

A Three-Dimensional Model of Identifying Barriers to Knowledge Management¹

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Abstract: This article is a continuation of the author's discussion concerning the identification and classification of barriers to knowledge management, which appeared in 2012 (see References). The author divides these barriers into three interrelated dimensions: a) the prevalence of these barriers (exceeding the classical triad of: individual, organizational, and inter-organizational levels), b) the stages of knowledge management processes, and c) the types of barriers. The three-dimensional model presented is based on the field of morphology utilized in the theory of combinations. This paper is conceptual in nature, and is aimed at identifying barriers to knowledge management, and new areas of research. Intrinsically related to knowledge management are numerous barriers influencing the process of managing this intangible resource both on an epistemological and ontological level. Researchers present different points of view in terms of performance, or causes of failure in projects and initiatives related to knowledge management. However, one fact remains indisputable. The causes and reasons for failure must be taken into account when considering potential limitations. The very awareness of their existence allows companies and individuals involved the opportunity to undertake appropriate steps in reducing their negative impact in the future. The approach presented in this article may lead to the recognition of areas considered as barriers relevant to the functioning of an organization, and with an analysis of the impact exerted by the external environment.

Keywords: barriers, knowledge management, morphological analysis

1. The morphological analysis as a research tool

The morphological analysis is one of heuristic methods of seeking new solutions and exploring possible research areas. A large number of scientists all over the world use this classic tool to explore problems and seek directions of possible solutions, such as: decision support modeling (Ritchey 2011), problem structuring (Ritchey 2006), or vocabulary development (Anglin 2000) and many, many others. It belongs to a group of combinatory methods, originating within the pragmatic field of heuristics. The method is focused on a specific goal and offers practical applications. Moreover, it belongs to heuristic methods (creative problem-solving, here heuristic means: *conducive to discovery*). The development of its principles and empirical application is attributed to F. Zwicky² (1967, 1969), however, the forerunner of methods based on the theory of combinations is a medieval scholastic - Raimundus Lullus (Ramon Llull; see more in: Bonner 2007). Lullus assumed that all possible judgments and new truths can be obtained by combining the fundamental and general concepts and predicates. Thus, even though he failed to prove his assumptions, he lay foundations for the methods based on a detailed analysis and systematic consideration of all possibilities through combinations of partial solutions.

The morphological analysis according to the definition of its creator is "a logical and analytical method of searching for and attaining creative solutions to problems by means of a systematic analysis of all possible solutions". The morphology of a problem field allows us to discern problems, create concepts or indicate the existence of possible directions of research. Therefore one of major functions of the morphological analysis is to search for new problems and research areas rather than ready solutions. Being a heuristic method it does not guarantee anything. It should be seen more as a method reducing ways of seeking the solution.

This paper aims at applying the morphological analysis to the search for new research areas concerning identification of possible barriers to knowledge management. The paper is of conceptual nature and is based on the review of subject literature and the procedure applied in the morphological analysis.

The morphological procedure (from Greek word *morphē*, which means form: Góralski 1980) distinguishes three stages in problem-solving. In the first stage we precisely determine the field, scope and content of the problem, in the second one – we analyze the problem and identify independent elements or dimensions of the

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² Swiss astronomer who invented the morphological analysis in around 1940 using the knowledge and experience gained in the research on space rockets.

problem and then specify each element, determining the attributes (alternatives) of particular dimensions. This method is logical and analytical in nature, however, in the second stage we perform free exploration of possible attributes of each dimension. It should be emphasized that among traditional alternatives we should also find unexpected attributes, original regardless of their usefulness or possibilities of application. As a result of combination we often come up with proposals of solutions which then can become starting point for a new, original product, service or problem to be solved. Like in each intuitive method, delayed evaluation of alternatives accepted for further analysis and general conditions supporting spontaneous group thinking are of key significance.

In the third stage – synthesis of the solution - we construct a morphological chart. Within the synthesis of the solution Zwicky also established ways of evaluating solutions, reducing the morphological chart (for example by means of Moles discovery matrix: Góralski 1980) and a choice of a solution. For the effective use of the morphological analysis its users must have extensive knowledge of the subject (process) of research and an ability of practical application of knowledge acquired by them. The morphological chart is a rather auxiliary tool and offers a starting point for the so-called hard variation of the method in which we juxtapose consecutive attributes of each parameter in order to achieve a set number of the so-called morphological products or the possibilities of solutions to the problem defined in the first stage.

2. Areas of possible application of the morphological analysis

Subject literature contains numerous examples of applications of the morphological analysis and two-dimensional discovery matrix. The author divided them into: intuitive (stimulating imagination), technical-technological (making inventions, new products, improving existing products) and searching for new scientific and research possibilities. In the last field we can list the following examples (Zwicky 1969; Kaufmann et al. 1975; Guilford 1959; Scerri 2006; Ritchey 2011):

- making a list of all possible energy conversions
- developing methodology of simultaneous foreign language teaching
- examining relationships between various fields of scientific research and industrial production
- Guilford's model of intellect
- Mendeleev's periodic table of elements
- creating concepts of: new market segments and applications and new ways of developing competitive advantage
- attempts at systemizing scientific terminology
- analysis of social problems.

A well-known example, listed above, is empirical verification of the use of discovery matrix in seeking new research possibilities, made, for example by Mendeleev. When he organized separate categories of chemical elements on a two-dimensional table, empty spaces could be found at the intersections of columns and rows, drawing the scientist's attention to searching for simple substances that had not existed yet and this led to the discovery of radioactive substances. A result of the morphology of a problem field is also a full, three-dimensional model of intellect developed by Guilford (Guilford 1959). Using Zwicky's morphological analysis the scientist could, through combining various elements of three dimensions: operations, contents and products, determine all theoretically existing mental capacities. Another interesting example is provided by Kaufmann et al (Kaufmann et al. 1975). The authors present the use of the discovery matrix to seek relations (or their lack) between various fields of science and industry. The idea of the research consists in identifying possible contribution and application of science in economy. If we construct a similar table, taking into account contemporary industries (mostly high technologies), where – as a result of conjunction of randomly juxtaposed elements of the matrix new, unclassified branches of industry may appear.

3. Identifying barriers to knowledge management using the morphological analysis

It should be noticed that the morphological analysis has the so-called *strong and weak forms*. In the *strong* variation we make combinations of the listed attributes of a particular dimension with all the other attributes, which constitutes its advantage on one side, as it provides us with a possibility of thorough analysis and examination of all originated morphological products, but on the other hand, such examination is time-consuming. Moreover, a side effect of methods based on combination theory is a certain number of products

which are clearly absurd and for which we cannot use rational evaluation criteria. There might also be traditional solutions, however, the main goal of this method is to search for new and original solutions, especially as the subject of the research is the search for new products or improving the existing ones.

One of the requirements of effective application of the morphological analysis is creation of morphological charts (boxes) with low dimensionality and a small number of elements created as a result of exploration of main categories (Table 1). This is obviously possible provided that we use the method without any auxiliary tools facilitating quick combination and analysis. This condition, however, in the era of advanced computer systems supporting creative thinking processes, is losing its significance. Based on computer programs, new methods are created, allowing to identify attributes, analyzing them quickly, making instant combinations, after which proposals of solutions are selected and specified along particular evaluation criteria. Here, computers show great advantage over humans in this respect.

Morphological analysis was for the first time used for identifying new areas of research connected with identification of barriers to knowledge management. For this purpose the author divided barriers to knowledge management into three dimensions: the level of knowledge analysis, types of barriers and the knowledge process while the columns were assigned attributes (features of the above dimensions), as in Table 1 below:

Table 1: Morphological chart

Attributes Dimensions					
Barrier level	(a1) Individual	(a2) Group	(a3) Organization	(a4) Inter- organizational	(a5) Sector (industry)
	(a6) Inter-sector (inter-industry)	(a7) Country	(a8) Global		
Knowledge process	(b1) Locating Searching	(b2) Identifying Recognizing	(b3) Acquiring	(b4) Organizing	(b5) Gathering
	(b6) Developing Learning	(b7) Codifying	(b8) Transfer, diffusion, sharing	(b9) Making available Popularizing	(b10) Adapting Absorbing
	(b11) Implementing and using	(b12) Preserving (organizational memory)	(b13) Measuring	(b14) Evaluating	(b15) Controlling
Barrier type	(c1) Psycho-social	(c2) Technical- technological	(c3) Cultural	(c4) Intercultural	(c5) Organizational
	(c6) Financial	(c7) Legal	(c8) Systemic		

The main dimensions are: level of knowledge, knowledge process and types of barriers. Knowledge may be analyzed on various levels, thus attributes of this dimension may be: an individual (as the main “carrier” and source of implicit knowledge) and a team, organization and inter-organizational associations, on the macro level the sector (industry) inter-sector (Inter-industry), country and global attributes were listed. Barrier types attributes comprise: psycho-social, technical-technological, cultural, intercultural, organizational, financial (resulting from deficit of resources), legal (connected with protection of intellectual property and developed know-how) and systemic attributes. A definite catalogue of these barriers cannot be created, though, due to individuality and complexity of human nature. However, we can talk of a certain group of barriers. Psychological barriers on the level of an individual employee could be barriers related to (Project EQAL 2007):

- natural fear of change,
- protection of their own interest and position,
- fear of one-way transfer of valuable experiences,

- unwillingness to do extra work,
- limited need for professional and personal development,
- lack of initiative,
- inability to acquire and evaluate knowledge on one's own,
- lack of courage to share one's observations,
- fear of making a mistake and its consequences
- inability to receive criticism and making constructive criticism
- inability to ask for advice or help.

Difficulties and barriers to knowledge management are not limited only to the level of an individual employee but also appear on the level of an organization, therefore organizational barriers may include:

- lack of clearly determined strategy or persistence in its implementation,
- lack of coupling with the field of human resources management,
- incorrect information flow,
- developed, hierarchical organizational structure,
- lack of people with new knowledge joining the company,
- lack of staff integration,
- unfavorable corporate culture,
- losing experienced employees who take early retirement,
- fear of information leaks from the company.

Social barrier, on the other hand, include: inability to work in a group, low awareness of benefits derived from knowledge management, low involvement of management in implementing and monitoring knowledge management, lack of a leader, fear of investing in employees who may leave for another company and bring no benefits for our business, or national and cultural differences. Serious problems in knowledge management appear also in the technical sphere. The major technical and technological barriers and financial difficulties in the level of an individual employee, organization and macro-environment (systemic barriers) cover:

- inability to use new technologies,
- incomprehensible codification of knowledge and freedom of interpretation,
- difficult access to the latest research achievements,
- lack of possibilities of financing the services related to access and acquisition of new skills and knowledge,
- unfavorable architecture of the organization and distance,
- technical infrastructure that is not integrated or that does not exist,
- lack of a system of archiving information,
- inability to substitute an employee during their training,
- limited possibility of making expenditure on implementation and realization of the knowledge management concept,
- wrong priorities leading to seeking savings in expenditures on improving employees' qualifications,
- deficit of knowledge management specialists (depending on a country),
- lack of highly-specialized and flexible trainings,
- education system that is ill-fitted to meet the needs of economy and its inertia,
- lack of contacts with the field of science and research,
- lack of a uniform system of acknowledging qualifications gained outside the formal education system,
- poor financing of science and research programs.

- The knowledge process in this form is extremely specific, we took into account all possible stages of process presentation of knowledge, that is: locating, acquiring, organizing, gathering, developing, codifying, transferring, making available, adapting, implementing and using, preserving, measuring, evaluating and controlling knowledge. Special attention should be paid to the process of measuring and evaluating knowledge, which offers a possibility of conducting the next stage of knowledge management, that is controlling knowledge. Without measuring knowledge we are unable to show the dynamics of changes taking place on the level of examined variables in a given period of analysis.

Based on the morphological chart constructed in this way we perform the so-called morphology of a problem field, consisting in combining particular attributes of specific dimensions (level, process, type). For this purpose we systematically juxtapose each attribute with each remaining one and obtain 960 combinations of possible barriers which not only need generating (identifying) but also evaluating and verifying empirically³.

In the weak variation of the morphological analysis we use Moles' discovery matrix. We pick any two dimensions and then we juxtapose their attributes in the initial matrix with two entrances, as we can observe in Table 2 below.

Table 2: Initial matrix

Dimension bj Dimension ai	(b1) Locating / Searchin g	(b2) Identifying/ Recognizin g	(b3) Acquiring	(b4) Organizin g	(b5) Gatherin g	(b6) Developing Learning	(b7) Codifying	(b8) Transfer, diffusion, sharing
(a1) Individual	a ₁ b ₁	a ₁ b ₂	a ₁ b ₃	a ₁ b ₄	a ₁ b ₅	a ₁ b ₆	a ₁ b ₇	a ₁ b ₈
(a2) Group	a ₂ b ₁	a ₂ b ₂	a ₂ b ₃	a ₂ b ₄	a ₂ b ₅	a ₂ b ₆	a ₂ b ₇	a ₂ b ₈
(a3) Organizati on	a ₃ b ₁	a ₃ b ₂	a ₃ b ₃	a ₃ b ₄	a ₃ b ₅	a ₃ b ₆	a ₃ b ₇	a ₃ b ₈
(a4) Inter- organizatio nal	a ₄ b ₁	a ₄ b ₂	a ₄ b ₃	a ₄ b ₄	a ₄ b ₅	a ₄ b ₆	a ₄ b ₇	a ₄ b ₈
(a5) Sector (industry)	a ₅ b ₁	a ₅ b ₂	a ₅ b ₃	a ₅ b ₄	a ₅ b ₅	a ₅ b ₆	a ₅ b ₇	a ₅ b ₈
(a6) Inter- sector (inter- industrial)	a ₆ b ₁	a ₆ b ₂	a ₆ b ₃	a ₆ b ₄	a ₆ b ₅	a ₆ b ₆	a ₆ b ₇	a ₆ b ₈
(a7) Country	a ₇ b ₁	a ₇ b ₂	a ₇ b ₃	a ₇ b ₄	a ₇ b ₅	a ₇ b ₆	a ₇ b ₇	a ₇ b ₈
(a8) Global	a ₈ b ₁	a ₈ b ₂	a ₈ b ₃	a ₈ b ₄	a ₈ b ₅	a ₈ b ₆	a ₈ b ₇	a ₈ b ₈

Table 2 continued:

Dimension bj Dimension ai	(b9) Making available Popularizi ng	(b10) Adapting Absorptio n	(b11) Implemen tation and use	(b12) Preserving (organizati onal memory)	(b13) Measuring	(b14) Evaluating	(b15) Controllin g
(a1) Individual	a ₁ b ₉	a ₁ b ₁₀	a ₁ b ₁₁	a ₁ b ₁₂	a ₁ b ₁₃	a ₁ b ₁₄	a ₁ b ₁₅

³ Due to the size of the analyses, generated morphological products will not be identified or discussed in detail here

Dimension bj Dimension ai	(b9) Making available Popularizing	(b10) Adapting Absorption	(b11) Implement ation and use	(b12) Preserving (organizati onal memory)	(b13) Measuring	(b14) Evaluating	(b15) Controllin g
(a2) Group	a ₂ b ₉	a ₂ b ₁₀	a ₂ b ₁₁	a ₂ b ₁₂	a ₂ b ₁₃	a ₂ b ₁₄	a ₂ b ₁₅
(a3) Organizatio n	a ₃ b ₉	a ₃ b ₁₀	a ₃ b ₁₁	a ₃ b ₁₂	a ₃ b ₁₃	a ₃ b ₁₄	a ₃ b ₁₅
(a4) Inter- organization al	a ₄ b ₉	a ₄ b ₁₀	a ₄ b ₁₁	a ₄ b ₁₂	a ₄ b ₁₃	a ₄ b ₁₄	a ₄ b ₁₅
(a5) Sector (industry)	a ₅ b ₉	a ₅ b ₁₀	a ₅ b ₁₁	a ₅ b ₁₂	a ₅ b ₁₃	a ₅ b ₁₄	a ₅ b ₁₅
(a6) Inter-sector (inter- industry)	a ₆ b ₉	a ₆ b ₁₀	a ₆ b ₁₁	a ₆ b ₁₂	a ₆ b ₁₃	a ₆ b ₁₄	a ₆ b ₁₅
(a7) Country	a ₇ b ₉	a ₇ b ₁₀	a ₇ b ₁₁	a ₇ b ₁₂	a ₇ b ₁₃	a ₇ b ₁₄	a ₇ b ₁₅
(a8) Global	a ₈ b ₉	a ₈ b ₁₀	a ₈ b ₁₁	a ₈ b ₁₂	a ₈ b ₁₃	a ₈ b ₁₄	a ₈ b ₁₅

The intersections between columns and rows of the initial matrix generate products which are then evaluated alongside established criteria (for example reliability, rationality, innovativeness). Another step is to reduce products in Table 2. In this process we select those products from the matrix (marked in Table 2) which can determine possible research directions and we juxtapose them also in a matrix with two entrances and with another dimension - c. The number of matrixes is determined by the number of dimensions (elements), as exploration is conducted until we juxtapose the last element with morphological products of the previous matrix. Thus the number of matrixes in this case equals 3 (Table 3):

Table 3: Final matrix

Dimension ck Dimension ai	(c1) Psycho- social	(c2) Technical- technologica l	(c3) Cultural	(c4) Inter- cultural	(c5) Organizati onal	(c6) Financial	(c7) Legal	(c8) Systemic
a ₄ b ₁	a ₄ b ₁ c ₁	a ₄ b ₁ c ₂	a ₄ b ₁ c ₃	a ₄ b ₁ c ₄	a ₄ b ₁ c ₅	a ₄ b ₁ c ₆	a ₄ b ₁ c ₇	a ₄ b ₁ c ₈
a ₄ b ₅	a ₄ b ₅ c ₁	a ₄ b ₅ c ₂	a ₄ b ₅ c ₃	a ₄ b ₅ c ₄	a ₄ b ₅ c ₅	a ₄ b ₅ c ₆	a ₄ b ₅ c ₇	a ₄ b ₅ c ₈
a ₄ b ₁₁	a ₄ b ₁₁ c ₁	a ₄ b ₁₁ c ₂	a ₄ b ₁₁ c ₃	a ₄ b ₁₁ c ₄	a ₄ b ₁₁ c ₅	a ₄ b ₁₁ c ₆	a ₄ b ₁₁ c ₇	a ₄ b ₁₁ c ₈
a ₄ b ₁₂	a ₄ b ₁₂ c ₁	a ₄ b ₁₂ c ₂	a ₄ b ₁₂ c ₃	a ₄ b ₁₂ c ₄	a ₄ b ₁₂ c ₅	a ₄ b ₁₂ c ₆	a ₄ b ₁₂ c ₇	a ₄ b ₁₂ c ₈
a ₄ b ₁₃	a ₄ b ₁₃ c ₁	a ₄ b ₁₃ c ₂	a ₄ b ₁₃ c ₃	a ₄ b ₁₃ c ₄	a ₄ b ₁₃ c ₅	a ₄ b ₁₃ c ₆	a ₄ b ₁₃ c ₇	a ₄ b ₁₃ c ₈
a ₄ b ₁₄	a ₄ b ₁₄ c ₁	a ₄ b ₁₄ c ₂	a ₄ b ₁₄ c ₃	a ₄ b ₁₄ c ₄	a ₄ b ₁₄ c ₅	a ₄ b ₁₄ c ₆	a ₄ b ₁₄ c ₇	a ₄ b ₁₄ c ₈
a ₄ b ₁₅	a ₄ b ₁₅ c ₁	a ₄ b ₁₅ c ₂	a ₄ b ₁₅ c ₃	a ₄ b ₁₅ c ₄	a ₄ b ₁₅ c ₅	a ₄ b ₁₅ c ₆	a ₄ b ₁₅ c ₇	a ₄ b ₁₅ c ₈
a ₅ b ₅	a ₅ b ₅ c ₁	a ₅ b ₅ c ₂	a ₅ b ₅ c ₃	a ₅ b ₅ c ₄	a ₅ b ₅ c ₅	a ₅ b ₅ c ₆	a ₅ b ₅ c ₇	a ₅ b ₅ c ₈
a ₅ b ₁₁	a ₅ b ₁₁ c ₁	a ₅ b ₁₁ c ₂	a ₅ b ₁₁ c ₃	a ₅ b ₁₁ c ₄	a ₅ b ₁₁ c ₅	a ₅ b ₁₁ c ₆	a ₅ b ₁₁ c ₇	a ₅ b ₁₁ c ₈
a ₅ b ₁₂	a ₅ b ₁₂ c ₁	a ₅ b ₁₂ c ₂	a ₅ b ₁₂ c ₃	a ₅ b ₁₂ c ₄	a ₅ b ₁₂ c ₅	a ₅ b ₁₂ c ₆	a ₅ b ₁₂ c ₇	a ₅ b ₁₂ c ₈
a ₅ b ₁₃	a ₅ b ₁₃ c ₁	a ₅ b ₁₃ c ₂	a ₅ b ₁₃ c ₃	a ₅ b ₁₃ c ₄	a ₅ b ₁₃ c ₅	a ₅ b ₁₃ c ₆	a ₅ b ₁₃ c ₇	a ₅ b ₁₃ c ₈
a ₅ b ₁₄	a ₅ b ₁₄ c ₁	a ₅ b ₁₄ c ₂	a ₅ b ₁₄ c ₃	a ₅ b ₁₄ c ₄	a ₅ b ₁₄ c ₅	a ₅ b ₁₄ c ₆	a ₅ b ₁₄ c ₇	a ₅ b ₁₄ c ₈
a ₅ b ₁₅	a ₅ b ₁₅ c ₁	a ₅ b ₁₅ c ₂	a ₅ b ₁₅ c ₃	a ₅ b ₁₅ c ₄	a ₅ b ₁₅ c ₅	a ₅ b ₁₅ c ₆	a ₅ b ₁₅ c ₇	a ₅ b ₁₅ c ₈
a ₆ b ₁	a ₆ b ₁ c ₁	a ₆ b ₁ c ₂	a ₆ b ₁ c ₃	a ₆ b ₁ c ₄	a ₆ b ₁ c ₅	a ₆ b ₁ c ₆	a ₆ b ₁ c ₇	a ₆ b ₁ c ₈
a ₆ b ₁₁	a ₆ b ₁₁ c ₁	a ₆ b ₁₁ c ₂	a ₆ b ₁₁ c ₃	a ₆ b ₁₁ c ₄	a ₆ b ₁₁ c ₅	a ₆ b ₁₁ c ₆	a ₆ b ₁₁ c ₇	a ₆ b ₁₁ c ₈

Dimension c_k	(c1) Psycho- social	(c2) Technical- technologica l	(c3) Cultural	(c4) Inter- cultural	(c5) Organizational	(c6) Financial	(c7) Legal	(c8) Systemic
Dimension $a_i b_j$								
$a_6 b_{12}$	$a_6 b_{12} c_1$	$a_6 b_{12} c_2$	$a_6 b_{12} c_3$	$a_6 b_{12} c_4$	$a_6 b_{12} c_5$	$a_6 b_{12} c_6$	$a_6 b_{12} c_7$	$a_6 b_{12} c_8$
$a_6 b_{13}$	$a_6 b_{13} c_1$	$a_6 b_{13} c_2$	$a_6 b_{13} c_3$	$a_6 b_{13} c_4$	$a_6 b_{13} c_5$	$a_6 b_{13} c_6$	$a_6 b_{13} c_7$	$a_6 b_{13} c_8$
$a_6 b_{14}$	$a_6 b_{14} c_1$	$a_6 b_{14} c_2$	$a_6 b_{14} c_3$	$a_6 b_{14} c_4$	$a_6 b_{14} c_5$	$a_6 b_{14} c_6$	$a_6 b_{14} c_7$	$a_6 b_{14} c_8$
$a_6 b_{15}$	$a_6 b_{15} c_1$	$a_6 b_{15} c_2$	$a_6 b_{15} c_3$	$a_6 b_{15} c_4$	$a_6 b_{15} c_5$	$a_6 b_{15} c_6$	$a_6 b_{15} c_7$	$a_6 b_{15} c_8$
$a_7 b_1$	$a_7 b_1 c_1$	$a_7 b_1 c_2$	$a_7 b_1 c_3$	$a_7 b_1 c_4$	$a_7 b_1 c_5$	$a_7 b_1 c_6$	$a_7 b_1 c_7$	$a_7 b_1 c_8$
$a_7 b_5$	$a_7 b_5 c_1$	$a_7 b_5 c_2$	$a_7 b_5 c_3$	$a_7 b_5 c_4$	$a_7 b_5 c_5$	$a_7 b_5 c_6$	$a_7 b_5 c_7$	$a_7 b_5 c_8$
$a_7 b_{11}$	$a_7 b_{11} c_1$	$a_7 b_{11} c_2$	$a_7 b_{11} c_3$	$a_7 b_{11} c_4$	$a_7 b_{11} c_5$	$a_7 b_{11} c_6$	$a_7 b_{11} c_7$	$a_7 b_{11} c_8$
$a_7 b_{12}$	$a_7 b_{12} c_1$	$a_7 b_{12} c_2$	$a_7 b_{12} c_3$	$a_7 b_{12} c_4$	$a_7 b_{12} c_5$	$a_7 b_{12} c_6$	$a_7 b_{12} c_7$	$a_7 b_{12} c_8$
$a_7 b_{13}$	$a_7 b_{13} c_1$	$a_7 b_{13} c_2$	$a_7 b_{13} c_3$	$a_7 b_{13} c_4$	$a_7 b_{13} c_5$	$a_7 b_{13} c_6$	$a_7 b_{13} c_7$	$a_7 b_{13} c_8$
$a_7 b_{14}$	$a_7 b_{14} c_1$	$a_7 b_{14} c_2$	$a_7 b_{14} c_3$	$a_7 b_{14} c_4$	$a_7 b_{14} c_5$	$a_7 b_{14} c_6$	$a_7 b_{14} c_7$	$a_7 b_{14} c_8$
$a_7 b_{15}$	$a_7 b_{15} c_1$	$a_7 b_{15} c_2$	$a_7 b_{15} c_3$	$a_7 b_{15} c_4$	$a_7 b_{15} c_5$	$a_7 b_{15} c_6$	$a_7 b_{15} c_7$	$a_7 b_{15} c_8$
$a_8 b_9$	$a_8 b_9 c_1$	$a_8 b_9 c_2$	$a_8 b_9 c_3$	$a_8 b_9 c_4$	$a_8 b_9 c_5$	$a_8 b_9 c_6$	$a_8 b_9 c_7$	$a_8 b_9 c_8$
$a_8 b_{11}$	$a_8 b_{11} c_1$	$a_8 b_{11} c_2$	$a_8 b_{11} c_3$	$a_8 b_{11} c_4$	$a_8 b_{11} c_5$	$a_8 b_{11} c_6$	$a_8 b_{11} c_7$	$a_8 b_{11} c_8$
$a_8 b_{12}$	$a_8 b_{12} c_1$	$a_8 b_{12} c_2$	$a_8 b_{12} c_3$	$a_8 b_{12} c_4$	$a_8 b_{12} c_5$	$a_8 b_{12} c_6$	$a_8 b_{12} c_7$	$a_8 b_{12} c_8$
$a_8 b_{13}$	$a_8 b_{13} c_1$	$a_8 b_{13} c_2$	$a_8 b_{13} c_3$	$a_8 b_{13} c_4$	$a_8 b_{13} c_5$	$a_8 b_{13} c_6$	$a_8 b_{13} c_7$	$a_8 b_{13} c_8$
$a_8 b_{14}$	$a_8 b_{14} c_1$	$a_8 b_{14} c_2$	$a_8 b_{14} c_3$	$a_8 b_{14} c_4$	$a_8 b_{14} c_5$	$a_8 b_{14} c_6$	$a_8 b_{14} c_7$	$a_8 b_{14} c_8$
$a_8 b_{15}$	$a_8 b_{15} c_1$	$a_8 b_{15} c_2$	$a_8 b_{15} c_3$	$a_8 b_{15} c_4$	$a_8 b_{15} c_5$	$a_8 b_{15} c_6$	$a_8 b_{15} c_7$	$a_8 b_{15} c_8$

As we can see in the final matrix, barriers have been selected for further exploration depending on where they appear, emphasizing the inter-organizational, sector (industry), inter-sector (inter-industrial), national and global levels. As far as the stage of knowledge management process is concerned, practically each stage is worth considering here. However, we skipped mostly the processes of knowledge transfer, diffusion and sharing, as they constitute a very popular area of research for scientists all over the world.

Some examples of products that could be further explored and empirically verified are provided in Table 4 below:

Table 4: Three-dimensional morphological products of the final matrix

Morphological product	Description of the product
$a_4 b_{14} c_4$	Intercultural barriers to knowledge management on the inter-organizational level related to the process of knowledge evaluation
$a_5 b_5 c_2$	Technical and technological barriers to knowledge management on the sector (industry) level related to the process of knowledge gathering
$a_6 b_{11} c_7$	Legal barriers to knowledge management on the inter-sector (inter-industrial) level related to the process of knowledge implementation and use
$a_7 b_{15} c_8$	Systemic barriers to knowledge management on the level of a particular country related to the process of knowledge controlling
$a_8 b_9 c_6$	Financial barriers to knowledge management on the global level related to making knowledge available and popularizing it

4. Directions for further research

There is little research dealing with the problem of analyzing barriers to knowledge management on the inter-organizational, sector (industry), inter-sector (inter-industrial), national or global levels. The author has found only a short review of research in this area on the level of construction industry (Carrillo et al 2004) and pharmaceutical industry (Lilleoere, Hansen 2010) as well as on the national level (Kuznetsov, Yakavenka 2005). It would be interesting to examine the differences between barriers to knowledge management between countries to see their specificity and to find out the origin of these differences. On the other hand, the concept related to seeking ideas and knowledge between sectors or industries is called technology brokering (Hargadon 2003). It is based on, in each case listed here, on re-combining old ideas, joining distant

technologies and concepts taken from particular ideas in order to generate new technological combinations, new ways of initiating revolution. Barriers to knowledge management on the individual, team and organizational levels have already been subject of numerous research (Martini, Pellegrini 2005; BenMoussa 2009; Sharma et al. 2012; Vashisth et al 2010). On the other hand, as far as the process of knowledge and identifying barriers in particular stages is concerned, the least explored area is the stage of locating/seeking, identifying/recognizing, acquiring, implementing/using, measuring, evaluating and controlling knowledge. Talking of measuring, evaluating and controlling knowledge the author does not mean the methods of evaluating, measuring and estimating intellectual capital, as these are widely exposed in subject literature (the author wrote about them in her book (2009). It would be more purposeful to refer to the methodology of knowledge audit understood as a tool for analyzing and evaluating organization's knowledge taking into account its usefulness and opportunities of achieving competitive edge by applying it (see more in Ujwary-Gil 2011; Levantakis, Helms, Spruit 2008). In the process presentation of knowledge management and barriers appearing at various stages of this process, authors have conducted abundant research, especially into knowledge transfer and sharing (Riege 2005; Yih-Tong Sun, Scott 2005) and cultural barriers to knowledge management (Levy et al. 2010; Khakpour 2009; de Long, Fahey 2000). Thus the area for potential research may focus more on the analysis of intercultural, legal and systemic barriers to knowledge management on the indicated stages of analysis (inter-organizational, sector (branch), inter-sector (inter-industry), national and global ones.

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