's social energy level; U_0 is the average social excitation energy in the normal social psychology state.

The social excitation threshold $f_3(D)$ is referred to the critical value (formation of large-scale disorderliness of society) that can be formed instantly in specific t, α, β conditions. The minimum average kinetic energy needed by this critical value can effectively overcome the "social potential barrier", realize the energy dissipation similar to quantum transition in rapid variant mode and play the effect of ignition temperature of crisis event of social system.

$$E_d \geq E_0 . \tag{7}$$

In the formula, E_d represents the average kinetic energy E_0 needed and equal to or more than the social excitation threshold.

In the three big factors for deterioration of social system in the social combustion theory, $f_1(M)$ represents a slow variant that has a controlling or basic effect in social system transform and its value range is regulated to be 0~1.0; $f_2(A)$ represents the medium variant that plays a catalytic role in change of social system. As the first correction factor of SCT, its value range is stipulated to be ± 0.2; $f_3(D)$ represents the slow variant that plays a critical role in social system. As the second correction

factor of SCT, its value range is ± 0.1. The relationship among the three can be written as follows:

$$SCT_{t,\alpha,\beta} = \{f_1(M)\exp[f_2(A)]\}\exp[f_3(D)] = \left\{\left[\int_t \left\{1-\left[\frac{SK}{SK_0}-(T-T_0)\ln P\right]\right\}dt\right]\exp(\int_t \overline{U_u}dt)\right\}\exp(\int_t E_d dt) \quad (8)$$

The deterioration process of social system inducted from the social combustion theory can be finally expressed as:

$$SCT_{t,\alpha,\beta}(t+1) = SCT_{t,\alpha,\beta}(t) + \{\int_t^{t+1}\left\{[f_1(M)]dt\exp\left[\int_t^{t+1} f_2(A)dt\right]\right\}\}\exp\int_t^{t+1}[f_3(D)]dt \quad (9)$$

4 Conclusion

(1) The SCT is a rule for explanation of dynamics for deterioration of social system. By learning from the basic idea of sociophysics and effective correction of social rules and psychological rules, it is possible to obtain brand-new explanations about the deterioration of social system.

(2) In the SCT, it is the social combustion substance ($f_1(M)$) that plays a basic role. Since the difference generated between the social individual and its expected virtual social objectives in spontaneous trend exits at any time, the macroscopically acknowledged five basic differences such as concept difference, culture difference, national difference, religion difference and wealth difference have composed the essential reasons for generation of accumulation of social combustion substances.

(3) In the process of composition of social combustion substances, due to the competition and comparison of two kinds of social forces, i.e., the rivalry effect between the positive force (including the external and internal social forces) maintaining the social system and the negative force for expansion of social disorderliness, the instantaneous mapping for the social system state at time t has been obtained. In this case, the instantaneous mapping has described the net accumulation of social combustion substances along with the time.

(4) The net accumulation of social combustion substances made along with the time has effectively lifted the combustion scale, speed and strength by further catalytic of social excitation energy so as to implement the effect of "the first correction factor" of SCT, expressed by $f_2(A)$ in the formula.

(5) In the resultant force of $f_1(M)$ and $f_2(A)$, it needs adding the social ignition temperature $f_3(D)$ for breakthrough of "social excitation threshold" whether or not the social system in the combination of t, α and β is disorderly. As a result, as the second correction factor of SCT, it has completed the retreat of social system in the "original state"; meanwhile, it provides necessary and sufficient conditions for the formation of social system (by socially self-organized behavior) in a "new state".

(6) The order of $f_1(M)$, $f_2(A)$ and $f_3(D)$ has been respectively defined in the essay. $f_1(M)$, as the basic variant, is in the range of 0∼1.0; $f_2(A)$, as the first correction factor, is ± 0.2; $f_3(D)$, as the second correction factor, is ± 0.1. At last, the SCT has integrated the natural factor, social factor, human factor, and psychological factor into a comprehensive series and finally completed the dynamic cognition of social system deterioration.

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