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The Research on Knowledge Field and Movement Mechanism of Knowledge Field Theory

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Abstract: Knowledge flows is unevenly distributed in time and space with field effect. The system of knowledge movement appears systematic effect taken by all Collaboration elements which are knowledge source, knowledge tracing line, knowledge node, knowledge pool it constructs the evolution of knowledge field. The article concludes knowledge need mechanism and movement model on the basis of knowledge field according to the mutual interaction of some eigenvectors such as knowledge field potential, knowledge prohibition, field strength. The article draws a conclusion that the theory of knowledge field can uncover the essence of knowledge movement effectively, the process of knowledge movement is the mutual effects of power and resistance.

Key words: Knowledge field, knowledge source, knowledge pool, knowledge tracing line, knowledge movement

INTRODUCTION

With the advent of the era of knowledge economy and the development of information network technology, an organization can have advanced knowledge and integrating it into the organization's core competitiveness has become the consensus of many excellent organization. Resource-based theory tells people, an organization only has the core resources which other organizations do not imitate and copy can gain lasting competitive advantage. Volatility in the environment of today, only keep learning, to master the new knowledge, an organization can detect the changes in the environment inside and outside and adjust themselves to adapt to the environment for the survival and development. All round the world famous knowledge-based enterprises such as McKensey, they can quickly adapt to changing market environment and meet the demand of the rapid development of the business, all are due to its long-term core competitiveness formed in the process of knowledge movement. Studying movement mechanism of the knowledge, therefore, is also very necessary. Knowledge of accumulating, continuity, systematization, use the non-exclusive knowledge itself has the property of flow in nature. Mobility of knowledge so that knowledge can be more subject to master, be applied by the society, create value for the society as a whole. This view without considering the difference between explicit knowledge and tacit knowledge, has certain limitations but this knowledge point the liquid material. Because the knowledge in time and space distribution is not balanced, I can use the concept of

knowledge space to describe it. Knowledge operation form presents the knowledge generated source tracing line (hereinafter referred to as knowledge source) knowledge of trace, knowledge nodes demand source (knowledge transfer) and so on various elements of the system effect of coordinating role which constitutes the knowledge field evolution of form. From intellectual field theory, to grasp the characteristics and operation characteristics of the knowledge field and for deepening the research on knowledge management, promoting the knowledge spillover and diffusion, sharing and translated it into the organization's core competence has important practical significance.

About studying the knowledge field, many scholars have made valuable researches. Polanyi (1998) proposed the concept of generalized field, from the cognitive perspective in the field of philosophy to discuss. Japanese scholar Nonaka and Takeuchi (1995) put forward the knowledge creation process (the SECI) model and making games, dialogue, system and practice field. Chinese scholars Wu and Su (2004) proposed the concept of "stuck field" and considered "stuck field" is a key factor in creating valuable intelligence. Li (2002) argued that knowledge field is which based on knowledge element a higher level of knowledge, is the product of scientific development to a certain stage. Zhang and Lan (2005) analyzed the construction, analysis and application of the knowledge field. Wang and Zhang (2011) studied the building, measure and evolution of the knowledge field.

These studies have a common characteristic, that is, from the narrow angle describe the conception of

knowledge field, knowledge to produce a certain neighborhood or knowledge center the time-space range of activities is called knowledge. And this article will try to study all of the movement process of knowledge from the angle of generalized knowledge from knowledge senders (tacit knowledge) to the receiver (knowledge transfer), the knowledge movement as a present state space displacement under the action of a force. From the angle of acting force to research knowledge movement process, to establish the theory of knowledge field, not only a better knowledge of the mechanism but to guide the knowledge dissemination, knowledge integration and knowledge sharing.

THE KNOWLEDGE FIELD THEORY AND THE KNOWLEDGE COMPONENTS

The concept of knowledge field: In essence, the flow of knowledge from people the demand for knowledge and the separation of knowledge suppliers and demanders, people's demand for knowledge can be seen as a force on the knowledge, sports knowledge is knowledge in under the action of this force flowing from the supplier to the purchaser. If the knowledge in the abstract as a particle, the demand force occurred knowledge movement and charge in the electric field by the electric field force and the objects in a gravitational field by gravity displacement are very similar. Accordingly, I can use the field theory of physics to study movement of knowledge, the knowledge from the supplier to the receiver of all movement of time and space scope is defined as the knowledge field.

Knowledge in knowledge field, due to the demanders' demand force and produce movement, so the knowledge field is produced by demanders', inspire, demand is the direct driving force of knowledge movement.

The knowledge field space constitute: Knowledge field permeates the entire space of the knowledge movement, to facilitate research, According to knowledge movement process elements of the spatial organization of the knowledge field into the form of a knowledge source, knowledge exchange, knowledge node, knowledge traces, knowledge beam and their meaning is as follows:

- **Knowledge source:** Tacit knowledge is the knowledge of the supplier. Knowledge starts from the point to the knowledge field of the other organizations or individuals. All providers of knowledge can be used as a tacit knowledge but from the knowledge of source analysis, tacit knowledge refers to the organization or individual should have knowledge of and as the carrier of knowledge, they have the ability or willingness to demander output knowledge

- **Knowledge transfer:** Knowledge transfer is the recipient of knowledge. Knowledge through a series of movements to reach the recipient, in order to satisfy people's needs. All knowledge of the receiver can be used as a knowledge transfer but analysis from the ultimate goal of knowledge, knowledge transfer should be referring to the knowledge of receiving digest absorb and take advantage of the organization or individual. activities, knowledge is the knowledge products trading center platform
- **Knowledge nodes:** Knowledge in the process of movement, through a platform to gather or integration, these platforms often becomes the center of knowledge movement, every day there are large quantities of knowledge by means of this focus, knowledge node is the knowledge in the field to gather, from the perspective of market economy
- **Trace knowledge:** In knowledge field, knowledge flows can be used a curve graphically represented are available and it is originating from tacit knowledge, the knowledge dissemination carrier (network, books, communication, etc.) in knowledge transfer, knowledge or through a number of nodes and then check in knowledge transfer. I call such a curve trace of knowledge, knowledge here set trace direction the same as the direction of motion of the knowledge, from knowledge to knowledge transfer and diffusion or convergence
- **Knowledge beam:** Knowledge beam is the sum total of knowledge trace and it is refers to all the knowledge movement path

As a result, the knowledge field of the space elements including knowledge source, knowledge transfer, knowledge node, trace knowledge (knowledge beam), can be abstract representations as in Fig. 1.

Knowledge field characteristic quantities: Knowledge field characteristic quantities including knowledge potential energy, knowledge resistance, knowledge field strength, etc, their specific meaning is as follows:

- **Knowledge potential energy:** And physics describes the object of the relative position with the potential, knowledge also has potential energy, potential energy is a relative concept, different location potential energy difference between is the potential difference. Knowledge field potential energy associated with knowledge in the field of space position, can be understood as the value of different location, knowledge in the field and potential difference of knowledge in different position the value of the difference. In nature can be interpreted as knowledge due to different value because people

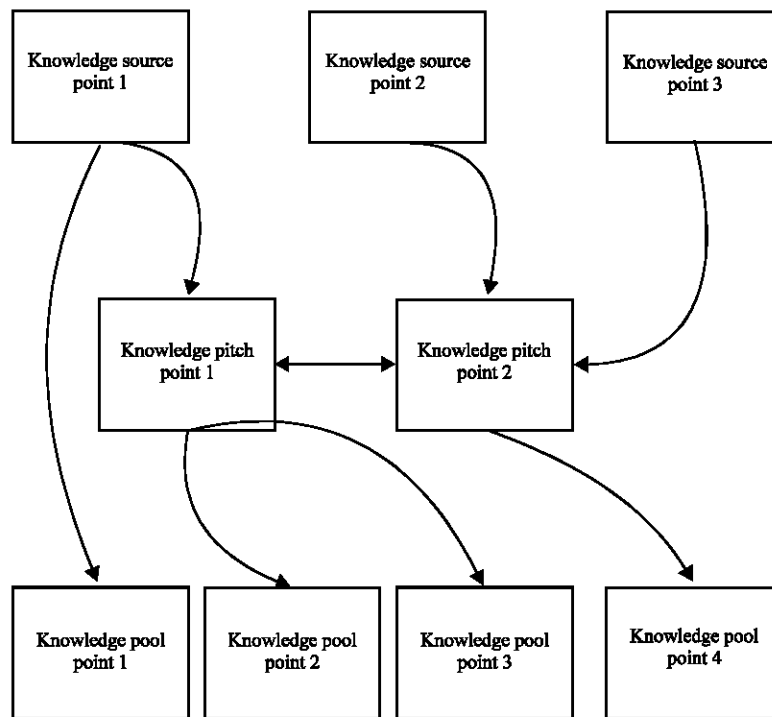


Fig. 1: The knowledge field space constitute

demand for knowledge, in the role of demand, the value of knowledge in the demanders is higher than its value in the supplier. The value of the difference between suppliers and demanders formed a kind of appeal and attract knowledge from supplier to the purchaser

Tacit knowledge field potential difference between the knowledge points and knowledge counterpoint can be expressed as follows:

$$\Delta U_{yh} = U_y - U_h = P_y - P_h \quad (1)$$

Wherein, knowledge in knowledge field potential difference between the knowledge points and sinks, respectively, the knowledge in the knowledge point y and counterpoint h, knowledge potential energy, respectively, in tacit knowledge for knowledge point the value of the y and counterpoint h.

Knowledge of resistance: Knowledge demand in the field under the action of potential difference but the real implementation knowledge demand is conditioned by various factors, such as those in knowledge transfer cost, time cost, digestion and absorption capacity, etc. These factors constitutes a resistance to the realization of the knowledge demand it can be said for the resistance of knowledge. Knowledge trace x in the resistance can be expressed as follows:

$$R_x = K_x + T_x + S_x + O_x \quad (2)$$

Knowledge among them, said mark x in the intellectual resistance, respectively along the knowledge trace x sports knowledge transfer cost, time cost, demanders of digesting and absorbing the cost and cost due to the complexity of other factors restricting the spread of knowledge.

Knowledge of the field strength: Knowledge indicates of knowledge in the knowledge field suffered in the gravitational field strength level. Generally, the traces of a knowledge field strength equal to the size of the knowledge in the knowledge sources, knowledge transfer knowledge to trace potential difference and traces of knowledge which the difference between the resistance, can be expressed as follows:

$$E_x = \Delta U_{yh} - R_x \quad (3)$$

Among them, E_x indicates trace x knowledge field and the meaning of the same Eq. 1 and 2.

BASED ON THE KNOWLEDGE DEMAND OF THE KNOWLEDGE FIELD THEORY MECHANISM

Mechanism of demand refers to the knowledge demand reason, demand by various factors in the process

of elimination of constraint, constraint factors, the final result and the process of the interaction which reveals the ins and outs of the knowledge demand. Demand of knowledge is the result of the interaction of force and resistance and its demand causes and influence factors are as follows.

The dynamic knowledge demand: From the value point of view, the knowledge demand is knowledge driven in the value difference between supplier and purchaser as a result, described in principle of knowledge field that it is the potential difference driving result between knowledge and knowledge resource. Therefore, demand for power is the potential difference between supply and demand of knowledge field, namely the value of knowledge between the supply and demand both sides. Under leading of the market economy, knowledge field potential difference is the market value of the knowledge but knowledge is a special kind of product, whose special value is often unlike other commodities and its transaction, payment method and economic benefit presents the complexity.

Knowledge demand resistance: Knowledge demand resistance is knowledge resistance existing in the knowledge of the trace and several factors impacting knowledge resistance are as follows:

- **Knowledge transfer cost:** The knowledge costs all the expense in the process of knowledge movement from the supplier to the purchaser, including product value of knowledge, transaction fees, management fees, etc
- **Time cost of knowledge movement:** The cost is the result of the effectiveness of the knowledge movement time. Knowledge movement time cost consists of two aspects: Firstly, the cost is related to the confidentiality of knowledge itself and timeliness of knowledge itself, etc; Secondly, opportunity cost is produced by knowledge exclusive requirements in the process of knowledge movement
- **Knowledge demanders absorb the cost:** In the process of knowledge demanders accepting knowledge products, due to the limitation of my knowledge and the particularity of intellectual products it is likely to be hired experts to carry on the improvement of digestion and integration innovation which needs further hardware and software
- **Other cost factors:** In the process of knowledge movement, there are also some factors hinder the efforts of movements, such as diffusion barriers formed by the knowledge patentability, knowledge transfer restrictions caused by knowledge transmission channel of the interruption and the imbalance of economic development due to natural

conditions and emergency etc. Such as the knowledge of advanced products and the reality does not match the level of economic development.

The mechanism of knowledge demand: Knowledge field potential difference is the power of knowledge demand but potential difference generated under the action of knowledge is only potential demand. Only when the potential difference is greater than the resistance of knowledge, namely field strength at zero in the knowledge trace can the knowledge of the potential demand translate into the reality of knowledge demand and can the intellectual movement be formed. In addition, due to the many factors that affect knowledge field potential difference, resistance and the dynamic change that will happen, the knowledge of the potential demand can also be as the change of potential difference and resistance and knowledge needs transfer into reality.

KNOWLEDGE MOVEMENT MECHANISM BASED ON KNOWLEDGE FIELD THEORY

Knowledge movement mechanism: After knowledge movement mechanism refers to the knowledge demand generation, through different trace from the source of knowledge to knowledge transfer knowledge to follow the principle of motion process it reveals the distribution regularity of knowledge in the knowledge of the beam. During beams of knowledge in knowledge demand and supply, in order to ensure the movement to create the value of maximum of knowledge, knowledge in the knowledge beam will seek practical knowledge trace according to the following principles: Firstly, the knowledge will move in the field of the potential energy difference between tacit knowledge and knowledge of one world biggest sport, in order to make sure get the best use of knowledge value; Secondly, knowledge will move along knowledge movement trace of the least resistance and the largest field strength, to ensure the maximum benefits during the process of knowledge movement, that is knowledge movement mechanism.

Knowledge motion model: Knowledge motion model is to use knowledge field theory and can make use of establishing the mathematical model to describe the knowledge movement mechanism, according to the optimized model to the real process of knowledge movement. But it is worth mentioning that in actual movement process of knowledge, knowledge potential energy and resistance, such as knowledge field strength characteristic is very complex, dynamic change. As a result, the model of tacit knowledge and knowledge transfer in knowledge potential energy field and knowledge of resistance shall be the function of

knowledge flow but with the help of mathematical model its mechanism is analyzed.

Knowledge motion model assumptions are as follows: There are a number of knowledge points and sink of knowledge in the certain field of the knowledge. Knowledge points and knowledge have knowledge beam sink consisting of knowledge trace and the number of each knowledge point receiving knowledge cannot exceed a certain limit and the sink receiving knowledge must meet a certain threshold. The number of knowledge points in all outlets and demand of knowledge potential energy is a function of knowledge flow and resistance is also the trace of the knowledge of knowledge flow function.

Knowledge movement model contains the following variables: y is tacit knowledge ($y = 1, 2, \dots, n$); X for tacit knowledge and knowledge between the sink mark line ($x = 1, 2, \dots, k$); Y for tacit knowledge point of knowledge supply; TPR h knowledge demand for knowledge; Trace for knowledge learned in x ; Y knowledge of potential energy for tacit knowledge point, is flowing through that point utility function; In TPR h of knowledge for knowledge potential energy is flowing through that point utility function; Knowledge in knowledge in the knowledge trace x resistance, is flowing through the trace utility function; Y for tacit knowledge spot supply limit; The lower limit of TPR h demand for knowledge; , as 0-1 variables, with a value of 1 represents knowledge trace after knowledge point x or y sink h its value is 0 represents knowledge trace after knowledge point x or y h knowledge TPR.

Created for intellectual movement model of the objective function value, the total utility in knowledge transfer and knowledge in the general utility of tacit knowledge and knowledge of the difference between the total resistance in the trace is the largest. Model specific said is as follows:

$$\max \left\{ \sum_{h=1}^n \int_0^{d_h} U_{dh}(x) dx - \sum_{y=1}^m \int_0^{s_y} U_{sy}(y) dy - \sum_{x=1}^k \int_0^{k_x} R_x(z) dz \right\} \quad (4)$$

$$\text{s.t.} \sum_{x=1}^i \alpha_{x,y} k_x = s_y \leq s_{y\max}, \forall y \quad (5)$$

$$\sum_{x=1}^i \beta_{x,h} k_x = d_h \geq d_{h\min}, \forall h \quad (6)$$

$$E_x = U_{dh} - U_{sy} - R_x > 0, \forall x, y, h \quad (7)$$

$$\alpha_{x,y}, \beta_{x,h} \in \{0, 1\} \quad (8)$$

$$d_h, Y_y, U_{dh}, U_{sy}, k_x \geq 0 \quad (9)$$

Among them, the Eq. 4 as the objective function and represents the knowledge in the knowledge movement mechanism, namely knowledge movement value created is the largest. Equation 5 and 6 for flow constraints which means each knowledge point, through the source point is the sum of all the knowledge learned in the trace is not greater than the upper limit of supply; For any knowledge of TPR, through all the knowledge learned in the trace of the TPR sum not less than the demand for lower limit. Equation 7 for knowledge movement condition, on behalf of the trace of the knowledge field strength is greater than 0, namely the tacit knowledge, knowledge field potential difference between the sink more than knowledge of trace resistance. Equation 8 constraints of 0-1 and Eq. 9 for nonnegative constraint.

Model of the objective function of the differential relations on behalf of the resistance varies continuously change with learned knowledge potential energy. In addition, the trace resistance can be subdivided into knowledge channel and the resistance of knowledge node, according to the actual situation in a different functional expression.

RESULTS AND DISCUSSION

Process of knowledge movement is an extremely complex process. Its movement process had the obvious characteristics of "field" which can use game theory to analyze the knowledge form and internal mechanism of the movement. Knowledge field of the research provides a new way to knowledge management to describe the law of the motion of knowledge, that can help organizations from the behavior and psychological guide and promote the active and effective knowledge transaction movement of knowledge, promote knowledge sharing and integration of innovation, make the knowledge become the edge tool to promote the development of economy.

Based on the concept of knowledge field, the paper expanded and enriched the concept of knowledge field, analyzes knowledge needs to promote the knowledge of the field potential difference and hinder the realization of knowledge resistance, summarized the interaction potential difference and resistance under the knowledge demand generation and movement of the specific process and established the movement mechanism knowledge motion model. This provides a certain theoretical support for efficient and reasonable knowledge movement.

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