

THE IDENTIFICATION OF KNOWLEDGE MANAGEMENT TOOLS IN THE CONTEXT OF THE RANGE OF FUNCTIONALITIES OF COMPUTER SYSTEM

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Based on questionnaire surveys conducted in selected mechanical engineering industry enterprises the authors presented users' expectations in the range of created system supporting knowledge management. The analysis was carried out to determine the IT tools which are necessary in the process of building the system supporting knowledge management. Based on undertaken investigations the conception of the functional range of the system supporting knowledge management was given to potential users of the system.

Keywords: knowledge management, functional range of IT system, specificity of mechanical engineering industry enterprises.

1. Introduction

It is not the intention of the authors to define again the concept of knowledge and knowledge management. The literature provides a lot of definitions and classifications of the knowledge and tools of its transformation [2, 8, 10, 13, 14, 16, 17, 18, 19, 22, 23]. The objective of the article is to introduce the kind of empirical studies related to the role of knowledge in production enterprises and the requirements in the creating process of the system supporting knowledge management in the real research objects. The authors pointed out that this aspect is neglected in the literature. It is very interesting not only from the point of view of emphasizing relationships that exist between the theory and business practice, but primarily due

to the fact that a huge disproportion between the expectations of management practitioners concerning functionalities of the systems supporting knowledge management and their actual potentiality, resulting from the interpretation of the knowledge concept. Based on undertaken investigations, carried out in selected mechanical engineering industry enterprises the level of knowledge and level of applicability of selected knowledge management tools have been identified. On this basis, taking into account the requirements and needs of potential users of the system supporting knowledge management some specific IT tools was discussed.

2. Knowledge categories in production enterprises

The undertaken investigations have provided the empirical view in terms of the way companies perceive knowledge. On this basis the knowledge was determined in the following categories:

- the knowledge of the users of products, goods and services or assets that give the strength to the organization in the market - market knowledge,
- the knowledge of experience, creativity and skills in management processes and the leadership of people in the organization - focused on human knowledge,
- the knowledge of the way how the organization operates: processes and standards, leadership and management, culture and values related to the activities and operations of the company - the infrastructure knowledge,
- the knowledge of products of mental processes in the organization, which legally belong to it, such as its name, logo, brand, product designs, trade secrets - knowledge related to intellectual property.

Fig. 1 presents the interpretation of knowledge categories according to managers' point of view in selected mechanical engineering industry enterprises.

Market knowledge refers to a firm's knowledge about customers' needs and behaviours, as well as competitors' behaviour [5]. It results from the systematic organizational processing of market information, including acquisition, interpretation, and dissemination, and represents a firm's cognitive map of its customers and competitors [4, 12]. Firms collect market information either through conventional marketing research activities or from external contacts, such as distributors and suppliers [7, 20].

The knowledge focused on people is the most important component of the knowledge category. Haines and Goodhue [9] indicated that the more capability and knowledge clients had, the more clients involved themselves and participated in the project team, resulting in more effective knowledge transfer. As O'Dell and Grayson [15] argued, IT human capability is much more valuable than IT infrastructure in knowledge transfer. While Park, Shin Im, and Kim [11] define client IT

human capability as a positively associated with knowledge transfer from vendors to clients.

With regard to the category of the infrastructure knowledge as it relates to the procedures, skills, and ways to handle all the technical assets necessary for the realization of various business processes. It also reflects the management methods and techniques used by the managers of these companies among others in the process of project management. It can therefore be concluded that the key piece of the knowledge infrastructure are the processes and related process assets. The processes describe how different tasks are to be executed and encapsulate the knowledge of the organization needs for efficiently performing that task. Hence, another key element in knowledge infrastructure for the project realization process is databases which store the knowledge of the realized projects in the past.

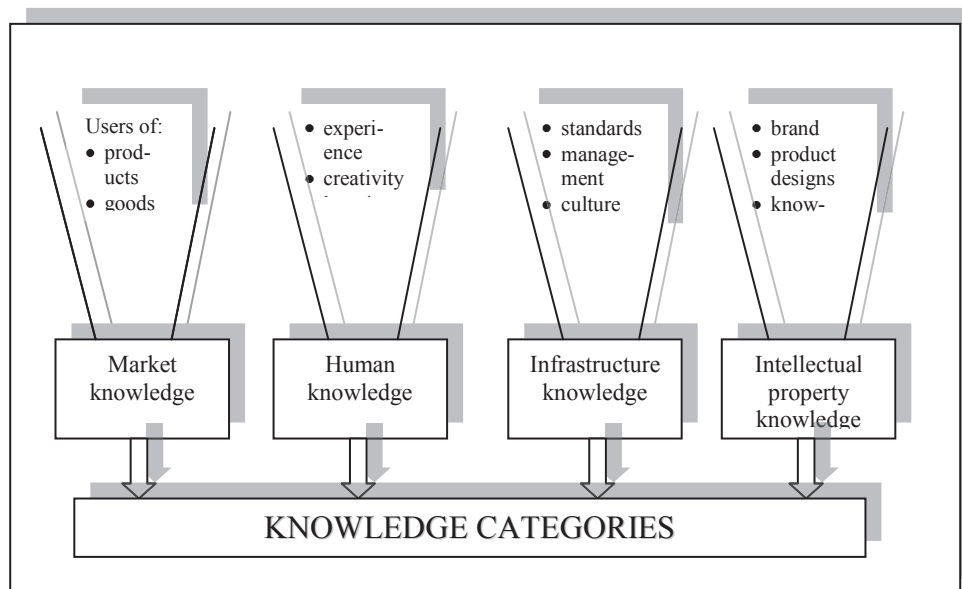


Figure 1. Interpretation of knowledge categories.

Source: own preparation

The knowledge connected with the intellectual property concerning mainly mental processes and often is connected with the category of tacit knowledge. This knowledge category is generally difficult to determine from companies' point of view and as the result it should be codified.

3. The overview of tools for building information systems supporting the knowledge management in polish companies

The literature gives various authors' interpretations of the taxonomy of systems supporting knowledge management. J.G. Bernard [1] identifies three types of knowledge management systems generators:

- knowledge repositories, which provide document and information databases, search engines, and intelligent agents,
- expert directories, such as yellow pages and knowledge maps,
- collaborative tools, such as groupware, email, listserv, newsgroups, chat, and conferencing.

B. Sostaric [21] presents a detailed list of tools, on which systems supporting knowledge management are built:

- Internet / Intranet - dealing with the communication in the transmission of knowledge through corporate portals, content management services (content management systems), e-mail or mailing lists,
- groupware systems - systems which allow the free flow and sharing of knowledge,
- document management systems (document management) - to collect and search for documents and access to the track record of changes by individuals,
- systems automation (workflow) - the source of information of organizational processes in an organization,
- databases and data warehouses – the technology that allows to collect current data and historical data on which the reports are prepared,
- systems for data analysis (data mining) - systems to explore the relationships between stored data in the databases' and data warehouses' knowledge,
- videoconferencing – the tool for the transmission of tacit knowledge,
- help-desk - saving and sharing the knowledge accumulated in the process of solving problems, combining specific solutions allows for the creation of new knowledge,
- distance learning (e-learning) – the meeting of experts at a distance allowing the transfer of knowledge to courses' participants,
- decision support systems, management information systems - applications fulfilling the function of planning and decision-making, which enables managers to make strategic decisions,
- expert systems - systems that contain the knowledge base and inference rules in order to solve problems.

As part of the R&D project¹, undertaken investigations have been conducted in selected mechanical engineering industry enterprises including, inter alia, the specification of the tools supporting knowledge management (Table 1).

Table 1. The acquaintance and the applicability of selected tools of knowledge management in Polish mechanical engineering industry enterprises

Tools supporting knowledge management in MEIE*	Acquaintance of the tools [%]	Applicability of the tools [%]	Planned use of the tools [%]	Unplanned use of the tools [%]
Internet	100	100	-	-
Intranet	100	78	20	2
Extranet	92	0	0	0
Portals	84	2	24	74
Videoconferences	87	5	12	83
Newsletters	54	28	52	30
Meetings	100	100	-	-
Data warehouses	76	15	80	5
Document management systems	89	80	20	-
Decision support systems	24	12	50	38
Group working supporting systems	12	10	38	52
CRM systems	45	30	69	1
ERP/MRP systems	89	80	20	1
E-learning	7	5	55	40
Content management systems	2	0	23	77
Expert knowledge positioning systems	0	0	12	88
Artificial intelligence systems	0	0	9	91
Own systems of knowledge management	2	0	89	11

* *mechanical engineering industry enterprises*

¹ The project „The computer system supporting management in the range of knowledge management in mechanical engineering industry enterprises” is financed from public science funds in the years 2010-2013 as the research project No. 03-0112-10 /2010 dated 09.12.2010. The main objective of the project is to build the information system supporting knowledge management in Polish mechanical engineering industry enterprises.

The undertaken investigations proved that the level of information knowledge of knowledge management tools is not very high. It is also confirmed by the very low percentage of the use of these tools. The conducted observations also show that the surveyed enterprises considered as a key success factor the characteristics and composition of the teams creating the enterprise (human capital) rather than technical resources. This is due to, inter alia, from the fact that they are characterized by flat organizational structures and of the "open" door policy, with the focus on cross-training and the development of interpersonal networks. It does not mean the lack of willingness or interest in the possibility of having their own information system for the collection, storage and processing of enterprise's knowledge enterprises related to the external and internal resources.

4. Expectations of mechanical engineering industry enterprises in the range of functionalities of the system supporting knowledge management

The undertaken investigations in selected mechanical engineering industry enterprises allow to determine the specificity of analyzed enterprises and hence, different in terms of functionalities, features and working out system's requirements. It was found that analyzed enterprises of mechanical engineering industry could be characterized as follows [6]:

- lathe and assembly production is discrete and highly complex,
- large share of unitary production, including the production of large machines, primarily as a make to order,
- the activity of analyzed enterprises is particularly sensitive to an economic situation change, vulnerability to recession is stronger and more violent than the reaction to an economic recovery,
- in the medium term production activity is characterized by a relatively large uncertainty and variability in exploited capacity (in terms of size and structure); the results are: the excess of capacity for machinery and the deficit in employment,
- the activity of enterprises requires high technical and organizational competences of personnel, especially in the preparation of production (constructors, technologists, workers of production units),
- in unitary production the profitability is affected by a great deal of different factors of low stability, particularly the order book, the parameters of the contracts with customers (unitary price can be very volatile), the parameters of contracts with suppliers and subcontractors (prices also can be very volatile),
- for the execution of profitable contracts and also not to comprise of unprofitable contracts, extensive knowledge about production costs, production

capacity, inventory storage and supply capabilities and knowledge of potential suppliers and receivers (as extensive as possible the list of subcontractors and suppliers, information about their reliability, costs, willingness to cooperate, negotiation potential) is required.

Taking into account the characteristics of the enterprises in the process to adapt to the individual needs of the enterprise the future system's user (especially in medium-sized enterprises) expects software vendors providing some organizational best practices, not only the implementation of pre-existing solutions, which may be incorrect or not responding to the new possibilities offered by the computerization. In fact, the specificity of the enterprises is not in any case immutable and is not of overriding priority, which should not be disturbed. This may be an unnecessary problem, which should be changed. Software company may have a better knowledge of the existence and relevance of various organizational solutions (especially in the typical areas of activity) than the potential user. In addition, the studies have shown that the surveyed enterprises might be interested in building a simple decision support system based on the analysis of available materials needed to produce a given product. For example, if the material specification shows that the available parts are only 30%, it means cancellation (postponement) of production. However, if there are more than 50 - 60% of the parts, it is a recommendation to take up production.

The undoubted benefits that enterprises can achieve by implementing the working out system are:

- improving the image (the value) of the enterprise in relationship with contractors (strategic clients, collaborators, potential investors etc.); coherent, reasonable long-term strategy of knowledge management to improve the company's image,
- ability to avoid irrelevant activities (premature, too large scale, too risky), and to avoid the associated expenses which would not benefit,
- the use of emerging opportunities that can benefit - not necessarily large, but rather of little risky, not intensive,
- ability to avoid losses related to handling knowledge ("leaks", loss of "stealing" employees),
- ability to build the competitive advantage in the long term,
- ability to avoid an (unreasonable) inaction in the area of knowledge management, which in the long run may lead to a breach of the competition step.

5. Conclusions

Taking into considerations the needs of investigated enterprises and the experience of the team working out the system supporting knowledge management it

could be stated that the above-mentioned system should be of an uncomplicated structure, but so advanced in terms of functionalities to be profitable i.e. benefits from its use should exceed the expenditures related to the operation and development. The evolutionary expansion and modification of the system should be mainly focused on the knowledge databases. The working out system should be focused mainly on the acquisition of information quality, poorly structured, and the tasks performed by the system should be supported primarily by the application of appropriate knowledge management tools. A key problem in the initialization phase will be to develop methods for the collection, processing and distribution of knowledge in this system. The structure of the knowledge handling procedures should be so general and flexible that there was no need to make changes in an evolutionary phase of the system development. The final step in the initialization phase is to define the tasks for the operation of the system and the determination of recipients of the working out system.

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