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Methodology for assessment of knowledge management in higher education institutions

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Since the introduction of knowledge management in higher education is inevitable due to current social and economic changes in the knowledge economy, research of its presence in higher education institutions is important not only for establishing its current state or for following the progress of its implementation, but also for establishing strong and weak points, predispositions and obstacles of HEIs for its implementation. On the other hand, research of KM in education is a rare, unrelated and occasional effort, small in extent and mostly in a form of case study. This paper presents a methodology for assessment of KM presence in the educational environment and deals with both organizational aspects and an educational process, and it was used at management faculties on the territory of Serbia. In addition to the methodology and possibilities it offers, the paper also presents results and experience gained from its application in actual research. Experience which is presented and transformed into the guidelines for the improvement of the methodology could play an important role in later research, and results could be compared to those already achieved.

Key words: Methodology, research, knowledge management, education, university, culture, process.

INTRODUCTION

The current technological and social changes in the human society are the main challenges for the education system of developing world (Alam et al., 2010a). As Birgeneau (2005) has pointed out, higher education institutions (HEIs) aim to "prepare new generations with the skills, cultural and scientific literacy, flexibility, and capacity for critical inquiry and moral choice necessary to make their own contribution to society". To achieve that, educational systems, as a key to national development (Alam et al., 2010b) must constantly reinvent themselves and remain relevant and innovative by implementing new technologies and using a relevant and adoptable knowledge base. For the sake of its viable development, it is inevitable that HEI become the leader in promoting knowledge management (KM) on both institutional and individual levels.

The literature and practice review

Being an emerging discipline, KM in education has not been sufficiently examined. Research in KM is rare even for profit organisation, let alone education sector which is

not for profit (Alam et al., 2010b). The OECD (Organization for Economic Co-operation and Development) occasionally runs projects on KM organized by the CERI (Centre for Educational Research and Innovation) in both the profit (Edler, 2002) and educational sectors (more on the site: http://www.iskme.org/what-we-do/publications/km-ineducation). The famous international consulting house, KPMG, also conducts research in KM in the profit sector. Furthermore, a connection between KM and other organizational performances such as technological innovation (Pavanelli Stefanovitz et al., 2010), environmental strategy (Po-Shin and Li-Hsing, 2010), green management performance (Guo-Ciang et al., 2010) and other have been examined.

Assessment of presence of KM in education, as well as the development of the methodology for it, consists of very few, unrelated and occasional efforts, small in extent and mostly in a form of case study. Since the introduction of KM into educational settings (especially HEI) is inevitable, it is important to research its presence not only for identifying the current state or for following the progress of introducing KM into educational institutions, but also because research can provide information about

strengths and weaknesses, predispositions and obstacles of KM introduction. There are very few studies in the available literature that deal with this issue. The organization that should be mentioned is the Ontario Institute of Studies in Education at the University of Toronto, which runs the "Research Supporting Practice in Education" - a program for learning about links between research, policy and practice. Their publications relevant to this subject matter are "Knowledge Mobilization Intermediaries in Education" by Amanda Cooper (2010), which proposes new ways to conceptualize intermediaries' roles in knowledge mobilization in education, and "Theory, research and practice in mobilizing research knowledge in education" by Levin (2010), which looks at the progress of promoting and increasing KM.

An overview of other studies that theoretically deal with KM in education was presented in the previous paper (Arsenijevic et al., 2009). There is an institute in the USA that deals specifically with this topic called ISKME (Institute for the Study of Knowledge Management in Education). In the Monograph on Knowledge Management in Education, published under the wing of ISKME in 2003[1], Patrides and Nodine, 2003, offered the results concerning barriers to an effective use of information in educational systems. The most recent research over the past few years includes "Knowledge Management and Higher Education: A UK case study" by Cranfield and Taylor (2008), which examines the practice and understanding of KM in higher education, "towards understanding km practices in the academic environment" by Oliver et al. (2003), which outlines the organizational environment and specific factors and assesses the approach and extent to which a semi-autonomous university school manages its organizational knowledge, and "assessing the link between service quality dimensions and knowledge sharing: student perspective" by Boon-In et al. (2010), which examines the link between service quality dimensions and knowledge sharing in the faculty of business of a private university in Malaysia[2].

Research focus

It is interesting that neither of the mentioned studies deals with the application of KM in the educational process - only with organizational aspects of KM in educational institutions. Even the one that examines KM in the university school focuses on organizational aspects only and does not mention KM in the educational process nor does it provide a survey of students' opinion. However, the educational process is very significant for educational institutions from the perspective of KM. Students are both "users" of the service provided to them by educational institutions and "participants" in the educational process. This fact is the most important element and the very focus of functioning of educational institutions. Very often, organizations actually acquire and manage the knowledge gained from their environment, above all from their customers[3].

Knowledge obtained from clients, business partners, providers, competition and, in general, from the environment, is actually as important as the knowledge within the company (know-how). That is why every reliable research in KM practice should include an analysis of the knowledge transfer between a company and its environment[4].

This leads us to the problem statement of this work: A need for a comprehensive methodology for knowledge management assessment in higher education institutions which embraces both its organizational aspect and presence in the educational process. Hence, the main aims of this study are providing a developed and tested methodology as a possible solution which meets the need and contributing to future research in resolving the KM problem in HEIs by presenting results and experience gained.

The premise of the study is inseparability of organizational aspects of KM in educational institutions and application of KM in the educational process, which is why the general objective of the study is two-fold:

i) The first objective of the study is introduction of methodology for the assessment of KM presence in the educational (university) environment which deals with both organizational aspects and educational process.
ii) The second objective of the study is provision of results of a survey conducted in the university environment on the territory of Serbia.

This paper, therefore, provides answers to the following research questions:

1. What common pillars are the most significant KM studies, particularly the studies of KM in education,

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[1] The information, examples and descriptions of KM practice comes from elaborate discussions that took place at KM in Education Summit, held in December 2002 in San Francisco, California. It was the first professional gathering in the US which focused on the role of KM in education. The participants were 40 professionals from K-12 schools, faculties, universities and businesses.

[2] The paper is focused primarily on service dimensions (assurance, responsiveness, reliability, tangibles and empathy) and was conducted on the Management Faculty, one of the most progressive private universities located in the state of Perak, Malaysia. The purpose of this study is to examine the service quality dimensions and link between these dimensions and knowledge sharing.

[3] There are well known examples of this practice. Such is the case of "general electric", which established one of the first call centres and customer services which gained, sorted and organized most frequent customers' complaints. This kind of customers' feedback was then forwarded to the project and production departments to avoid repeating the same mistakes in the future. Another well known example is that of Ritz Carlton, American chain of luxury hotels, which notes each customer preferences, creates customer profiles and knowledge database, which results in a better service and subsequent higher customer satisfaction.

[4] Although it is a very common practice for students to evaluate lectures, this is only the beginning of the first phase of knowledge gaining, and only related to lectures.

generally based on?

2. What grounds is the methodology for KM assessment in HEIs presented in this paper based on?

3. What results have been achieved with the application of the methodology on the sample of management universities in Vojvodina in Serbia, that is, to what extent has the knowledge management system been recognised?

4. How the presented methodology could be improved based on acquired experience and what are directions of further research?

5. What are the possibilities of qualitative elaboration of obtained results of the methodology?

Methodologies used in most important researches in KM

Here is the summary of what has been previously discussed: OECD and KPMG occasionally conduct researches in KM in the profit sector, using the same framework of study in every environment. For measuring the use of formal, informal and everyday knowledge management practices OECD uses KM framework which includes such key points as "policies and strategies, leadership, incentives, knowledge capture and acquisition, training and mentoring and communications" (Edler, 2002).

KPMG conducts research in the profit sector worldwide, but it applies a different approach and its main focus is not on examining the presence of KM but rather on experiences and approaches of companies introducing KM.

Its methodology for knowledge management research is based on the following focus points (visible in all its reports, for example: KPMG, 2005): current state of KM (KM strategy, status of organizations' KM programs, KM value for management), who is responsible for KM (KM drivers, departments responsible), experience to date in KM (current KM problems, benefits or losses resulting from ineffective KM), the role of technology (level of technology implementation, most and least effective KM technologies, technology development), organizational implications (KM projects), KM journey (the level of organizational development - self-assessment and KPMG assessment).

Following studies of KM in the educational sector, The ISKME monograph (Patriedes et al., 2003) summarizes KM practice in some schools trough interviews and discussions on conferences and presents some common barriers to the effective use of information.

Research conducted by Oliver et al. (2003) towards understanding KM practices in the academic environment, is based on four key points: Organizational environment, technological infrastructure, knowledge processes, and knowledge measurement practices. It was applied in one organization – the university school

and used questionnaire techniques. Participants in the study were members of the academic staff and 17 surveys were returned[5].

Cranfield and Taylor's (2008) study "knowledge management and higher education: A UK case study" uses well known Stankosky's KM pillars: leadership (environmental, strategic, and enterprise-level decision-making processes), organization (operational aspects of knowledge assets), learning (organizational behavioural aspects and social engineering) and technology (various information technologies that support and/or enable KM strategies and operations). The focus of this study was to evaluate the application of KM at Heist in England and how suitable they were for KM implementation. It was conducted in seven state faculties (excluding private ones), and surveyed 18 respondents - university staff members in different capacities.

Due to these facts it can be noticed that KM literature lacks a common framework because there is no consensus about a definition of KM itself. There are many available frameworks, some of them focusing on technological aspects, some on cultural, and others on knowledge processes (capture, sharing and storage of knowledge).

Discrepancies in methodologies appear mainly because there is still not a common and compatible KM framework. While KPMG and ISKME use different approaches from other studies (KPMG focuses on experiences and approaches to KM, whereas ISKME's research focuses on technological aspects or information organization), other studies examine the same issues: whether KM processes are present in an organization, whether there is an adequate technological infrastructure, whether KM is supported by organizational aspects (leader's support, organizational learning, culture, goals and strategies). In fact, the common denominators of all most significant studies of KM mentioned herein are three pillars of KM well known in literature: People, technology and processes (or culture, technology and structure of an organization). These are the pillars this paper attempted to determine with the first question.

The methodology presented in this paper is based on KM framework which equally addresses KM processes and KM culture. There are plenty of theories on KM processes in the literature, but the one which unites all of them is taken as the basis for this methodology. In addition, examining these processes will also involve examining technological aspects, since this KM framework includes the process of storing and organization of knowledge and at the same time analyzes if these processes are in progress and if organizations are using an adequate technology.

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[5] The main conclusion derived from the survey of KM practices is that there is a difference between the perceived importance of KM and importance of its implementation.
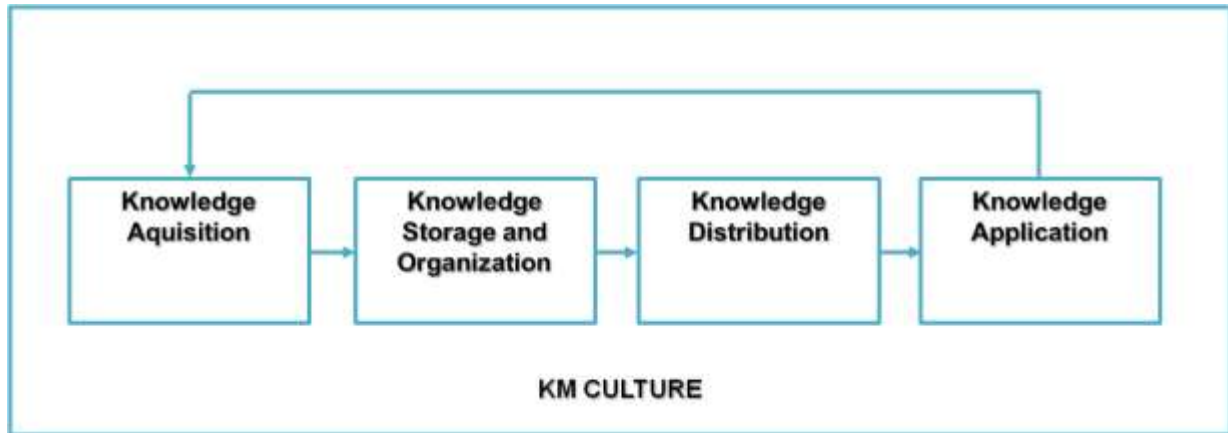
Figure 1. Knowledge management framework.

MATERIALS AND METHODS

Framework of knowledge management in education – Conceptional framework of study

The methodology presented in this paper is based on KM framework derived from the KM Process theory by Donald Clark (Clark, D. R. (2004) Instructional System Design Concept Map). KM framework is presented in Figure 1 and includes five different dimensions: KM culture and four KM processes: knowledge acquisition (gaining and creation), distribution (sharing and allocation), storage and organization and knowledge application.

Knowledge sharing represents the transfer of knowledge from one person to another, while new knowledge is often created in the process. The main purpose of this process is for all the individual knowledge, both tacit and explicit, to become collective. In HEIs, this process includes the exchange of employees' experiences, ideas and information through a dialogue, presentations and lecture attendance. Students' knowledge sharing in class is realized trough team work, common projects, debates and discussions, with the aim of exchanging and managing knowledge and opinions.

Knowledge allocation (in literature also known as dissemination) is a process of knowledge distribution which puts all the available knowledge at disposal of all employees. At faculties, this process is manifested through a systematic and organized distribution of new knowledge to the whole faculties' staff. It can also be manifested through a practice of informing students about availability of relevant knowledge through information and communication technologies (E-mails, the Internet).

Knowledge gaining is the process of acquiring completely new knowledge one did not have previously. Knowledge gaining at faculties is manifested through the organization of seminars and training programs, through studying literature and other sources, interaction with the surroundings, consultations or mentoring. The knowledge creation process is realized through research and experimenting in work, analysis and discussion, and scientific research projects.

Knowledge storage aims at enabling accessibility of knowledge to everybody within the system. Stored knowledge has an explicit form and is organized for its improved transparency and easier application. Storage and classification of knowledge in HEIs (academic institutions) can be organized through a certain informational system (knowledge data base or knowledge and information-exchange engine software). Knowledge data base can be accessible to one or more faculties, bringing together all the relevant knowledge of both teachers and students within the network of interconnected faculties.

New knowledge application represents use of shared and organized knowledge with the aim of increasing the effectiveness and efficiency of the work. Knowledge application represents the peak of knowledge management cycles in an organization. All the previous processes have served as preparation - knowledge was selected, shared, integrated, stored and allocated in order to eventually be used in an organization, with the aim to enhance troubleshooting, decision-making, and increase newly-created values. This is the key process, but it cannot be referred to as more important than others. If previous preparation has not been done adequately and in a quality manner, knowledge application will not occur. Certain knowledge can even be misused in such a case. That is why all these processes are equally significant.

Teaching staff of a faculty manifest knowledge application process through interaction and application of shared knowledge and ideas, or systematically, through organizing and storage in the afore-mentioned knowledge data basis. The basic purpose of application of that knowledge is quality decision-making and troubleshooting within the educational process, as well as overall performance at the faculty. Knowledge application in the classroom is realized through individual work or practical projects. To get a complete picture of KM at faculties, all these processes should be put in the context of KM culture (culture of knowledge sharing, learning and experimenting), which is the key factor in implementing KM into educational institutions. The culture of a faculty is in fact the milieu in which mentioned processes are realized. Argumentation of Vehbi (2009) affirms this notion: "Strong school culture elevates academic performance of this school. Throughout schools where organizational commitment is high, more effective learning environment is created".

This set of processes, along with KM culture, is what makes up the framework of KM in HEIs. If an organization does not have culture that supports and stimulates collective sharing of knowledge, learning and experimenting (KM culture), individual solutions that can enable realization of stated processes, will not provide the necessary level of KM. KM framework presented in Figure 1 which includes four KM processes and KM culture is the ground on which the research methodology in this paper is based. At the same time, this ground includes all three key factors of knowledge management: people (KM culture), processes (four KM processes) and technology (process of storage and organization of knowledge) and include both organizational aspects and aspect of educational process of KM. This ground is mentioned in the second research

question of the paper.

Under assumption that organizational aspects and educational process in educational institutions are inseparable, a methodology has been created to evaluate the presence of KM on a teaching staff level (among teachers) and level of lectures (among teachers and students). Teachers are the ones who (should) implement and lead the process of knowledge management at faculties and create KM culture in a classroom. On the other hand, students do not participate in the process of implementation of KM in classroom practice; they are participants in classroom activities and, above all, users of an education service, and, thus, competent arbiters whose opinion must be taken into consideration.

Students can influence classroom culture and improvement of certain processes or activities, as well as general success of KM processes. This is why the methodology presented herein includes both points of view, in the relevant environment.

Sample selection, size and construction

This methodology applies a research technique of formal and structured communication - questionnaires. Instruments have been designed for purpose of gathering required information about the level of KM application at management faculties, through questions which examine this issue from the aspect of KM framework dimensions. Research was conducted at private and state management faculties in Vojvodina, on an adequate sample and provides an overview of a complete geographic region, taking into account faculties of both ownership structures. The research includes two types of respondents: 90 lecturers and 369 students, with the total of 459 respondents, which was enough for statistical evaluation of data by multivariate analysis.

The selection of respondents in both groups was random, with an exception that the surveyed students were all seniors, since they have created attitudes and gained experience in the previous years of studying. The number of respondents was determined in accordance with the number of questions in the questionnaire, for purpose of obtaining valid research results. The premise of this methodology is that it is necessary to examine the presence of KM primarily at management faculties, since management is the focus of their teaching and research, and they represent a pool of knowledge, competence and awareness of the necessity and advantages of KM. Faculties focused on other scientific fields can because of their particularity favour some KM processes over others and thus give a distorted image of KM presence. For instance, faculties for sports and physical education are more likely to cultivate sharing of knowledge; science faculties such as faculties for chemistry, physics, and pharmacy have more possibilities for creating and usage of knowledge in laboratory conditions; social science faculties are probably more focused on gaining and sharing knowledge, etc.

Since it is well known that advantages of KM are only achieved when all the processes are used simultaneously and where there is an adequate feedback, advantages of the sample selected from management faculties are clear. This is why this research represents a challenge and provides relevant scientific information - it offers a real image in the most consistent and best conditions. Other HEIs can only have less presence of the KM concept.

The following methods were used in the empirical part of the paper:

1. The Delphi method for designing the questionnaire, which involved six experts from different relevant fields: an expert from the field of intellectual capital and management, expert from the field of andragogy and education management, expert from the field of human resources management and leadership and three experts from the field of statistics;

2. A survey method using the questionnaire technique, for purpose of confirming the proposed hypothesis, that is establishing the level of presence of KM processes at the surveyed faculties;
3. Statistical processing of results obtained by the empirical research conducted in accordance with the most adequate accepted statistical methods that fall under multivariate analysis.

Research instruments

This methodology uses two questionnaires for two groups of respondents. The first one was designed for teachers and examines KM on both organizational and class levels, and the other one was designed for students and examines KM on a class level. Instruments of this research (questionnaires) were created on the basis of the previously mentioned KM framework. They put KM culture and processes into the educational environment by defining a set of questions which practically represent both KM processes and KM culture. With the aim of objective examining, two different perspectives (that of the teachers and of the students) of examining KM are formed in special questionnaires. In order to avoid biased research results, which would favour a certain perspective, both perspectives were equally taken into account in the evaluation of the presence of KM in the educational process on the surveyed sample.

The scores of presence of the KM framework elements are given according to Likert scale system and range from 1 to 5[6]. Apart from the questions that examine the attitudes towards KM processes and KM culture at the faculty, instruments include certain independent socio-demographic variables.

Structure of the respondents is defined by those variables. In addition, independently of KM framework elements, questionnaires for teachers examine their assessment of KM presence on an organizational level. Upon completion of the research, this provides a comparison between estimated and factual presence. It is recommended that this comparison is expressed through a statistical method of t-tests and calculation of Pearson's correlation coefficient. This comparison offers a clear picture of teachers' perception of KM and their (im) partiality. The methodology offers a system of evaluation of presence of KM framework elements, hence culture can be extremely non-affirmative, non-affirmative, average, affirmative or extremely affirmative, while processes can be unrecognized, partially recognized, moderately recognized and fully recognized. The total score on the organizational level is obtained from an average KM score within the teaching staff and in classroom activities.

In order for research results to state that KM is present in an organization, it is necessary that all five dimensions of the KM framework are recognized. Based on the analysis of the level of process presence and individual questions within KM framework elements, it is possible to distinguish good practice and identify the weaknesses and obstacles for achieving better results.

RESEARCH RESULTS - EVALUATION OF KM PRESENCE

The tables offer research results and scores of all KM

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[6] The level of the dimension of culture in relation to score range: 1 to 3: highly non-affirmative, 3 to 3.5: non-affirmative, 3.5 to 4: average, 4 to 4.5: affirmative, 4.5 to 5: highly affirmative. The level of the dimension of process in relation to score range: 1 to 3: the process is unrecognized, 3 to 3.5: the process is partially recognized, 3.5 to 4: the process is recognized to a small extent, 4 to 4.5: the process is moderately recognized, 4.5 to 5: the process is completely recognized.

Table 1. Average scores of the respondents concerning the dimension of KM culture.

	Teaching staff (Q1-Q8)	Lectures (Q9-Q12)	Total
Teachers	3.8548	4.5333	4.0361
Students		3.6098	3.8902
Total	3.8548	4.0715	3.9632

Table 2. Average scores of the respondents concerning the dimension of the process of knowledge acquisition (gaining and creating).

	Teaching staff (Q13-Q19)	Lectures (Q20-Q24)	Total
Teachers	3.7270	4.0578	3.8924
Students		3.2314	3.2314
Total	3.7270	3.6446	3.6720

Table 3. Average scores of the respondents concerning the dimension of the process of knowledge distribution (sharing and allocation).

	Teaching staff (Q25-Q30)	Lectures (Q31-Q35)	Total
Teachers	3.0148	3.4178	3.2163
Students		2.5373	2.5373
Total	3.0148	2.97755	2.9899

framework dimensions, while table keys contain question-naire questions for each dimension separately. As individual KM processes are conducted on the levels of teaching staff and lectures, the evaluation covers both of these levels, taking into account answers of both groups of respondents. Further will be presented an overview of both individual and collective results. Figures in Table 1 shows that the total score of KM culture in surveyed faculties corresponds to the average value and has the highest grade of all the dimensions. According to the answers of both groups of respondents, the level of KM culture in class is higher than that among the teaching staff - affirmative compared to moderate. In addition, the teachers gave a much higher evaluation of KM culture in class than the students, almost by a whole grade. The difference between teachers' evaluation of the teaching staff and class culture is also almost a whole grade.

Scores of the surveyed faculties related to the dimension of the knowledge acquisition process are presented in Table 2, and the total average score is 3.67. The scores of the teaching staff and lectures are of the approximately same value, while there is a considerable difference between teachers' and students' evaluation of lectures. Scores of individual questions for this dimension indicate that there is a considerable interest among teachers in expanding their knowledge independently and creating new knowledge through their work, but on an individual level. Practice that is less present in terms of

knowledge sharing is teachers gaining and creating knowledge on a collective level. With the total average value of 2.99, the knowledge distribution process (Table 3) is on the very upper limit of low intensity processes.

According to both teachers and students evaluations, the knowledge sharing process is less present in class than among the teaching staff, according to the teachers' perspective. Concerning the presence of this process in class, the teachers give a much higher grade than students. If this score is compared with the score of the teaching staff sub-dimension, we can see that the teachers themselves give a higher grade to knowledge sharing in class than among the staff. The total average score for the process of knowledge storage and organi-zation is 2.28 (Table 4). This process has the lowest grade of all. Additional questions in the questionnaire, where the respondents had to state specific website addresses or KM systems, indicate that this sample does not include any form of IT support to knowledge management.

Table 5 shows that the total mean value of the dimension of knowledge application process is 3.52. According to the opinion of both groups of respondents, the knowledge application process is more present in class than among the teaching staff (which is, as in the case of KM culture, the result of educational practice rather than knowledge management). Most part of the process of knowledge application among the teaching

Table 4. Average scores of the respondents concerning the dimension of the process of knowledge storage and organization.

	Teaching staff (Q36-Q37)	Lectures (Q38)	Total
Teachers	2.3556	2.2000	2.2778
Students		2.2880	2.2880
Total	2.3556	2.244	2.2812

Table 5. Average scores of the respondents concerning the dimension of the process of knowledge application.

	Teaching staff (Q39-Q42)	Lectures (Q43-Q45)	Total
Teachers	3.3444	4.0667	3.7055
Students		3.1635	3.1635
Total	3.3444	3.6151	3.5248

staff refers to the application of individually acquired knowledge, while knowledge acquired collectively or at IS faculties is not used. In class, students also use individual knowledge rather than previously shared and organized knowledge.

Legend

Legend for the Table 1, Q1 : The prevailing atmosphere at the faculty is that it is desirable and appreciated to conduct research and be innovative (3.7[7]). Q2: The prevailing atmosphere at the faculty is that it is desirable and appreciated to learn and share knowledge and experiences (3.8). Q3: The faculty has a defined business philosophy (the mission and vision of the faculty) (4). Q4: Teachers are directed towards development of their potentials, and dedicated to the faculty's mission and vision (3.5). Q5: The faculty is inclined to self-evaluation and self-questioning according to environmental circumstances (3.6). Q6: Teachers are creative and prone to critical thinking (3.5). Q7: The most valuable knowledge teachers have is shared with everyone, regardless of advantage this knowledge can give them (3.8). Q8: Employees are motivated to share knowledge at the faculty, that is, to contribute to faculty's collective knowledge database: (3.1). Q8a: by financial stimulus (2.8); Q8b: by career advancement opportunities (3.2); Q8c: by public acknowledgement (3.3); Q8d: by faculty's team spirit (3.1); Q8e: by other benefits (3). Q9: Teachers insist that students ask questions, even if those questions

are not directly connected to the subject matter being discussed (3.8). Q10: Students are encouraged and directed towards problem solving, individual researching and freely drawing conclusions (4.1). Q11: In class teachers insist on communication among students, encourage them to state their opinions and exchange ideas freely, directly and without prejudice (4.2). Q12: Students are encouraged to be creative and innovative (4.1).

Legend for the Table 2, Q13: Teachers gain new knowledge in their field through literature, additional training or from other sources (4.5). Q14: In their work, teachers gain knowledge from teachers of other faculties, through sitting in on lectures, discussions at joint conferences or organized projects (3.5). Q15: Teachers learn from experts available to the faculty though consultations and mentoring (3.1). Q16: Teachers exchange knowledge, experiences and ideas with colleagues from other relevant organizations from their environment (institutes, associations, companies or expert organizations) (3.8). Q17: Through research and experimenting in their work (in class, lesson planning and other school activities) teachers develop new knowledge in their field (4.1). Q18: Through analysis and discussion about methods, implemented innovations and results, teachers and their colleagues discover new knowledge useful in their further work (3.7). Q19: Teachers participate in scientific and research projects at the faculty and thus reach new discoveries in their field (3.4). Q20: Teachers demand the use of Internet and other resources besides students' official textbooks (4.2). Q21: Teachers direct students to write reports and papers where they have to gather information from media and wider literature (4.3). Q22: Lectures include research and experimental projects where students gain new knowledge on their own (3.1). Q23: Students are encouraged to discover new forms of work, and if efficient, to use them in class (3.3). Q24: Teachers encourage students

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[7] The number in the parenthesis represents the total score for each individual question (for the questions in the "teaching staff" column: the average score of the teachers' answers; for the questions in the *lectures* column: the average score of both the teachers' and students' answers).

to participate in faculty's projects and, consequently, in creation of new knowledge (3.4).

Legend for the Table 3, Q25: At faculty there is a practice of sharing useful knowledge, experience and conclusions among teaching staff (in lesson planning and conducting, organizing classroom activities and conducting relations with students) (3.6). Q26: Teachers visit pilot (trial) classes of their colleagues which feature new lecturing methods and techniques (2.3). Q27: Teachers collaborate by analyzing and exchanging lesson materials (lesson plans and strategies, teaching props, tests, quiz questions, additional materials) (3.1). Q28: Faculty organizes presentations of best practices (methods, classes, lesson plans and strategies, tests, quizzes etc.) for whole teaching staff (2.6). Q29: If general knowledge at faculty is expanded, the employees are notified and able to access and use that knowledge (3.5). Q30: Faculty organizes seminars and training courses for teachers and they attend them regularly (2.8). Q31: During lectures students are encouraged to work in teams, to exchange and share knowledge and ideas (3.8). Q32: During lectures, teachers organize common projects or quizzes involving students of other faculties or departments (2.1). Q33: Lectures feature debates and similar activities in which students' state and confront their opinions about an interesting topic related to the subject matter (3.1). Q34: Faculty organizes seminars or additional lectures for students when it becomes apparent that they lack specific or additional knowledge (3.2). Q35: Faculty practices notifying students via e-mail about new relevant knowledge that they can access (3.1).

Legend for the Table 4, Q36: Knowledge is organized within an information system (knowledge data base or software for searching and exchanging knowledge and information) at faculty (2.3). Q37: There is a system for knowledge organization in a form of database accessible to other faculties (2.4). Q38: Faculty has an information system containing student papers and projects which they can use in their studies (2.2).

Legend for the Table 5, Q39: In practice, teachers apply methods, plans and strategies acquired from their colleagues through materials exchange, discussion or lectures visits (3.6). Q40: In practice, teachers actively use knowledge they acquired by learning or additional training (4.5). Q41: In practice, teachers use knowledge (expert, from their field of interest, or pedagogical, about lesson planning and conducting or teaching methods) gained through a common information system available at faculty (2.5). Q42: Knowledge in the information system is at disposal of all employees and is used in decision making and problem solving (in class, self improvement and work in general) (2.8). Q43: Students are encouraged to extensively use all the accessible knowledge from information systems (if available) and libraries, in order to troubleshoot and write papers (3.4). Q44: Students are encouraged to use all the available knowledge when making decisions (4). Q45: Lectures

include projects in which students have to apply their knowledge practically (3.5).

DISCUSSION

Research results show that KM culture was recognized on an average level, knowledge acquisition process to a small extent, knowledge distribution process was not recognized[8], knowledge storage and organization process was also not recognized and knowledge application process was recognized to a small extent. Considering it was stated at the beginning of the paper that the methodology implies that all processes should be recognised in order to be able to assess the presence of the KM system (which is not the case here) and that a mean value of all processes ranges between 3 and 3.5, we can conclude that KM was partially recognized in the surveyed sample. This information at the same time provides an answer to the third research question from the introductory part of the paper. These results can be interpreted with the fact that, at the time the survey was conducted, KM in education was still in its infancy and within academic circles. This was pointed out in one of the first studies in KM, by Oliver et al (2003): "the low level of implementation found are the major indicators of this being an emerging area". The real challenge would be to use this methodology to conduct a research in KM in the future, when dispersion of KM in HEIs has taken momentum, and on a sample drawn from an internally more developed educational system.

Additionally, according to the questioned sample, the teachers had a tendency to give socially desirable responses, but only when asked about their own practice (from their own point of view, they gave a higher grade). The same consideration of students' answers prevented the distortion of results. KM dimensions on the teaching staff level remained unaffected by teachers' socially desirable responses because the questions referred to the practice of their colleagues, about which they showed complete impartiality.

Analysis of the level of presence of specific KM framework dimensions offers a possibility of distinguishing good practice and identifying weaknesses; however, when interpreting results, it is important to take into account scores of individual questions, which offer an even more detailed overview of strengths and weaknesses, as well as obstacles for achieving better results.

These results present teachers' considerable interest in

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[8] With the total average value of 2.99, the knowledge distribution process (presented in Table 3) is on the very upper limit of low intensity processes. This process is generally regarded as problematic, and a study by Cranfield and Taylor (2008) points out the same issue: "Academics are considered experts in their field and hence do not take too easily to being managed or having "what they know" managed. They are not averse to the idea of sharing of best practice, but, rightfully so, want to exercise their academic freedom so as to cultivate innovation and creativity".

expanding their knowledge independently and creating new knowledge through their work, but on an individual level. There is an obvious lack of initiative among the teaching staff to collectively acquire and create new knowledge, and encourage the same processes among their students in class. In accordance with the afore-mentioned, there is an obvious tendency to utilize indivi-dually acquired knowledge and disregard collectively acquired or previously stored and organized knowledge. Furthermore, the results suggest that within the dimension of KM culture on the teaching staff level, moti-vation, that is presence of stimulus for knowledge sharing is low[9]. Everything points to the fact that KM presence is elemental and sporadic, on an individual level and directed towards individual interests, rather than strategic and directed towards the interests of the whole organiza-tion. This assumption, derived from the analysis of scores of individual questions, was confirmed by the result referring to the scores of all dimensions - absence of knowledge storage and organization[10]. Introduction of knowledge storage and organization process requires a firm initiative on the management's part to procure and provide IT solutions, as well as create a suitable cultural ground for its use in the organization. Absence of this solution implies absence of managerial initiative, and is manifested in its elemental and sporadic realization, primarily on an individual level[11]. Although this process objectively depends on managerial initiative, it was not present in the sample on which the research was conducted, so there is no clear view of the relationship between the management and willingness of users to use it - two of the most important prerequisites for the presence of this process.

The research should also be conducted on a sample where there is an IT solution for knowledge management and the range of questions for teachers and students should be elaborated to refer to their own practice - questions about whether the faculty provides an IT solution and those about whether an IT solution is being used should be separated. It would also be useful to present this issue from the management point of view.

Conclusion

Since the introduction of KM in higher education is

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[9] Financial stimulus is not an important motivator here; acknowledgement was the stimulus most highly rated, but still not regarded as enough.

[10] Similar findings of the absence of knowledge storage and organization process were presented by Oliver, Handzic and Van (2003) "there may be a need for further investment in technological infrastructure in order to facilitate knowledge management processes".

[11] Moreover, the sporadic implementation of KM primarily on individual level, with the lack of management support and initiative, can be recognized in earlier findings in the survey of KM practices by the variance between the perceived importance of KM practise and KM implementation (Oliveret al., 2003). Even though respondents of the mentioned research found that the knowledge management system is very important, they do not practice it. Furthermore, this phenomenon is also confirmed with the teachers' tendency to give socially desirable responses from this research (p: 21).

inevitable due to current social and economic changes in the knowledge economy, research of its presence in higher education institutions is important not only for establishing its current state or for following the progress of its implementation, but also for establishing strong and weak points, predispositions and obstacles of HEIs for its implementation. This paper presents a methodology for research of KM in HEIs which was used at management faculties on the territory of Serbia. In addition to the methodology and possibilities it offers, the paper also presents results and experience gained from its appli-cation in actual research. Experience which is presented in discussion and transformed into the guidelines for the improvement of the methodology could play an important role in later research, and results could be compared to those already achieved.

First of all, through statistical evaluation of the research results (calculating Cronbach's Alpha coefficient and factor analysis) it has been determined that reliability of the questionnaire is very high.

Factor analysis has distinguished "prominence of all processes and the KM culture" (except for the process of storage and organization, since it wasn't present among the surveyed sample, and the respondents did not iden-tify it as a distinctive factor). Cronbach's Alpha coefficient has shown "an exceptionally high value of reliability for the measurement scale for teaching staff: 0.9339, while the reliability of instruments for students has been con-firmed by the coefficient value 0.8732", also determined as high. This data offers the conclusion that the instruments used for this research are well designed and reliable for measurement of given issues.

The methodology was designed to provide several advantages. It begins with the inseparability of organizational aspects of KM in educational institutions and application of KM in educational process, so it examines both KM levels, as opposed to other similar studies. Furthermore, it encompasses perspectives of two most important groups within HEIs, teachers and students, and thus provides a clearer picture which is not affected by a subjective point of view of a specific and consistent group of respondents. On the other hand, perspective of the students, who are the users of the education service, offers additional information which, when taken out of context, represents a valuable input to faculties and helps them improve their own performance.

Examining the process of gaining and creating new knowledge included practices of knowledge acquisition from the environment: knowledge gained from other students (Q22), other HEIs, expert organizations, scien-tific institutes and economy in general (Q14, Q15, Q16, Q36). This represents a significant KM indicator and is in accordance with the statement from the Introduction that "every reliable research in KM practice would have to include investigation of knowledge transfer between com-pany and its environment". The methodology has been developed on a KM framework based on three pillars

common for the methodologies of other similar and already conducted studies: people, processes and technology. Human perspective was included in the dimension of KM culture, process perspective was examined through four KM processes, and technological perspective was examined within the process of knowledge storage and organization. The methodology is applicable at faculties of all scientific fields, although it is possible to examine a sample drawn from management faculties since they represent a pool of knowledge, skills and awareness of KM necessity, and thus provide a clearer perspective than other HEIs.

Apart from measuring KM presence, research results obtained with this methodology offer a range of possibilities: examination of relation between KM culture and KM processes using Pearson's correlation coefficient, factor analysis and t-tests, which was earlier published in the previous the study (Arsenijevic et al., 2009); inter-correlation among individual KM processes, as well as KM dimensions within the teaching staff and on lectures; influence of socio-demographic factors on KM perception examined by a discriminative analysis - factors like gender, age, profession, qualifications, ownership structure of a faculty, etc. (observation of a connection between gender and willingness to share knowledge could be particularly interesting); furthermore, also with a discriminative analysis, study of the difference in KM perception between teachers and students, that is degree of impartiality of one or both groups (t-tests, discriminative analysis), (Arsenijevic et al., 2009) etc.

All of the stated analysis represent potential methods for providing relevant scientific information in the field of KM in HEIs, and represent a possibility of a qualitative elaboration of results obtained by the presented methodology. This brings us to the answer to the fifth research question. Based on discussed characteristics of the methodology and experience gained from its testing, our recommended answer to the forth research question are guidelines for further improvement of the presented methodology and further research paths as follows:

1. Faculty management should be introduced as the third group of respondents, as a KM control group within the teaching staff, to obtain an additional insight into the KM process and culture at the faculty for areas not accessible to students;
2. KM strategy should be examined and connection made between the organizational strategy and general evaluation of KM (intended and implemented), as well as between the organizational strategy and management's answers to the questions regarding their own practice;
3. IT logistics and support should be examined in more detail.

If present, systems for knowledge and information management should be examined according to several criteria: knowledge sharing level, presence and amount of knowledge data base, access to knowledge exchange forums, amount of added content in a period of time, amount of used content from a data base, tasks and positions related to the IT support of knowledge management (controlling and updating contents), etc. It would be necessary to conceptualize this issue in detail, using already existing research instruments. It is important that IT is viewed only as a logistics support to the KM process and not as a self-sufficient unit which represents a KM solution.

Research on knowledge management (as well as on all other areas) requires continuous improvement in more sophisticated methods and instruments and more sharing of knowledge, ideas and experience among researchers in different fields. This is why this paper should be viewed as a starting point in the development of this field of research.

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