RISK ASSESSMENT RELATED TO INFORMATION UNCERTAINTY COMPONENTS

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Abstract
Both organization and individuals deal with and manage knowledge. Considering the basic approach, we distinguish two principal clusters: tacit and explicit knowledge. The knowledge management is targeted at making the organization knowledge operation more effective and providing the right people with relevant information at the right time. Knowledge and information uncertainty components have become one of crucial assets of any company or organization. Their crucial potential consists in smart knowledge management handling, proficiency and art to fit the risky market needs better than competitors.

1. Introduction

Mankind has been working with knowledge from beginning to everlasting end and is trying to find the way how to manage it. The difference consists in technological and scientific level and maturity of current generations. Technological level makes possible for broad masses of public free access to knowledge, and, in addition, there are scientific branches, such as neurology, genetics, psychiatry and psychology that are able to initiate undreamt-of abilities of a human brain. Simultaneously the volume of knowledge rises undoubtedly fast and we need to search for methods and tools that can assist to sort out, classify and systematize the heritage of mankind's knowledge; however, at the same time we should try to eliminate the fact the knowledge is available but the individual who needs it does not know it, therefore it is unavailable.

The purpose and goal of knowledge management are targeted at three crucial phenomena:

- a person should keep at disposal the knowledge he needs,
- the knowledge should be available at the time he needs it,
- it should be nobody but the person who needs this knowledge indeed.

There are many approaches to knowledge and knowledge management. This tendency is remarkably evident in technologically advanced branches, e.g. communications. In fact, organizations in this field do not differ in technical utilities. In case they need to differ from other competitors, they have to attract customer and offer a different product or a product with higher added value, a higher quality product or a cheaper product. Whatever method they select in order to differ from others, they must be able to exploit and take advantage of knowledge available to be better and smarter than their competitors.

2. History of knowledge management

Knowledge management is a new discipline considering its systematic approach to knowledge. People tried to manage the knowledge since its very beginning; however, we can characterize it as more or less intuitive. Depending on needs, our predecessors emphasized various aspects of knowledge utilization. In the Stone Age people's knowledge was oriented at animals, plants, weather and tribe rules and habits. Knowledge passed in tacit form, orally and through non-verbal communication. Ancient Roman period is considered a foundation of intellectual property of mankind: mathematics, philosophy, geometry, astronomy, medicine and logic were developing extremely fast. Considering the approach to r preparation knowledge,

Greek philosophers and scholars characterized knowledge as something that exists objectively, i.e., something we can prove. Logical argument was one of crucial veracity tools and it has been used up to now. Plato and other Greek philosophers work with two expressions: doxa (= faith) and episteme (= knowledge). Doxa is characterized as subjective understanding of the world, this view varies, changes, it is subjective and we cannot rely on it or consider it appropriate. What is true at one moment is wrong a moment later. One considers something truth, the other does not believe it. Episteme, knowledge, on the other hand, is something constant, fixed and it does not apply just to the present time. If the consensus is reached, the knowledge is proved as knowledge: once something has been proved, therefore it is truth. In addition, written form was standardized at that time. Greek impact on knowledge understanding is remarkable up to now. Knowledge was something that did not change, i.e. unchanging abstract objects: changing world was not classified as knowledge due to its unsteadiness and changeability. This point of view limits the approach of West cultures to knowledge and it is one reason of explicit knowledge orientation.

3. Basic terminology of knowledge management

There are three basic terms applied and utilized in the field of knowledge management: data, information, and knowledge.

3.1. Data

Data can be characterized as everything able to be monitored through our senses, i.e., all we can feel, taste, see or hear. Data can also be specified as objective facts on events or sequence of attributes. Data are mostly well structured and related to a particular technology. They can be quantitatively assessed

- via expenses, i.e. means we have to spend in order to get them,
- rate, i.e., how fast we get them,
- capacity, i.e. what amount of data is available at particular moment.

Data can also be classified through qualitative indicators. In that case we observe whether

- the data are available if needed,
- they follow required demands,

the coded information included is understood properly

3.2. Information

Information can also be specified as data both through quantitative and qualitative phenomena. Qualitative assessment provides users´ benefit, i.e., to what extent the information is relevant for a user. The information is generated from data as follows:

- contextualization, i.e., the user knows the purpose why the data were gathered,
- classification, i.e., the user knows what category they belong to,
- calculation, i.e., data are analyzed through mathematical and statistical methods,
- correction, i.e., data are corrected and errors are eliminated,
- condensation, i.e., data are summarized by a user.

The information value depends on two factors:

- the price we had to pay to obtain the information,
- personal relation to the information.

Referring to the historical development point of view, our position is very curious: we do not suffer from shortage of information but from its excess and redundancy. The success of both the individual and

organization consists in the ability to pick up the information which is relevant and fits the particular situation best. The problem is the user must carry out the selection by him and neither information system nor technology can substitute for him. In order to succeed and select the right one, he must acquire knowledge and information becomes a fundamental building block of knowledge.

3.3. Knowledge

Knowledge can be specified as a varying system covering interaction between experience, abilities, facts, relations, values, thoughts and meaning. It can also be specified through the term of information:

$$K = I + x,$$

where K is knowledge,
I is information,
x is what the information in the brain interacts with, i.e., our previous knowledge and abilities, experience, mental models, relations, values, principles we follow in our life, what we believe in, etc.

Knowledge is always closely related to activities and emotions and human mind: it is a part of routines, processes, practices and standards.

Knowledge
↑
Information
↑
Data

There are several ways how knowledge can be derived from the information:

- comparison, i.e., we compare new information and already familiar knowledge of similar or different situations,
- coherence, i.e., we assess the importance of information due to further decision-making and activities,
- interlinkage, i.e., we try to find the relation to knowledge that has already been available either for us or other individuals,
- conversation, i.e., we try to find out what other individuals guess about the information.

Knowledge is created in human mind and its quality and importance are assessed through activity. Sometimes it is very complicated to find, characterize and specify this delicate relationship between knowledge and activities. Knowledge cannot be stored, transported and expressed via technology. Attempts focused on its externalization resulted in knowledge damage and finally its value declined or was damaged as well.

4. Western and Eastern knowledge understanding

There are two basic approaches towards the knowledge concepts: tacit and explicit. A Swede, Karl-Erik Sveiby [6], represents explicit Western knowledge approach: he realized the importance of knowledge in order to support the competitive strength of an organization. On the other hand, his followers, Japanese representatives Nonaka and Takeuchi [3], pointed out Japanese and Asia cultural specificities. We should be aware of these crucial differences and do not underestimate them, otherwise essential mistakes and misunderstandings result in practical fails very easily. Japanese society principals are substantially different from Western cultural ones.

Western nations emphasize individuality, independence and responsibility of an individual. Japanese and other Asian nations prefer team interests and knowledge is understood primarily as tacit one. They do

not understand the Western explicit verified knowledge, they consider it absolute, static and inhuman because it cannot record relative, dynamic and human dimensions. Resulting from their understanding, the same knowledge can be, depending on the situation and context, true, half-true or untrue. True knowledge is considered relative. Knowledge is a dynamic quantity created by social interactions among individuals and across the entire organization.

Knowledge and experience of Western cultures with tacit knowledge result from this specific situation and it is very complicated or sometimes impossible to apply it to Western culture. For example, typical Japanese spend all life working for one organization. Social contacts are related to the organization they work for. The individuals have minimal relationships from their organization. Every organization builds own policy, structure, identity, rules, specific communication codes, procedure and interpretation practice. As all the members know each other well, rules can be specified as informal restrictions such as taboo, habits, penalties, traditions. There are not preferred formal rules typical for Western cultures, i.e. constitution, acts, law of property, etc. This type of environment supports tacit knowledge activities. When using Japanese materials and experience, these differences have to be considered seriously. A great amount of knowledge is applicable to European or Western environment, nevertheless there are procedures and counseling which might cause demotivation or do not work at all.

5. Explicit and tacit knowledge concept

Knowledge can be understood from many points of views. Basic classification follows the explicit and tacit concept is presented in *Table 1.*

Table 1. Explicit and tacit knowledge

Explicit knowledge (objective)	**Tacit knowledge (subjective)**
Rational (mind)	Experience (relation to body)
Successive (logically provable)	Simultaneous (it is available just at a particular moment)
Theory	Related to activities

Explicit knowledge can be expressed through a formal and systematic language, i.e., we can pronounce, write, draw or visualize it. It can be expressed by formulas, data, specifications, manuals, it can be stored and carried over. Professional and scientific literature classifies explicit knowledge as information.

Tacit knowledge is created by interaction of explicit formalized knowledge and experience, abilities, intuition and personal ideas, mental models, etc. It is closely related to activities, routines, procedures, ideas, values and emotions of a particular individual. It is very complicated to express and share it. Its personal characteristic is very high and its possessor does not have to know about it at all.

There are scientists who believe that tacit knowledge can be converted into explicit one (Nonaka and Takeuchi [3]). Others (Polanyi [4]) argue it is not possible because tacit knowledge is highly personal, it cannot be formalized and transferred as it is deeply inracinated in activities and it is a part of particular operations. In case we are trying to formalize it, tacit knowledge is damaged.

Sometimes it is not possible to isolate explicit knowledge dimension from tacit one. Too much attention paid to explicit knowledge component can result in “paralysis due to analysis”. If there is dependence on tacit component too high, it can result in harmful dependence on previous success and neglecting new information, ideas and views. Explicit and tacit knowledge interacts at creative activities of individuals, e.g., we learn how to drive a car, how to manage complicated software, etc. Some knowledge classification considers not only ability to formalize knowledge but also its role and importance for the organization. Boisot [1] based its classification on the following matrix, see *Table 2.*

Table 2. Boisot knowledge classification matrix

	Non-distributed knowledge	**Distributed knowledge**
Codified (formalized) knowledge	Proprietary knowledge	Public knowledge
Uncodified knowledge	Personal knowledge	General subconscious knowledge

Boisot classifies *public knowledge* as codified and distributed, i.e., books, textbooks, journals, periodicals and news. Public knowledge is easily transferable, however, on the other hand, it is usually fixed and cannot be simply modified.

General subconscious knowledge is distributed, generally spread and less codified compared to the previous one. Individuals get this knowledge gradually resulting from their personal life experience, their colleagues´ experience, family members, mental models, etc. This knowledge can be internalized and has impact on further understanding reality and what knowledge the individual is going to apply to.

Personal knowledge can hardly be codified, transferred and shared. It depends on personal knowledge of individual and character itself.

Proprietary knowledge always originates within particular context, and therefore it cannot be spread because it looses predictability. Organization builds proprietary knowledge depending on its development and progress.

Cultural knowledge should not be left out of consideration as well, and there are scientists who emphasize this up-to-date phenomenon, e.g. Choo [2] specifies concept of three knowledge components: explicit, tacit, cultural.

Regardless of various types of classification, every organization must understand its priorities and needs and select the relevant balance between tacit and explicit knowledge that fits demands best. Cultural criterion, however, should fundamentally be considered because factor of globalization is present, multinational expert teams and organizations are more numerous and maximum organization efficiency has become task number one and nightmare for top management [5].

6. SECI – how knowledge is created

Conversion is a theoretical simplification and example how knowledge is created. By Nonaka and Takeuchi [3], knowledge is created through interaction between individuals and different type and knowledge content. There are four basic ways how knowledge is created, see *Figure 1*.

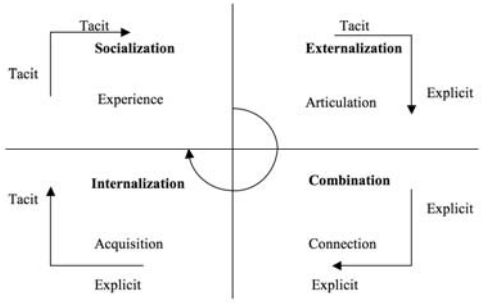

Figure 1. SECI

In real situations all four steps proceed simultaneously, nevertheless it is worth to know how to differ and classify them (combination calls for different approach than socialization), what has to be focused and how potential problems can be troubleshot.

Combination (explicit – explicit) is the simplest way and there are minimum problems. Separated explicit pieces of knowledge are associated and new explicit knowledge is created. Three basic steps are as follows:

- explicit knowledge inside and outside the organization is gathered and new explicit knowledge is created,
- knowledge is extended,
- knowledge is edited and passed on to other users.

During internalization process (explicit – tacit) the tacit knowledge is derived from explicit one. The crucial process is classified as "learning through practical activities". It requires time and patience and we have to realize that internalized explicit knowledge interacts in the individual mind with his previous knowledge, experience, abilities and mental models: therefore, the same explicit knowledge can result in two different outputs (it becomes useful to verify results by tests in order to prevent further misunderstanding), e.g. Hoskova [8].

Externalization (tacit – explicit) is a process of tacit knowledge articulation. There is one practical reason why to apply this method. It is easier to use explicit knowledge, it can be simply spread and distributed, and therefore it becomes a foundation for new knowledge. Tacit knowledge can be transformed into explicit one by metaphors, analogies and models.

Socialization (tacit – tacit) is a process of sharing, i.e., tacit knowledge based on other tacit knowledge, transfer and re-creation of other knowledge. It is very complicated to manage socialization because confidence and friendliness are crucial qualities of co-workers in an organization. Since externalization is time and money-consuming and requires human resources as well, organizations prefer to keep tacit knowledge in its form and share it among individuals or within a group or working unit.

6. 1. Knowledge assets

Assets in general are specific risky resources of any organization for creating values, and knowledge belongs to these assets as well. Knowledge assets are classified as input and output of knowledge creation, see *Figure 2*.

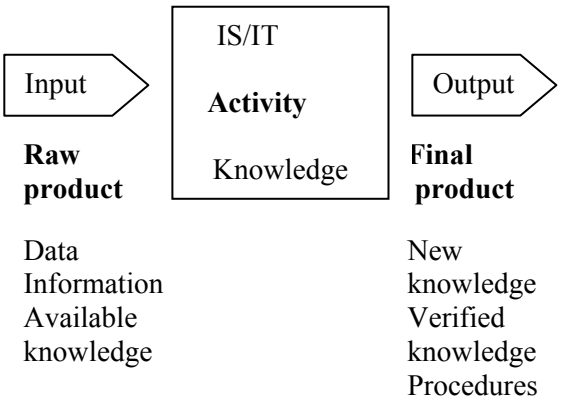

Figure 2.

Fundamental knowledge assets, i.e., data, information, knowledge, both tacit and explicit, are available for members of organizations. Knowledge is a highly dynamic and subjective concept and it has to be understood related to activities and events and is always applied to a particular individual.

Japanese approach (see *Table 3*) classifies four types of knowledge assets having direct impact on SECI conversion:

- experimental knowledge assets,
- conceptual knowledge assets,
- systematically organized knowledge assets,
- routine knowledge assets.

Table 3. Knowledge assets classification

Experimental knowledge assets	**Conceptual knowledge assets**

Tacit knowledge is shared through common experience • abilities and know-how of individuals • confidence, interest , safety • energy, emotions, effort	Explicit knowledge is articulated through concepts, symbols and language • product concept • design • characteristic features of the branch
Systematically organized knowledge assets Systematically organized explicit knowledge • documents, specifications, manuals • databases • licenses, patents	**Routine knowledge assets** Tacit knowledge becomes routine and it is applied to activities and practices • know-how • organization routines • organization culture

7. Conclusion

Knowledge assets are one of crucial key-stones of knowledge creation process. In order to manage process successfully, organization must be able to know and map its sometimes uncertain and risky assets in detail and find the way how to use them best for its particular needs. All the time it has to be considered that knowledge assets are highly dynamic, sometimes risky "raw material" with mutual interlinkage and relations and new knowledge is often created and origins from assets already available inside the organization.

In addition, key technological abilities must be considered as well because synergy of four dimensions is in operation simultaneously: competence of knowledge uncertainty and abilities of individuals, physical and technological support (software, machinery, and devices), managerial systems, values and standards (applied to knowledge available for particular individuals). There is always risk in knowledge management for every organization

- to know WHAT ("raw material" for decision making – who knows what + common sense, concepts, theories, mental models…),
- to know HOW (sources for effective behavior – manuals, automated processes, plans, expert knowledge, intuition, culture…).

Finally, regardless the type of knowledge – tacit or explicit, every organization is offered the same chance: to fill a gap in the market. Its crucial potential consists in smart knowledge management handling, proficiency and art to fit the market needs better than competitors.

References

[1] Boisot, M. H. (1995). Information Space: A Framework for Learning in Organizations: An Overview and Interpretation. Organization Studies 16, USA.

[2] Choo, Wei Chun. (1998). *The Knowing Organization.* Oxford University Press, UK, ISBN 0-19-511012-9.

[3] Nonaka, I. & Takeuchi, H. (1995). *The Knowledge Creating Company.* Oxford University Press, UK, ISBN 0-19-50929.

[4] Polanyi, M. (2001). Personal Knowledge towards a Post-Critical Philosophy In Nonaka, I., Toyama, R., Byosiere, P. A Theory of Organisational Knowledge Creation. Understanding the Dynamic Process of Creating Knowledge, Eudokma, Copenhagen.

[5] Rosicka, Z. (2004). Preparation of crisis manager in the area of effective communication. *Conference proceedings Crisis Situations in Specific Environment.* Zilina University, Slovakia, ISBN 80-8070-273-X.
[6] Rosicka, Z. (2006). Risk in Problems of Knowledge Management. *Proceedings of Sixth International Scientific School MASR in Complex Systems.* Saint Petersburg, Russia. ISBN 5-8088-0181-8.
[7] Sveiby, K. E. (2002). Strategy in Knowledge Economy. *Lecture at Conference KM Europe 2002*, London.
[8] Hoskova, S. (2007). Teacher – crucial subject in education and mathematical training, *In International Conference Didza 2007, Žilina,* Slovakia. in print.