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Research on the Operation Mode of Crowdsourcing Self-Organization Based on Synergetic Theories

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Abstract: Based on the self-organization characteristics of crowdsourcing behavior, the concept of "crowdsourcing self-organization" is proposed. Then from the perspective of synergy, the connotation and mechanism of crowdsourcing self-organization collaborative operation mode are analyzed. Finally, based on the three influencing factors of "internal needs", "ability endowment" and "external conditions", the realization mechanism of crowdsourcing self-organization collaboration is established, and the crowdsourcing self-organization collaborative operation mode is designed to improve the efficiency of crowdsourcing self-organization.
Keywords: Synergetic theories, crowdsourcing, self-organization, operation mode.

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1. INTRODUCTION

With the advancement of information technology and the changing needs of users, enterprises regard the public as one of the providers of creativity, which makes the boundaries between the public and the organization more blurred, and the public participation in the operation of the organization brings unexpected effects, making crowdsourcing become more and more concerned by the outside world, and its application range is rapidly expanding to multiple fields and levels.

The concept of crowdsourcing was first proposed by Jeff Howe [1] in 2006. He defined it as a behavior that a business or organization outsources the internal work tasks performed by his employees to a non-specific public who volunteers to undertake a task to reduce operating costs. Liu Feng [2] proposed a concept 'Witkey' similar to crowdsourcing in 2005 that has triggered an explosive growth in the number of domestic crowdsourcing platforms.

However, compared with the explosive growth of the number of crowdsourcing tasks and the number of platforms, the domestic crowdsourcing platform has not successfully attracted China's huge human resources to effectively invest in crowdsourcing activities. The performance 1 is that the proportion of people involved in crowdsourcing is low, and the

performance 2 is that the amount of tasks solved per capita is small. Therefore, designing an efficient operation mode of crowdsourcing is of great significance for achieving crowdsourcing effects.

2. LITERATURE REVIEW

Through the literature review, it is found that domestic and foreign scholars mainly study the operation mode of crowdsourcing platform into two categories:

One is to find out the reasons for the continuous participation of the contractor through various theories such as value expectation theory, social identity theory, social exchange theory, etc., analyze the internal mechanism of crowdsourcing platform operation, and then construct the operation mode. Sun et al. [3] constructed the public's continuous participation in the crowdsourcing willingness model based on the value expectation theory. The contractor in the task China platform was used as the research object, and found that both internal and external motivations can promote crowdsourcing behavior. Ye et al. [4] used the social exchange theory to analyze the behavior of public participation in crowdsourcing from the perspectives of interest and cost.

The other combines the characteristics of a specific field with the concept of crowdsourcing to build a specific operating model. Bo [5] introduced the concept of crowdsourcing service into the public library digital consulting service, and proposed operation mechanisms such as perfecting incentive mechanism and integrating multi-party resources.

This paper attempts to regard the public participation in crowdsourcing behavior as self-organizing behavior, and proposes the concept of crowdsourcing self-organization, and then uses the synergetic theories to design the crowdsourcing self-organization operation mode, in order to study the operation mode of crowdsourcing platform from a more in-depth and new perspective to improve the operational efficiency of crowdsourcing behavior.

3. CONCEPTION AND FEATURES OF CROWDSOURCING SELF - ORGANIZATION

3.1 The concept of crowdsourcing self-organization

Based on the literature research on crowdsourcing and self-organization, this paper finds that the mass group participating in crowdsourcing activities also has self-organizing characteristics, namely, openness, away from equilibrium, non-linear effects, and random fluctuations. Specifically: (1) Openness is reflected in the fact that the public can exchange arbitrary substances, energy and information with the outside world. On the one hand, the crowdsourcing task information is obtained from the crowdsourcing platform to realize the input; on the other hand, the task solution is submitted to the platform to realize the output. (2) Far from the equilibrium state is reflected in the heterogeneity and instability of the mass individual. Heterogeneity is manifested in the different educational backgrounds and life experiences of the public. Instability is manifested by the constant updating of the public knowledge system and the uncertainty of participation behavior. (3) The nonlinear effect is

reflected in the role of each individual in competition or cooperation in the crowdsourcing process. The exclusivity of mission rewards creates competition among the masses, and exchanges between the public promote collaboration. (4) Random fluctuations are reflected in the knowledge spillover effect brought about by mass innovation or knowledge integration, which makes the participation of crowdsourced public status transition. This provides the basic conditions for the article from the perspective of self-organization theory.

Therefore, this paper proposes the concept of "crowdsourcing self-organization" to describe the masses participating in crowdsourcing and their crowdsourcing behavior. Combining the concept of crowdsourcing and self-organization, the self-organization of crowdsourcing is defined as follows: non-specific people with unorganized relationships are irrelevant in subjective will, but solve the crowdsourcing task under certain rules of mutual understanding. An ordered structure with similar organizational effects. Simply put, crowdsourcing self-organization refers to the organizational group structure formed by the non-specific people spontaneously participating in the crowdsourcing tasks they are interested in.

3.2 The features of crowdsourcing self-organization

In order to enrich the concept of "crowdsourcing self-organization", this paper gives four characteristics of non-mandatory, non-hierarchical, class organization and evolution based on definition. Among them, non-mandatory means that the non-specific public has complete personal choice rights for whether to participate in crowdsourcing activities or choose which crowdsourcing tasks. This right is not forced by others or the environment, and is the most crowded and self-organized. The main feature; non-hierarchicality refers to an organizational relationship in which non-specific public does not have power jurisdiction or hierarchical stratification, but is centered on crowdsourcing tasks, and each person makes decisions independently and is responsible for them. An unorganized relationship; class organization emphasizes the effect of crowd-sourced self-organization in solving crowdsourcing tasks similar to organized behavior, that is, solving a large number of crowdsourcing tasks within a certain period of time; evolution Sexuality means that with the gradual improvement of the crowdsourcing environment and the gradual improvement of the mass crowdsourcing ability, the number of tasks and the efficiency of solving through the crowdsourcing model have been significantly improved.

4. THE FEASIBILITY OF USING SYNERGETIC THEORIES IN RESEARCHING THE OPERATIONC OF ROWDSOURCING SELF-ORGANIZATION

Crowdsourcing self-organization is a very complex open system. As the number of people participating in crowdsourcing activities increases, individual differences gradually increase, and the uncertainty brought about by them has a crucial impact on the crowdsourcing effect. The non-mandatory nature of the public participation in crowdsourcing behavior makes the crowdsourcing self-organized operation more complicated. The research on crowdsourcing self-organizing operation should not only focus on the crowdsourcing performance of everyone, but also pay attention to the interrelationship between the public. If conflicts or

frictions often occur between individuals, it will certainly cause an increase in the internal consumption of crowd-sourced self-organizing systems, which will inevitably affect the crowdsourcing effect generated by them, and return the system to disorderly state. Therefore, achieving the synergy between the masses is the key to the efficient operation of crowdsourcing and self-organization. Therefore, it is hoped to introduce synergy to design the operation mode of crowdsourcing self-organization. Firstly, the feasibility of applying synergy to crowd-source self-organizing operation research is analyzed.

When studying the principle and mechanism of laser, West German scientist Hermann Haken discovered that the phase change is converted into laser when the ordinary light is far from equilibrium, and the chemical oscillation and meteorology are analyzed based on the theoretical model of the laser. Processes, etc., their subsystems exhibit competitive and synergistic characteristics, thus creating an interdisciplinary theoretical synergy. Specifically, synergy studies how a large number of subsystems with completely different properties in a system spontaneously generate an orderly structure of time, space, or function [6].

The universality of synergy theory and the system characteristics of crowdsourcing self-organization make it feasible to apply synergy in the research of crowd-sourced self-organizing operation mode. First of all, synergy is generally considered to be a common law that studies the various systems to change from disorder to order, and is a cross-cutting science that studies the more general objective laws between sciences. At present, synergy has been successfully applied in many disciplines, which basically cover the entire social sciences and natural sciences, thus reflecting its universal applicability. Secondly, the research object of synergy is the open system far from the equilibrium state, and the crowdsourcing self-organization is characterized by openness and away from the equilibrium. These two aspects are as follows:

(1) Crowdsourcing self-organization is an open system. Because the outside world provides information about the task to be solved to the crowdsourcing organization, the crowdsourcing self-organization itself outputs various information to the outside world by solving the crowdsourcing task, thereby embodies the openness of the system, and its operation needs to continuously carry out information and the outside world. Energy exchange.

(2) Crowdsourcing self-organization is a system that is far from equilibrium. The basis is as follows: First, crowdsourcing self-organizing constitutes the masses with different knowledge backgrounds and professional abilities. The heterogeneity of them makes the system far from equilibrium due to non-linear effects. Second, the process of mass participation in crowdsourcing activities. The type of crowdsourcing task can be chosen autonomously, and the uncertainty of the result also makes the system far from balance. Third, as time goes by, the mass-market self-organized public constantly updates its own knowledge system, and the system composed by the public itself is in the evolving state undoubtedly causes the system to stay away from equilibrium.

5. ANALYSIS OF THE OPERATION OF CROWDSOURCING SELF - ORGANIZATION BASED ON SYNERGETIC THEORIES

Haken's synergetic theories believe that the structure, characteristics and behavior of all systems are not a simple summation of the structure, characteristics and behavior of their subsystems, but through the competition and synergy between subsystems, forming a new nature. Ordered structure or the overall effect presented [7]. The basic concepts used in synergy include order parameters, competition and synergy, and synergies. Among them, the order parameter is the macro parameter introduced to reflect the overall behavior of the system; competition and coordination are the two interactions that must exist within the system, and also the source of the evolution of the system; the synergy effect refers to the formation of time and space at the macro level. Or the overall effect of the function. Therefore, the synergistic analysis of crowdsourcing self-organization starts from the above three aspects.

5.1 The leading role of order parameters in the operation of crowdsourcing self - organization

The order parameter in the synergy is evolved by borrowing a concept of phase transition theory in physics. Its meaning is to measure the degree of order of the macroscopic overall model formed after the collective movement of the subsystem, and to describe the overall behavior of the system. On the one hand, the generation of order parameters is due to the competition and coordination between heterogeneous subsystems within the system. On the other hand, the sequence parameters formed can control the motion of other subsystems, thus realizing the evolution process of the whole system [8].

In crowdsourcing self-organization systems, there are mass individuals with different needs and abilities, so each individual has a personal goal to participate in crowdsourcing activities. In the process of crowdsourcing participation, whether it is the competition or synergy between the masses, it is difficult for individual goals to avoid intersections, which leads to a certain trend, which leads to the dominant order of “mass cross-target”. Parameter. In turn, the public cross-goal will dominate the crowd's crowdsourcing behavior, because achieving cross-cutting goals means that the public must provide better solutions or form more effective complementarities, so it is entrusted by this invisible force to make crowd-sourced self-organizing. The operational efficiency is improved.

5.2 Synergistic mechanism is the driving force of the operation of crowdsourcing self - organization

According to the principle of synergy, synergy and competition between subsystems within the system is the driving force for its self-organization evolution. Among them, the competition of subsystems will make the system form the necessary condition of self-organization, that is, it tends to be unbalanced, and the synergy between them refers to the joint and amplification of certain movement trends in the subsystem under non-equilibrium conditions. One or several of these trends predominate, thus governing the evolution of the system [9].

In the crowdsourcing self-organizing system, the synergy mechanism also includes competition and synergy, which are competitive synergy and cooperative collaboration.

Among them, competitive synergy means that multiple masses of individuals provide their own better solutions for a crowdsourcing task. Moderate competition makes the crowdsourcing self-organizing system relatively viable and forms the effect of “good money to drive out bad money”. Let the task solution be excellent, and drive the crowdsourcing self-organizing and efficient operation. Cooperative collaboration means that multiple masses of individuals jointly propose task solutions for the same crowdsourcing task. The cooperation between the masses forms knowledge integration and complementary capabilities, so that certain movement trends in the system are combined and amplified to achieve macroscopic effects. Promote the efficient operation of crowdsourcing and self-organization.

5.3 Synergistic effect is the essential requirement of the operation of crowdsourcing self-organization

Synergistic effect refers to the result of the subsystem's synergy. The overall value of the system generated by the subsystem interaction is greater than the sum of the values of multiple subsystems. Synergism is the internal driving force of the system to produce synergy. When this effect causes a system to undergo a qualitative change at the critical point, it will multiply the overall value of the system, that is, produce a synergistic effect.

The essential requirement of crowdsourcing self-organizing operation is to improve the operational efficiency of the system, which is embodied in the realization of value integration between the masses and the effect of aggregation amplification and function multiplication. The crowdfunding self-organizing operation can be described as a typical scenario: a task-centric, rapid emergence and aggregation of a group of individuals with task-solving skills, each of which has more expertise and can work collaboratively. And quickly dispersed after the task is completed, and this temporary community is also disbanded, but in the end it brings amazing results, that is, task completion is more efficient, cost-effective and better.

The idea of synergy reveals us that the selection and management of order parameters is an effective way to grasp the direction of crowdsourcing self-organizing and orderly operation, and guide the crowdsourcing self-organization to the desired direction through management order parameters; the establishment of mass cooperative operation mechanism It is a means to form the dynamics of self-organization evolution of the system. Through the synergy mechanism, the original scattered masses have a nonlinear effect, resulting in an overall effect. The synergy effect is the essential requirement for the efficiency of crowd-sourced self-organized operation. At the time, it will inevitably improve the operational efficiency of the system.

6. CONNOTATION AND MECHANISM OF THE COOPERATIVE OPERATION MODE OF CROWDSOURCING SELF-ORGANIZATION

6.1 The connotation of the collaborative operation mode of crowdsourcing self - organization

The crowdsourcing self-organizing system is composed of a number of popular individuals and crowdsourcing platforms that participate in crowdsourcing. Because each individual has

different crowdsourcing motives and abilities, and the platform has no jurisdiction over their crowdsourcing behavior, causing them to be on the platform. The movement in the middle is chaotic. If they simply gather on the crowdsourcing platform, their behavior is very likely to be conflicted or the behavior results in internal friction, which makes it impossible to achieve macro system functions. Therefore, according to the above-mentioned collaborative analysis of crowdsourcing self-organizing operation, this paper proposes a crowd-sourced self-organizing collaborative operation mode, and analyzes its connotation and characteristics in detail below. According to the synergistic theory, in the case of a certain external energy, information or material input, a large number of subsystems will form an ordered structure with new functions through synergy [10]. Applying this idea to the research of crowdsourcing self-organizing operation problems, it is found that the competitive synergy and cooperative cooperation among the masses produce the order parameter of “mass cross-target”. Under its leading role, the public focuses on the crowdsourcing task. The task solution with higher quality is proposed, and the system synergy effect is realized with the cooperation of crowdsourcing environment. Therefore, the crowdsourcing self-organizing collaborative operation mode is proposed. According to the relationship between order parameters, coordination mechanism and synergy effect and crowdsourcing self-organizing operation, the connotation of crowd-operated self-organizing system operation mode is described as follows: In the perfect crowdsourcing environment, by selecting and managing order parameters and establishing synergy mechanism To make the public focus on crowdsourcing tasks and cooperate with each other to enable crowdsourcing self-organization to achieve the synergy effect of “1+1>2” in terms of structure and function.

6.2 The mechanism of the cooperative operation mode of crowdsourcing self - organization

According to the synergy theory, the selection and management of order parameters and the establishment of synergy mechanism are two important focus points for crowdsourcing self-organization and orderly operation. The perfect crowdsourcing environment is the guarantee factor for the public to continue to participate in crowdsourcing. Therefore, the mechanism of the crowd-sourced self-organizing cooperative operation mode is described as follows: Firstly, the competitive synergy mechanism or cooperative synergy mechanism is established between the public due to the nonlinear effect, so that the originally scattered people are connected and become an organic whole. Make full use of various explicit and implicit resources to form the effect of complementary knowledge, ability integration and learning enhancement, and exert the overall macro effect. Secondly, in the process of mass interaction, the trend of “mass cross-target” is magnified, dominates, and becomes a systematic order parameter. The campaign has positioned the public's crowdsourcing behavior to provide better solutions. Finally, the improvement of the crowded environment in which the public is located has escorted the orderly activities of its crowdsourcing activities. If the environment is bad, the public will have no attachment, and the crowdsourcing will be disbanded.

In the complex system of crowdsourcing and self-organization, there is independence and relevance among the masses. The independence is reflected in the fact that the public can choose different types of crowdsourcing tasks independently, and the correlation is reflected in the public. A competitive relationship formed by the same task or a synergistic relationship formed by the intersection of goals. In order to avoid the internal friction of performance, the order parameter is generated under the synergy mechanism, which dominates the public's crowdsourcing behavior, and the crowdsourcing environment provides protection, forming a crowd-sourced self-organizing synergy effect.

7. THE DESIGN OF THE COOPERATIVE OPERATION MODE OF CROWDSOURCING SELF - ORGANIZATION

The mechanism analysis of crowd-sourced self-organizing collaborative operation mode illustrates the feasibility of collaborative operation in the theoretical sense, but how to apply the theory to reality, that is, how to achieve crowdsourcing self-organizing collaboration is not known. According to the three major factors affecting the public's crowdsourcing behavior, internal needs, ability endowment and external conditions, we will establish the realization mechanism of crowdsourcing self-organizing synergy, and finally design a crowdsourcing self-organizing collaborative operation mode.

7.1 Collaborating internal needs

The public in the crowdsourcing self-organization does not know each other, and basically presents the way of independent contracting, which makes the public lack of interaction and lack of platform belonging, resulting in a very fragile structure. If we want to make crowdsourcing self-organizing into an organic whole and exert the overall macroscopic effect of the system, we must first make a close connection between the public. Referring to the mechanism of community operation, considering starting from the common interest of the public, building a virtual community on the crowdsourcing platform, the public with the same or similar areas of interest will form a circle of interest and generate interaction. But how do they give them a sense of community, that is, to continue to participate and contribute value? Lou [11] and others have shown that the key psychological motivation for establishing a psychological connection between netizens and the community is self-identification and social identity, which undoubtedly provides a clear direction for the community to design a sustainable and efficient operation mechanism. Self-identity is achieved by highlighting the value of individual contributions, such as setting up other people's praise functions, platform reward points and other measures, so that the public feels that the self-presentation effect is good, and the degree of self-recognition is enhanced. Social identity, through the full use of the public's self-expression tools, such as grades, honor values, self-introduction, etc., allows them to identify with the community identity. The strengthening of the sense of identity will make the public's level of interaction higher, which means that the level of understanding and relationship between the people involved in the crowd is closer, and the non-linear role of the public is realized.

7.2 Integrating ability endowment

In the crowd-sourced self-organization, the heterogeneity of the masses is different from the internal needs, and there are also differences in abilities. Therefore, in order to make this heterogeneous individual form an organic whole, the macro-effects can be obtained. In addition to the internal coordination, the feasible measures can also consider the public ability. The integration of endowments. Collaborative collaboration means the formation of knowledge integration and complementary capabilities, which can be achieved through knowledge sharing and cooperative contracting. First, the way of knowledge sharing, in the crowdsourcing virtual community, due to the temporary nature of the mass competition and the desire for identity, some people are willing to convert their ability to answer questions or share experiences into visual information content. It is secondarily spread or understood by other people in the community to absorb or even sublimate, and then applied to solve the new round of crowdsourcing tasks, in this way to form the synergy of mass capabilities. Second, the cooperative contracting method, for complex crowdsourcing tasks, the mass individual can team up on their own, in the case of consistent goals, the formation of complementary capabilities, and jointly solve the crowdsourcing task.

7.3 Improving the crowdsourcing environment

The external conditions of crowdsourcing and self-organization are the crowdsourcing environment. Its efficient operation is attached to the perfect crowdsourcing environment. The process of mass participation in crowdsourcing activities in the crowdsourcing platform is also the process of interaction between the public and the crowdsourcing environment. In order to promote the crowdsourcing environment to promote the efficient operation of crowdsourcing and self-organization, the crowdsourcing environment should promote competitive synergy and cooperative synergy among the public, and maintain the order of the public cross-target. First, create a fair and equitable competitive atmosphere, and achieve competitive synergy among the public through measures such as open and transparent program selection and reasonable rewards. Second, to create the basis and environment for mass cooperation, and to promote cooperative cooperation among the public through the establishment of discussion communities and the establishment of cooperative contracting methods. Third, timely reward the mission rewards promised to the public, including material rewards and spiritual rewards, in order to maintain the cross-target of the public.

7.4 The overall design of the collaborative operation mode of crowdsourcing self - organization

The scattered mass individual who participates in crowdsourcing has a relationship through internal integration of synergy and ability endowment integration, and the role of competitive synergy or cooperative synergy is transformed into an organic whole, achieving complementarity, integration and learning; The parameters indicate the direction of the public's crowdsourcing behavior, that is, providing quality solutions to ensure the crowdsourcing effect is ensured; and the improvement of the crowdsourcing environment is to create a competitive

synergy or cooperative collaborative environment between the public and maintain the public cross The target parameter of the target.

8. CONCLUSION

By analyzing the current problems of crowdsourcing self-organizing operation, this paper proposes to solve it with the theory of synergy, so that crowdsourcing self-organization can run efficiently. Firstly, the feasibility of applying synergy to crowd-source self-organizing operation is analyzed. Secondly, it is analyzed synergistically. The connotation and mechanism of its cooperative operation mode are explored again. Finally, the mechanism and implementation mechanism of the operation mode are completed. The overall design of the crowdsourcing self-organizing operation mode.

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