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Using Creativity Techniques as Operative Knowledge Management Tools - A Case Study

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Abstract
So far, the consideration of creativity techniques in the context of knowledge management is of insignificant importance. However, there are useful starting points for integrating creativity techniques in the knowledge management strategy of an organization. Creativity techniques possesses capabilities, which exceed pure problem-solving expertise. They can be purposeful used for accomplishing specific knowledge management-tasks. In particular the solution finding socialization of experiences, proficiency and insights of the participants, which accompany the solution finding process, may replace subsequent knowledge handling. Group techniques do not require an independent diffusion of the problem and solution knowledge. This article introduces a creativity technique, which has been specially adapted for the aspect of socialization. The creativity technique has been tested in practical case studies and its content is focused on the ability to solve interdisciplinary problems regarding critical effects on a system. Furthermore the article shows how the classical tasks of knowledge management can be covered by this technique. The criteria for the evaluation of the creativity technique are derived from the Potsdam Knowledge Management Framework. These criteria consider the suitability of the creativity technique and how the specific knowledge management tasks (e.g. knowledge diffusion, knowledge elimination, knowledge identification) can be fulfilled. There are different potentials. Conventional problem-solving approaches (e.g. if one expert is working on it) requires additional tasks to communicate the technical backgrounds of the problem and the selected solution. Creativity techniques are able to integrate this step into the solution process.

Keywords: Creativity techniques, change capability, operative knowledge management

1 Introduction

In times of steady change, knowledge has to be continuously generated, categorized and distributed as well as take many more functions. To handle these requirements and the resulting complexity, knowledge management frameworks are adjuvant. An area of research which has not been considered sufficiently in the context of knowledge management, is the use of creativity techniques.

However, it has to be stated that the use of creativity techniques has rapidly increased. The application of the latter has become more popular and a variety of different techniques were developed over the last years. The enforcement of systematic problem solving approaches is fundamental for the longevity of every kind of organization, especially regarding the capability to act and react. Nonetheless, creativity techniques are able to fulfill more than this. They can be used as operative knowledge management tools with manifold kinds of problem orientations.

In order to legitimate this viewpoint, creativity techniques first of all have to be located within the context of knowledge management: Which role do they take and which benefit can they deliver from the viewpoint of knowledge management? To exemplify this, a creativity technique will be presented and analyzed with regard to its suitability for knowledge management. An according case study of its application will be presented and discussed.

This paper is organized as follows: first of all the Potsdam knowledge management framework is explained in section 2, in which particular tasks are discussed. Then there follows a brief outline of creativity techniques. Section 4 covers a PoCCI case study. The first subsection focuses on the Potsdam change capability conception. After that, the theoretical framework of PoCCI is explained, which is followed by the case study. In section 5 knowledge management critical constitutive criteria are discussed and compared with the tasks. The paper ends with a conclusion and recommendation for future research in section 6.

2 Framework for Knowledge Management

There are different approaches, to prepare knowledge management including its characteristics in an understandable and usable manner (e.g. Nonaka and Takeuchi, 1995; North, 2002; Probst et al., 1999). In order to position creativity techniques in the context of knowledge management, an according framework will be used.

In this work, the Potsdam knowledge management framework is used (Gronau 2009). The aim of the model is the definition and holistic understanding of knowledge management. The starting point for the development of this model was the necessity to distinguish the activities of researcher from the tasks of knowledge management (as well as from the tasks of General Management). A framework for reference should be created, in which the measures of knowledge management are positioned regarding their range, their relevance for management and their organizational meaning. Research activities are taken over by a researcher during a task, which needs knowledge in order to fulfill it. It is this intention which is helpful to position and legitimate creativity techniques as operative measures in knowledge management.

Operational knowledge management can be characterized through the incentive to achieve a sustainable and efficient change of knowledge concentrating on organizational and procedural aims as well as through the circulation of information by accessing knowledge. Thereby knowledge is seen as being connected to a person. It is created and used by people. It can be based on data and information and represents a changeable mixture of categorized experiences, moral values, contextual information and competent judgments, which offer a framework for the judgment and internalization of experience and information (see Davenport and Prusak 1998).

These two definitions represent the basis of the framework of reference. The tasks of knowledge management define the categories of measures, which are relevant in the context of knowledge management. These can be differentiated by three characteristics: the organizational-procedural, the organizational-structural and the personal range of measures. Every measure is subordinated under technical, organizational, cultural, economic, legal and political conditions which can again be the object for action of measures.

The tasks of knowledge management are realized by measures. Here the choice, adaptation and introduction of measures already pose one part of the task. The measures influence the area for the composition of knowledge management in an individual manner. The measures are therefore neither to be completely implemented nor free from interdependencies between each other.

Tasks of knowledge management are the following:
Acquire knowledge, conserve knowledge, spread knowledge, prepare knowledge for its use, make knowledge transparent, support the use of knowledge, identify knowledge, detect knowledge, determine a knowledge strategy, evaluate knowledge and adjust knowledge.

In contrast to knowledge management tasks, knowledge activities are enacted by actors as an integrated part of working procedures. They describe the operative dealing with knowledge. Actors who enact many or important knowledge activities are labeled as researchers.

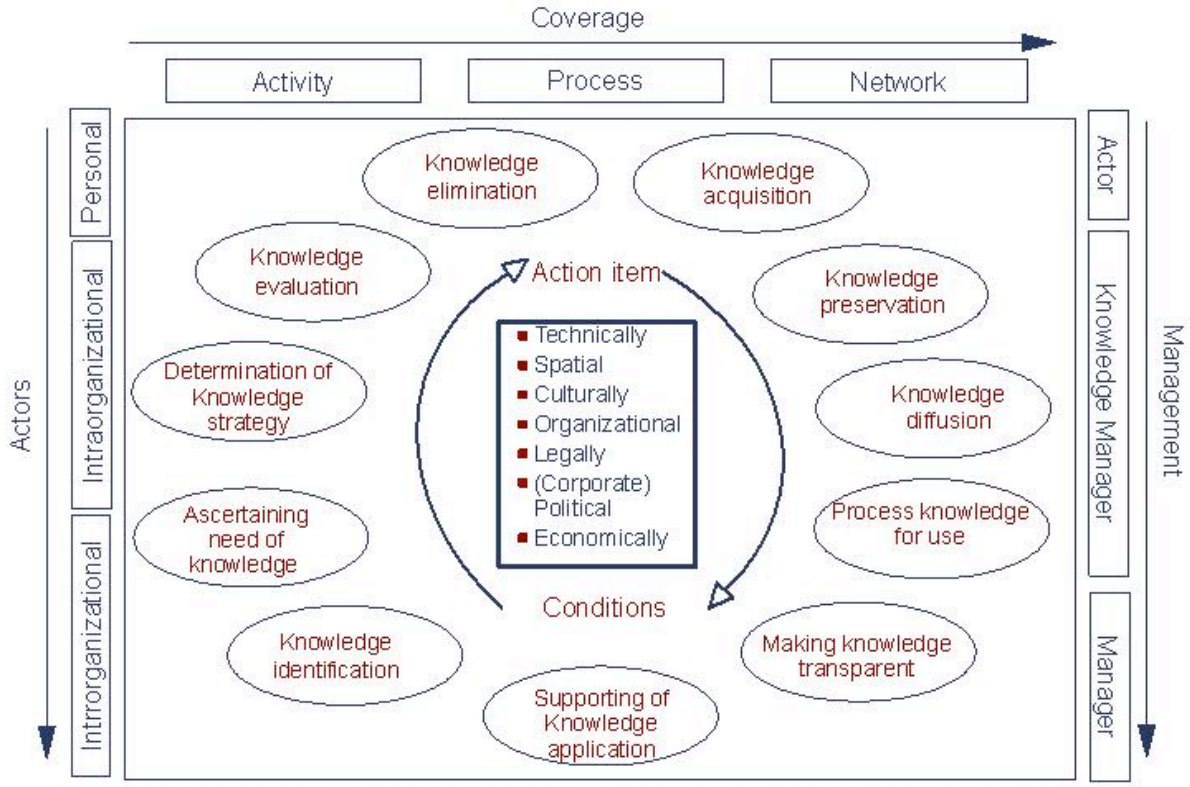

Figure 1: The Potsdam Knowledge Management Framework (Gronau 2009)

3 Creativity Techniques

Creativity techniques are methods that can be used to assist the process of finding ideas or problem solving. Through this, the creative power of an individual or a group will be supported. Furthermore, information behavior will be encouraged (Mamede and Santos 2009). Creativity techniques are helpful to alleviate mental blocks or to steer creativity. Ideas will be specifically produced and efficiently developed by means of cooperation and support within the team (West 2012). During the implementation, there exists an equality of hierarchy. Synergies are created thanks to the involvement of participants from different functional areas.

For the selection of the right creativity technique, the recognition of a problem, its definition and its compatibility with the participants are crucial. In the area of creativity, two types of thinking will be distinguished: the engineer and the artist. The engineer prefers to work in accordance to prescribed guidelines, tables or checklists. In contrast to this, the artist needs techniques with which he can work emotionally, artistically and chaotically (Von Stamm 2008). It is essential to select a technique which meets the specific requirements of the context and conditions.

Modern development approaches such as design thinking, represent a potentially successful approach to initiate the required interdisciplinarity. It is however no creativity technique, but an approach, that involves and applies creativity techniques. Design thinking combines innovation with a user-centered design philosophy (Brown 2008). Elementary is not only the creativity and expertise, but the combination of both. Yet even these are, in their performance, dependent on the adequacy and diversity of creativity techniques. Design thinking has recognized this need for interdisciplinarity and creativity. Single discipline or only strictly formal procedures are not able to generate emerging and synergistic effects (Brown and Katz 2009).

Creativity techniques are widely used for developing knowledge management systems as well as evolving them (Thierauf and Hoctor 2006). By using an adequate technique, it is possible to enlarge the abilities of combination and socialization of knowledge conversions. Different creativity techniques enable a manifold handling of the knowledge, which depends in its concrete uniqueness on these varied methods.

4 PoCCI Case Study

The first part of the following paragraph describes the Potsdam change capability conception, followed by an introduction into an analogy-based creativity technique. The paragraph ends with a case study about the application of this creativity technique in a data center.

4.1 The Potsdam Change Capability Conception

Change Capability characterizes the ability of a system to shrink fast, efficiently and autonomously to changes in its environment. Further essential factors in relation to change capability are flexibility and the capacity to respond. These are considered separately in the following parts, in order to clarify their relevance for the Potsdam Change Capability Conception (referred to (Gronau and Weber 2009)).

The classical definition of flexibility connotes bendability or conformability. Important to note is that there is an external power which causes the change. Being flexible does not mean that a system is able to adapt actively to the environmental situation. It rather means that the flexible object is bent into the new situation by the environment. This initial and rather negative connotation is reversed as flexibility can be understood in the context of independence and as something beneficial. The capacity of flexibility is not sufficient for systems, that can adjust themselves independently and proactively to environmental changes. Flexibility describes only one of various manners in which such a system can behave. The fact that flexibility and flexion (the act of bending) are considered as part of change capability can be justified, despite its passive role. Systems, capable of change, should recognize the need for change independently. This change should be enacted efficiently. It can hence be a conscious decision of the system to be bent by the environment. This is sometimes friendlier to resources-than a change, basing on the systems own active participation.

Systems are able to respond to changes in an adequate manner, if they are able to foresee events or conditions effectively and hence use changes to their own advantage. Efforts have to be taken to develop and maintain the capability to respond. For certain systems, it may be useful to minimize these efforts. This is the case, when the subsequent disadvantages of changes are vanishingly small or have no economic relation to the cost of the necessary capability to respond. The ideal response to environmental change can thus be either active or passive.

The capability to respond, which is appropriate to the situation, can take up various forms, ranging from highly responsible to completely incapable. The capability to respond is hence not an attribute or characteristic that contributes to an improvement of the concept of change capability. The capability to respond is rather a design feature of specific pattern of activity, by which change capability should be ensured.

The relationship between change strategy and change capability is complex. It is not sufficient to consider whether a strategy is available or not. System A is already at an advantage compared to system b, if it is able to learn. This consideration is not valid on the short-term. However, on the long term, the system is able to adopt more strategies. Yet system C can also have an advantage over system B, although the latter has fewer strategies. This is because; the decisive factor is the suitability of a strategy to a particular situation. The applicability of a strategy is under certain circumstances linked to conditions, whose appropriation represents an effort. The less effort a strategy costs, the better it is. While considering the long-term change capability of a system, it is necessary to reflect on the ease of learning, availability, sustainability and the adequacy of a strategy.

Change capability characterizes the ability of a system to handle the requirements of the environment in a fast, efficient and autonomous manner. This is done through the strategic use of structures or strategies of action to achieve the systems goals. System goals such as the preservation of the system, its growth or self-protection can be operational, tactical or of strategic nature (Ruiu et al. 2012). Without any additional effort, structures of action hold a change capability, in which further structures of action can be derived for similar environmental situations. The more they are capable of change, the more situations can be detected by them. A system decrees over more change capability, the more pattern of action it has and the more capable of change these structures are. The ease of learning, availability and the degree of change capability of a systems structure of action can be monitored by indicators. The sustainability and adequacy of a strategy will be evaluated by the efficiency and rapidness of the implemented actions.

Only a system which is capable of change is able to adapt to environmental changes. Therefore there is a necessary and a sufficient criterion. It is necessary that the system autonomously decides which strategies (and their specific configuration) should be provided. The system decides whether it will implement learnable strategies, whether available strategies will be provided and whether sustainable strategies should be used. The role of the system is sufficient, when certain strategies are used. The dealing with environmental change can be either treated by the system in an active and autonomous manner or the system behaves consciously passive in accordance with a conscious applied change strategy.

4.2 Potsdam Change Capability Indication

The following paragraphs will present the behavioral pattern-based analysis model and creativity technique. The Potsdam Change Capability Indication-technique (PoCCI) is a creativity technique based on system behavior. Its origin is change capability research. On the basis of various pattern of action which are analogue to nature, new courses of action will be developed. This is done using specially designed strategy cards. Based on the identified options, requirements for the overall system can be derived.

A first step towards the implementation (see figure 1) of this technique is an approximate definition of the problem scenario. This is followed by a pretest and a discussion of the pretest results in a panel of experts. Here it is crucial to formulate the problem scenario, which exactly defines what belongs to the system, what belongs to the relevant environment and in what form the environment has an impact on the system in advance. The scenario is then operationalized accordingly.

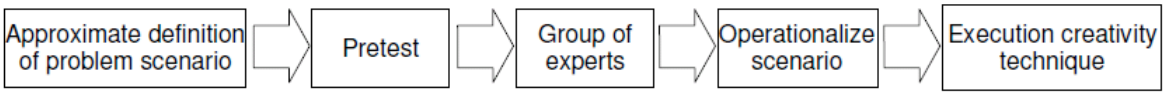

Figure 2: PoCCI process model

The application of PoCCI will be employed within a workshop. The strategy cards (see figure 2) will be randomly and blindly distributed to the participants. In turn, each participant uncovers a strategy card, explains the behavioral pattern and describes a solution for the problem, deriving from the behavioral pattern. This proposal may be picked up by the other participants and subsequently be developed. Furthermore, other approaches are being developed.

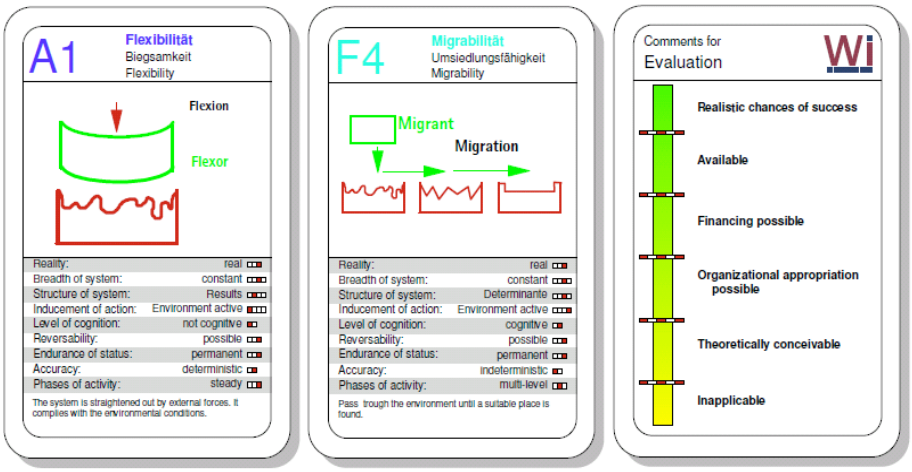

Figure 3: Selected PoCCI strategy cards

For the evaluation of the options for actions there are two validated methods available which can be used alternatively. One possibility is that the participants evaluate the strategies through an evaluation method based on PoCCI by themselves, the other one is the AHP-method (Analytic Hierarchy Process, see Saaty and Vargas 2001).

The goal is to raise the awareness of the participants for their options of action and hence allow for an expansion of the scope of action, as well as identify an ideal solution strategy.

The initial idea of the creation of an analogy within a group develops an own dynamic in the process of finding ideas. In this process, existing pattern of thoughts which base on existing solutions, hierarchies and specific expertise are reevaluated. This is why PoCCI represents a suitable

instrument to generate structured, new and varied approaches to solutions considering concrete problem scenarios.
Especially in the area of knowledge management, in which the human being takes a considerable role, PoCCI can increase transparency. The potential of participants can be fully utilized and innovative and sustainable solutions can be identified and guaranteed.
The presented creativity technique is independent from its context. It can be employed in regard to technical, organizational, socio-cultural, political and economic questions. It can furthermore support the approach of both types of thinking. The technique connects the systematic approach and support which is needed by the engineer with the artistic and chaotic framework, which is a prerequisite for the success of the artist.

4.3 Application-Context Data Center

The proposed framework was applied in a German multinational automotive corporation. The evaluation occurred in an IT department, responsible for data center operations.

Data Centers are the most sensitive areas of a company. They can be considered as a company in a company, which links all divisions taking the role of a central unit. Information and communication, especially inside a company, is fundamental for economic activity (Mosco 2009). Particularly the identification of knowledge, its preservation and diffusion is a crucial challenge for critical infrastructures.

As a part for developing a risk based approach to strategy execution, PoCCI was used to identify both, preventive as well as reactive alternatives of action for a disaster recovery case. Initial starting point is the problem scenario, here being a data center breakdown by virtual assault on core switches. Furthermore, it is really important to define, what belongs to the relevant system, what belongs to the environment and how affect the environment the system. In this case, the relevant system include the IT-infrastructure, IT department, data center infrastructure, networks, computer systems, application, services and organization responsible for the IT. All connected systems and elements which are not mentioned in the system definition are defined as environmental elements. The effect was that the entire communication infrastructure including critical business processes breaks down.

After a short theoretical introduction of the participants regarding change capability and the creativity technique began an intense creative phase. Based on the resulting synergy effects were also further need for action identified.

This is a considerable difference that could be achieved with other creativity techniques in approximately comparable time. In addition, the PoCCI technique enlarges the way for a solution through variety. PoCCI represents an aid to orientation that offer the participants assistance to develop creative, innovative as well as chaotic solution strategies. In As a result of the successful application of this creativity technique was the using across parts of the organization initiated.

5 Evaluation of PoCCI considering the aspect of fulfillment of knowledge management tasks

To conclude there is supposed to be a discussion about the ability of creativity techniques to fulfill tasks of knowledge management. The structural-/procedural-organizational and personal range as well as the objects of action represent options of composition for the use of the creativity technique. It depends on the discretion of the users and the formulation of the problem as of which areas are addressed. This is different regarding the manner in which knowledge of participants is used during the implementation of a creativity technique. Even with this viewpoint at the micro-level, one can identify peculiarities of the knowledge management tasks. These vary nonetheless, depending in the used creativity technique. The judgment is done according to qualitative statements which have been collected through the evaluation of the case study. This will be transferred into an approximate categorization of four groups, according to its relative suitability. Here there will be a distinction between

- Whether the task is not within the focus of the creativity technique (-)
- Whether a methodological addition is necessary in order to cover all untreated aspects (o)
- Whether a methodological addition is necessary in order to cover so far only rudimentary treated aspects (+)
- Whether the task can be fulfilled in general (++).

Here it is important to consider that in the end it is again the decision of the users, whether the potential of a creativity technique can be used in its full scope.

Task	Explanation regarding PoCCI	Evaluation
Knowledge acquisition	☒ New knowledge through the combination of abstract pattern and a concrete context ☒ Presentation and discussion of problem solving approaches during the phase of the creation of analogies	++
Knowledge preservation	☒ Documentation of solutions, their evaluation and development	++
Knowledge diffusion	☒ Diffusion of knowledge through interdisciplinary and trans-sectoral project groups ☒ Provision of documents	+
Process knowledge for use	☒ Systematic and generally understandable documentation of results	+
Making knowledge transparent	☒ Competent and specific knowledge is opened to other areas	++
Support of knowledge application	☒ Incentive through a play instinct ☒ Ex post: dependent on the existent bindingness of results	++
Knowledge identification	☒ Through the formulation of the main problem ☒ Presentation of research and opinions within the project group	+
Ascerting need of knowledge	☒ Through the choice of the team ☒ Comprehensive questions during the phase of ideation	+
Determination of knowledge strategy	☒ Decision over the use of creativity techniques is subject of building a strategy	-
Knowledge evaluation	☒ Problem solving approaches are explicitly judged	++
Knowledge elimination	☒ Non-practical problem solving ideas are consciously singled out ☒ Misjudgments of risks and dangers will be eliminated during the discussion	++

Table 1: Evaluation of the PoCCI-approach as an operative knowledge management tool

The procedural model for the use of PoCCI has been consciously developed in order to cover the knowledge management tasks. The areas, in which optional additions are possible, have consciously been explained in a short manner in order to keep the practicability of the creativity technique. For instance, a systematic and explicit analysis of the existent and necessary knowledge has been disclaimed. On the one hand, this would be helpful to legitimate the use and composition of the team for this creativity technique. On the other hand, doing so the problem would already be analytically permeated and the neutrality of the solution would become endangered. The processing of knowledge for its re-usability and its diffusion are hence only enacted in a superficial way, as during the implantation phase there is no detailed documentation of the problem solving approaches and as there is no active result-based communication beyond the project group. Here is the discretion of the implementer and user of results to introduce additional documentations and diffusion measures.

6 Conclusions

It is always a challenge to overcome the beginning skepticism of technically marked experts regarding creativity techniques. This is however a fate, which is in general shared by all less technically directed knowledge management measures. Here it does not only depend on the

personal attitude of the single participants but on the entrepreneurial culture in general and on the free spaces for these techniques, which is provided to the employees by the management. Problem solving approaches for existent problems also can be approaches through a conventional manner without the use of creativity techniques. The question of quality of the in the end chosen approaches as direct results is posed in both cases. Indirect results are however depending on the characteristics of creativity techniques, for instance the ability to offer a structured procedure in group work and thereby to break through or pass around fixed pattern of thinking. More advantages can be seen if one looks at creativity techniques from the viewpoint of knowledge management and its tasks. Here, one can see that many tasks are actually fulfilled implicitly and next to their original performance. Through this use as an operative tool, other measures within knowledge management are dispensable which would have to implement a sustainable dealing of the problem- and problem solving knowledge. Through creativity techniques it is hence possible to enact a problem-, problem solving and integrated problem solving knowledge management. This means that the tasks of knowledge management are directly started and introduced at the actual working place of the researcher.

Looking at the use of a creativity technique this contribution aimed to trace and show up the advantages of the technique. Here it is possible to establish tie points for further investigations which go beyond the mere configuration of creativity techniques. This includes a detailed and wide-ranging investigation if creativity techniques in relation to their suitability for knowledge management tasks. In addition to that, approaches for evaluation are needed, which look at how the effort and the benefit of an integrated knowledge management behave vis-à-vis downstream knowledge management measures.

References

Brown, T. (2008): Design Thinking, in *Harvard Business Review*, June, pp. 84-92.

Brown, T. and Katz, B. (2009): *Change by Design. How design thinking can transform organizations and aspire innovation*. HarperCollins Publishers, New York.

Davenport, T. and Prusak, L. (1998): *Wenn Ihr Unternehmen wüßte, was es alles weiß. Das Praxisbuch zum Wissensmanagement*, MI.

Gronau, N. (2009): *Wissen prozessorientiert managen. Methoden und Werkzeuge für die Nutzung des Wettbewerbsfaktors Wissen in Unternehmen*, Oldenbourg, München.

Gronau, N. and Weber, E. (2009): *Change Capability: Generic strategies for handling environmental changes-technical report* (written in German). Chair of Business Information Systems and Electronic Government, Potsdam University.

Mamede, H.S. and Santos, V. (2009): The Creative Information System. In: Dhillon, G., Stahl, B.C. and Baskerville, R. (Eds.): *Information Systems - Creativity and Innovation in Small and Medium-Sized Enterprises*, Springer, Berlin Heidelberg New York, pp. 116-121.

Mosco, V. (2009): *The Political Economy of Communication*. SAGE Publications, London.

Nonaka, I., Takeuchi, H. (1995): *The Knowledge-Creating Company – How Japanese Companies Create the Dynamics of Innovation*, New York.

North, K. (2002): *Wissensorientierte Unternehmensführung*. 3Rd edition, Wiesbaden.

Probst, G., Raub, S., Romhardt, K. (1999): *Wissen managen. Wie Unternehmen ihre wertvollste Ressource optimal nutzen*, Frankfurt/Wiesbaden.

Ruiu, M., Ullrich, A. and Weber, E. (2012): Change Capability as a Strategic Success Factor - A Behavior Pattern Approach for Operationalizing Change Capability. *Proceedings of the Conference on Strategic Management 2012*, 25-27 May, Bor, Serbia.

Saaty, T.L.; Vargas, L.G. (2001): *Models, Methods, Concepts & Applications Of The Analytic Hierarchy Process*, Kluwer Academic Publishers, Boston.

Thierauf, R.J., Hoctor, J.J. (2006): *Optimal Knowledge Management: Wisdom Management Systems, Concepts and Applications*. Idea Group Publishing. London.

Von Stamm, B (2008): *Managing Innovation, Design and Creativity*. John Wiley & Sons. Glasgow.

West, M.A. (2012): *Effective Teamwork - Practical Lessons from Organizational Research.* BPS Blackwell and John Wiley & Sons, West Sussex.