



**Doctoral School of
Business Informatics**

THESIS

SZMODICS PÉTER

**Evaluating the organizational knowledge based on
business process management**

–

Ph.D. dissertation

Supervisor:

Gábor András, CSc

Budapest, 2017

THESIS

SZMODICS PÉTER

Evaluating the organizational knowledge based on
business process management

–
Ph.D. dissertation

Supervisor:

Gábor András, CSc

Budapest, 2017

© Szmodics Péter

LIST OF CONTENTS

1 Introduction.....	4
2 The origin and the goal of the research	6
3 The applied research methodology.....	9
3.1 Theoretical background	9
3.2 Knowledge management methodologies	10
3.3 Research methodology	12
4 Main results.....	14
4.1 Descriptive analysis of the results	14
4.2 Explanation of result interrelations	16
4.3 Conclusion	20
5 Comments for further utilization of the research	22
6 Publication List.....	24
7 List of References	27

1 Introduction

As a result of continuous technical development, the operation of organizations becomes more and more complex, and at the same time it maps the real processes better. In advanced economic structures, beside the technical development and infrastructure, the applied (organizational) knowledge plays a major role. Knowledge management is already present in most organizations at a strategic level; its proper usage can be a competitive advantage.

The condition of organizational operation is an organizational framework in which business processes and human resources, that have the required knowledge for operation, can be integrated. Understanding the role of knowledge is essential to evaluate real value added processes within the organization, in other words, evaluation and measurement of the processes are prerequisites of effective knowledge management.

This research presents the relevant practical aspects of knowledge management from the point of view of business process management.

The business process management (hereinafter referred to as process management) is one of the most interesting research domains. As a research domain, it is directly related to both academic domains and business practices, so its results can be immediately validated and transposed into practice. The role of knowledge management is similar, since both the scientific and the real projections are similar.

The role of process management and knowledge management in value creation is difficult to be demonstrated, their relationship is difficult to be measured. It also follows from the difficulties that it is not possible to interpret this relation in general without any restrictions. The identification, storage, and reuse of knowledge are usually bound to a goal in the complete organizational life's affinity space, within the framework of a project.

2 The origin and the goal of the research

The aim of the research is to present the current knowledge management practice with practice-oriented tools that can reveal previously unrecognized relationships and which can provide assistance to the practitioners, and it may show new directions for theoretical research.

The following questions outline the central problem of the research:

- Can the application of knowledge management be defined at all? Under what limitations is it definable?
- Is organizational knowledge assessable with the process management tool and concept library and can it be evaluated? Under what circumstances can the assessment and the evaluation be realized?
- Can the level of knowledge management be defined? Under what circumstances is it possible to determine the levels?
- With what accuracy and relevance can the organizational knowledge management be measured based on business process management?

Some level of knowledge management is applied in every organization, its awareness generally depends on how knowledge-intensive the given organization is, how much the external pressure is, and what the goals are to be met. Definition of applicability based on

process management means that knowledge management is pursued in connection with an organizational process and/or some documentation system.

On process management basis, the organizational knowledge can be measured by embedding the knowledge into a platform, this means a structure that can be interpreted without exceptions and difficulties. The frameworks, policies, methodologies and the combination of their actual application provide the opportunity to acquire the foundation for measuring organizational knowledge.

Defining the level of organizational knowledge management starts from the aforementioned base. The nature of the problem calls for a holistic approach, so the level definition cannot be reduced to a linear, simplistic dimension. The existence of process management implies that the conclusions drawn about the operation of the organization are based on evidences. The evidences' coexistence, the timing of the creation, their contextual relations and the lack of critical elements determine what opportunities the documented knowledge management system itself can offer for the applying management.

Knowing the business and organizational issues helps with identifying the goals to be achieved within the organization. Knowing the resources available helps the organization with setting up a supply mix that can effectively meet these goals or business needs. Organizations strive to maximize customer satisfaction by using the given resources. Since the complexity of knowledge management is very high, therefore so it is optimizing. The aim of the research is to

explore the prerequisites for optimization considerations, helping to create an optimal knowledge management system.

While the preparation of the research, the first step was the synthesis of theoretical and practical domains, based on which a questionnaire was developed for the purpose of data collection.

3 The applied research methodology

3.1 Theoretical background

The requirement for meeting any business needs is the availability of a resource pool of appropriate composition. This set consists of elements of different characteristics, the role of human resources in this research is more significant. In the case of human resources the actor's (the role of the person performing the activity within the organization) attitude, knowledge and the operational context determine how the particular business processes are executed.

The structure of knowledge can be divided into two main components. Explicit knowledge that can be formalized and transferred in some form. Tacit knowledge is the implicit knowledge of the actors, this latter is difficult to be formalized, knowledge transfer can only be achieved with great difficulties.

Measuring knowledge and knowledge management can be a complex task in simpler systems as tacit knowledge cannot be structured and documented within a short time. Nonaka's model (1994) distinguishes four conversion steps between explicit and tacit knowledge transitions. Nonaka's knowledge conversion model is interesting, because it clearly outlines which phase how is related to process management. In each process step, it can be clearly determined which actors are involved, what kind of aids they can use (input and output documents), and even the activities can be separated

from each other ideally, with this the process management receives a significant space in studying the knowledge management.

March (1991) distinguished the knowledge generation (exploration) and application (exploitation), following this logic, Grant (2010) classified the knowledge processes within the organization and split them into the following into the following processes:

- Knowledge Generation (Creation, Acquisition)
- Knowledge Application (Integration, Sharing, Replication, Storage and Organization, Measurement, Identification)

The above classification is primarily to be interpreted in a business environment. Grant utilized both the theories and the practices for presenting a wide range of usable organizational tools. The relationship among these tools can be linked to process management.

3.2 Knowledge management methodologies

Process management within business organizations has many criteria; the most important ones are proper documenting, role identification and measurability. The generally accepted methodologies and standards for organizations provide a framework in which the above criteria can be interpreted. Quality management (ISO, 2015) focuses on process-orientation (ISO-9001), service management standard (ISO, 2010) supports service measurability (ISO/IEC-20000).

Standards, in addition to the general wording, also contain more specific, compliance-like requirements that help examine the relationship between process management and knowledge management. It is worth pointing out that knowledge management plays an increasingly important role in the standards as well as in the methodologies.

Beside the guidelines of the standards, related methodologies form the basis of the research questionnaire. The CMMI Institute's capability and maturity model, the „CMMI[®] for Services” (SEI, 2010) presents service-management expectations, similar to ITIL[®]V3 (OGC, 2007) and COBIT[®]5 (COBIT, 2012).

The latter is linked to the management of information and communication technology, and includes both the detailed breakdown of knowledge management processes and the required documentation (Delak, 2015). In addition to the above, the P-CMM (Curtis et al., 2009) capability and maturity model presents elements closely related to knowledge management that have a direct relationship with process management.

The description of the methodologies is very detailed and general, so only those parts are highlighted and used that are directly related to knowledge management.

3.3 Research methodology

The research is inductive, based on the collected data such patterns are to be identified that are suitable for determining the basis of new theories. The composite knowledge management (KM) model (Figure 1), what is established from the synthesis of methodologies and theories, determines the structure and content of the questionnaire.

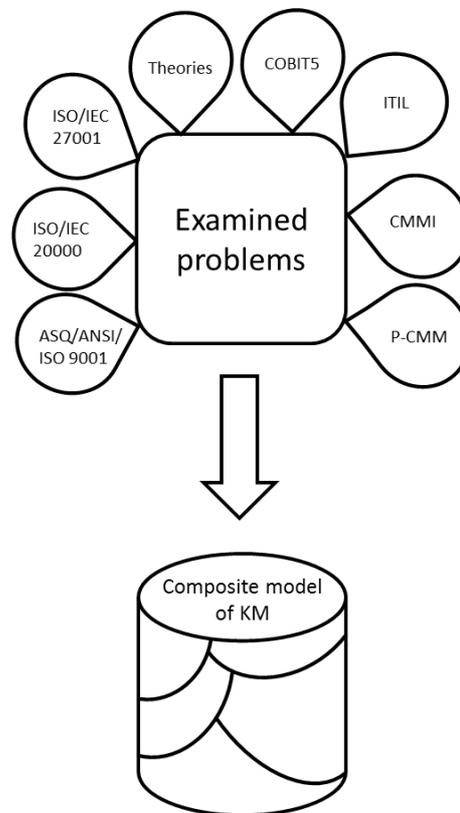


Figure 1 – KM model

During the research the primary data came from questionnaires, the data validation happened through interviews. Multiple choice questions were utilized, beside them, supportive questions helped to understand the problem by preserving the anonymity of the

respondents. The questionnaires were collected in 2015, via the Internet and personal inquiries. A total of 100 corporate employees answered, with the participation rate being 10.5%. Five potential respondents replied that they could not disclose information about their internal operations due to confidentiality considerations.

The main criterion for selecting respondents was to get inputs from some knowledge-intensive sector (primarily from real sector) and to have some international background. The potential respondents were selected with judgmental sampling, from them quality responses were expected. The respondents were representatives of business organizations whose operations can be expected to be stable in the longer term. The knowledge-intensive concept gives such a characteristic to the organizational operation what means that the organizational and business processes are of intellectual nature in the overwhelming part (Alvesson, 2001). According to Rylander and Peppard (2005), knowledge-intensive organizations are difficult to be identified. Knowledge level and knowledge management can be different within the same sectors, it is difficult to define it, but it exists. In order to operationalize the problem space, at least some scale-based measurability is required. This necessarily entails loss of information, but it increases the manageability of the space of the state and provides a basis for consistent conclusions.

4 Main results

4.1 Descriptive analysis of the results

Respondents are typically employed in a large-sized corporate (69%), most of the organizations operate internationally (69%), their activities include services, information and communication, technical, and other domain-specific sectors are covered. Applying knowledge management is relevant in every case. First the process management's results are presented, then the knowledge management's.

The majority of the respondents states (76%) that the business processes within their organizations are cyclic, reoccurring and they do not have to face hectic changes. The business processes are identified in 98%, but the full integration is low (24%). The structuring and documenting of business processes are important (55%), in contrast, the practical documentation is not completely realized. The measurement of organizational processes has primarily a financial perspective, the usage of qualitative and quantitative measurement systems is low (25%).

In case of the organizational roles, the value-adding and the supportive roles are separated from each other. The responsibility and the accountability are defined (78%), however there are overlapping among the roles (80%). Coordination amongst the roles requires flexibility, and there are authenticity/authority issues, for resolving them extra resources are needed. In case of unknown tasks and

complex problems, the management would be able to find both the competent persons (84%) and the roles (76%).

Responses show that organizations are committed to documentation and regulation, but their implementation and compliance do not always reach the expected level. The measurement systems are incomplete, primarily the financial viewpoint dominates.

The knowledge management part, like process management, focuses on documentation and KM process management.

According to respondents, active roles and persons are identified (81%) and their role is tagged. Competent persons can be identified within a short period of time (earlier than roles). Organizations have some degree of knowledge base (79%) but their usage is not measured. Individuals' competences are documented (88%), within the organization they know each other's competences (71%). Most organizations have a competence map (66%), in case it is available then the following competences are documented: substitute (74%), complementary (51%), unique (52%), business critical (63%), and competitive advantage-related (68%). In particular, the competences supporting operative tasks are recorded. Furthermore, knowledge sharing has difficulties, but if it is successful, it is usually transparent within the organization.

Employees have a defined training plan (87%), the content of the plan is defined by the supervisor or external organizational unit (human resources), the employees' influence is less (34%). When personal change occurs, in most cases, the person who leaves has to

share her/his knowledge compulsory with the new entrant, and it has to be documented. The more impactful or more specialized the given role is, the more emphasis is placed on keeping this process. The losses caused by the loss of leavers' knowledge are not measured by the organizations; if it is measured, it is not punctual.

Organizations use the ideal technical (78%) and knowledge structure (83%) and the respondents believe that their organization is knowledge-intensive, based on this we can conclude that active knowledge management is in place.

It should be noted the most of the respondents (86%) thinks that the use of organizational terminology is not consistent and it can be misinterpreted, causing communication difficulties.

The practical implementation of process management and knowledge management lags behind the theories, standards and methodologies. The conditions for operation appear to be fulfilled at the same time.

The research was completed by the validation of the questionnaire, interviewees evaluated it, and there was no significant difference between the intended interpretation and the respondents' interpretation.

4.2 Explanation of result interrelations

*Can the application of knowledge management be defined at all?
What are the limitations of definability?*

For organizations, based on the theories, methodologies and standards presented above, knowledge management can be considered applied, if the competences are documented, the knowledge is stored, there are training plans, the knowledge management processes are explicit and the organizations handle knowledge management on strategic level.

Fifty-two entities met these criteria. The circumstances of the knowledge management applicability outline a kind of transparency and consistency within the organizations. The boundary conditions of the applicability can be defined, if the organization meets a certain level of documentation. In case of applying knowledge management, the following are typical for organizations: systems with good metrology correlate positively with the *reliable* knowledge. The ‘reliable’ means here and in the followings that it is justified, supported by evidences.

The correlation between the cyclical business processes and the hierarchy of the organization is positive as well. Possessing reliable knowledge correlates positively with a high-level measurement of the business processes. In case of personal exchanges, they have a mandatory knowledge transfer procedures in place. There is also a positive correlation between the availability of the knowledge base and the dedicated training time. A high level of digitalization within the organization also positively correlates with the successful realization of knowledge management processes. Overall, the

relevance of applied knowledge management is high for cyclical business processes, and the operation of the organizations is primarily based on reliable knowledge.

Is organizational knowledge assessable with the process management tool and concept library and can it be evaluated? Under what circumstances can the assessment and the evaluation be realized?

Can the level of knowledge management be defined? Under what circumstances is it possible to determine the levels?

The level of knowledge management is high within the above-described framework, if the knowledge management-related expectations are fulfilled: the knowledge management processes are well-documented and are well-known to the organizations' members. These conditions were met in forty-one cases. The main characteristics of these cases, that highly cyclical process positively correlate with the real-time measurement of business processes, with the mandatory knowledge transfer process and the transparency of reliable knowledge. The reliable knowledge correlates positively with the real-time and detailed measurement of business processes and the identification of competent roles. The reliable knowledge has a distinguished role.

In fifty-nine cases, the level of knowledge management is low: in these cases, it can be observed that the main principles of the process

management are met. Documentation positively correlates with the operative nature of work (short-term approach, short cycles). The high-level measurement positively correlates with the hierarchical organizational structure and by the fact that the employees rely more on documented procedures.

With what accuracy and relevance can the organizational knowledge management be measured based on business process management?

The validity of organizational knowledge management measurement means in terms of process management that the processes are identified, documented and understood by the applying employees. These conditions were met in thirty-seven cases. The existence of reliable knowledge is distinguished in this case as well; it positively correlates with real-time measurement. In case of personal change, there is a mandatory knowledge transfer process; however, it negatively correlates with the documentation of passive knowledge (passive knowledge's interpretation: in the given work environment not utilized or just indirectly utilized knowledge) and whether the new entry employee has the proper knowledge right away. Organizations applying high-level process management are less person-dependent and do not measure passive knowledge. Existence of reliable knowledge in the organizations involves real-time measurement tools. This kind of knowledge is not based on "purchased" resources, but on

proves experience. In case of high-level process management, there is a strong positive correlation between the competitive advantage and substitutive competences, while the rare and unique competences' role is low from operational point of view.

4.3 Conclusion

The organizations, that have a high-level process management, rely less on persons, their role within the organization. The most important characteristic of the used knowledge is reliability, which is based on proven evidence. Maintaining the process management principles has a positive correlation with the process management awareness, the role definitions' and the competence-mapping's relation is also positive.

The conditions of the knowledge management applicability are well described by the existence of documentation and applied processes. The knowledge management applicability is justified where the business processes are cyclical and where the cycles' period time is short. By applying the knowledge management, the competent roles and persons can be identified clearly, the knowledge is available in digitized systems. The digitalization also creates the virtual space of knowledge management. The measurement of passive knowledge elements is not realized, the focus is on the operational approach and on reliable knowledge.

In case of high-level knowledge management, the cyclical processes have positive interrelation with real-time measurement and

the more precise tracking of knowledge management processes. In case of high-level knowledge management, the availability of the reliable knowledge is of significance.

In case of low-level knowledge management, the organizations bear the process management principles. The more hierarchical the organization is, the more punctual the measurement. The higher measurement level is associated with lower employee dependency.

The research was explorative and inductive with the aim of finding patterns that could help to create relevant, relating theories. Several aspects of the problem space underline that it is difficult to make consistent and general findings. While analysing the results, the emphasis was placed on identification of relationships and not on identifying cause-and-effect relations, based on this some characteristics are revealed. The cyclical nature of business processes determines the nature of the knowledge management used (Finding 1). Since the cycles are mostly based on external factors, it can be considered as an independent variable. Based on the responses the reliable knowledge has a prominent role in high-level knowledge management (Finding 2). Reliability itself as a characteristic needs further operationalization, it is necessary to determine which factors can be considered to be reliable knowledge. The last finding (Finding 3): in case of low-level knowledge management and active process management, the organizations are committed to the whole process management system from a holistic point of view.

5 Comments for further utilization of the research

The original intention of the research is to give guidelines for exploring the theoretical and practical interrelations within the knowledge management domain, and to help effectively alloying them.

The relevant standards, methodologies and generally accepted procedures provide useful bases for the theory. Standards in this research can be considered canonized variants of theoretical, practical researches and best practices. As quasi standards they define not a very limited range of activities, their abstraction level is the same as of the theories, therefore they can be applied in researches.

The research has involved representatives of organizations where both process management and knowledge management have relevance. The covered spectrum contributed to the inclusion of organizations that were in different periods from knowledge management point of view, so they were able to provide a closer picture of the real processes.

The main characteristics originated from the research questions can be the base of further research, and deductive research can now be conducted.

The cyclical nature of business processes as an external factor significantly influences the nature of knowledge management (Finding 1). Reliable knowledge within the organizations has a distinguished role (Finding 2), and since it is a qualitative indicator, its

operationalization can be the base for further research. Furthermore, regardless of the knowledge management, organizations operate on process management bases (Finding 3)

From a practical point of view, the methodology described in the dissertation can be recommended to organizations whose purpose is to increase organizational awareness and understand the real business logic. Small organizations can focus primarily on the holistic viewpoint. An exclusively small- and medium-sized enterprise's outlook towards this direction might be also justified, especially if organizations want to increase their size or if they want to introduce knowledge management system. Understanding the event space, expanded by knowledge management, is a prerequisite of the organizational growth, and the territorial clustering. In case of large organizations, the organizational structuring's enhancement and the more punctual measuring might be the priority. The process management based knowledge management allows better measurements, and it can identify such gaps that are not the subject of measurement. It can be used to increase transparency within the organization and to understand the with difficulties manageable processes, thus making organizations more resistant to environmental changes and challenges.

Regardless of organizational size, the presented results can help with personal-level risk management and business continuity management.

6 Publication List

Journal

SZMODICS, P. 2017. High-skilled immigrant on the job markets, initiators of change. *Journal of Knowledge Economy*, 1-14. Print ISSN-1868-7865. Online ISSN-1868-7873. DOI-10-1007/s13132-017-0495-8.

SZMODICS, P. 2014. Evaluated knowledge representation. *SEFBIS Journal*, 9, 1, 28-35. HU-ISSN-1788-2265.

Conference proceedings

SZMODICS, P. 2015. Knowledge-based Process Management. In: CogInfoCom 2015, 6th IEEE Conference on Cognitive Infocommunications, 19-21 October 2015 Győr. IEEE, 33-37. DOI-10-1109/CogInfoCom.2015.7390560.

SZMODICS, P. 2015. A tudásmenedzsment értékelése folyamatmenedzsment alapokon. In: BUZÁS, N. & PRÓNAY, S. eds. Tudásteremtés és –alkalmazás a modern társadalomban, 15-16 October 2015 Szeged. Szegedi Tudományegyetem Interdiszciplináris Központ, 288-298. ISBN-978-963-306-412-2.

SZMODICS, P. 2015. Knowledge management and value creation. In: Challenges in economic and technological development, 15-16 October 2015 Lillafüred. University of Miskolc, 185-196. ISBN-978-963-358-100-1.

Conference presentations

SZMODICS, P. The knowledge, the business process, and the business value. 12th International Conference on Business Information Systems, 6-7 November 2015 Veszprém.

SZMODICS, P. How to use the knowledge-based process management to prevent organizational abuse. 15th Annual Conference of European Society of Criminology, 2-5 September 2015 Porto.

Posters

SZMODICS, P. Evaluated knowledge representation based on BPM aspects. 11th International Conference on Business Information Systems, 7-8 November 2014 Budapest.

SZMODICS, P. Knowledge representation and risk identification.
14th Annual Conference of European Society of Criminology, 10-13
September 2014 Prague.

7 List of References

ALVESSON, M. 2001. Knowledge Work: Ambiguity, Image and Identity. *Human Relations*, 54, 7, 863-886.

CURTIS, W., HEFLEY, W. & MILLER, S. 2009. People Capability Maturity Model (P-CMM). Pittsburgh: Carnegie Mellon University - Software Engineering Institute.

DELAK, B. 2015. How to Evaluate Knowledge and Knowledge Management in the Organization Using COBIT 5. *ISACA Journal*, 2015, 3, 19-23.

GRANT, R. M. 1991. The Resource-based Theory of Competitive Advantage: Implications for Strategy Formulation. *California Management Review*, 33, 3, 114-135.

ISACA 2012. COBIT5 – A Business Framework for the Governance and Management of Enterprise IT, Rolling Meadows, ISACA.

ISO 2015. 9000 Quality management systems – Fundamentals and vocabulary, 9001 – Quality management systems – Requirements, Geneva, International Organization for Standardization.

ISO/IEC 2010. *TR 20000-4 Information technology - Service management - Part 4: Process reference model*, Geneva, International Organization for Standardization, International Electrotechnical Commission.

MARCH, J. G. 1991. Exploration and Exploitation in Organizational Learning. *Organization Science*, 2, 71-78.

NONAKA, I. 1994. A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5, 1, 18-20.

OGC 2007. *ITIL® The Official Introduction to the ITIL Service Lifecycle*, London, The Stationary Office, Office of Government Commerce.

RYLANDER, A. & PEPPARD, J. 2005. What Really is a Knowledge-Intensive Firm? - (Re)Framing Research in the "Knowledge Economy". *Organization*, 2005, 10.

SEI 2010. CMMI for Services, Version 1.3. Pittsburgh: Carnegie Mellon University - Software Engineering Institute.