CULTIVATION OF PERCEPTION AND CREATIVITY BY REPEATING SOFT SYSTEMS APPROACH

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ABSTRACT

Employees learn not only expertise on a given problem but also how to solve problems collectively and collaboratively together with others leading to innovation. When they perform innovative activities, they demonstrate collective creativity and perception on the basis of communication. This paper proposes a soft systems approach to cultivate such collective creativity and perception of employees. This approach assumes the use of the soft systems methodology or the design thinking methodology; both consist of the inquiry and learning cycle equipped with the function of double loop learning. An innovation process is viewed as a nexus of self-referential communications by the selectivity of information. It can be said that the selection is performed unconsciously, based on one's norm which is the basis of creativity and perception and is born of experiences. It is shown that management of motivation, intellectual curiosity, and spirit of inquiry is required to strengthen one's long-term memory and hence creativity and perception according to results in brain science. In cooperation with such management, rich experiences of innovative activities are required to strengthen creativity and perception, and for the requirement the soft systems approach proposed in this paper plays the role to share rich experiences among employees.

Keywords: Knowledge management, Creativity, Design thinking, Soft systems methodology, Social system theory.

INTRODUCTION

The SECI model describes the features of organizational knowledge-creating processes with four elements: Socialization, Externalization, Combination, and Internalization, identified in the case studies of successful innovations (Nonaka and Takeuchi, 1995). Beginning with the Socialization process, concept creation or discovery of the key technology along with the Externalization process is one of the successful factors for innovations, where employees collectively demonstrate perception and creativity, as tacit or embodied knowledge, under self-referential communications. The Internalization process can be said to reinforce perception and creativity. The cultivation of such embodied abilities of employees is required for innovations, and is one of the important subjects of knowledge management.

It is said that a communication can be viewed as a three-part selection process, the selectivity of information is itself an aspect of the communication process, and the emergent order from a nexus of self-referential communications, particularly about decision makings, is an organization (Luhmann, 1995). This emergent order can also be considered as the organizational knowledge or the dynamics of an organization in the context of knowledge management. Communication must be maintained to continuously improve the dynamics of an organization. The cultivation of employees' norms for information selection is the key for such improvement. This is dependent on the given contexts of an innovation in a collective environment. There are three types of media to transform what is improbable into what is probable in communication: language, media of dissemination, and symbolically generalized communication media. On the basis of these media, communication is maintained and reinforced for innovation.

The way of thinking of experts on problem solving can be formalized as a methodology. For example, the inquiring and learning cycle of the soft systems methodology (SSM) shows an experts' framework of problem-solving activities (Checkland, 1999). It can be said that this cycle consists of single and double loop learning according to Argyris (1977). Single loop learning occurs in the stages of building models of systems and of comparing the models with perceived real situation in order to derive a set of actions to improve the situation. Double loop learning occurs in the application of the derived set of actions in practice.

For another example, the design thinking methodology consists of three processes: Inspiration, Ideation, and Implementation (Brown, 2008). The Inspiration and Ideation processes are implemented in five modes: Empathize, Define, Ideate, Prototype, and Test[1]. Prototyping from the early stage of design activities is recommended to understand the target users. These five modes can be viewed as single loop learning. Developers learn how to use their expertise on a given problem, and the ways of communication and collaboration along with the five modes. It is necessary to perform the Implementation process for double loop learning.

Employees gradually indwell in a methodology while repeating its use, in addition to acquiring expertise on a given problem. The tacit knowing introduced by Polanyi (1966) explains these phenomena.

Tacit knowing is a kind of philosophy closely related to creativity and perception. One shapes a comprehensive entity to act in one's environment by the functional structure and simultaneously, by sharing the same time and place with the others in the environment, perceives its reaction in the environment by the phenomenal structure. Repeating shaping, one can gradually improve one's action. The functional structure can be replaced by the frontal lobe and the phenomenal structure by the hippocampus, and consideration of the cultivation of creativity and perception can hence be shifted from the philosophy to the mechanism of the long-term memory system in the human brain

[1] The following document can be found in the web site. Hasso Plattner Institute of Design at Stanford: An Introduction to Design Thinking PROCESS GUIDE.

(Squire and Kandel, 2009). Embodied knowledge is a kind of nondeclarative memory and born of experiences. Note that poor experiences cultivate poor embodied knowledge.

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Nonaka and Takeuchi (1995) defined the explicit and tacit knowledge in the context of organizational knowledge-creating processes. On the basis of the epistemology, they explained what codified or explicit knowledge looks like. Tacit knowledge consists of two kinds: one relies on the mental model (Johnson-Laird, 1983) and the other on tacit knowing (Polanyi, 1966).

Explicit Knowledge

It is obvious that explicit knowledge is true within its stand-alone context. Because the SECI model describes the features of successful activities of organizational knowledge-creating processes, the output from the externalization process can be necessarily said to be true. In practice, however, the output from the activities trying to follow the Externalization process may result in failure. In such an unsuccessful case, it cannot be called explicit knowledge. In the combination process, different bodies of explicit knowledge are combined to transcribe the concept into an archetype with originality and ingenuity in the problem context. In practice, different bodies of explicit knowledge in the combination are respectively true, but the combination may fail by some technical reasons even though the concept has been true. In this case, the input to the combination process is explicit knowledge, but the output from the process is not. If the transcription of the concept into the archetype is successful, then the archetype can be called explicit knowledge because it is equivalent to the concept.

Tacit Knowledge – Tacit Knowing and Metal Model

'Twisting stretch' motion to knead of a master baker is an example of tacit knowing (Polanyi, 1966). The motion is a comprehensive entity of the baker, where a comprehensive entity consists of proximal term, distal term, and tacit relation between the terms. Only the distal term, that is the externalized motion, is observable and can be explained in linguistic description.

The mental model (Johnson-Laird, 1983) is the representation of a particular, and it has an individual token for each instance, and it is based on person's perception. Note that it can be explained in linguistic description although it is subjective.

One pays attention to a matter in the real world for some reason. Both conscious and unconscious awareness occur in this process. One consciously perceives it, and holds its relatively subjective image in one's brain; this image is a mental model corresponding to the matter. Simultaneously, one unconsciously perceives something related to the matter. This phenomenon affects the improvement of perception. The phenomenal structure of the tacit knowing plays an important role for this.

In the case study of the home bakery machine (Nonaka and Takeuchi, 1995), the engineers finally codified 'twisting stretch' motion to knead of the master baker as the key explicit knowledge to develop the machine while imaging and discussing mental models by observation, imitation, and practice. Tacit knowledge can be said to be converted to explicit knowledge. Note that the skill, or equivalently the comprehensive entity, of the master baker cannot be converted to explicit knowledge. Instead, the observed motion, the distal term of the comprehensive entity, to knead of the master baker is articulated through the metal models of the engineers.

From Tacit Knowing to Long-Term Memory System

The functional and phenomenal structures of tacit knowing can be replaced by the frontal lobe and hippocampus in the human brain, respectively. One acts in one's environment by associating one's memories at the frontal lobe, and simultaneously, one consciously and unconsciously perceives the reacted information in the environment at the hippocampus. The frontal lobe, mainly frontal association area, is related to creativity, and the hippocampus in cooperation with five senses is related to perception. Information from five senses flows into the hippocampus through the dentate gyrus. The frontal lobe is said to reach its fully operational state only sometime between the ages of eighteen and thirty (Goldberg, 2007). After the age, what can only be endeavored to cultivate creativity is to strengthen long-term memories, and it requires perception.

Long-term memories consist of declarative and nondeclarative memories, and they are further divided into several types of memories (Squire, 2004). Information comes to the hippocampus through five senses and some of them will be stored in the brain as long-term memories. These long-term memories are associated in the frontal lobe to act according to a situation.

Induction of the long-term potentiation (LTP) and θ rhythm in the hippocampus, proliferation of granule cells in the dentate gyrus, and the synaptic plasticity in the cerebral cortex are keys to strengthening long-term memories (Squire and Kandel, 2009). It is said that states of mind such as motivation and intellectual curiosity activate the amygdala, and consequently, it tends to induce θ rhythm and LTP in the hippocampus. It is said that states of mind such as motivation and intellectual curiosity also activate the nucleus accumbens, and consequently, it tends to initiate synaptic plasticity in the cerebral cortex. It is said that granule cells in the dentate gyrus tend to proliferate with states of mind such as intellectual curiosity and spirit of inquiry.

KNOWLEDGE MANAGEMENT

Knowledge management in this paper focuses on the cultivation of collective creativity and perception of employees. Collective use of their abilities under communication is the key to innovation. The SECI model describes the features of innovation processes. An innovation process can emerge from a nexus of self-referential communications, where a communication is viewed as a three-part selection process (Luhmann, 1995). It is also said that the selectivity of information is itself an aspect of

the communication process. In this context, it can be said that individual creativity and perception rely on conscious or unconscious selection of information, where the norm for a selection is implicit and born of experiences. This paper claims that learning of the norm of information selection is the key to cultivate creativity and perception in addition to acquiring expertise on a given problem. Double loop learning (Argyris, 1977) or equivalently the Internalization process of the SECI model explains this kind of learning, and the soft systems methodology and the design thinking methodology can be used for the purpose of double loop learning as mentioned in the introduction.

Knowledge management in this paper pursues innovations and assumes the activities referring to the SECI model. For example, when the concept of the system to be designed is created before the formulation of root definitions, SSM can be said to formally follow the SECI model. When the concept of a product to be designed is created at the beginning of the Ideation process, the design thinking methodology can also be said to formally follow the SECI model.

As mentioned in the previous section, what is required to cultivate individual creativity is to strengthen one's long-term memories, and it requires perception which can be enhanced by proliferating granule cells of the dentate gyrus. In addition to management of motivation, intellectual curiosity, and spirit of inquiry, it is beneficial to share rich experiences together with experts on a given problem to cultivate creativity and perception along with innovative activities. Approaches and behaviors of experts on a given problem are generally rich and can be shared by novices to consciously and unconsciously learn how experts apply expertise as the patterns combined explicit knowledge (or declarative memories) with tacit knowledge (or nondeclarative memories).

The implicit norm of information selection is the source of creativity and perception for innovations as mentioned before. In order to acquire it, each employee is required to repeat rich experiences along with the context of innovation processes. Use of SSM or the design thinking methodology helps this purpose since their processes are implemented along with innovation processes based on the SECI model in their forms. Facilitators of the methodologies also help achieve the purpose by giving advice on how to use the methodology.

CONCLUSION

It is important to repeat the proposed soft systems approach to share rich experiences of innovations together with experts on given problems, and consequently, strengthen employees' collective creativity and perception under self-referential communications. Note that the proposed approach is based on the results in brain science instead of the philosophy or mechanism of tacit knowing.

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