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RESEARCHES RELATED KNOWLEDGE MANAGEMENT DEVELOPMENT IN ROMANIAN ENGINEERING EDUCATION

Anca Draghici[1], George DRAGHICI[1]
[1]Politehnica University of Timisoara, Integrated Engineering Research Centre,
{adraghici, gdraghici}@eng.upt.ro

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Abstract: The paper describes some research results obtained during our implication in the UNIKM national project (contract no. 92074/2008). There shall be analysis the stage of the knowledge management in higher education institutions in Romania by presenting the research results of a pilot survey. In this context, there will be identifies a number of existing facilities, services, systems that contribute to knowledge management in higher education, such as information technologies facilities (started from databases and other services have extended to virtual reality), networks, communities, partnerships which provide data, information and knowledge to different kind of users (students, professors, administrative employees). Then there are consider the challenges associated with the creation of a knowledge environment in higher education, and explore the opportunities offered by viewing knowledge as an asset for this organization type. Effective knowledge management implicates changes in organizational culture, values, structures and motivation policy.

1. KNOWLEDGE MANAGEMENT IMPORTANCE FOR MODERN ORGANIZATIONS

In global economy, modern organizations need competitive advantage despite their faced with major challenges linked with increasing competition. Organizations have to efficient, and effective manage their knowledge assets. Such organizational behavior determines the increasing. Nowadays, knowledge management imposes a large diversity of *business models*, depending on the organization profile, dimension or its process development. There are recognized several knowledge management enablers (that sustained in different degrees the desire business model for an organization) such as: collaboration, trust, learning, centralization, formalization, T-shaped skills, and information and communication technology support. An integrative strategic approach in the field of knowledge management always conduct to an equilibrium between the ITC used and the techniques, methods and tools for managing people (Sveiby, 2001). Because of this balance, it is useful to clarify the knowledge management definition Table 1 presents an overview of the field together with the dominant perspective or approaches.

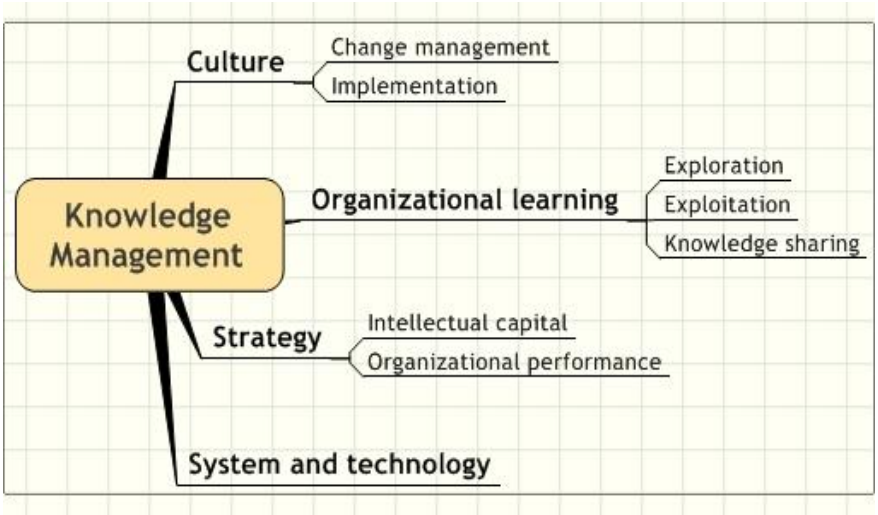


Figure 1. Knowledge Management Dimensions.

Table 1. Relevant Knowledge Management Definitions and Their Perspectives

Author/s	Definition	Perspective – definition focus on:
(Nonaka& Takeuchi, 1995)	… management by creating new knowledge continuously (chishiki keiei).	Human and information integration
(Davenport & Prusak, 1998)	Knowledge management draws from existing resources that your organization may already have in place – good information systems management, and human resources management practices.	Human and information integration
(Swan et. al. 1999b)	... any process or practice of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organization.	Human resources
(Skyrme, 1999)	The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organising, diffusion, use and exploitation, in pursuit of organizational objectives.	Human resources
(Mertins et. al., 2000)	... all methods, instruments and tools that in a holistic approach contribute to promotion of core knowledge processes.	Information
(uit Beijerse, 2000)	The achievement of organization's goals by making the factor knowledge productive.	Strategy
(Newell et.al., 2002)	... improving the ways in which firms facing highly turbulent environment can mobilize their knowledge base (or leverage their knowledge assets) in order to ensure continuous innovation.	Strategy
(Sveiby, 2001)	... the art of value creation based on intangible assets.	Human and strategy integration

From the knowledge management definitions, given in an overview in Table 1, it can be seen that advancements in this field need to adopt an integrated, interdisciplinary and strategic perspective as it can be seen in Figure 1.

Higher education institutions or universities are in the knowledge business, because they are actually very involved in knowledge creation, dissemination and learning processes. By this paper, there shall be examined the applicability of the knowledge management concepts to Romanian universities (presentation of a pilot research result).

In this context, there will be identifies a number of existing facilities, systems or projects which contribute to knowledge management in higher education, such as libraries (even they have extended to virtual one), networks, communities, partnerships and management information systems which provide data on the user (students, professors, administrative employees) profile. Then there are consider the challenges associated with the creation of a knowledge environment in universities, and explore the opportunities offered by viewing knowledge as an asset for this organization type.

Effective knowledge management in universities requires significant change in culture and values, organizational structures and reward systems. The paper will refer to a group of Romanian universities that have tradition in engineering education and will outline a research approach to determine key performance indicators and metrics for the knowledge management activities in higher education.

2. THE RESEARCH CONTEXT OFFER BY THE UNIKM PROJECT

The paper presents some research activities developed by the project: Comparative Researches Concerning Knowledge Management in Romanian Engineering Education, Project supported by Romanian Ministry of Education, Research, Youth and Sport National Authority for Scientific Research Programs Partnerships in Priority Fields - Contract 92074/2008. Within this framework, the general objectives of the project are to sustain and develop research activities, carried out in collaboration by the consortium.

UNIKM proposes the development of a knowledge management based environment in engineering education institutions, for new approach and innovation generation in teaching and research activities, as well as the improvement of effectiveness and efficiency of their services.

From the perspective of these project objectives, there are two key areas to consider when measuring the success of a knowledge management strategy implementation:

(1) The knowledge management enabled area (processes, projects, Community etc.);

(2) The people (employees of the universities involved in the project). For this reason there will be presented the research activities of identifying and characterizing these aspects.

Figure 2 presents the adopted research scenario together with some research results representation used for the scientific research development that were adopted in the UNIKM project. This overview will make understandable the following paragraphs and the research results obtained.

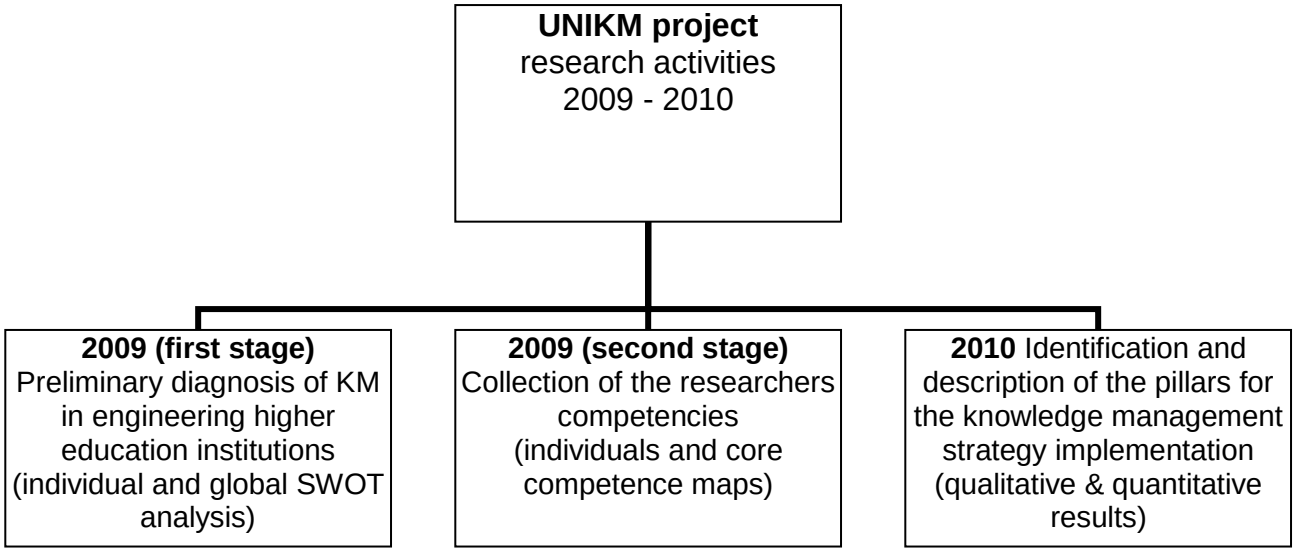


Figure 2. The Proposed Research Scenario.

2.1.1. DIAGNOSIS OF KNOWLEDGE MANAGEMENT IN ENGINEERING HIGHER EDUCATION (ROMANIAN UNIVERSITIES)

Considering these objectives and the research context, a partnership was defined and in the first stage of the UNIKM project development the consortium was established. The partners involved in the UNIKM project are University of Oradea (coordinator), Politehnica University of Timisoara (P1), Technical University of Cluj-Napoca, Politehnica University of Bucharest and a IRECSON (a research institute). In addition, a first knowledge management diagnosis has been obtained from all the partners that represent universities.

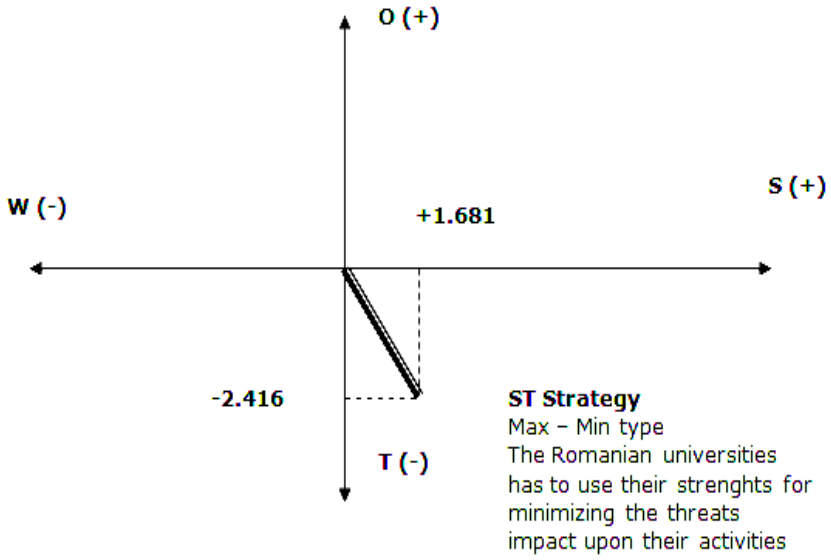
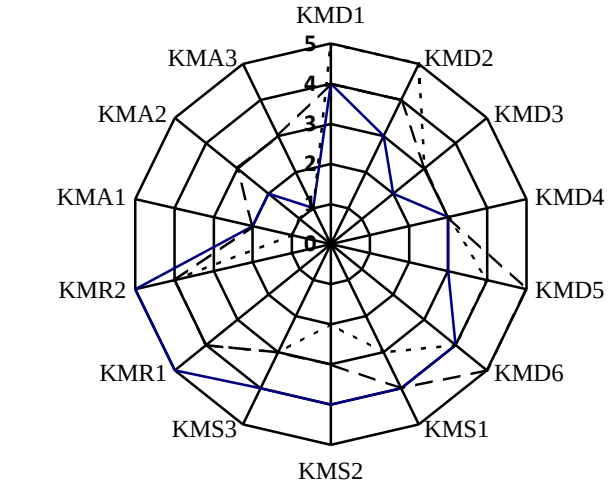


Figure 3. The SWOT Profile of the Research Result.

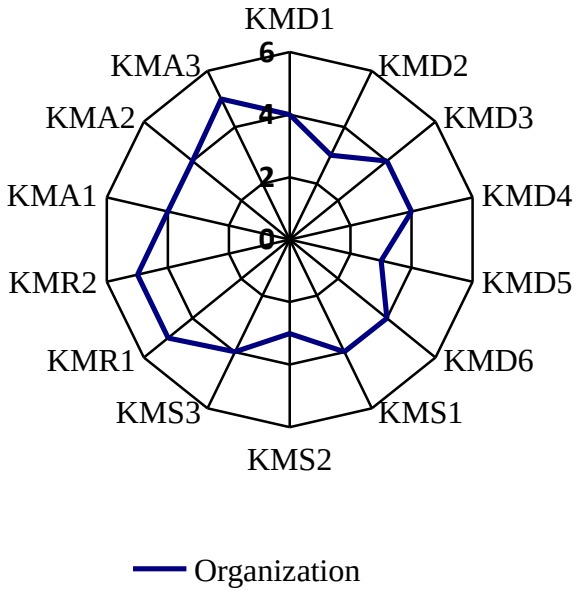
Figure 3 shows the SWOT profile as a graphical representation of the research result. The results underline that: the engineering education in Romanian universities has been supported by a specific and very well defined ITC system (the universities web pages are very well defined and up-grade) that can sustain the knowledge management activities; there are many knowledge management activities developed by the professors (employees that define the academic community). These are the *engines* of the knowledge management in their institutions; some knowledge management activities are developed with the students support (e.g. dissemination, transfer, sharing); the administrative and auxiliary employees have benefits from the knowledge management activities and they are an important link that facilitates the knowledge management activities/processes (e.g. dissemination, transfer, sharing).

2.2. COLLECTING UNKM TEAMS MEMBERS COMPETENCIES

In the second phase of the UNIKM project there were capitalized the teams members competencies and they were structure to better support the future research activities. A survey was carried out to acquire practical information regarding the team members' competences of each university partner. The survey addresses the information, collaboration, sharing possibilities in research, teaching, student and administrative services. The questionnaire used for the survey development was e-mailed to the teams' members and there were 100% rate of e-mails return (until the end of 2009).



a) Competence Map for Individuals (professors 1, 2 and 3)



b) Core Competence Map – for a High Education Institution

Figure 4. Core Competence Maps.

The following Core Competence Maps has been obtained as results of the survey (Figure 4, examples). The Competence Map (a) shows an individual result (that map was design for each university team involved in the UNIKM project) and (b) shows the overall competence of an organization (for each university involved in the UNIKM project). The symbols used in Figure 4 represents indicators of knowledge management in the organization (different aspect characterization by the survey) and they have been quantified by the responds of the members teams. The symbols indicate:

KMD1 – diagnosis about the knowledge management in didactical activities (related to sharing and collaboration for the education plans and syllabus design);

KMD2 – diagnosis about the knowledge management in didactical activities (related to sharing and collaboration for the education plans implementation);

KMD3 – diagnosis about the knowledge management in didactical activities (related to sharing and collaboration procedure for pedagogical matters);

KMD4 – diagnosis about the knowledge management in didactical activities related to the subjects including in the education plans of different specializations;

KMD5 – diagnosis about the knowledge management in didactical activities (related to sharing and collaboration procedure in the case of the examination processes);

KMD6 – diagnosis about the knowledge management in didactical activities related to career plan of young professors;

KMS1 – diagnosis about the knowledge management activities related to students services (information methods, procedures for professors and students);

KMS2 – diagnosis about the knowledge management activities related to students services (students career planning);

KMS3 – diagnosis about the knowledge management activities related to students services (alumni services);

KMR1 – diagnosis about the knowledge management in research activities (related to knowledge creation, sharing, collaboration and information)

KMR2 – diagnosis about the knowledge management in research activities (related to research and development management and best practices)

KMA1 – diagnosis about the knowledge management activities related to administrative services in the university (financial and accounting services);

KMA2 – diagnosis about the knowledge management activities related to administrative services in the university (acquisitions services);

KMA3 – diagnosis about the knowledge management activities related to administrative services in the university (human resources management services).

3. IMPORTANT ASPECTS FOR KNOWLEDGE MANAGEMENT DEVELOPMENT IN ROMANIAN ENGINEERING EDUCATION

In 2010, the research activities were focused on the identification and description of the pillars for the knowledge management strategy implementation in the case of Romanian engineering education.

A survey was conducted using an specific questionnaire with 4 main close questions:

(1) Which are the priorities of the knowledge management activities in your university?

(2) Which are the specific needs of knowledge management activities in your university?

(3) Which are the specific knowledge management tools used and/or exist in your university?

(4) Which kind of administrative support is given by your university for the knowledge management activities development?

All questions answers (possible responds) were measured on a five points scale (1=”fully disagree” – 5=”fully agree”). In order to facilitate interpretation, scores were aggregated after data collection as follows: score 1 or 2 = “Disagree”, score 3 = “Neither agree nor disagree” and score 4 or 5 = “Agree”.

The responds data were analyzed using indices and parametric statistics. Representative results are shown in Figures 5, 6, 7 and 8.

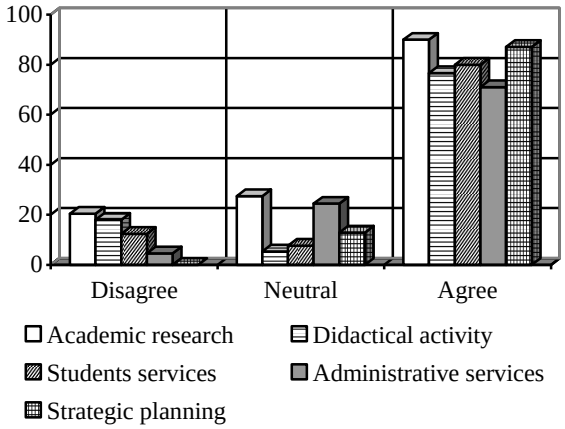


Figure 5. KM Priorities.

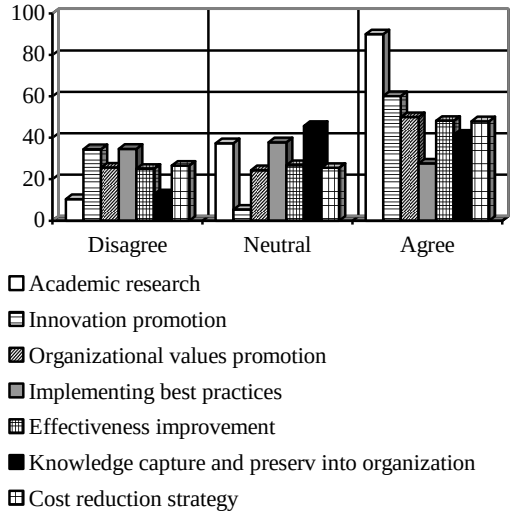


Figure 6. KM Specific Needs

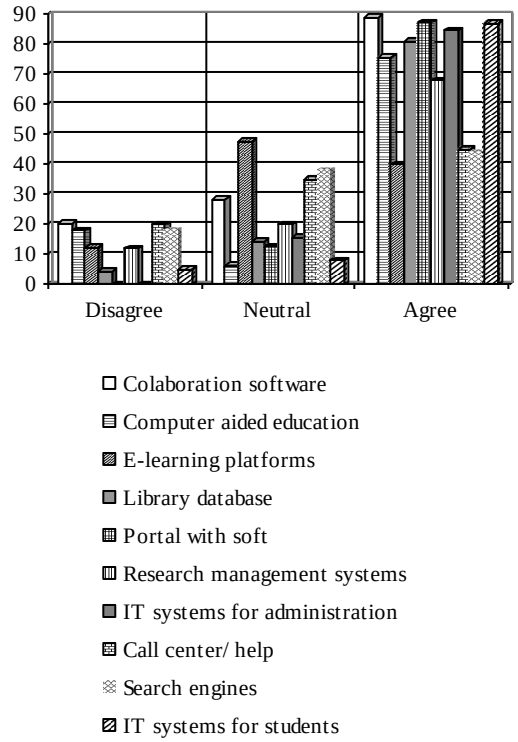


Figure 7. Specific KM Tools

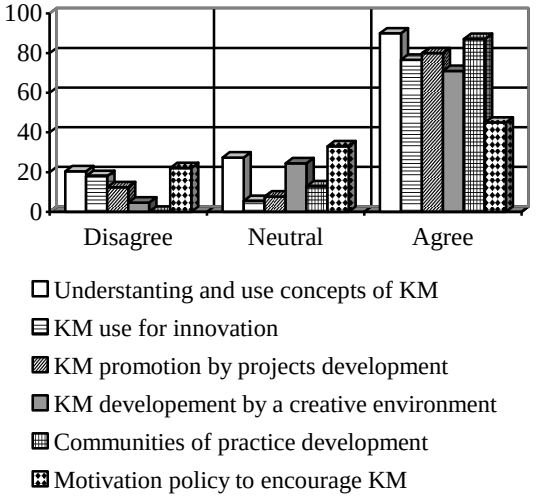


Figure 8. KM Administrative Support

4. CONCLUSIONS

After the first knowledge management diagnosis and the human resources competencies capitalization there have been developed a survey to identify the pillars of the knowledge management. As it has been shown in Figures 5, 6, 7 and 8 (cumulative data for the pilot research using the UNIKM consortium universities):

- Most of the respondents recognize the important of the knowledge management priorities mention in the questionnaire (Figure 5, most answered are *agree*). The

same attitude was related to specific knowledge management Tools (Figure 7) and to administrative support (Figure 8);

- In the case of knowledge management specific needs, respondents were almost uniform distributed between the answers possibilities (Figure 6).

In the future there will be developed a guide for the knowledge management implementation and development in universities based on the research results (particular conclusions elaborated by the senior researchers) and with a collection of best practices (collected at the international level).

5. ACKNOWLEDGEMENTS

The paper presents some of our research results that have been obtained because of our implication as partners in the project: *Comparative Researches Concerning Knowledge Management in Romanian Engineering Education - UNIKM* (contract no. 92074/2008-2011) financed by the National Centre for Programs Management in Romania (in the context of the PN II - Partnerships projects in priority R&D fields). Any findings, results or conclusions expressed in this article belong to authors and do not necessarily reflect the views of the Romanian National Authority for Scientific Research or Romanian National Centre for Programs Management.

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