Annals of the Academy of Romanian Scientists
Series on Economy, Law and Sociology
ISSN 2067-5704 Volume **1**, Number **1**/**2009**

KNOWLEDGE MANAGEMENT METHOD TO IMPROVE DECISION-MAKING

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Rezumat: *Odată la fiecare câţiva ani, câte o nouă dezvoltare tehnologică atrage atenţia gânditorilor strategici ai organizaţiilor şi întreprinderilor. Cu ceva timp în urmă, au fost dezvoltate şi conceptualizate noţiunea de "management total al calităţii" (Total Quality Management) şi cea de "reproiectare a procesului de afaceri" (Business Process Reengineering). Recent, a apărut un nou interes pentru "administrarea informaţiilor" (Knowledge Management), deşi, încă din 1950, Peter Drucker a introdus noţiunea de "lucrători informaţionali" pentru lucrătorii capabili să-şi folosească cunoştinţele pentru dezvoltarea de noi produse intangibile.*

Abstract: *Once in a few years, a new technological development draws the attention of the strategic organization thinkers from organizations and enterprises. Not long ago, the notions of Total Quality Management and Business Process Reengineering were developed and conceptualized. More recently, a new interest for "knowledge management (Knowledge Management)" has emerged, although since 1950 Peter Drucker introduced the concept of "knowledge workers" for those workers able to use their knowledge for the development of new intangible products.*

Key words: knowledge management, e-government, data mining, data warehouse, intranet, groupware

Introduction

In the transition to information society, knowledge is regarded worldwide as a necessary development to ensure sustainable development in the context of "new economy" based mainly on product and intellectual-intensive activities and to achieve an advanced socio-human civilization.

In this context, organizations have realized that it is necessary to know their main values and have the ability to use this knowledge on organizational processes and technologies in order to achieve competitive advantage. If in industrial society there were different types of organization that used strict methods for coordination, planning of technological resources, processes and financial resources, the information society based on knowledge has to find principles, methods and techniques of investigation, planning, organizing resource-critical knowledge.

The concept of knowledge management is not new, in the 1950s Peter Drucker

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introduced the concept of "knowledge workers" (Drucker, 1999, 17) for workers able to use knowledge for the organization of intangible products. Many organizations use knowledge management techniques in an informal manner for decision-making or for achieving goods or services. What's new in knowledge management is the act of being aware of the existence of a process of knowledge management.

The term knowledge in the field of knowledge management is sometimes confusing because the terms knowledge, information and data are, in their turn, confusing sometimes. While the data reflect written or numeral descriptions of actions, processes, facts, events, information brought a growth of knowledge reflecting a set of data grouped in certain patterns and forms, and knowledge of a complex grouping of information with a strong and decisive human context. In this respect, knowledge describes a set of information acquired or applied in a certain context through human thought. A significant difference between information and knowledge is determined by the transfer. While the information can be transferred easily from person to person, knowledge has a lower degree of transferability, provided by the socio-economical context and the personal capacity to get and transform the knowledge elements.

The author (McDormont, 2003, 16) highlights the characteristics of knowledge making it distinct from information:

- ✓ Knowledge is human acts;
- ✓ Knowledge is outcome of thinking;
- ✓ Knowledge belongs to communities;
- ✓ Knowledge circulates in community in various ways.

Knowledge management can be approached as a set of tools and skills that organizations need in order to develop the knowledge which is to be used as a comprehensive resource that allows the future generation's access to new knowledge.

1. Approaches in the field of knowledge management

As the market has become more competitive and more complex, organizations can turn the values resulted from the knowledge process into competitive advantages which allow them to maintain the position on the market. If in the industrial society there were different types of organization, which strictly used methods of coordination, planning and administrating of the available resources, in the informational society it is worked with ideas, projects and processes as elements of effective concretization of knowledge.

Transitioning to a knowledge-based economy, and in particular the construction

and operation of knowledge-based companies, cannot be achieved without an efficient management of knowledge.

A clear distinction must be made between the concepts of "knowledge" and "knowledge management" as operational practice (Nicolescu, 2006, 25). The distinction between the two concepts is that knowledge management as subdivision a new concept of knowledge economy is a method and a new concept of management that relates to the acquisition, creation, preservation and application or reuse of knowledge. Its fundamental objective is exploiting resources and the intelligence elements of the organization, giving it the possibility to turn into a learning-organization.

There are more ways to approach the knowledge management:

A) Lester's Approach (typical for specialists from informatics science and electronics) who, in a study based on more projects and investigations, proposed the following definition: "Knowledge-based management is a key process by which the companies, industries and countries achieve higher economic performance for the people involved in the process of decision-making, facilitating them the development and professional fulfillment through creativity, and ingenuity."

B) Thomas Clarke and Christina Rollo's Approach, who define knowledge-based management as a process through which the organizations become producers and providers of knowledge and flows of knowledge.

C) Abell and Oxbrow's Concept. In the paper "Competing with Knowledge", after having consulted several studies of knowledge management, the two authors mentioned their choice for the approach of knowledge management as a scientific discipline and, at the same time, as being perceived as an economic practice.

D) Ferguson's approach – leading consultant in management. In his vision, he believes that knowledge management is based on the economic processes and the solutions implemented in an organization, in order to improve operational efficiency and profitability of the organization. Furthermore, the author stresses that information technology, economic processes and organizational culture combine to create an environment where knowledge (experience, skills, information and data that have economic value) is identified, collected, disseminated, used and exploited.

Starting from the previous types of approaches existing in the world, Romanian specialists (Nicolescu, 2006, 35) have identified the following characteristics:

- ✓ transition to a new kind of economy, profoundly influences the content and way of manifestation of management in all its components and at all levels of society;

- ✓ knowledge itself becomes a resource which the organizations must administrate efficiently;
- ✓ taking into account the complexity and diversity of the socio-economical phenomena, knowledge becomes the object of the knowledge management at the same time;
- ✓ knowledge management may be defined as a factor of efficiency of the organization: organizational structure, production structure communication processes etc. All these features listed above were put into practice through information and communication technology to facilitate and enrich the future work of the organizations.

2. The content of knowledge management

Knowledge management can be considered a set of tools associated with IT, communication and methodologies that enable information structuring, recovery and availability in the form of knowledge.

According to the authors (Igor and Veaceslav 2002, 35) knowledge management can be divided onto three levels:

- ✓ Level 1 – document management;
- ✓ Level 2 – creating information and sharing it;
- ✓ Level 3 – business intelligence.

Graphic representation of these levels is illustrated in Figure 1.

Steps taken during the crystallization process of knowledge management are:

- ✓ Phase **I** –
  knowledge begins to be recovered through databases and working groups;
- ✓ Phase **II** –
  the use of data warehousing concepts (data in different formats is stored in one place to allow easy integration of their own) and data mining (the analysis of the database which can be identified information with future potential to be used in the substantiation of business decisions).
- ✓ Phase **III** –
  associated with e-commerce (electronic commerce) and the opportunity to learn more about interactions with customers via web forms and online purchases.

Fundamental elements for crystallization of knowledge management according to the authors (Luban and Brezu 2002, 15) include: the human factor, processes and technology.

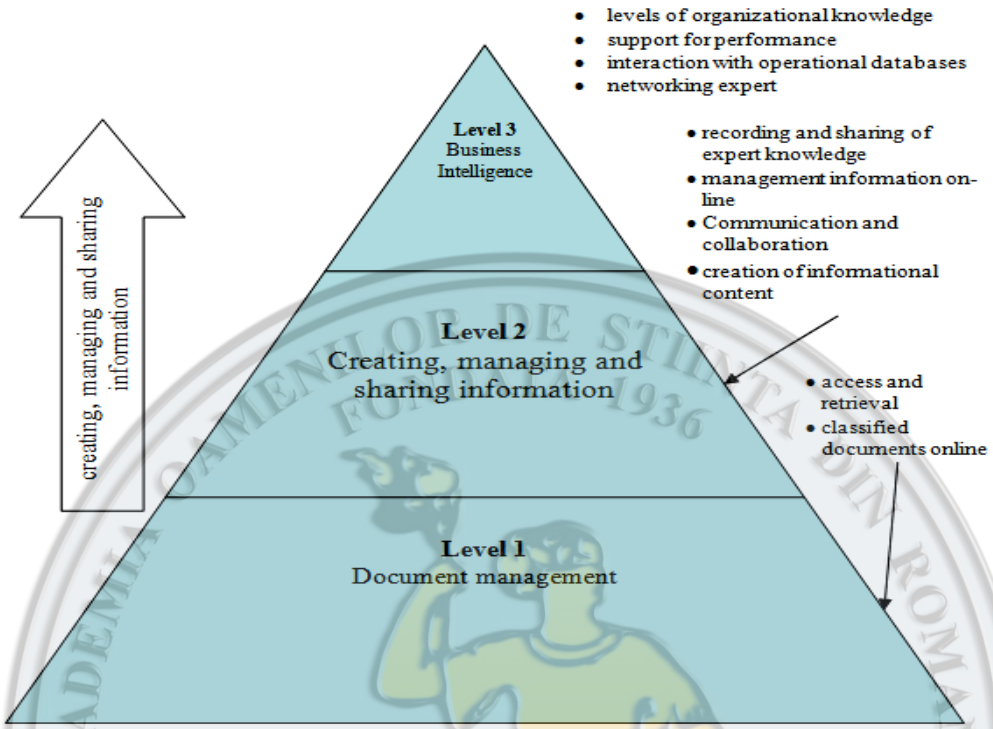

Figure 1. Pyramid of Knowledge Management

Human factor

Developing an organizational culture fitted to knowledge management is the most important and most difficult challenge in knowledge management. Successful knowledge management initiatives depend on the motivation, readiness and ability of employees to disseminate and exchange information.

Employees from an organization, technological processes can act as an incentive or barrier to practice knowledge management. Therefore potential barriers should be identified and eliminated and stimulating factors should be encouraged.

The traditional structure of public sector organizations is "partitioned". In such an environment, information and knowledge are scattered at different organizational levels. Employees share their knowledge for reasons such as reciprocity, reputation, prestige and sometimes altruistic reasons. This suggests that knowledge transfer is a natural act in an organization. To change attitudes and behavior and reduce the barriers, people have created a culture of spreading knowledge.

To achieve this it is necessary:

- ✓ To be aware of the benefits of knowledge management;

- ✓ To create a trustworthy environment;
- ✓ To have leaders able to promote the activities of knowledge transfer;
- ✓ To have a system of reward for those who share their knowledge to others;
- ✓ To develop centers where a participative management to be practiced, which allows the group members to develop themselves.

Processes

As far as the processes and techniques for knowledge management are concerned the following steps can be identified:

- ✓ ***Identification***. Determination of key skills, recognition of knowledge areas and recognition of forecasting abilities, setting the level of expertise for each domain of knowledge and focusing on creating links between existing knowledge;
- ✓ ***Capture***. Attempts to obtain the necessary knowledge from internal and external sources through knowledge;
- ✓ ***Selection***. Average amount of knowledge collected and formalized and its filtering in order to obtain the appropriate knowledge;
- ✓ ***Storage***. Classification of filtered knowledge, organizing it into a standard format;
- ✓ ***Transfer***. Classification and arranging the organizational knowledge from and its presentation in such a way to make it available to as many users as possible;
- ✓ ***Implementation***. Using knowledge in problem solving, decision making, find ideas, learning;
- ✓ ***Creation***. Discovering new knowledge through a variety of processes such as: education, practice, research, pilot studies.

Technology

Technology is an important factor used in knowledge management.

Currently, there are countless marketing technology solutions for knowledge management. For choosing an appropriate technology the following actions would be required:

- ✓ Identifying the hardware and software solutions suitable for knowledge management and ensuring that the technologies used are fitted for employees and processes of the organization;
- ✓ Creating the technological infrastructure by identifying employee needs in

terms of resources, knowledge and processes;

- ✓ Implementing the organization intranet technologies and the communication processes to encourage the spread of knowledge;
- ✓ Creating a knowledge portal accessible through intranet;
- ✓ Organizing and storing knowledge in the electronic media to enable fast and efficient access and retrieval;
- ✓ Providing access to knowledge resources in order to facilitate the interaction with customers, suppliers and partners.

A graphic representation of the elements highlighted above with the common definition of areas which make up the process of knowledge management, can be seen in Figure 2.

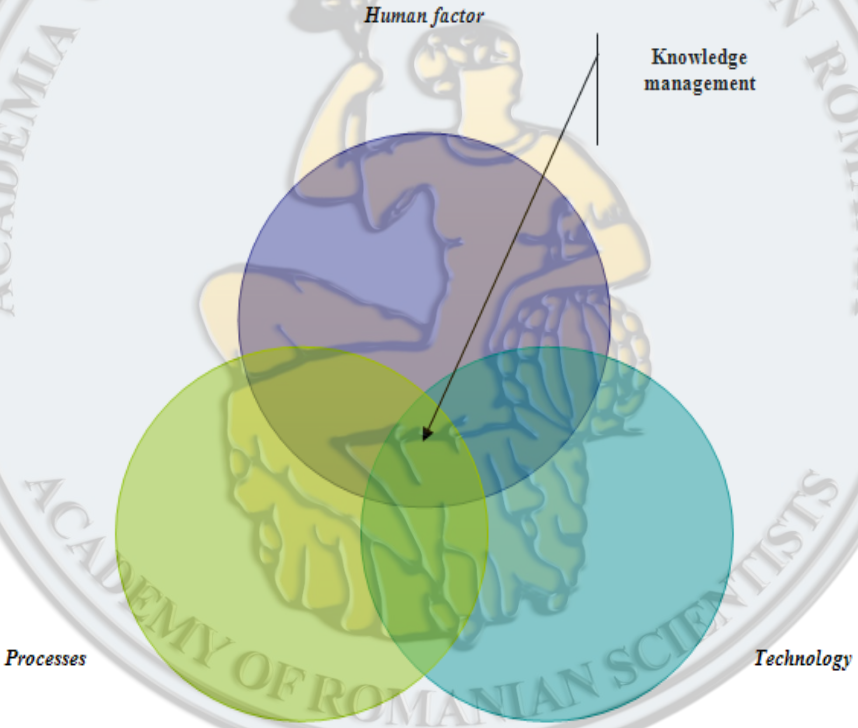

Figure 2. The fundamentation of knowledge management.

3. Information technology and communications used to support knowledge management

The process of knowledge management assumes a specific process of administration of knowledge starting with the acquisition, storage, information processing and reuse. The technologies related to the presented phases are different, depending on the organizational particularities. The information the organization

possesses thus become a strategic resource which can be used in fulfilling the organizational mission. For this purpose, the IT instruments and tools have an important role materializing in three directions (Ursăcescu 2006, 86):

- ✓ ***Role of IT in knowledge acquisition and representation*** can be approached in two ways: on the one hand in terms of extracting knowledge from employees for the purpose of placing them into a system of knowledge management, and on the other hand through the collection of knowledge by the employees from the environment they work in. In the first case, the contribution of information technology is limited, the emphasis being placed primarily on the participation of specialists who have the power to collect and transmit the knowledge to the workers. In the second case, various information tools constitute an important support in the capitalized acquisition of knowledge within the organization, for their subsequent use by employees. This technology creates informational flows available and accessible to the users. In addition, an increasingly important role is the use of "groupware" technology.
- ✓ ***Role of IT in knowledge storage***. The process of archiving is the way the knowledge may perpetuate in time within the organization. If the storage operation is important by what it represents in itself, it is far more significant to identify what knowledge is accepted. In terms of storage capacity, the potential of current technology is practically unlimited, but for the formation of a relevant knowledge base they must meet criteria related to: their ability to be shared (and understood by others), to be consensual (accepted throughout the organization in terms of their validity and usefulness), to be integrated (of a conceptual framework, interrelated with a more general context). In this situation, the use of groupware technology enables the creation of intra-organizational memoranda.
- ✓ ***Role of IT in reuse and sharing knowledge***. Possibility of reusing knowledge in the organizational memory is conditioned by its quality and structure, held in storage time. There are currently a number of technologies able to support the reuse of knowledge, when one wishes to reuse them in a new organizational context. An example is the TOPIC technology (created by Verity Inc.). The knowledge is represented as a conceptual tree, in which the links between concepts (similar to keywords) are weighted according to their degree of relevance, taking into account the scope and terms of the human expert.

The contribution of information technology in the organization and capitalization of knowledge in the establishment of a performing system KMS (**K**nowledge **M**anagement **S**ystem) which generates a series of positive effects related to: the

ability of the adoption of decisions more efficient, reduce cycle time in decision making, capacity building and innovation and learning employees, etc.

In Figure 3 there are presented several types of useful information tools for knowledge management, indicating that a good part of them are already implemented at many organizations, but mainly used in the operation of classical databases (operational):

1. *Tools for creating an infrastructure for knowledge management*:

- ✓ electronic messaging systems;
- ✓ Internet systems, Intranet, Extranet;
- ✓ Systems management workflows.

2. *Tools capitalization of knowledge and their structure*:

- ✓ servers for knowledge;
- ✓ systems management of electronic documents, coupled with techniques for automation of office;
- ✓ system for establishing data warehouses.

3. Tools for knowledge exploitation:

- ✓ systems including Data Mining tools;
- ✓ analysis systems from known cases (shown in the past);
- ✓ groupware systems that allow job sharing.

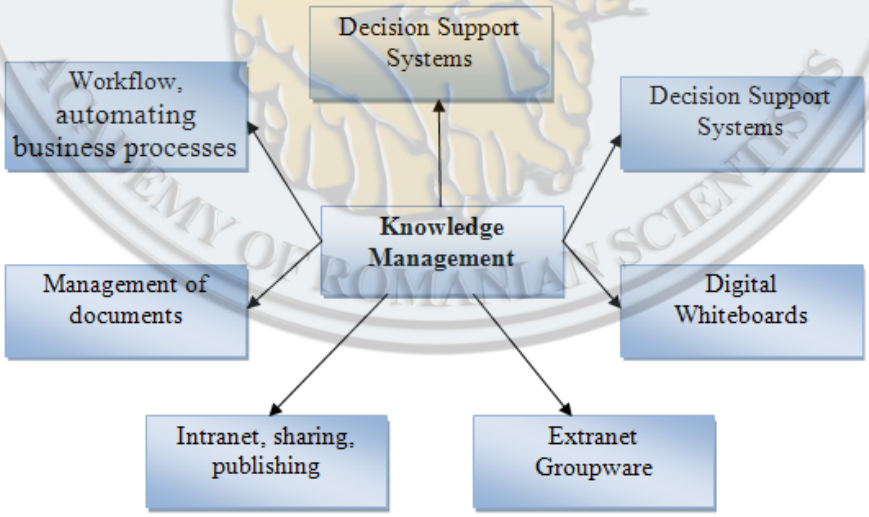

Figure 3. ITC components used in knowledge management.

4. Extracting knowledge from the organization database

In response to the request for information on which decisions are made, a new research field called Data Mining (DM) came into being. Located at the confluence of several disciplines, statistics (Statistics), database systems (DBS - Database Systems), and artificial intelligence (AI - Artificial Intelligence), the term was used especially by statisticians and analysts in the community of management information systems.

Fayyad et. al. (Figure 4) were the first to use the KDD model (KDD - Knowledge Discovery in Database) which later was improved by others. These ones identified the following steps to take in achieving the KDD model:

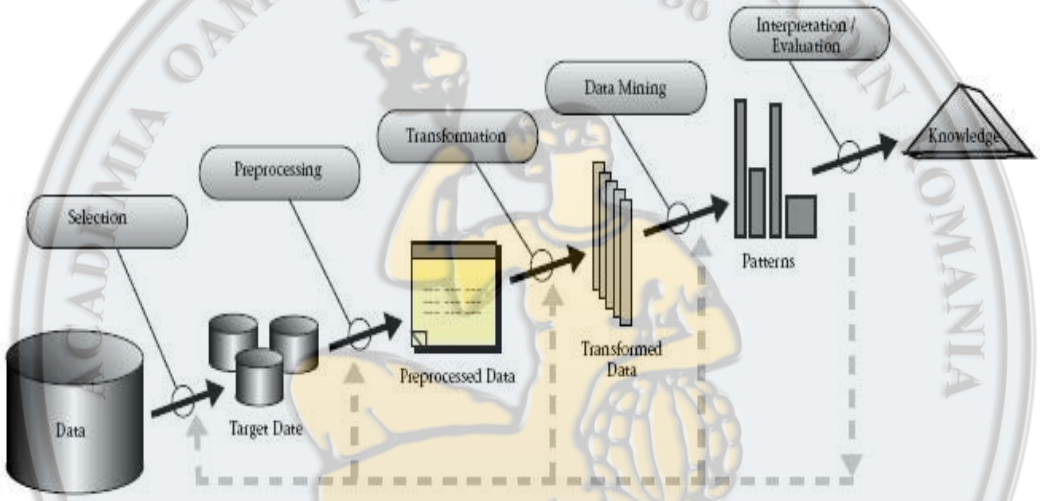

Figure 4. Stages KDD process [Fayyad, Piatetsky-Shapiro, Smyth3, 1996].

- ***Developing and understanding the application domain.*** This step includes the study of relevant knowledge prior to the end user and purpose of knowledge discovery. Clarity of objectives to be pursued in accordance with the purposes of research;
- ***Creating a target data set***. Selecting data by focusing on a subset of variables (attributes) or samples of data that we want to interpret. This step usually requires query existing data, for selecting the desired subset;
- ***Data cleaning and pre-processing***. The stage at which the data are cleaned. Delete incorrect data, duplicate data etc. Also now describing how the fields will be handled missing values;
- ***Reduction and design data***. Establishing significant attributes of the data to be used in data mining, the selection of those properties of interest to the field of analysis and detection of invariant representations of data;

- ***Choosing data mining application***. Depending on the target set in step 1) to choose the method DM (clustering, classification, regression etc.) Search for patterns of interest;
- ***Choosing data mining algorithm***. In accordance with the method chosen it is decided what model and parameters are appropriate given the situation;
- ***Data mining***. At this point patterns are generated in various forms, such as classification rules, decision trees, regression models, trends etc.;
- ***Interpretation and verification of their patterns obtained by data mining***. Results are viewed, validated and interpreted;
- ***Strengthening the knowledge discovered***. The final step of the KDD process. It consists in using knowledge to support system performance and prevents any abnormalities.

Using data mining methods a few questions can find an answer:

- What is the profile of potential clients?
- What are the significant attributes underlying the decision to purchase the company's products?
- How can we develop models of performance in a company?

The answer to these questions is very important for the managerial practice in terms of efficient use of the available resources:

- human resources (customers, employees);
- material resources (facilities, equipment).

Conclusions

Knowledge management represents a fundamental element for the management of an organization. The approach to achieve a performing strategy is based on the bi dimensionality of the managerial act (technological and cultural). Studies of knowledge management demonstrated that any process occurring within an organization implies the human element and the way he manages the situations. Thus, the following professions related to knowledge management came into being:

- ✓ Knowledge Manager who leads the department dealing with management and capitalization of knowledge.
- ✓ Expert in knowledge transfer: person who extracts knowledge from various sources, organizes it so that anyone can use it and it is updated regularly.

- ✓ Strategy maker in knowledge management: people who draw up strategies for the base knowledge - knowledge audit sources, requirements deriving from the mission, purpose and objectives, assumed knowledge of strategic planning necessary to implement the procedures, etc.
- ✓ Designers of knowledge: people who seek knowledge of design rules and knowledge throughout the organization.
- ✓ Officers of knowledge management: responsible with creating the infrastructure of knowledge, structures and related processes and organizational culture-oriented learning and knowledge accumulation.

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