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THE ROLE OF KNOWLEDGE MANAGEMENT TECHNOLOGIES AT A POLISH UNIVERSITY – A CASE STUDY

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Abstract

The purpose of this paper was to present an analysis on challenges and barriers connected with the use of technical, or Information Technology (IT) tools of knowledge localization, creation, use, transfer, and codification at a Polish university. A synthetic review of the literature on knowledge management (KM) IT tools is presented. Results of surveys and in-depth interviews on the use of IT KM tools conducted among academic teachers, university IT specialists and university administrative staff from the Polish-Japanese Academy of Information Technology in Warsaw are presented. Discussion and implications are carried out. The main conclusion of the study is that although teachers and researchers are aware of the usefulness of various IT KM tools and are willing to use them in their daily work, there is still room for improvement. Its seems that the main challenge for academic authorities is to conduct a thorough analysis of the real needs of academics concerning KM IT tools and to provide them with both the tools and the knowledge how to use them. A further, more comprehensive research into the matter will be worth conducting.

Keywords: *Knowledge, knowledge management, it tools, higher education.*

1. Introduction

Modern developed economies tend to be Knowledge Based Economies. Therefore, there has been a dynamic development of studies focused on knowledge management. And institutions that have always been meant to create and share knowledge are universities, or institutions of higher education. It is worth mentioning here that the views on the goals and ways of creation and dissemination of knowledge in higher education institutions have significantly changed throughout the centuries. For example, the aim of the medieval university was to protect knowledge from the past and to cultivate knowledge and traditions in accordance with the interpretation of the Church doctrines rather than to create new knowledge or technologies. In the nineteenth-century, by contrast, the so-called Humboldtian university focused on developing research in the field of *pure science*, i.e. basic research. In the same period in the United States, most universities adopted the direction proposed by Yale College, according to which higher education institutions should teach only logical thinking. A group of universities, however, headed by the prestigious Harvard University did not agree with these assumptions as they recognized the research of practical and utilitarian nature as a priority for scientific activity (Matusiak, 2010, pp. 159 - 169). Nowadays it seems that universities differ in the proportions of studies devoted to basic research, utilitarian research and teaching, but none of them would decide not to create and share any new and at the same time usable knowledge at all.

The aim of the article was to continue studies on the characteristics and effectiveness of various IT (Information Technology) tools of knowledge management in higher education institutions in Poland started by the author in 2018 (Cieciora, 2018) and to define challenges and barriers connected with the use of technical, or IT tools of knowledge localization, creation, use, transfer and codification in the academic environment

First, a synthetic review of the literature on knowledge management (KM) IT tools is presented. Next, results of surveys and in-depth interviews on the use of IT KM tools conducted among academic workers and administrative staff in an academy in Warsaw are presented and discussed. Finally, conclusions of the analysis are presented.

2. Knowledge management IT tools in modern organizations – a literature review

As for the above-mentioned technical knowledge management tools, it should be emphasized that their dynamic development is closely connected with using more and more advanced information technologies. In organizations it becomes common to use facilities such as content management systems (CMS), i.e. software that allows easy creation and development of websites and www servers also by users with no technical knowledge, or Data Mining and Knowledge Discovery tools (translated, e.g., as exploration or extraction of data), in which statistical techniques or machine learning are used to help extract and analyze data from large databases and data warehouses. Other dynamically developing tools include blogs, communication tools such as e-mails, text messages, electronic newsletters, tele- and video conferencing group calendars, systems for working together remotely over one text (an example can be Google Docs), wikis, intranets, extranets, corporate file repositories, knowledge bases or e-learning trainings, as well as decision support systems or artificial intelligence tools (Dalkir, 2005, pp. 217 - 236). In the literature on the subject, one can find quite a lot of studies on the usefulness of IT KM tools in various types of modern organizations as well as challenges connected with their implementation. Sikorski *et al.* (2015), e.g. analyzed the use of intranet portals. The main conclusion was that advanced intranet portals can serve in many companies as Electronic Workplace (Digital Workplace) and facilitate to a great extent knowledge sharing. (Sikorski *et al*, 2015, pp. 26-27). Sobińska (2016) analyzed risks (e.g. lack of exclusive control of the tool) and opportunities (e.g. constant access to cutting-edge solutions) connected with using *cloud computing* for organizational knowledge management. Soniewicki (2017) studied the intensity of usage of information technologies supporting knowledge management processes in construction companies in Poland. He found out that there was a correlation between the intensity of the usage of the IT KM tools and the company's competitiveness level. And the bigger the company, the more intensive the IT tools usage. Shahmoradi, Safadari and Jimma (2017) presented a literature review on the implementation and use of IT KM tools in healthcare. It seems that nowadays the most popular of these tools include data management and learning tools, knowledge repositories, databases, electronic bulletin boards and e-mail services. There is also growing interest in Web 2.0 tools (such as blogs, wikis and the social media) as well as clinical decision support system, electronic health record system, community of practices and advanced care management.

3. Results of surveys conducted among academic teachers and researchers of Polish-Japanese Academy of Information Technology (PJAIT)

3.1. Description of the statistical methodology

This data was collected through questionnaires on a group of 36 researchers at the Polish-Japanese Academy of Information Technology, 9 from each of the Academy's departments. The analyses include a statistical test (T-test model, with a p-value of 0.05) used for making comparisons between the groups, as well as calculating the degree of correlation between different aspects of technology use. In order to conduct more fine-grained analyses, three compound indexes were created, which represent the use of various technologies, the intensity of this use, and perception of the technology's usefulness. These indexes are described below.

3.1.1. Use of technology index. This index represents the broadness of use. The higher the score of the index, the more technologies the researcher uses. The index is created based on the following formula: $Index_{Use} = \frac{\sum_i U_i}{N_i}$, where: $\sum_i U_i$ – sum of the answers given to question related to the use of technology (4 – use very often, 1 – do not use at all), N_i - the number of questions related to the use of various technologies.

3.1.2. Intensity of use index. This index represents the depth of use. Participants were asked what types of task they use the specified technology for. They could choose from five different tasks. The Intensity of use index represents the percentage of tasks that the participant uses the specific technology for. The higher this score, the more versatile the use of a technology. The index is based on a formula similar to the one used in the Use of technology index: $Index_{intensity,Technology} = \frac{\sum_i U_{Technology,i}}{N_i}$, where: $\sum_i U_i$ – sum of the answers given to questions related to the intensity of the use of a technology (1 – use technology for a task, 0 – do not use for a task), N_i - the number of questions related to the use of various technologies

3.1.3. Perception of usefulness index. This index, unlike the previous two deals with the way a given technology is perceived. The higher the score, the stronger the participants perception of the general usefulness of all the technology she was asked about. The index is based on the following formula: $Index_{Perc} = \frac{\sum_i P_i}{N_i}$, where: $\sum_i P_i$ – sum of the answers given to question related to the perception of the usefulness of technology in ones work (7 –extremely useful, 1 – do not use at all), N_i - the number of questions related to the use of various technologies.

3.2. Results of the statistical analysis

3.2.1. Use of technologies in the whole sample. As far as the use of different tools is concerned in the whole sample, the Use of technology index is slightly skewed towards the maximal values. This indicates that only a minority of the researchers is below the average when it comes to the use of varying tools for aiding their work. As one can see from Table 1. the most widely used tools include basic reporting tools, as well as email and web search engines. Other tools used for many tasks include document management systems such as Google Docs, or e-learning systems. These results can be attributed to the fact that such tools are quite general in their scope, so they can be used in many fields, and for many varying tasks related to knowledge management. As one can see from Table 2, researchers at the Academy have at least a moderately positive view of the usefulness of the tools they use, or wish to use. And as shown in Table 2, the most general tools were generally viewed as the most useful. This is in contrast to more specialized tools, which received lower scores.

Table 1. Intensity of use among different tools.

Tool/Technology	*Total*
Basic tools	*0.53*
E-mail	*0.45*
Google. search engines	*0.41*
Google docs	*0.35*
ERP systems	*0.28*
E-learning systems	*0.28*
Social media	*0.23*
Wiki based services	*0.23*
Group management software	*0.22*
Blogs	*0.21*
Workflow systems	*0.19*
Document Management	*0.17*
Corporate portals	*0.15*
Data Warehouse	*0.14*
Recommender systems	*0.08*

Table 2. Perception of different technologies.

Tool/Technology	*Average perception*
Basic tools	6,75
E-mail	6,69
Google. search engines	6,64
ERP systems	5,94
Google docs	4,94
Group management software	4,94
Workflow systems	4,83
Social media	4,78
Wiki based services	4,75
E-learning systems	4,69
Blogs	4,19
Document Management	3,94
Recommender systems	3,78
Corporate portals	3,53
Data Warehouse	3,19

3.2.2. The use of technologies by department and education. In general a significant difference was observed when comparing the average values of the Use of technology index among the four departments of the Academy. The use of technologies was the highest among the researchers in the Department of Computer Science. This indicates that they are the most motivated to use many computer aided technologies to aid in their work. This may be related to the nature of work done in this department. One needs to point out, however, that the mean values for this index are mediocre. It may indicate that only specific tools are used most of the time. Conversely, the lowest values of the Use of technology index was observed in the Department of New Media Arts.

Additional differences were observed when the Intensity of use index was taken into consideration. As shown in Table 3, once again researchers in the Department of Computer Studies were shown to be more inclined to utilize computer aided technologies in their work. As the table shows, they are also more likely to use the tools in many types of tasks. Conversely, researchers from the at the Department of Culture of Japan were shown to be least versatile.

Table 3. Intensity of use index for mentioned tools (Number in bold indicate results significantly lower/higher than the total average at p-value = 0.05).

	Total	Computer Science	Information Management	Culture of Japan	New Media Arts
Basic tools	0.53	0.6	0.58	0.51	0.44
E-mail	0.45	0.56	0.4	0.4	0.44
Google. search engines	0.41	0.36	0.36	0.51	0.42
Google docs	0.35	0.36	0.38	0.18	0.49
Document Management	0.17	0.38	0.07	0.02	0.2
Workflow systems	0.19	0.31	0.2	0.09	0.16
Group management software	0.22	0.42	0.2	0.02	0.24
ERP systems	0.28	0.44	0.24	0.16	0.27
Corporate portals	0.15	0.18	0.11	0.02	0.29
E-learning systems	0.28	0.58	0.13	0.16	0.27
Data Warehouse	0.14	0.31	0	0.16	0.09
Social media	0.23	0.2	0.29	0.16	0.29
Blogs	0.21	0.2	0.13	0.13	0.38
Wiki based services	0.23	0.27	0.07	0.2	0.38
Recommender systems	0.08	0.07	0.2	0	0.07

The Education section was divided in two ways: on the type of education in relation to the field of study (Computer Science, Economics, Culture Studies) and on the level of education (with three levels: Undergraduates, Graduates and Professors). In general, little significant differences were observed. However, the collected data seems to further confirm previous observations. Among education groups least likely to utilize computer aided tools in their work were people with degrees in economics and professors.

3.3. Comments on the use of other IT KM tools

As far as other IT KM tools used by employees are concerned, it seems that they are mostly used by teachers from the Department of Computer Science. They include, among others applications designed by a teacher himself that are meant to speed up or facilitate work, e.g. a mobile application that can verify the identity and academic achievements of a student entering the examination room in order to quickly eliminate people not admitted to the exam and people who intend to take an exam for somebody else. And as for the suggestions regarding the creation of new KM IT tools, most of them were also reported by teachers from the Department of Computer Science. Most of them suggested constant improvement of already existing tools, mainly modules of the integrated school system called Gakko, e.g. adding an interface that would show aggregate reports needed to complete the employee's card. They also pointed to the need to create new tools, e.g. a forum with answers to students' questions about homework and projects or an application matching job offers for students and graduates.

3.4. Results of in-depth interviews with administrative workers

The results of the survey study were presented to administrative employees of the Academy who were responsible for the organizational management of the work of teaching-and-research staff – vice-deans from all the departments and IT specialists - supervisors of Gakko. They were asked to comment on the data received. None of them was surprised by the results of the survey. The supervisors of Gakko agreed with the suggestions for improvement of the system and admitted that workers form other departments than Computer Science could have problems with the system’s interface and access to some

modules. Vice-deans from all the departments apart from Computer Science admitted that their workers would benefit from trainings devoted to the use of IT KM tools as quite often they were just not aware of the existence and ways to use IT tools that were accessible in the Academy. The vice-deans also found some inventions of the staff to be of great interest (e.g. the mobile application that can verify the student's identity and status) and declared undertaking efforts to implement them throughout the Academy.

4. Discussion and conclusions

Upon the quantitative review of the available data, we were able to reach to some general conclusions. Firstly, researchers in the Academy are mostly focused on using general and basic tools for aiding their work. This may be partially explained by the very nature of these tools. By being general and simple, they can be appealing to researchers, regardless of their education and field of study. Furthermore, potential for implementing more specialized tools exists among the researchers, since the same levels of perceived usefulness of such tools was observed. Although this perception is mostly narrowed to some basic tools used at the moment, the fact that similar patterns are observed across many departments, and by people with differing backgrounds, lends credence to the notion that more specialized tools can be introduced, for example through dedicated training sessions. This is further corroborated by the observed correlation between the actual use of the tools and their perceived usefulness. The results of the quantitative study were confirmed during in-depth interviews with vice-deans of the Academy departments and the supervisors of Gakko, who also saw the need to both upgrade Gakko, introduce new solutions and organize trainings for workers, especially from other departments than Computer Science. The findings also go with accordance with the literature review, which shows the growing relevance of IT KM tools in modern organizations.

The paper was meant as a pilot study. The main value of the study is the collection of opinions and suggestions from a sample of respondents from different departments of a university concerning the actual use and perceived usefulness of IT KM tools in the academic environment. This can be used as a basis for further research on the choice of IT KM tools and ways of implementing them at universities in Poland. Its limitations include the lack of research on a larger research sample that would include the majority of Polish universities and verification of employee opinions on the effectiveness of applied IT KM tools with objective methods measuring the effectiveness of their use. Also, opinions of students and university authorities should be collected and analyzed. A more thorough literature review covering solutions related to the use of IT KM tools at leading foreign universities should also be considered as an important direction for further research.

References

Cieciora, M. (2018). Knowledge management in the academic environment in Poland – a pilot study. Refereed paper proceedings, KM Conference 2018, University of Pisa, Italy, International Institute for Applied Knowledge Management, pp. 55 – 66.

Dalkir, K. (2005). *Knowledge management in theory and practice*, Elsevier.

Matusiak, K. (2010). *Budowa powiązań nauki z biznesem w gospodarce opartej na wiedzy. Rola i miejsce uniwersytetu w procesach innowacyjnych (Building links between science and business in a knowledge-based economy. The role and place of the university in innovative processes)*. Warszawa, Wydawnictwo SGH.

Shahmoradi, L., Safadari R., and Jimma, W. (2017). Knowledge Management Implementation and the Tools Utilized in Healthcare for Evidence-Based Decision Making: A Systematic Review. *Ethiop J Health Sci.*, *27*(5), pp. 541 – 558.

Sikorski, M., Fazlagić, J., Ludwiszewski, B. and Sala, A. (2015). Oddziaływanie portali intranetowych na zarządzanie wiedzą w nowoczesnych organizacjach (The impact of intranet portals on knowledge management in modern organizations). *Problemy Zarządzania*, *13/2*(1), pp. 101-112.

Sobińska, M. (2016). Cloud computing a zarządzanie wiedzą – wyzwania, szanse i zagrożenia (Cloud computing vs. knowledge management – challenges, opportunities and threats). *Informatyka Ekonomiczna Business Informatics, 1*(39), pp. 83-97.

Soniewicki, M. (2017). Znaczenie wykorzystania technologii informatycznych w procesach zarządzania wiedzą przedsiębiorstw budowlanych (The importance of knowledge management systems' use in construction companies). *Prace naukowe Uniwersytetu Ekonomicznego we Wrocławiu/Research papers of Wrocław University of Economics*, No 496, 2017.