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## **IMPLEMENTATION AND DEVELOPMENT OF KNOWLEDGE MANAGEMENT SYSTEM – RESEARCH RESULTS <sup>1</sup>**

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The objective of the paper is to present the results of professional literature and empirical studies referring to both implementation and development of knowledge management system (KMS) by focusing on existing conditions. The additional objective is also to present methods of effectiveness measurements applied by studied enterprises. Two types of enterprises were analyzed: manufacturing and knowledge offering enterprises, which facilitated the identification of differences and similarities in the studied domain. The leading research objective was to define guidelines regarding methodology for introducing a knowledge management system, that resulted in not exclusively cognitive but also utilitarian orientation of the study.

**Keywords:** knowledge management, knowledge management system, implementation, information management, human resources management

### **1. INTRODUCTION**

Knowledge management (KM) represents one of the dynamically developing concepts in the management of an organization. The concept appeared and developed as the result of knowledge based economy emergence and the assumption that overall organization success is mainly influenced by the knowledge and experience of organization actors (Drucker 1993; Skrzypek 2000, p. 285; Kaplan, Norton 2001, p. 26–27; Mikuła 2007, p. 113). Moreover, the manner in which knowledge is managed, including its application in order to accomplish the set targets, is absolutely crucial.

Problems referring to knowledge management, in spite of growing and extensive interest in them among researches (e.g. Davenport, Prusak 2000; Evans 2005; Jashapara 2006; Liebowitz 1999; Nonaka, Takeuchi 2000, Perechuda 2005; Probst et al 2002), have not yet received sufficient in-depth analyses, many issues have been left unsolved and require further research, substantiated descriptions, or specification of indications for business

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practice. In professional literature the concept discussed is most frequently characterized from an ideological perspective, however, the guidelines referring to its operational sphere are missing.

In consequence, knowledge management is not commonly applied in the practice of Polish enterprises – the process of purposeful and planned implementation represents an initial stage. At the same time, however, it occurs more and more frequently that consulting companies offer assistance in this matter, while information technology companies provide software for establishing KM systems, and enterprises witnessing this phenomenon – a peculiar trend in management – become more and more eager to search for knowledge related to the discussed concept and its introduction within the framework of their structures.

Therefore, a need occurs to provide them with methodology for introducing knowledge management systems. Unfortunately, so far, science has not been successful in offering clear and unambiguous determinants in this matter. What is more, specific research in the area of knowledge management systems, with regard to the type of activity, is completely missing, additionally verified methods to monitor their effectiveness are also absent.

At the point of initiating research, the intention was to guarantee the higher effectiveness of the KM system by means of the already formalized project of its implementation.

The objective of this study is to present implementation methods for knowledge management system and for its effective measurement, as well as the identification of development determinants and specific KMs of the two groups of analyzed enterprises. The analysis of case studies was supported by professional literature examples, which facilitated the presentation of guidelines regarding the methodology for KM system implementation.

The author's own input into the theory of knowledge management and resulting from the attainment of the above objective is mainly represented by the proposal of KM system implementation methodology, but also relates to: effectiveness measurement proposal from the point of view of basic activities focusing on processes or projects, specification of determinants for such system development and the identification of differences resulting from the specific nature of KM systems in the two types of enterprises under analysis.

The study is divided into four major parts. The first illustrates the methodology of conducted research, the following one offers basic definitions, the third part presents analysed enterprises and the final one puts forward the obtained research results. The overall body of the study is closed by final conclusions.

## 2. RESEARCH METHODOLOGY

Professional literature studies and deductive method were applied in order to conduct this research. Additionally, an inductive method was broadly used – empirical research constituted the basis for general assumptions. The specific nature of research subject matter decided about the application of the case study method, which facilitated detailed and multidimensional analysis of knowledge management systems in selected enterprises and allowed to focus on the already implemented, or just initiated processes of KM systems implementation, on the specific nature of their functioning, their development and the applied methods for effectiveness measurement.

The study focused on manufacturing enterprises and those offering services (i.e. offering knowledge in the form of consultancy or advisory services), medium and large in size. The choice of the above two types of enterprises resulted from the assumption that the specific nature of KM systems is mainly influenced by the type of conducted activity and different level of concentration on related knowledge resources. It was also assumed that organizations offering knowledge usually apply its management practice solutions at a more advanced level. Additional stimulating factor of the research was the curiosity whether and how manufacturing enterprises adopt these solutions, or whether they work out their own approach. Trading companies were purposefully excluded from research due to their limited methods for obtaining, disseminating and creating, mainly trade oriented, knowledge and applying narrow innovation activities in creating new knowledge, which constitutes the major subject matter of the studied concept. Small enterprises were also excluded since their systems present significantly less complicated structures and therefore constitute a minor research problem.

The selection of enterprises was intentional and focused on enterprises which have already implemented, or just initiated, the process of introducing knowledge management systems. The confirmation of advancement level, regarding the above subject matter, was the information published by enterprises themselves, mainly on web pages or in articles discussing their activities, but also the author's own knowledge in this domain. Many enterprises do not explicitly disclose that they apply knowledge management activities, however, based on available information it is possible to detect that they use numerous solutions characteristic for the above concept.

An inquiry to obtain permission for conducting research was sent to over 30 enterprises which presented advanced level of knowledge management, unfortunately in most cases permission was not granted. Finally, the research

was conducted in to nine enterprises, out of which five represented knowledge offering companies. Following data confidentiality rules, some of the companies did not agree to disclose their name. Therefore, the author decided to apply such limitation with reference to all analyzed enterprises included in this study (see table no. 2, 3).

The research work was carried out by means of analyzing organizational documents from enterprises covered by the study, and conducting categorized interview based on a questionnaire consisting of questions addressed mainly to sections responsible for knowledge management, human resources management and information management (owing to their direct relation to the studied problem). The form of research questionnaire facilitated the systematization of collected information, as well as their later analysis.

Comparative case study was performed on the basis of collected data according to the arrangement: manufacturing vs. service (knowledge offering) enterprises, which allowed to define differences regarding implementation methods, development and the specific nature of KM system.

Research, in the form of both professional literature analysis and case study covered the period of 2007–2010. In one of manufacturing enterprise under analysis, research was initiated as early as in 2005 and continued in the above time span (company F).

### **3. BASIC DEFINITIONS**

On the basis of critical analysis of professional literature, the following conclusions may be put forward:

1. The theory of knowledge management does not provide uniform definitions of basic terms, such as: knowledge management or knowledge management system. Additionally, there is no full consensus regarding such system components.

2. A commonly recognized and practically verified methodology of knowledge management system implementation is missing. Examples of solutions borrowed from knowledge management practice also emphasize extensively diversified approaches in this matter.

3. The term of knowledge management effectiveness or KM system still represents the area poorly recognized in the theory of the discussed subject matter, just like in the case of other concepts based mainly on non-material resources. According to the author, this results in undertaking rare activities by companies in the field of planned implementation. If indicators tailored for measuring implementation effectiveness were available,

managers would gain arguments for undertaking due activities in this matter. Additionally, if it were possible to measure the effectiveness of particular system elements application, it would also be possible to improve their adjustment to the needs, objectives and unique company profiles.

For the sake of this research needs it was assumed that:

The concept of knowledge management comprises the whole spectrum of processes which facilitate creating, disseminating and taking advantage of knowledge in order to accomplish company objectives (Murray, Myers 1997; Grudzewski, Hejduk 2000, p. 26). Among the processes of KM the following are listed most often: knowledge localizing, capturing, creating, sharing and dissemination, its application and storage (Probst et al 2002, p. 46);

Knowledge management system represents a complex set of principles, methods, means, information sources, human resources and networks characteristic for their mutual relations and helpful in carrying out KM concept assumptions in order to accomplish due organizational goals (Mikuła 2007, p. 121).

Independent of the accepted KM system definition, most frequently such set of instruments (principles, methods, means, information sources and human resources) together with system organization (network of mutual relations) are divided into two areas: information management and human resources management. Such division is agreed in response to the need of managing both explicit knowledge – collected in different types of repositories, and implicit knowledge – present in human minds (Morawski 2006, p. 221). The overall set of instruments and its organization may also be analyzed from the point of view of particular instruments input in individual knowledge management processes, while the system itself should support the implementation of assumptions ingrained in the accepted KM strategy (personalization or codification strategy<sup>2</sup>) (Morawski 2006, p. 242–246).

However, according to the author, human resources management should be understood broadly in this context and supplemented by tools related to establishing organization culture. What is more, organization structure should be regarded as the crucial component of both domains: information management (IM) and human resources management (HRM) representing implicit knowledge.

According to the author, knowledge management system effectiveness is understood as the ability to accomplish certain objectives by means of implementing knowledge management processes and by taking advantage of

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<sup>2</sup> More about the presented knowledge management strategies in: Kisielnicki 2003, p. 83; Kobyłko, Morawski, 2006, p. 69–72; Mikuła, Pietruszka-Ortyl 2003, p. 7; Strojny 2000, p. 23.

knowledge resources, instruments offered by the system and its proper organization.

The author based this definition on the one suggested by Pszczołowski (1978) who referred to effectiveness as the desirable attribute of activities offering some positively evaluated result regardless of the initial intention, whether it was purposeful (effective and efficient activity), or unintended (only efficient activity). In the case of activities taken up in an organization in most cases we come across intended and purposeful results, since they are an effect of organized and goal oriented efforts.

Many methodological problems resulted from accepting the above definition of implementation and development regarding the analyzed system. Having considered that every organization has developed a less or more advanced knowledge management system which is, or is not, sequentially subject to development stages to follow, the notion of implementation poses certain problems in comprehending the meaning it carries. Is it correct to state that it begins as early as the initial stage of starting due organizational activities, or should it rather be clearly defined by a specific time span and organizational framework? The author has finally decided that knowledge management system development is initiated in line with the development of an organization itself, while the act of system implementation is understood as the planned project of knowledge management concept implementation and, what follows, the application of KM system instruments, including its organizational specification. Therefore, even if any organization experiences knowledge management system development, not each and every one reaches the stage of implementing the project of formal changes within the framework of knowledge management.

Following, however, the methodology assumptions suggested by T. Pszczołowski, it should be understood as the methodologically correct set of directives which defines the manner of functioning, methods leading to particular goal accomplishment, e.g. organization methodology indicates specific methods and techniques to be applied while performing certain organizational tasks (Pszczołowski 1978). If understood in the above way, the methodology of KM systems implementation should therefore indicate ways, methods and techniques indispensable to accomplish the set target, i.e. implementation of an efficient system (Tabaszewska 2008d, p. 68).

Proposals of methodologies for KM principles implementation available in literature are, in the author's opinion, too general for management practitioners to be able to implement them directly. From the perspective of Polish enterprise managers, their absence in national literature definitely poses an additional obstacle (Tabaszewska 2008e, p. 85). Table 1 compares

methodologies and procedures regarding knowledge management systems implementation by different authors (Tabaszewska 2008f, p. 217).

Table 1

Comparison of approaches towards KMS implementation

<b>Procedure/ Methodology</b>	Relation to general strategy	Management support	KM strategies	Organizational culture	Organizational structure	Balance between implicit and explicit knowledge supervision	Knowledge management processes	Improving KMS
T. Beckman (1999)	-	-	-	-	-	✓	identifying acquiring storing disseminating applying creating selling	-
<i>Wiig</i> (1999)	✓	✓	✓	✓	✓	✓	acquiring creating applying disseminating	✓
A.S. McCampbell, M.L. Clare, S.H. Gitters (1999)	✓	✓	✓	-	-	domination of explicit knowledge supervision	identifying collecting	✓
Dataware Technologies (1998)	✓	✓	-	✓	-	✓	acquiring locating	-
Xerox Corporation (1999)	✓	-	✓	-	-	✓		- ✓
<i>SMARTvision</i> (2001)	✓	-	✓	✓	-	✓	acquiring locating collecting creating disseminating	✓
<i>Y.F. Jarrar</i> (2002)	✓	✓	✓	✓	-	✓	collecting disseminating creating/ developing measuring	-
<i>S. Kim, Ch. Lee, Y. Park</i> (2006)	✓	✓	✓	✓	✓	✓	disseminating locating	✓

Source: author's compilation based on: Evangelista et al 2003, p. 19; Jarrar 2002, p. 322-328; Kim et al 2006, p. 4-5; Levett, Guenov 2000; McCampbell et al 1999; Rubenstein-Montano et al, 2001, p. 302 – 304, 306-309; Wiig 1999, p. 3-6

On the basis of information included in table 1, it may be concluded that only methodologies by K.M. Wiig and S. Kim with co-authors present the majority of characteristic properties, different from the perspective of KM system. They, however, do not include all KM processes.

#### 4. PROFILES OF ANALYZED COMPANIES

As has already been mentioned, the study covered nine companies including five offering knowledge. Only three enterprises introduced the initially planned project of knowledge management system implementation – one of them is a knowledge offering company (company B) and the other two represent manufacturing enterprises (company F and G). In the other cases the development of knowledge management system became the result of particular companies' current needs. It should be emphasized that one of the analyzed businesses combines two profiles of activity since it represents both a manufacturing enterprise and a knowledge offering one (company H).

The tables below illustrates the basic profiles of studied enterprises ordered according to the size of employment:

Table 2

Profiles of analyzed companies – knowledge offering enterprises

<i>Characteristic feature</i>	<i>Company A</i>	<i>Company B</i>	<i>Company C</i>	<i>Company D</i>	<i>Company E</i>
<i>Type of activity</i>	Advisory services: - preparing applications for EU subsidies - training financed by EU - managing projects financed by EU	Research and development activities in the area of: - geology, - hydrogeology, - geophysics, - mining, - rock mass mechanics, - mechanization in coal mines, - waste management - environment protection	Legal consultancy services: - company law and commercial law - banking and insurance - real estate - property - taxes	Legal consultancy services: - economic law, - banking, insurance and reinsurance - real estate and construction - intellectual property - taxes	Advisory services: - financial audit - taxes - consulting - human resources services - restructuring - business expertise - business transactions servicing
<i>Number of employees</i>	21 employees	127 employees, including 35 with at least PhD title	116 employees, including 60 lawyers	200 employees, including 120 lawyers	About 850 employees, including 560 consultants
<i>Organizational and legal form</i>	Limited liability company	Limited liability company	Limited partnership company	Limited partnership company	Limited liability company
<i>Participated in the study</i>	one employee: Vice-President of the company	four managers: HR department, library, contracts and projects management department and knowledge management implementation project department	one employee: library manager	two employees: HR manager and library manager	seven employees, including: HR manager, section heads: business development, library, technical unit and specialists of knowledge management

Source: author's compilation



Table 3

Profiles of analyzed companies – manufacturing enterprises.

<i>Characteristic feature</i>	<i>Company F</i>	<i>Company G</i>	<i>Company H</i>	<i>Company I</i>
<i>Type of activity</i>	Production of goods: - seals - heat-insulation - rubber - brakes  Services - designing injection moulding press for rubber and plastics	Production: - technological assemblies for paper production - components for paper machines  Services: - engineering and technological, e.g. designing, start-up of machines - paper machines renovation	Software production for business services: - MRPII type integrated management systems - human resources management servicing systems - controlling servicing systems  Consultancy services related to company's own products implementation.	Production of construction chemicals including: - materials for ceramic and stone lining - grounding, cleaning and protective materials - ready-made construction mortar - insulation and seal materials - stucco - thermal insulation systems, and - gypsum products
<i>Number of employees</i>	140 employees	247 employees	About 360 employees including 140 production staff and 150 consultants	835 employees
<i>Organizational and legal form</i>	Limited liability company	Joint stock company	Joint stock company	Limited liability company
<i>Participated in the study</i>	fifteen employees, including company president, managers of HR, IT, quality management departments and members of knowledge management unit	three employees, including: management board member, manager of personal development and knowledge management department and also one consulting department employee	three employees, namely: production manager, HR management head and strategic analysis specialist	ten employees including: vice-president responsible for research and development, and also managers, section heads and specialist from selected organizational units, responsible for knowledge management system, including human resources management and information technologies

Source: author's compilation

## 5. RESEARCH RESULTS

The order of presented research results corresponds to the order of presented research goals. Table 6 (see annex) presents basic data referring to problems studied in particular enterprises, to be discussed in more detail below.

### **5.1. Objectives and applied methodologies for knowledge management systems implementation**

The planned implementation of KM systems is not an easy task. It covers changes both in technological infrastructure and organizational culture, but also requires the ability to manage different types of knowledge. At the same time it is not easy for managers to obtain guidelines instructing how to handle knowledge management systems. Reasons for such a situation are also ingrained in the sphere of science which, so far, does not offer any explicit, theoretical guidelines, not to mention a formalized and well tested methodology for knowledge management systems implementation. It results in undertaking such activities which are either quite rare or not efficient enough (Tabaszewska 2008f, p. 210; Wong, Aspinwall 2004, p. 93, 102). Enterprises under investigation in this study did encounter similar difficulties.

The analysis of knowledge management systems implementation in the studied companies, with particular emphasis on their objectives and methodologies, allowed for the following conclusions:

1. The leading implementation objective, or reason underlying knowledge management systems development, in the case of knowledge offering enterprises, mainly represents the availability of updated, extensive knowledge, to play the role of experts. Another objective is also its smooth dissemination in a given company, in order to provide services at a stable and high level. In the case of manufacturing enterprises the objectives are mainly related to an increase in product innovations, transformations in organizational culture and providing high quality offer.

2. Each enterprise which participated in the project of knowledge management system implementation, experienced situations in which staff responsible for carrying it out did not have access to well tested methodologies instructing how to function in particular situations. In consequence a unique, 'own company's approach' was prepared based on the knowledge of its experts (company F and G).

3. In each of these cases the implementation plan underwent changes during the actual process of introducing it, as the result of more and more knowledge collected on the way in the given subject matter, due to goals modification or financial capacity alterations. Its implementation was mainly influenced by the company situation and its basic functions. The more stable it was, the more effective implementation activities were undertaken. In one

case (company F) the project was even stopped due to problems resulting from company privatization and decreasing sales figures.

4. In the case of knowledge offering enterprises, the implementation of knowledge management rules is more often the result of their actual activity development rather than a formally planned project (Tabaszewska 2008h, p. 65, 70). In this type of organization all activities focusing on knowledge management are ingrained in company policy.

5. In each case the success of such implementation, or opportunities for KM system development are, to a great extent, influenced by the degree of company staff involvement, their professional preparation to perform the task, and whether they have due budget at their disposal.

The research confirmed that, regardless of KM instruments implementation planning level, alterations were introduced in the project itself owing to the current needs and strategic goals of studied companies.

However, as far as differences in KM systems implementation methodologies are concerned with reference to both knowledge offering enterprises and manufacturing ones, it should be pointed out that differences consist in the fact that e.g. implementation in company B included the division into scientific and managerial knowledge oriented activities (Tabaszewska 2009a, p. 449), while in the case of manufacturing companies (company F and G) it consisted in the supervision of knowledge management processes, and additionally in the case of company G the development of staff competencies was more extensively supervised (Tabaszewska 2007a, p. 437; Tabaszewska 2008b, p. 57-58). This may result from the fact that in knowledge offering companies there is a distinctive division into knowledge oriented staff, representing employees responsible for creating services and customer contacts, and administration staff. In manufacturing companies, on the other hand, the implementation was mainly based on the most popular process model for knowledge management, available in professional literature (based on distinguishing KM processes), which is also confirmed by implementation methodologies illustrated in table 1.

Additionally, in the case of knowledge offering companies it is more often the result of management systems' natural development, rather than strategically planned implementation. In manufacturing companies knowledge management issues are regarded as additional or complementary ones, apart from their basic activities. Therefore, according to companies' management they require the realization of a separate project.

Considering the research results it is not possible to confirm that formalized implementation is the condition for KM system effective implementation and functioning. This is due to the fact that, on the one hand, planned projects for introducing KM instruments were not finalized in any of the three cases and, on the other hand, in companies where KM system was developing without any background in the form of an overall implementation plan, the systems resulted in the successful accomplishment of the intended effects.

## **5.2. Effectiveness of knowledge management systems**

The criteria for KM system assessment may be divided into two groups: criteria directly related to information quality and those referring to properties of the system itself. Apart from such features of information and knowledge quality as e.g.: being available, constantly updated, unbiased, complete, easy to process, detailed (Kisielnicki, Sroka 2005, p. 35-39), additionally the following criteria for KM system quality assessment may be indicated (Kisielnicki, Sroka 2005): reliability, flexibility, effectiveness, economic nature, system reaction time, system stability, prioritization, safety, or uncomplicated application. It is knowledge management systems' operational effectiveness which influences opportunities for using knowledge itself, i.e. in consequence it is the quality of the KM system which decides the level of knowledge usefulness. Therefore, the establishment of the KM system is crucial, whether it provides access to good quality information or knowledge, and whether it is flexible enough to adjust to the changing requirements of its users (Kobyłko, Tabaszewska 2008, p. 120; Benbya, Belbaly 2005, p. 206).

In particular, KM system application results in the increased competitive advantage of an organization by means of organizational knowledge usage and development, e.g. it facilitates systematic identification of key knowledge and experience, codification of individual knowledge and therefore makes it better available for other people, which results in its extensive application and development. Therefore, KM system may facilitate the integration of dispersed knowledge (Grant 1996), speed up replication of best practices (Nelso, Winter 1982), prevent from creating inventions which already exist (Quinn 1992; Quinn et al 1996), as well as limit costs for obtaining and spreading explicit knowledge (Hedlund 1994; Benbya, Belbay 2005, p. 206).

From the perspective of the above cited KM system effectiveness definition, the author was mainly interested in the effects obtained, e.g. in the form of improving the presented above system quality parameters and methods applied to measure them. As has been illustrated in table 6, it is only in four companies that an attempt was made to establish suitable measures for the above purpose.

Company B suggested two major effectiveness indicators for knowledge management related activities, which are directly adjusted to company developmental perspectives resulting from a strategic scoreboard applied by an enterprise.

The first one is called KNOW and represents the combination of several measures referring to operational objectives accomplishment. These indicators are related to annual changes in (*Strategic... 2009*):

- number of publications,
- number of conference participants,
- number of individuals involved in a self-study programme,
- outlay spent on training, and
- outlay spent on financing mandatory contracts (financed by the Ministry of Education).

KM was also covered by quality evaluation. Positive values confirm an ongoing progress in the domain of human resources and knowledge development.

The second indicator, referred to as WCBR, stands for cooperation intensity with other research and development entities. The applied measures refer to:

- number of organizations with company B as their member,
- number of projects prepared in cooperation with other entities in relation to the number of all projects prepared, and also
- quality assessment of innovation supporting activities in the region.

Positive values confirm progress and advancement in establishing relations under analysis.

Both indicators were measured during the turn of March and February and on their basis adequate activities were prepared, e.g. in 2009 the decision was made that submitting an article is the condition for conference participation, or certain motivation incentives were introduced in order to encourage applying for external means to be spent on conducting research.

In the case of the above company it is still not possible to define finally what are the results of work performed and related to knowledge

management system implementation, due to the fact that only an initial stage was completed.

In company E, KMS effectiveness measurement is mostly based on using opportunities offered within the framework of the applied information technology systems, e.g. statistics of web sites, services, domains visits, or the number of documents presented in data bases, as well as their update level, are analyzed. Such opportunities are for example provided by Lotus Notes used in the company. Data base servicing staff may keep observing the level of interest related to particular information and decide about extending such information, or disregarding it in future work.

Additionally, the company applies surveys for staff satisfaction measurement, the results of which are used each year to modify the existing motivation system, or to influence organizational culture. Management by objectives represents a similar tool, which facilitates employees' development monitoring. In the case of units closely connected with knowledge management, like library, technical team or business development, responsible for collecting particular information and their dissemination, certain general trends are common in taking advantage of their services, e.g. the noticeable result is the fact that it is mainly line staff who use services of the mentioned units and by doing that they save time and remain assured that work performed by a team of specialists in collecting information will present a better, more advanced level and offer more reliable and complete information, as well as having being obtained in shorter time.

As a rule, however, these activities are not systematic, but undertaken depending on the needs. According to the author this results from the fact that the KM system was developing in reaction, to current requirements and therefore an overall perspective in this field is missing (more on KM system in company E see: Tabaszewska 2008i, p. 199-206).

In the case of company F, during workshops organized for its knowledge management team and focused on particular instruments divided according to KM processes, particular objectives and indicators for measuring their effective accomplishment were defined (Tabaszewska 2008b, p. 53).

Measures suggested by the team were, however, not applied also because implementation project was already disrupted at the beginning of improvement activities. It may, however, be stated that the following, direct effects of knowledge management system introducing and initiating were obtained (Tabaszewska 2007a, p. 437; Tabaszewska 2008b, p. 54; *Reports... 2006*):

- increased level of staff knowledge regarding the concept and significance of knowledge management,
- establishing training materials base,
- establishing external contacts report base,
- providing computer room for staff employed in manufacturing department,
- defining the level of confidence with regard to most important information,
- establishing good practices base.

In the case of the last researched company, which decided to undertake KM system effectiveness measurement – company G, just as in the previous example, the set of indicators was defined at an initial, preparatory stage for knowledge management system implementation. Indicators were defined into simple, advanced and, generally applied, financial group of indicators.

Among basic indicators the following may be mentioned: number of interdisciplinary teams, internal coaches, development oriented projects, level of staff education. Among advanced indicators the following were included: client's satisfaction, scope of knowledge in data bases, number of new products or market share (Truszczyńska 2007). Their measurement, however, was not performed, but it is worth mentioning that a program for competence management was initiated and focused on measuring staff competencies development, as well as combining them with company objectives. The system of staff appraisal was also applied and based on management by objectives. Additionally, establishing an internal company university also became an outstanding result of initiating KM system implementation project (Tabaszewska 2009d, p. 647-655).

At this point the author would like to emphasize that the outcome of information management process, or staff implicit knowledge management, is also applied and measured in other enterprises, however, the awareness of their relation to knowledge management system is missing.

Among the most important effects of the analyzed system application the following are included:

- standardization of activities, owing to knowledge codification and its dissemination, mainly possible due to information technologies application,
- orderly arrangement of information and knowledge bases, which extensively simplifies finding and implementing them by establishing data bases or libraries,
- faster knowledge acquisition and sharing by appointing organizational

units specializing in this domain (e.g. companies B – E, H),

- staff development supervision by means of their competence management, by objectives oriented management, or by systems of training (e.g. companies B – E, G),
- easier knowledge acquisition from recipients and development of their knowledge about a product by creating units specializing in providing consultancy and educational services for clients (e.g. company I).

As regards the most frequently applied measures and measurement methods, the following may be distinguished: frequency of data base usage, speed in acquiring information, easy access to data, number of introduced innovations, staff satisfaction measurement, organizational culture analysis, staff appraisal, also with regard to their competencies development or objectives accomplishment, measurement of training effectiveness.

It is easily noticeable that measuring indicators applied by companies are well known from professional literature referring to intellectual capital management. According to the author, such approach is correct, since it is intellectual capital which results from proper knowledge management and which offers the potential for obtaining key company competencies, and in fact constitutes such competencies. It has to be emphasized, however, that these are still the only measures related to particular instruments effectiveness, but not referring to the overall KM system.

It is worth pointing out that none of the studied companies measures knowledge management system effectiveness in an integrated way. Attempts undertaken in this area refer to selected instruments and frequently systematically performed measurement is not applied. At the same time it may be stated that from this perspective the usefulness of particular tools is analyzed in a relatively short period of time and quite quickly the decision is taken regarding their purposefulness. Integrated approach should, however, offer additional advantages in the form of better system organization. For example in company E staff appointed for direct contacts with clients may send an inquiry for information to several units dealing with knowledge acquisition simultaneously, since the scopes of their duties overlap. This brings about unnecessary costs and may cause delays in performing other tasks and in dealing with orders for other clients.

According to the author, based on the presented above research results, it may be concluded that refraining from KM systems effectiveness measurement methods application does not exert any negative influence on their implementation, functioning and development. This has been confirmed by extensive and bringing substantial effects KM systems applied



in global companies presented in the hereby article (companies C, D, E) (Tabaszewska 2008g, p. 299-310). The systems applied were not based on an overall implementation plan, they also do not have satisfactory measurement methods at their disposal, however, a high level of their development has been achieved. Therefore it is not possible to confirm the assumption, since it assumes that the condition for effective introduction and functioning of knowledge management systems in enterprises manifests itself in the application of formalized methodology of these systems implementation.

Smaller effects may be obtained if it was possible when such measurement would occur. This probably results from the fact that the decision to initiate a certain instrument originates from specific needs and meeting them constitutes a sufficient reason for its further application.

On the other hand one has to keep in mind that enterprises do not have such measures at their disposal, also because professional literature does not offer any verified tools in this matter. The available measurement methods are mainly based on these suggested within the framework of intellectual capital management (Haffer 2006a, p. 149-162).

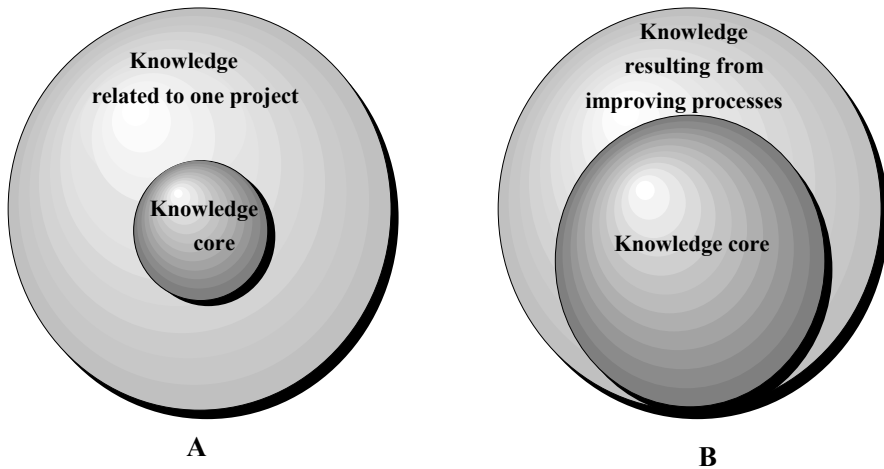
The method for knowledge resources measurement and KM level is worth mentioning at this point, which was suggested by M. J. Stankiewicz's team. It assumed that a larger number of applied tools means higher level of knowledge, without referring this measurement to for example the organization size or type of conducted activity (Haffer 2006b, p. 189-203).

According to the author, the application of such a method may result in misleading conclusions, in fact characteristic for all available measurement proposals, and resulting from the lack of research regarding KM systems specific nature. For example, a small company does not need to apply a complex KM system. It is also important whether basic company activities revolve around processes or projects.

In enterprises characterized by the dominating role played by projects' management there occurs a basic and crucial obstacle in KM system establishment, which is more difficult to codify knowledge and its short life cycle. This results in the fact that the so called *knowledge core*, i.e. general knowledge, relatively easy to codify and supervise, is quite narrow. The rest is filled by knowledge specific for a given project and of low usefulness for the following projects. The first type of knowledge is usually related to project team work, while the second depends on problems, specific profile and needs of individual clients (Leseure, Brookes 2004, p. 107).

Having compared this particular aspect with process oriented organizations one can observe much more extensive opportunities for knowledge core

development (exhibit 1), owing to the repetitive nature of the performed activities. The knowledge outside knowledge core is related to processes improvement (Tabaszewska 2009e). However, it has to be remembered that in both cases the knowledge outside its core may, at some point, support it which, as a standard, occurs in enterprises based on processes.



Picture. 1. Knowledge core in a project oriented organization (A) and in a dominating process oriented approach (B).

Source: author's compilation

According to the author, the study of the KM system, in relation to activity type and process or project orientation resulting from it, offers additional opportunities to measuring its effectiveness. It is feasible to prepare certain indicators focused on activities related to knowledge management from the perspective of their influence on processes or projects. For example, it is possible to measure:

- whether and how the preparation of quicker access to a selected knowledge base, or extending its scope, influenced the *time* spent on process/project realization,
- whether and how an introduction of additional methods for knowledge exchange among process/project team members influenced the final *quality*,
- how the new, created knowledge, or appointing a special unit responsible for obtaining knowledge influenced *cost* cutting in carrying out due processes/projects.

The KM system may be regarded as effective if it results in improving related activities. Therefore, KM system effectiveness should be measured

from the perspective of processes or projects effectiveness (Tabaszewska 2009e; 2009f, p.125]. However, in this case, the effects of particular KM tool application would still be measured neglecting the overall system of quality measurement.

### 5.3. Knowledge management systems specification

On the basis of research results and professional literature analysis the set of most important determinants for introducing, functioning and development of knowledge management systems was elaborated (table 4). They determine the specific nature of applied systems.

Table 4

Selected determinants for the development of KM systems in organizations based on knowledge and manufacturing enterprises

<i>Knowledge offering organizations</i>	<i>Manufacturing enterprises</i>
<i>Type of a product</i>	
<p>Knowledge represents the main product, therefore methods and techniques supporting active involvement, independence and upgrading employees' qualifications are of significant importance.</p> <p>The more standardized the services are, the better the chance of implementing information technologies for knowledge codification.</p>	<p>A product in its traditional meaning, however, its development depends on new knowledge.</p> <p>A company may offer additional knowledge intensive services, such as an access to information about a product, possibilities for its modification according to individual needs.</p>
<i>Employees</i>	
<p>Majority of knowledge workers<sup>3</sup>, that significantly influences organizational culture and management style.</p> <p>These are independent employees, attempting self-development, presenting high qualifications – this influences overall trust in their professional skills, competencies and allows for an extensive delegation of powers regarding new knowledge creation, as well as KM system flexibility, according to current needs of employees.</p>	<p>Knowledge focused employees represent a significant minority.</p> <p>Standardization in activities is still more important than introducing opportunities for creating new knowledge.</p>
<i>Organizational culture</i>	
<p>Organizational culture closely connected with attributes of knowledge oriented employees.</p> <p>This is the leading component of KM system, decisive for its effectiveness, therefore it requires due awareness and ongoing monitoring.</p>	<p>This is of decisive significance in successful implementation and KM system functioning, but usually requires additional activities facilitating employees' transformation from traditional into knowledge oriented ones.</p>

<sup>3</sup> For more information see: Davenport 2007; Morawski 2003 p. 19

<i>Knowledge offering organizations</i>	<i>Manufacturing enterprises</i>
<i>Size of workforce</i>	
<p>The bigger the size of workforce, the higher the need for KM tools application, including those based on information technologies, enhancing fast communication and knowledge sharing, as well as the growing need for undertaking activities enhancing team integration.</p> <p>Additionally, it is necessary to increase employment in units dealing in KM, especially related to acquiring and disseminating knowledge.</p>	
<i>Structure of employment</i>	
<p>The greater the share of younger and new employees, the higher the need for providing training instructing how to take advantage of available information sources and the need for undertaking more activities related to organizational culture. In the case of employment structure, where the biggest group is represented by older personnel, it is highly likely that standardized activities will dominate and smaller number of innovations will result.</p>	
<i>Life cycle of an organization</i>	
<p>At the initial stage of an organization life cycle the defined numerical targets are more important. Following company development, so after specifying the rules of functioning and obtaining the level of organizational stability, soft components of management become of major significance, such as: employee integration, improvement of organizational culture and functioning. It is only then that full development of KM system may occur.</p>	
<i>Financial capacity</i>	
<p>The bigger the financial resources, the higher the possibility to apply advanced information technologies and methods for stimulating employees. This also influences efficient knowledge sharing within the framework of global structures.</p>	
<i>Range of activities</i>	
<p>The bigger the company (international, global), the higher the standards of performance and requirements towards workers, which exerts a direct influence on organizational culture. There is also a bigger need for information technologies application, mainly because of the willingness to share knowledge between regions.</p>	
<i>Diversified environment</i>	
<p>Bigger diversification of environment results in the need for establishing specialized units, facilitating the supervision of changes with regard to external knowledge, as well as its dissemination to line employees.</p>	
<i>Development of information technologies</i>	
<p>The development of information technologies offers more extensive opportunities for knowledge codification, facilitates obtaining knowledge owing to a bigger number of information sources, knowledge sharing and its implementation.</p>	

Source: author's compilation (Tabaszewska 2007b, p. 52; Tabaszewska 2008h, p. 69-70)

Having considered the above mentioned absence of transparent and unambiguous requirements regarding components of knowledge management systems, organizations elaborate their own approaches to such system establishment. In consequence, knowledge management systems take different forms. Some of them emphasize information technologies application and tend to focus more on information management rather than knowledge. In other cases the dominating role is played by sharing knowledge among

employees, or establishing systems for the purposes of continuing education processes. Other concepts focus on innovation and employee creativity and also on intellectual capital formed and used in a way which increases a given enterprise market value. At the same time only a few organizations are capable of establishing such KM system which could integrate all these activities (Wiig 1999, p. 3-12, Tabaszewska 2008e, p. 79-80).

On the basis of conducted research one may conclude that the specific nature of knowledge management systems is given mainly by the following internal determinants:

1. Focusing activities on replicable processes or single projects, which was discussed in the previous sub-section. It also decides about the type of accepted strategy – in process-oriented organizations the codification of activities is more possible, while in the case of the dominating role played by projects, a company follows the strategy of personalization.

2. Enterprise size – the larger an organization, the bigger the needs for implementing knowledge management supporting instruments. Their nature and orientation towards the above mentioned KM strategy type depends on the stage of development, following Greiner's model (see further part of the study).

3. Level of offer diversification – the deeper the diversification, the more often it is necessary to create separate knowledge repositories or paths for employee development. Therefore, the same instruments may be used even though their substance regarding information and knowledge resources is different.

Enterprise objectives were not included among internal factors which determine the specific nature of KM system since, according to the author, they much more influence the nature of applied KM instruments and the content of information resources rather than their number. For example, monitoring changes in environment, spreading knowledge inside the company, availability and transparency of knowledge resources, supervising employee development or creating company culture are crucial for every organization, however, knowledge resources themselves are different since they refer to different products or markets and involve different competencies, values and standards. While analyzing KM systems' specific nature, the author was mainly interested in their components, and to a lesser extent in their characteristic properties.

Among external factors the following may be included:

1. Changeability of environment – the bigger the changeability, the more often it is necessary to appoint units specializing in knowledge acquisition and dissemination inside a company.

2. The role of clients in creating product value – the bigger it is, the

more often a need occurs to take up special activities in the field of educating clients and transferring knowledge outside the company.

It is also possible to distinguish elements characteristic for KM systems in knowledge offering organizations and manufacturing enterprises (table 5). One, however, has to bear in mind that the comparison presented below refers to big enterprises, characterized by extended systems and project oriented organizations in the first case, and processes oriented ones in the second. As far as enterprises manufacturing goods ordered by individual clients are concerned, it is possible to apply solutions typical for knowledge offering enterprises. On the other hand, in the case of knowledge offering enterprises, not influenced by frequent changes, an option of codifying activities<sup>4</sup> is more often available.

Table 5

Components of KM systems in knowledge offering organizations and manufacturing enterprises

<i>KM component</i>	<i>Knowledge offering organizations</i>	<i>Manufacturing enterprises</i>
<i>Specific organizational units</i>	Central libraries also conducting research work Organizational units specializing in knowledge acquisition and its spreading in the company Teams for organizational ethics and culture Units responsible for clients' education focused mainly on expert image creation	Numerous smaller libraries located in particular units and offering publications in line with their specialization Training centres Units responsible for clients' education focused mainly on skills how to use their products best
<i>Teams' profile</i>	Omnipresent, changing teams, employees involved in a few teams and playing different roles	Team work present mainly in the process of designing products
<i>Work organization</i>	Evolving around projects	Evolving around processes
<i>Dominating KM strategy</i>	Personalization	Codification

Source: author's compilation

<sup>4</sup> The description of knowledge management systems in analyzed companies was presented, among others, in the following publications: Company A – Tabaszewska 2008i, p. 58-77; Company B – Tabaszewska 2009b, p. 386-395; Company C – Tabaszewska 2008a, p. 85-95; Company D – Tabaszewska 2008a, p. 85-95; Company E – Tabaszewska 2008i, p. 199-206; Company F – Tabaszewska 2007a, p. 431-440; Company G – Tabaszewska 2009d, p. 647-655; Company H – Tabaszewska 2009c, p. 367-375; Company I – Tabaszewska 2010b.

Having considered the above, the differences in KM systems functioning and specific nature for manufacturing and knowledge offering enterprises may be confirmed. They mainly refer to the fact that in the case of manufacturing enterprises KM systems more often accept the strategy of codification, while in knowledge based organizations – the strategy of personalization (see also table 6).

However, at this point, the author wishes to emphasize that KM strategy accepted by a particular company becomes its basic one, but it does not eliminate, at the same time, the application of numerous tools characteristic for the second type of strategy. For example, in knowledge offering companies information technology systems are commonly applied and one of the major objectives is to codify knowledge, however, this type of activity is of a supplementary nature. In the case of manufacturing enterprises the approach is quite contrary.

On the basis of research conducted in the field of KM systems development it may be concluded that it keeps progressing adequately to developmental stages distinguished by Greiner (Greiner 1972; Lichtarski 2003, p. 109). Initially one comes across the dominating role of direct contacts, which results in the poor application of professional tools for information and knowledge management. Next, basic activities are orderly arranged, which in the case of knowledge management results in focusing on information management and therefore on knowledge codification, as well as the extension of these organizational units which are responsible for its acquisition, collecting and undisturbed transfer. As the organization expands, its activities focused on implicit knowledge management become intensified, especially the implicit knowledge related to human resources management, to establishing organizational culture and creating management styles, adequate to the assumptions of the discussed concept, but obviously information management is preserved and subject to ongoing improvements (Tabaszewska 2010a, p. 293).

Therefore, depending on the stage of company development, different activities are undertaken which are characteristic for different strategies, personalization in the first phase, later codification, and so on. The longer an organization functions in the market and the larger it is, the bigger the need for both strategies integration. It seems, however, that the final stage of knowledge management systems development, related to conquering cooperation crisis – according to Greiner's model the transition to a higher stage of development is connected with surviving some sort of crisis successfully – may turn out possible to accomplish only by knowledge

offering organizations. In the conditions of contemporary manufacturing technology development, it is still not possible to obtain its advanced individualization, which requires team work orientation typical for knowledge offering enterprises (see table 5).

#### **5.4. The proposal of methodology for knowledge management systems implementation**

Having used the deduction method mainly and following its verification resulting from the conducted research, a set of guidelines was developed and adjusted to knowledge management system implementation methodology. The suggested methodology, according to the accepted assumption, should also cover the existing conditions, including the set objectives and system effectiveness measurement.

The question arises, however, whether it is possible to prepare such a specific and precise methodology. This question also gives rise to doubts, since having considered the specific nature of an organization it is also possible to establish KM systems tailored to the needs of each of them. Additionally, the elaboration of individual methods for knowledge management may become yet another competitive factor.

Among major difficulties encountered in the process of preparing universal methodology for KM systems introduction one may include different internal and external conditions that influence the orientation of KM system itself (e.g. necessary knowledge of strategic analysis, information technologies or methods for organizational culture creation), and result in a high level of such process complexity (Tabaszewska 2008c, p. 409).

Having considered the above, the author suggests to assimilate the general form of KM system implementation methodology, since it incorporates the above requirements (exhibit 2).

It is worth emphasizing that this refers to all KM system components and follows its definition presented in the previous sub-section.



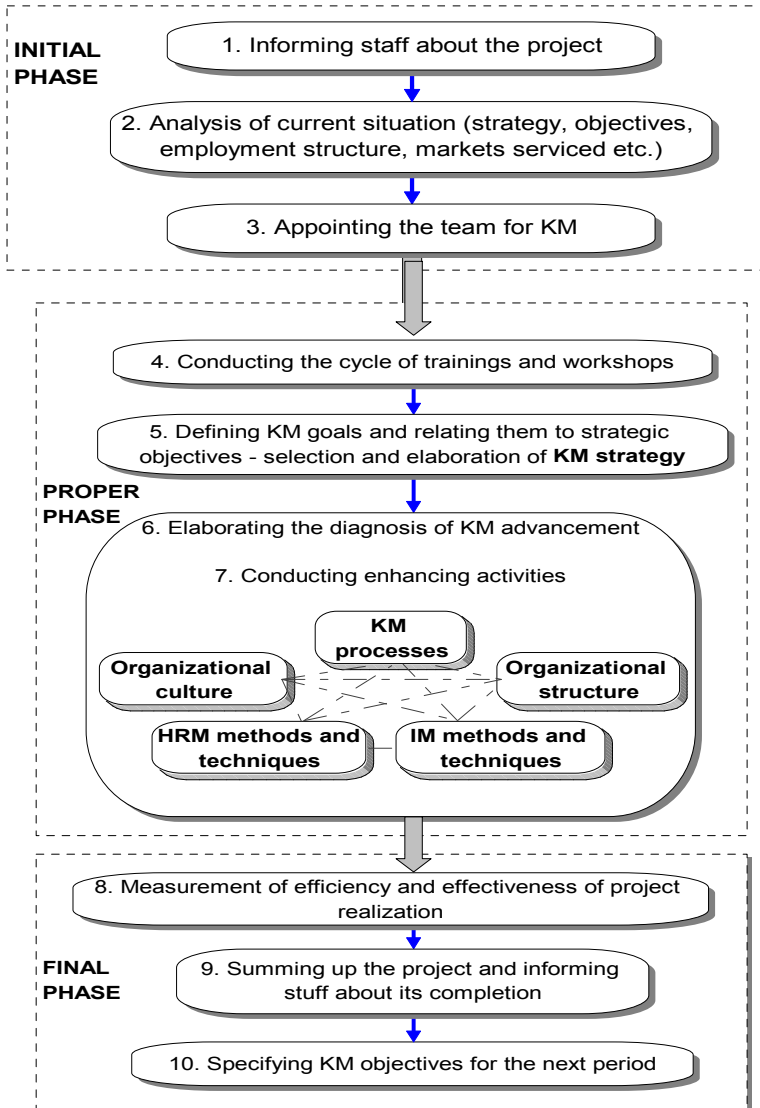


Exhibit 2. Methodology for knowledge management system implementation.

Source: Tabaszewska 2008c, p. 413

*Initial phase (preparation)*, covers the following stages (detailed description of methodology is presented in: Tabaszewska 2008c, p. 412-414; Tabaszewska 2008d, p.71-73):

1. Informing staff about the planned project. Each effective strategy will be suitable for that purpose. This may take the form of organizing meetings with employees, however, it is possible only in small and medium organizations, or e.g. passing such information by middle level management.

2. Review of current situation, after considering strategic analysis, employment structure analysis and its probable influence on company organizational structure.

3. Appointing a KM team including selected employees of the organization. An organization management representative should play the role of the team formal leader, however, he/she should not represent top management due to possible problems with disclosing true opinions by staff.

**Proper phase** divided into the following stages:

4. Conducting the cycle of training and workshops related to knowledge management for key company employees, who represent different units of an organization, including participants of the KM team.

5. Defining the fundamental goals of knowledge management and relating them to the other strategic objectives an organization follows. They may include: a growing number of product-oriented innovations introduced, minimizing time spent on obtaining knowledge about new launches in a particular professional domain, leadership in providing consultancy for clients, or introducing improvements in organizational culture. On this basis a KM strategy is selected and prepared.

6. Elaboration of knowledge management advancement diagnosis by the KM team, considering all KM system components. The diagnosis should emphasize strong and weak points referring to the level of particular elements adjustment to conceptual assumptions and help in defining suggestions for their improvement.

7. Elaboration and realization of improvements and referring to particular KM system components. The implementation of knowledge management system should commence with basic tasks which, at the beginning, require improvements (previously distinguished weak points regarding KM), or owing to their relation to an organization's strategic objectives are considered priorities.

Having carried out all improvements one can move on to the **final phase** of KM system implementation, which covers the following stages:

8. Measurement of effectiveness and efficiency of knowledge management system implementation consisting in an assessment of the set goals accomplishment level and effects obtained.

9. Holding a top management meeting with the KM team and later with all company staff at which the summary of performed activities is presented and information about measurement results is provided for all employees. At this point it is advisable to express an official gratitude to individuals most actively involved in an overall project implementation.

10. Specifying knowledge management objectives for the next period, also based on strategic analysis of an organization.

The above presented methodology for KM system implementation refers to planned and formalized project of knowledge management instruments implementation.

One should bear in mind that organizational culture and management style also represent KM system implementation determinants and determine the system effectiveness, efficiency, or its realization time, but changing them may also constitute one of the project objectives. If the desirable organizational culture background is in place, KM system implementation may largely consist in applying proper information technologies, which seems a relatively simple task, not requiring much time. However, the most difficult objectives to be attained and, at the same time, those requiring slow and gradual changes, are the ones which have to occur in employees' mentality and refer to values they prefer, or behaviour patterns they accept. Therefore, in the case of companies that do not follow the preferred style regarding organizational culture and applied management orientation, the whole project realization, and in consequence KM system implementation, becomes much more difficult (Tabaszewska 2008d, p. 74).

## 6. FINAL REMARKS

On the basis of conducted research it may be concluded that there are no grounds to claim that knowledge management concept implementation proves a more effective process if based on a formalized methodology. The majority of studied companies did carry out due activities without their organized, initial preparation in the form of an overall plan. It may be stated that a cascade methodology was applied in that case, followed by the next implementation stage that may be reached only after due verification of the previous one (Szyjewski 2004, p. 32-35). On the other hand, in the enterprises where formalized implementation was applied the process has not yet been finalized and, therefore, one cannot talk about an accomplished objective in that case. In the author's opinion, as far as manufacturing

enterprises are concerned, one may expect better effectiveness if a formalized solution is applied, mainly due to increased awareness regarding the significance of information and knowledge resources for successful performance, which in the case of the first analyzed group – knowledge offering companies, is significantly higher.

The performed research confirmed the occurrence of differences in the methodology of knowledge management systems implementation and functioning in case of the two analyzed groups of enterprises. They mainly consist in the fact that manufacturing enterprises follow an overall implementation plan more often, while in knowledge offering companies the system constitutes the reaction to occurring needs. Differences in KM system functioning are mainly related to process orientation in manufacturing enterprises, or project orientation in knowledge offering companies.

It is definitely necessary to continue further research in the domain of implementation and specific nature of knowledge management systems in different types of enterprises. In this way management practitioners may finally obtain useful indications allowing for a broad and effective application of the analyzed concept assumptions. Moreover, most of all that could facilitate obtaining competitive advantage by organizations they manage.

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## APPENDIX

Table 6. Research results – basic information

Company	KM system implementation project	Stage of implementation project realization	Implementation objectives/ KM system development objectives	KM system effectiveness measurement	Main units responsible for KM system	Main conditions for KM system establishment	Type of KM dominating strategy
<i>Knowledge offering enterprises</i>							
<i>A</i>	-	-	<ul style="list-style-type: none"> <li>It is required by the type of conducted activity</li> <li>Keeping up with market changes dynamics</li> <li>Improved innovation</li> </ul>	-	Absence of specialized units	<ul style="list-style-type: none"> <li>Small number of employees;</li> <li>Narrow specialization;</li> <li>Domination of knowledge oriented employees</li> </ul>	Personalization
<i>B</i>	Yes	In progress, just initiated	<ul style="list-style-type: none"> <li>Improved information management and effective knowledge application based on experiences obtained in carrying out previous projects</li> <li>Changes in organizational culture</li> <li>Innovation improvement</li> <li>Intellectual capital protection</li> </ul>	Yes, refers to overall KM system	<ul style="list-style-type: none"> <li>Scientific Board</li> <li>Library</li> <li>Archives</li> <li>KM Team</li> <li>Human Resources Department</li> <li>Information System Department</li> <li>Marketing (related to market analysis)</li> </ul>	<ul style="list-style-type: none"> <li>Specific type of staff (experts with academic titles);</li> <li>Narrow specialization of particular teams;</li> <li>Until 2006 stability in receiving orders from mother company;</li> <li>Domination of knowledge oriented employees;</li> <li>Until 1993 as a state owned company</li> </ul>	Personalization
<i>C</i>	-	-	<ul style="list-style-type: none"> <li>Keeping up with market changes dynamics</li> <li>Changes in organizational culture and management style</li> </ul>		<ul style="list-style-type: none"> <li>Library and Information Resources</li> <li>Office Head</li> <li>Information Technology Department</li> </ul>	<ul style="list-style-type: none"> <li>Enterprise functioning in global structures;</li> <li>Specific type of employees (lawyers);</li> </ul>	Personalization supported by codification

<i>Company</i>	<i>KM system implementation project</i>	<i>Stage of implementation project realization</i>	<i>Implementation objectives/ KM system development objectives</i>	<i>KM system effectiveness measurement</i>	<i>Main units responsible for KM system</i>	<i>Main conditions for KM system establishment</i>	<i>Type of KM dominating strategy</i>
	-	-	<ul style="list-style-type: none"> <li>Improved information management</li> </ul>			<ul style="list-style-type: none"> <li>Specialization in selected domains;</li> <li>Extensive financial resources;</li> <li>Domination of knowledge oriented employees</li> </ul>	
<i>D</i>	-	-	<ul style="list-style-type: none"> <li>It is required by the type of conducted activity</li> <li>Improved information management</li> <li>Strategic objectives implementation</li> <li>Changes in organizational culture (standardized activities within the framework of global structures)</li> </ul>	-	<ul style="list-style-type: none"> <li>Library and Information Services</li> <li>Lawyers supervising company portal</li> <li>Human Resources Department</li> <li>Information Technology Department</li> <li>Marketing</li> </ul>	<ul style="list-style-type: none"> <li>Enterprise functioning within global structures;</li> <li>Specific type of employees (lawyers);</li> <li>Specialization in selected domains;</li> <li>Extensive financial resources;</li> <li>Domination of knowledge oriented employees</li> </ul>	Personalization supported by codification
<i>E</i>	-	-	<ul style="list-style-type: none"> <li>It is required by the type of conducted activity</li> <li>Keeping up with market changes dynamics</li> <li>Improved innovation management</li> </ul>	Yes, refers to selected instruments	<ul style="list-style-type: none"> <li>Business Information Centre</li> <li>Technical Team</li> <li>Business Development Department</li> <li>KM Team</li> <li>Marketing (taxes section)</li> <li>Company Ethics Team</li> </ul>	<ul style="list-style-type: none"> <li>Enterprise functioning within global structures;</li> <li>Depending on type of consulting services more or less extensive possibilities for knowledge codification;</li> <li>Different number of employees in</li> </ul>	Personalization supported by codification

Company	KM system implementation project	Stage of implementation project realization	Implementation objectives/ KM system development objectives	KM system effectiveness measurement	Main units responsible for KM system	Main conditions for KM system establishment	Type of KM dominating strategy
<i>Manufacturing enterprises</i>							
<i>F</i>	Yes	In progress, project stopped at the stage of introducing initial activities	<ul style="list-style-type: none"> <li>Changes in organizational culture</li> <li>Improved innovation</li> <li>Leadership in consultancy</li> </ul>	<p>Yes, at the planning stage indicators for selected instruments were prepared</p>	<ul style="list-style-type: none"> <li>Technology Department</li> <li>Product Development Department</li> <li>Human Resources Department</li> <li>Controlling and Information Technology Department</li> <li>Consultants</li> </ul>	<ul style="list-style-type: none"> <li>Small number of employees;</li> <li>Until 2002 functioning as state owned company</li> </ul>	Codification supported by personalization
<i>G</i>	Yes	In progress, advanced	<ul style="list-style-type: none"> <li>It is required by the type of conducted activity</li> <li>Keeping up with market changes dynamics</li> <li>Changes in management style</li> <li>Supervision of staff knowledge development and its implementation</li> </ul>	<p>Yes, indicators for selected instruments were prepared and are applied</p>	<ul style="list-style-type: none"> <li>Construction Department</li> <li>Technical Department</li> <li>Company university + library</li> <li>Staff development and KM department</li> <li>Project managers</li> <li>Information Technology section</li> </ul>	<ul style="list-style-type: none"> <li>Products ordered individually by clients;</li> <li>Functioning in global structures;</li> </ul>	Codification supported by personalization
<i>H</i>	-	-	<ul style="list-style-type: none"> <li>Changes in organization culture</li> <li>Improved information management</li> </ul>		<ul style="list-style-type: none"> <li>Market analysis specialist</li> <li>Production Department</li> <li>Product Managers</li> </ul>	<ul style="list-style-type: none"> <li>Fluency in information technology systems (company leading product);</li> </ul>	Codification supported by personalization

<i>Company</i>	<i>KM system implementation project</i>	<i>Stage of implementation project realization</i>	<i>Implementation objectives/ KM system development objectives</i>	<i>KM system effectiveness measurement</i>	<i>Main units responsible for KM system</i>	<i>Main conditions for KM system establishment</i>	<i>Type of KM dominating strategy</i>
			<ul style="list-style-type: none"> <li>Strategic objectives implementation</li> </ul>	-	<ul style="list-style-type: none"> <li>Secretary office (library resources servicing)</li> <li>Human Resources Department</li> <li>Information Technology Department</li> </ul>	<ul style="list-style-type: none"> <li>Small number of employees in particular units (headquarters + 3 subsidiaries);</li> <li>Domination of knowledge oriented employees;</li> <li>Geographical dispersion of units</li> </ul>	
I			<ul style="list-style-type: none"> <li>Improved information management</li> <li>Integration and standardization of activities</li> </ul>	-	<ul style="list-style-type: none"> <li>Research and development section (R&amp;D laboratory, Technology Department)</li> <li>Application and new products introduction section</li> <li>Inter-sector Communication Department</li> <li>Product Managers</li> <li>Training Department</li> <li>Technical, commercial, network and investment consultants</li> <li>Employment and payroll section</li> <li>Operational section</li> <li>Information technology and tele-transmission section</li> </ul>	<ul style="list-style-type: none"> <li>Small number of employees in particular units (headquarters + 3 subsidiaries);</li> <li>Extensive financial resources;</li> <li>Geographical dispersion of units</li> </ul>	Codification supported by personalization

Source: Author's compilation