



## Soft Systems Methodology on Knowledge Integration and Creation

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### **Abstract**

In the age of creativity and innovation, knowledge is considered the most strategically important resource and learning the most strategically important capability for individuals, groups, organizations, and as a result, societies and countries. Continuous integration of knowledge in order to solve ill-structured and fuzzy problems will create new knowledge. Knowledge creation is cognitive, rational, irrational and emotional activity that are done by human's minds. Although, knowledge is a humanism heritage, but it created by individual. Therefore, individuals, and then organizations do the four activities of acquiring, exploiting, creating and accumulating of knowledge. Therefore, in all these stages, the different kinds of knowledge will translate each other. In this article, I will describe integrating and creating knowledge based on soft systems methodology.

**Keywords:** knowledge creation and integration, Soft systems methodology



## Introduction

In 21<sup>st</sup> century, and in the post-industrial economy, sometimes termed the "knowledge economy", knowledge has become the key asset to drive organizational survival and success, and a critical success factor to grow and develop countries.

The importance of knowledge has been stressed by many management researchers and authors. For example, Peter Drucker has declared that knowledge is just not another resource like, labor, capital, but is the only important economic resource in the knowledge society (Drucker, 1993). Toffler subscribes to the views of Drucker, by proclaiming that knowledge is the source of the highest-quality power and the key to the power shift that lies ahead (Nonaka et al., 2000). Quinn shares a similar view while stating that economic and producing power of modern organizations lies more in its intellectual assets and capability more than the other tangible assets (Frapp Aolo, 2006). Also, Gibran has stated that "a little knowledge that acts is worth more than much knowledge that is ideal, and Lew Platt, Former CEO of Hewlett Packard, has stated that if HP knew what HP knows we would be three times more profitable (Zeleny, 1987).

There are number definitions of knowledge definition of knowledge range from the practical to the conceptual to the philosophical, and from narrow to broad in scope. For example, knowledge refers

to an observer's distinction of "objects" through which he brings forth from the background of experience a coherent and self-consistent set of coordinated actions (Marakas, 1999) or knowledge is an organized combination of ideas, rules, procedures, and information. In a sense, knowledge is a "meaning" made by the mind (Marakas, 1999). Nonaka (1994) defined knowledge as justified belief, where beliefs are used to justify self-interested. This concept of knowledge is congruent with the "constructionist perspective". In this perspective, actors are considered to enact and construct realities based on their mental models, which are shaped through interpretations and discourse between different members (Dervin, 1994). There forth, on based this definition of knowledge, a part of knowledge becomes public-goods that are continually reexamined and reinterpreted by different social members (Raelin, 1997). The part of the knowledge still remains exclusively in the domain of the individual. This knowledge can not be fully communicated, but only perceived by the individual (Nonaka, 1994; Nonaka & Takeuchi, 1995; Polanyi, 1967; Nelson & Winter, 1982). Davenport & Prusak (2000) has defined knowledge as a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experience and information. It originates and is applied in the minds of the owners of knowledge and in organizations, it often becomes embedded not only in documents or repositories, but also in organizational routines, processes, practices and norms. Therefore, Knowledge is organized information applicable to problem solving, or knowledge is information that has been organized and analyzed to make it understandable and applicable to problem solving or decision making, or knowledge is reasoning about information and data to actively enable performance, problem-solving, decision-making, learning and teaching (Shimeura & Nakamori, <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.09.2714&rep=rep1&type=pdf>). In a practical sense, knowledge could be considered as "actionable information". Actionable information allows us to make better decisions and provide an effective input to dialogue and creativity in organization. This occurs by providing information at the right place, at the right time and in the appropriate format (Jashapara, 2004). All knowledge can be classified according to its complexity on a continuum from explicit to tacit. Michael Polanyi identified the distinction between these two types of knowledge in 1966 (Frapp Aolo, 2006). Explicit knowledge is knowledge that is articulated in formal language and easily transmitted among individuals both synchronously and asynchronously. Tacit knowledge, on the other hand, is personal knowledge embedded in individual experience and involving such intangible factors as personal belief, perspective, instinct, and values. Although, explicit knowledge can be adequately transferred with the help of electronic tools. On the other hand, the most efficient ways to convey tacit knowledge throughout the organization are face to face, social interactions and learning.



For decades, researchers from information science, and, also organizations have focused on developing new applications of information technology to support the digital, storage, retrieval and distribution of organization's explicitly documented knowledge, rather than tacit knowledge. But no doubt, tacit knowledge plays a pivotal role in distinguishing organizations and poising them for success. As small number of organizations believes that the most valuable knowledge is the tacit knowledge existing within people's heads, augmented or shared via interpersonal integration and social relationships(Zack, 1999). Therefore, with considering of the importance of tacit knowledge, and its impact on the acquiring and sustaining competitive advantage, this question is: how will different kinds of knowledge integrate, and how will knowledge create.

In order to answer these questions, I will apply a soft systems methodology for integration and creation of these different types of knowledge. This article is organized in five part. This introduction aims to give the reader a background about what is knowledge. The second part will be described the meaning of knowledge integration and creation, and its approaches and schools of thinking. The third part will be described soft methodology system.

In the forth part, I will describe soft systems methodology for knowledge integration and creation. In the fifth part, I will make some final conclusions.

## 2-knowledge integration and creation

knowledge creation is cognitive, rational, irrational and emotional activity that are done by human's minds. Knowledge creation is not simply a codification efforts, nor one driven only personal(Huang et al., 2001). According to Marakas(1999), knowledge creation refers to ability of an organization to develop novel and useful idea and solutions. By reconfiguring and recombining foreground and background knowledge through different sets of interactions, an organization can create new realities and meanings(Bhatt, 2001). Lynn et al(1996) have stated that knowledge creation is an emergent process in which motivation, inspiration, experimentation, and pure chance play an important role. Therefore, when knowledge is considered to be novel that it solves existing problem more proficiently and effectively. Bhatt(2001) has declared that an organization should not create new knowledge from scratch in every situation, but also, there are several other ways that can be pursued in combination with a "fresh-start".

According to Horgan(1996), the success of knowledge creation is a chance event, based on the convergence of the world reality and structure of one's thinking. Creation is only a fearful possibility of finding a meaningful relation in uncovered combinations. Weick(1979, 1995) has noted that the knowledge creation process is evaluated based on its originally and adaptive flexibility to facilitate the solution of a problem in different context. The process of knowledge creation and evaluation not only requires organizations to alter their cognitive frameworks, but also forces organizational members to view reality in new perspectives.

Shimemura and Nakamori(<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.09.2714&rep=rep1&type=pdf>) define the word of creation as a new combination of materials. This definition is accepted as integration or synthesizing, and creation will have a quite near meaning. Therefore, new knowledge will be created at a certain stage of an integration of fusion process of different knowledge. Knowledge integration can be conceptualized based on four distinctive but interrelated dimension, namely structural, technological, intellectual and socio-emotional. The dynamics of knowledge integration are not limited to within individual or group or organization. Instead, knowledge integration is an ongoing process which takes place intra- and inter organization, group, individual. Therefore, the transmission of knowledge further surfaces the intellectual dimension of knowledge integration. It is necessary to create "common knowledge through synthesizing differentiated expertise. Knowledge integration is also a socio-emotional process. The socio-emotional dimension address the point that socialization is not only a critical ingredient for knowledge creation. Albeit, the literature has tended to focus on the intellectual rather than socio-





emotional aspects. however, it is necessary to understand the interplay between those dimensions as a means of anticipating the processes of knowledge integration(Wierzbick & Nakamori, 2005).

Until the last decade of the 20<sup>th</sup> century, there were two main streams of thinking how knowledge is created. The first stream maintained that knowledge creation is essentially different activity than knowledge validation and verification- thus distinguishing the context of discovery from the context of verification. This stream also maintained that creative abilities are irrational, intuitive, instinctive, subconscious. This view was also supported by sociology in soft and critical systems theory. The second stream kept to the old interpretations of science as a result of induction and refused to see creative acts as irrational. This view, represented by many hard scientists(Brinklow, 2004). since the last decade of 20<sup>th</sup> century, quite new approaches to knowledge creation appeared, that all directly or indirectly resulted to Japanese origin. Historically, the first of such approaches is Shinayakan systems approach of Sawaragi and Nakamori that influenced by the soft and critical systems tradition. It did not specify a process-like, algorithmic recipe for knowledge and technology creation, only a set of principles, like using intuition, keeping open mind, trying diverse approaches and perspectives including all advancement of both hard and soft systems science, being adaptive and ready to learn from mistake, being elastic like a willow but hard as a sword. At the same time, in management science, another approach was developed by Nonaka and Takeuchi. This is the new renowned SECI spiral, with a process- like, algorithmic principle of organizational knowledge creation. This principle note the rational use of irrational mind capabilities, namely tacit knowledge consisting of emotions and intuition. According to the SECI spiral, new knowledge is created after each cycle of socialization, externalization, combination, internalization. Almost at this time, Motycka in Poland

proposed another theory of basic knowledge creation. She used for this purpose also irrational abilities of human mind- instincts and myths, not intuition, namely the concept of collective unconscious of Jung. She postulates that, in times of a crisis of a basic science, scientist used a regress to myths and instincts in order to obtain stimulation of novel approaches to their field of science. Nakamori has developed Shinayakana systems approach, and presented a systemic and process-like approach to knowledge creation called I<sup>5</sup> system, that Five ontological elements of it are intelligence, involvement, imagination, intervention, integration. Thus I<sup>5</sup> system stresses the need to move freely between diverse dimension of creative space(Wierzbick & Nakamori, 2005).

In an attempt to explain how knowledge is created and disseminated throughout an organization, Boisot explores a variety of theoretical perspectives based on the structure and communication of information. The exploration commences with the proposition that cognitive activity employs two fundamental techniques to extract information from data: coding and abstraction. Coding is defined as organization an experience of some environmental phenomenon into a perceptual category selected from a repertoire of possibilities exhibiting varying degrees of generate with respect to that experience. Abstraction enables the individual to generate concepts allowing the perceptual categories to be managed more efficiently by creating generalizations enabling discrete perceptual and conceptual categories to be manipulated as single entities(Brinklow,2004 ). Also, researchers in Japan believe that " knowledge creation can be performed only by people's capability instead of a system. Then it is unreasonable to think that knowledge is created in a situation without prior information and direct or indirect experience(Shimemura & Nakamori, <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.109.2714&rep=rep1&type=pdf>).

Demerest(Suresh, [http://www.providersedge.com/docs/km\\_articles/km\\_an\\_overview.pdf](http://www.providersedge.com/docs/km_articles/km_an_overview.pdf)) has developed knowledge creation model that emphasis the construction of knowledge within the organization. This model includes the social and scientific inputs. This knowledge in then embodied within the organization through explicit programs and social interchange. This is followed by a process of dissemination of espoused knowledge throughout the organization. Ultimately, this knowledge is seen as being of economic used in regard to the organizational outputs.

Also, the knowledge development cycle is defined the knowledge management process in an organization, as a cycle process from knowledge creation to knowledge review and revision. According to this cycle, the knowledge creation process involves the creation of new knowledge in the organization. This also includes activities like research and development, consulting, education, etc,



and the knowledge adoption process involves the adoption of created knowledge and adapting the knowledge. the knowledge distribution and knowledge review and revision process involves the conversion of converting the individual knowledge to organizational knowledge(Suresh, [http://www.providersedge.com/docs/km\\_articles/km\\_an\\_overview.pdf](http://www.providersedge.com/docs/km_articles/km_an_overview.pdf) ).

### 3-Soft systems methodology

System studies emerged from the investigation of well-defined hard system problem, also called systems engineering. The need for methodologies to help solving messy and ill-structured problem lead researchers to seek for flexible models. In their point of view, softer models would better represent different and subjective points of view, helping them to solve real-world messy problem. Late in the 1940's, Bertalanffy the idea that systems thinking could be applied to any kind of system, but in the 1950's and 1960's many practical hard systems applications were still been used to solve complex and messy business problem. Prescriptive systems can lead to much faster results than constructivist ones and can give optimal answers for well-defined problems. But when they are used indiscriminately for any kind of problem, it can lead to bad solutions (Graeml et al., 2004). On the other word, systems thinking is initially bounded within hard systems thinking, which recognizes the hard components and the soft relationship between component: the world is systemic, composed of a set of interacting systems, within which there is a real- world problem whose objective is obvious. The process starts with a well-defined problem and, through a scientific and rational analysis, results in the problem solved. This is based on the assumptions that problems are simple, obvious, and manageable

by applying or refining existing knowledge. Conventional systems thinking incorporates the soft element of human situations, but lacks subtlety of softness in that it merely recognizes people's perception and people's inquiry into complexity, but does not refer to understanding of how to change people's perception, trigger creativity, and enable proactiveness. However, the reality of the current world is featured by complexity, ambiguity, novelty and deception. Problems may appear in an unfamiliar way and new to the goal structure that is to be attained or visualized, thus tasks are undetermined just to understand and define the problem itself, there is an over whelming amount of information to be processed. In some cases, a situation or problem can even be deceptive because it looks familiar to previous ones and may deceptively direct problem solving to look for conventional solutions where a novel one is truly required. The increasing uncertainty of environments has created an increasing number of fuzzy and poorly-defined problems, which cannot be simply solved within the existing knowledge structure. Soft systems thinking arises in response to this challenge(Wang & Ahmed, 2002 ).

Soft systems methodology is a methodology that explores the notion of purposeful human activity. SSM not only enhances our knowledge of the problem and situation, but comes up with the on a useful intervention for such situations. The philosophical underpinnings of this methodology are essentially interpretative. Checkland highlights that this is important for the socio-human systems studies, because unlike the other sciences, human beings can always attach different meaning to the same social world. SSM helps that investigator to move beyond simply generating knowledge and theory about a situation, to solving real worlds(lee et al., 2000). SSM helps decision-maker understand the real-world problem, by comparing people's perception with declared world-view models, and answering questions like: what is the problem? Why is the problem happening? How can the problem be solved(Graeml et al., 2004)

SSM, instead of simply seeking an obvious goal or objective, managing is a sense-making process, allowing exploration of how people in a specific situation create for themselves the meaning of their world and so act intentionally. This demonstrate a stronger emphasis on the soft element of systems: people's appreciation, i.e. perception and judgment of the reality, which contributes to ideas stream, and leads to actions taken as part of the events stream. People's appreciation is personal, institutional or cultural, based on previous or appreciate the facts. Endowed with the softness, systems thinking views the inquiry into the complexity of the situation to define a problem and coping with it as an organized learning system, using the many models as a source of questions to ask of the real







II) is establishing new premises (paradigms, schemata, mental models or perspectives) to override the existing ones. In this stage explicit knowledge will translate to tacit knowledge. on the other word, internalization will occur.

2) Developing a rich picture. In this stage, a group of individuals from all organizational fields and different levels of organization developed a rich picture based on their prior knowledge and experience, and problematic situation analyze and define. In during of this stage, individual will share their tacit knowledge and externalization will occur. A rich picture is like an organizational puzzle produced by all those involved in the problem situation. Through iterative reviewing and rethinking, participant created hand drawn renderings, named "rich pictures", that provide insights into the organizational situation, past history and plausible futures. In this stage, tacit knowledge will transform to tacit knowledge.

3) Root definition of relevant systems: In this stage, the problem is examined from a number of viewpoints. The definition is ensuring that all points of view and interest are considered in the requirements elicitation. In this stage, knowledge will share and tacit knowledge will translate to explicit knowledge.

4) To design conceptual models: this stage includes the construction of a conceptual model identifying what the system needs to accomplish including its activities and their interaction. These activities describe what has to happen for the system to meet the goals and aims defined in the root definition. According to Checkland, the conceptual model should focus on what is done, not how it is done. In this stage, decision-maker will design a conceptual model with using and integrating acquired knowledge from forth stage and exploiting him/herself knowledge.

5) Comparison of conceptual model and real world: in this stage, the conceptual model is compared with the real world system to highlight possible areas where changes are necessary. This conceptual model will identify where problems or deficiencies exist between what is happening (the rich picture) and what is desirable (the root definition) as defined by the models. In this stage, the activity of combination and integration will do and the learning II will occur. Also, it is here that a scientific revolution will occur.

6) Definition feasible desirable changes: in this stage, changes to address the disconnects or gap between the conceptual model and the real world identified in stage in stage 5 are introduced and evaluated for feasibility. These alterations may include changing the way certain activities not currently achieved in the real world, as a result, new knowledge create and innovate.

7) Action to improve the problematic situation: final recommendations for change implemented. These changes then result in a modification of the problem situation. This new situation may then lead to a new cycle of the methodology, that in turn, new knowledge is acquired.

## 5-Implications and conclusions

The complexity of the problems call for that we act in a simultaneous way on the human minds, the partner- political-economic structures and the environment, which cannot be achieved without fomenting a systems thought. According to Alvin Tofler, the social and economic transformations of an industry society that goes toward a society based on knowledge, are generating a great challenge to the nations and companies. That is forcing them towards the development of capabilities to transform and to adapt quickly according to the circumstances to the environment (Lopez et al., 2003).

In this article, I integrate knowledge integration and creation as a ill-structured problem and SSM as a framework for the inquiry into ill-structured situation. On the other hand, knowledge integration and creation are a dynamic and complex process creation that is result from learning. As Lee and Yang believed that knowledge acquisition and knowledge innovation certainly involve interaction between these two kinds of learning, which forms a kind of dynamic spiral (lee & Yang, 2000). On the other word, SSM provides a general set of concepts and an intellectual for articulating the search for "images of reality" which are relevant to taking purposeful action within some problem situation. On the base of SSM, the problem is solve through learning rather than through replacement of the current situation with an espoused improved ideal, that contribute knowledge creation. SSM uses models to



structure a debate in which different conflicting objective, needs, purposes, interests. Also, SSM contribute to localize knowledge with considering political, cultural circumstances into all human activity systems. As Checkland has believed that conflict in technology and organization are not technical issues per se, but are also associated with human affairs. Therefore, SSM use as a problem-solving method in order to create and innovate knowledge with emphasizing on system thinking idea in complex problem involving human affairs. As a result, SSM can apply as research tool for a wide range of social science research, and the use of it for theory generation and/or testing.

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