

## **AIMS AND CRITICAL SUCCESS FACTORS OF KNOWLEDGE MANAGEMENT SYSTEM PROJECTS**

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**Abstract.** Knowledge has been identified as a key organizational resource for generating competitive advantage over other firms. Knowledge of the enterprises is unique, valuable, difficult to imitate and the result of a firm's history, structure and culture over time. There are many information technologies that enterprises may choose in order to effectively manage the valuable resource. All the technologies can be organized in form of knowledge management system which besides technological has social components. This article deals with the practical realities of knowledge management by focusing on a tangible, pragmatic entity, knowledge management system project. Primary focus of the paper is to analyse possible aims of knowledge management system projects and to briefly explain factors that critically influence success of the projects.

**Key Words:** knowledge management, information technologies, knowledge management system, critical success factors

### 1. INTRODUCTION

Until the end of last century, focus of practitioners and researchers in information systems field was data and information and how to transform rough data to information for decision making via information technologies (IT). However, in last years, emphasis is on knowledge which is on higher level of processing than data and information. Knowledge is created when data and information are processed, analysed and interpreted in specific context depending on attitudes, opinions, previous knowledge, experience and subjective estimation of a decision maker. IT gives analytical and methodological framework for data and information conversion to knowledge.

Subsistence and development of an enterprise depend on its abilities to absorb tokens from the environment, to reveal the right meaning of the tokens and to undertake adequate actions based on that meaning. Enterprise is deemed intelligent if it has institutional

ability to gather, share and get meaning and knowledge from information coming from the environment, usually market environment. Thereby categories such as knowledge, intelligence and learning relating principally to people are moved into the domain of organization which is deemed an entity with ability to learn, acquire knowledge and behave intelligently in response to the threats or opportunities coming from the environment.

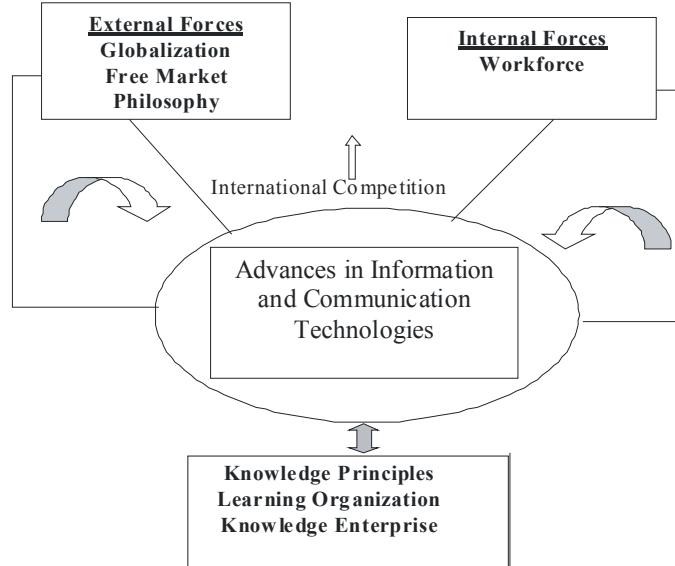
Great advance in information and communication technologies has undoubtedly facilitated creation, storage, sharing and transfer of knowledge. However, if we emphasize the importance of technology too much, and do not include the other critical elements, mainly social in nature, the result could be unsuccessful knowledge management projects. So we must consider the importance of the other critical elements, such as business strategy, leadership, organizational structure, culture and learning. There is no success in knowledge management without these critical elements.

There are many researches [1] [2] [3] on universities of developed countries treating knowledge management supported by IT, concept of intelligent enterprise and social factors critical to success of knowledge management projects. This paper represents a contribution to domestic academic research of knowledge management with some practical implications for managers in our enterprises. Research methodology used in the paper is theoretical analysis of many published studies and articles treating topic of knowledge management, particularly knowledge management information technologies. Results of the research show that the key factor of greater return on investment in knowledge management projects is the choice of appropriate information technologies for given social and organizational context in an enterprise. In addition, enterprise should establish organizational structure and culture supporting knowledge sharing and effective use of knowledge management information technologies.

The paper is organized in seven parts. In the next part of the paper, the importance of IT in knowledge management is emphasized and explained. The third part is dedicated to most important knowledge management technologies, knowledge management system and its components. The fourth part is focused on aims of knowledge management system projects, while the fifth part briefly analyses critical success factors of the projects. The sixth part is dedicated to research results and discussion, while the final part gives concluding remarks.

## 2. IMPORTANCE OF INFORMATION TECHNOLOGIES IN KNOWLEDGE MANAGEMENT

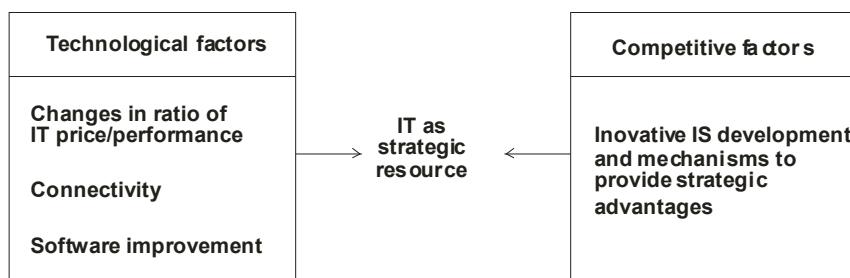
Today's economy has benefits from contemporary information and communication technologies (Internet, wireless communication, satellites, computer networks, videoconferences, etc.) in exchange of ideas and knowledge inside and between organizations that is increasing efficiency of economic activities. Advancements in the information and communication technologies have facilitated creation, storage and transfer of knowledge. Globalisation, enhanced international competition and philosophy of free market are the leading forces of the advancement, as is illustratively shown on figure 1.



**Fig. 1** Knowledge management and IT advancement

In contemporary business environment it is not a question whether IT has a strategic role, but rather how to use it in management of enterprise or more precisely, how to integrate business strategy with IS development strategy. Thus, main challenge for top management of an enterprise is to use IT and knowledge as enterprise strategic resources in competition with rivals.

Every enterprise formulating business strategy by research of competitive environment and analysis of resources for the strategy implementation must take into account influence of IT on the strategy. The influence of the IT is not related only to support of strategy implementation, but strategy formulation, so IT is deemed a very important strategic resource. The way how IT has been becoming essential strategic resource by impact of technological and competitive factors is shown in figure 2.



**Fig. 2** IT as strategic resource

Knowledge management can be defined as systematic, explicit and methodical creation, retention and use of knowledge in order to maximize enterprise effectiveness and

revenue from assets contained in knowledge. Primary focus of knowledge management is use of information technologies and tools, business processes, best practices and culture in order to develop and share knowledge in organization and to connect knowledge owners to people who do not possess it. Finally, use of relevant knowledge to improve performance of organization is the essence of knowledge management.

Knowledge creation, retention and sharing inside and between various communities and groups of users require coordinative management and exchange of knowledge. IT provides channels for flow of the knowledge and means for processing and conversion of knowledge from one form to another. Knowledge management information technologies are organized around five activities (identification, evaluation, codification, storage and sharing of knowledge) to achieve six basic aims: know what, know where, know when, know who and know why. Therefore, knowledge management IT should enable:

- knowledge creation;
- defining, storage, categorization, indexing and joining of digital objects related to some knowledge area;
- search of relevant content;
- presentation of content with enough flexibility of expression in order for the knowledge to be applicable in different contexts.

Market of knowledge management IT offers many products and "portal" solutions for main functions and activities of knowledge management. Many companies implement knowledge management IT by buying ready-made solutions and count that buying of some technology will obtain return on investment. Only one IT solution can not resolve all enterprise requirements in knowledge management. For example, data warehousing solution can resolve problem of knowledge storage and access, but can not meet requirement of users for exchange of information and sharing of ideas and knowledge. Therefore enterprises should implement a mix of several information technologies and create appropriate organizational environment for knowledge sharing in order to develop an effective knowledge management system.

### 3. KNOWLEDGE MANAGEMENT SYSTEMS

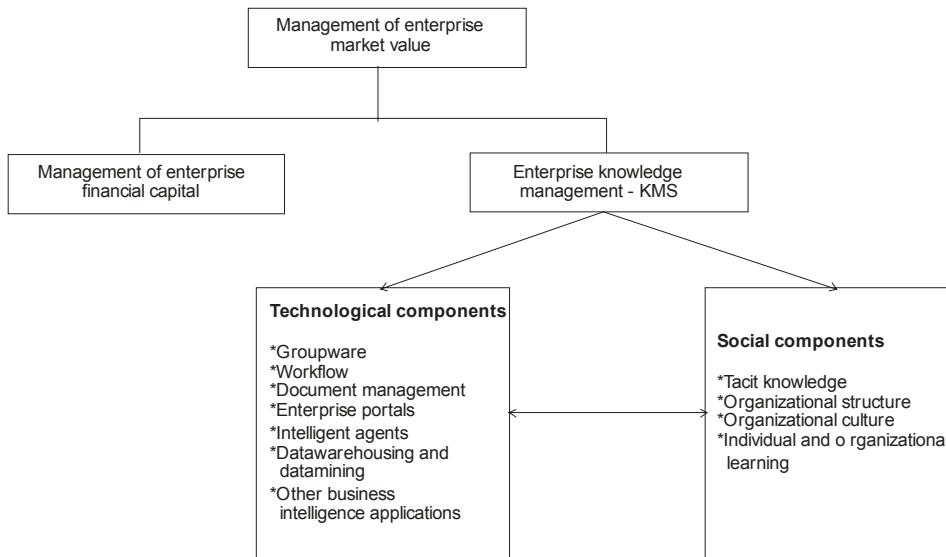
The following IT plays most important role in knowledge management: document management applications, data warehouses and data mining, enterprise information portal and intranet, intelligent agents and web search engines, groupware, workflow applications, help-desk applications. In order to choose adequate technologies, specific role of any of them must be analyzed. We present brief review of the most important ITs and their roles in knowledge management:

- **Systems for document management** are warehouses of important documents of an enterprise and valuable tools for creation and processing of complex documents. Content of documents along with principles of its organization make up explicit intellectual assets of enterprise.
- **Data warehouse** is hardware and software platform with integral and cleaned operational data of improved quality for support of decision making processes in organization. **Data mining** is technology which is used to extract and analyze useful information from great database, such as data warehouse.
- **Enterprise information portal** is web application enabling company to make available stored information to internal and external users. Portal provides to internal and

external users a unique gateway to personalized information needed for decision making. Enterprise web portals are usually implemented in an intranet environment with secure connection to external users.

- **Intelligent agents and web search engines** improve rapidity and accuracy of information search through nature query languages, information filtering or creation of abstracts. Push technologies and agents facilitate tracking of some types of knowledge, so users do not have to learn complex syntax of searching.
- **Groupware** improves exchange of tacit knowledge allowing formal and ad hoc conversation between employees in spite of time, spatial and social barriers.
- **Workflow** applications enable users to codify formalized knowledge transfer processes and to manage flow of information compatible with flow of work processes in enterprises.
- **Help-desk** technology is used in many organizations as means of response to requirements of internal and external customers. Accumulated knowledge in using of such systems has more extensive application in fast design and improvement of products and services.
- **Knowledge mapping** is technology playing the role of yellow pages for transfer of best business practices to interested users.
- **Training systems and simulation software** enable employees to acquire knowledge and support the conversion of explicit knowledge to tacit one.

As we mentioned previously, the information technologies can be organized and implemented in form of knowledge management systems (KMS) [4]. KMS establish structural relations between people, regardless of time and geographic barriers and so increase opportunity for combination and exchange of knowledge and intellectual capital. Although IT plays a vital role in enterprise knowledge management, without human factor it would be useless. Therefore, structure of KMS is compounded of technological, as well social components, as we can see in figure 3.



**Fig. 3** Social and technological components of KMS

Whereas technological components are explained previously, we will briefly analyse the most important social components. These components are: tacit knowledge, organizational structure and culture, individual and organizational learning.

**Tacit knowledge** which individuals possess is in implicit form. In fact, the biggest problem in knowledge transfer is the implicit nature of that knowledge. The knowledge is very difficult to articulate and tell in explicit form. Implicit nature of that knowledge makes its transfer between people difficult, for it is not possible to express it in clear and understandable verbal and written form. This knowledge is also called procedural knowledge, it is acquired through experience and experiments, and that is why it is completely clear and obvious to individuals who possess it.

**Organizational structure** is a model of allocation of human and other resources, responsibilities and authorities in an enterprise. More flexible forms of organizational structure are appropriate for knowledge management. The forms are project and team oriented where members of team are empowered to make many decisions in order to meet project goals. On the other hand, we have a bureaucratic form of organization based on hierarchical relations between managers and their subordinates. This form of organization is not suitable for knowledge sharing because it prevents free flow of knowledge in an enterprise.

**Organizational culture** can be defined as set of opinions which are shared by all members of some social unit such as organizational unit and enterprise in whole. Before an organization implements information technologies for successful knowledge management, it must identify cultural issues emerging in the implementation and make plan for solving the issues. Organizations that are the best in knowledge management information technologies implementation have organizational culture equally oriented to business effects (production), as well as to human resources.

**Individual and organizational learning** has many forms. Training is a traditional form of knowledge transfer and learning, but new and innovative forms of learning have emerged, such as knowledge factory, community of practice and knowledge sharing group.

Training is still basic method for skill development and knowledge transfer. However, the greatest number of training programs are directed to information transfer between experts and training participants where there is no action and experience. It is a better solution to organize training programs encompassing learning of practical accomplishment of work or development of know how. In the training programs, new information and knowledge is combined with action, experiment and experience. As we stressed before, several forms and metaphors of learning have emerged in order to include experiments, experience and actions in training process. Examples of the metaphors and forms are: knowledge factory, community of practice and share groups.

Knowledge factory is metaphor meaning organization for fast learning guided by dynamic processes, in which superior knowledge is created and converted to competitive capability. Community of practice is form of organizational learning where a group of people are connected informally and members of the group are referred to each other to solve common class of problems. Finally, a share group consists of several communities of practice from various enterprises.

#### 4. AIMS OF KNOWLEDGE MANAGEMENT SYSTEM PROJECTS

Taking into account most of knowledge management projects implemented in USA enterprises [5], we can identify four broad types of the projects aims: 1. knowledge warehouse creation, 2. improvement of knowledge access, 3. improvement of environment for knowledge sharing, 4. management of knowledge as an enterprise asset. Although a knowledge management project can have all four aims, most projects have one primary aim.

**1. Knowledge warehouse creation.** A great problem in KMS implementation is to treat knowledge as something that is separable from people creating and using it. Here the basic aim is to store documents containing knowledge (memos, reports, presentations, articles) in a warehouse from which the documents can be easily retrieved. Also, the aim is to store less structured knowledge forms, such as a discussion database. Users register their own experiences on various cases in the database and react on comments of other people. There are three basic types of knowledge warehouses: a) warehouse of external knowledge (for example, intelligence on competitors), b) warehouse of structured internal knowledge (reports on research, marketing materials relating to product, technics and methods), c) warehouse of informal internal knowledge (discussion databases containing know how or lessons learned).

**2. Improvement of knowledge access.** Although knowledge warehouse creation is a very important aim, many knowledge management projects are focused on enabling of knowledge access or facilitating of knowledge transfer between people. Implementation of the projects showed that searching for a person possesing knowledge and transferring the knowledge to other people are very difficult tasks. If a library is metaphor for knowledge warehouse, then Yellow Pages are metaphor for knowledge management projects whose aim is the access to, sharing and transfer of knowledge.

**3. Improvement of environment for knowledge sharing.** The third type of enterprise knowledge management projects encompasses establishment of environment which is appropriate for effective creation, transfer and use of knowledge. Some knowledge management projects are directed to building of conscience and culture for knowledge sharing, some projects try to change behaviour of employees relating to knowledge, while some projects try to improve knowledge management process.

**4. Management of knowledge as an enterprise asset.** Enterprise can attain the aim if it treats knowledge as any other asset in its balance sheet. Scandia, great Swedish company providing financial sevices controls internally its intellectual capital every year, in order to incorporate it in the annual report for its shareholders. Some companies are focused on more effective management of specific assets containing great volume of knowledge. Great changes in accounting system are required for measurement of intellectual capital and its representation in accounting books.

Four categories of aims described here represent ideal types of knowledge management projects. However, in reality besides one primary aim of a project, some aspects of the other aims can be identified. It can be expected that projects with several aims will be more successful than projects with the only one aim.

### 5. CRITICAL SUCCESS FACTORS OF KNOWLEDGE MANAGEMENT PROJECTS

We have already stated that only IT is not enough to make success in knowledge management and to implement effective knowledge management system. Enterprises must take into account the following critical factors needed for the success of knowledge management system project: support of top management and leadership, development of organizational and social structure supporting learning in enterprise, establishment of organizational culture supporting knowledge sharing in enterprise.

Leadership is directed to strategic planning and systemic thinking, extracting the most possible benefits from resources, nurture of culture encouraging open dialogue and team learning. Finally, leadership is directed to stimulation and compensation for taking risk, learning and knowledge sharing. Organization should have structure facilitating personal interaction and supporting community of practice in gaining of tacit and explicit knowledge. Finally, organization should enable individual learning and connect it with business performances. Such organization should develop standards for measurement of learning results and encourage employees to work better by setting of rigorous and clear goals.

Learning and knowledge management have been realizing in a very dynamic organizational context, therefore organizations should be viewed and understood as dynamic social systems. In addition, organizations are continually facing more complex and dynamic global markets. Basic characteristic of organizations as social systems is that their effectiveness is not considered only through business activities and performance, but through combination of business activities and learning. Information technologies should be coordinated with knowledge flow in an organization, knowledge context and critical actions supporting IT investments. As we could see, leadership, organization, technology and learning are four main pillars of knowledge management, and organizational and managerial factors are becoming inevitable in IT applications and scope definition of the applications.

Results of some researches [6] [7] in knowledge management field show that one of the main barriers in information technology implementation is the absence of organization culture promoting collaboration and knowledge sharing. Although focus on organization culture and organizational changes may prolong the preparation of a knowledge management project, great benefits will be achieved. Therefore organization must identify its culture profile and determine which attributes of the profile make positive environment for creation, transfer and use of knowledge.

Emergence of organizational culture as a key element of successful knowledge management projects implementation has made many issues related to methods of the projects effectiveness measurement, feasibility of cultural changes, and process of the changes. Cultural issues have direct impact on information technologies choice, therefore they must be considered in choosing the best information technologies for knowledge sharing. Before an enterprise implements information technologies for successful knowledge management project, it must identify cultural issues emerging in the implementation and make plan for solving the issues.

### 6. RESULTS AND DISCUSSION

This research is overall theoretical view to a very important topic of enterprise knowledge management from the aspect of knowledge management system project implemen-

tation. Regardless that the research is mainly theoretical in nature, it has practical implications specifically for our enterprises. The paper gives conceptual framework for defining aims and critical success factors of knowledge management system projects. Although the research is based on known published articles and books, it gives new insight in the analyzed problem, particularly in domestic research and practical area of knowledge management. The practice of knowledge management in our enterprises is not on adequate level. Primary focus of our enterprises is not yet on knowledge management, but on data processing. The paper could eventually make managers of our enterprises change focus from data processing to knowledge management. The managers can organize existing IT resources in their enterprises and provide some new knowledge management information technologies in order to implement knowledge management systems. Even in the domestic market of IT, there are many knowledge management IT solutions which are not so expensive. They can choose one and several aims of knowledge management system projects analyzed in the paper. Also they should pay attention to factors that mostly contribute to success of the projects. Although technological factors are very important, they must not neglect social, organizational and cultural factors having primary impact on the success of knowledge management system projects.

Future researches of knowledge management system projects should be more empirical based on case studies of enterprises where KMS is implemented and on sample of enterprises planning to implement KMS. Thereby we can study aims and critical success factors of concrete knowledge management projects already implemented and planned for implementation. This theoretical research gives solid foundation for the future researches.

## 7. CONCLUSION

Many organizations in developed countries try to improve business performances by undertaking knowledge management projects. The organizations undertaking knowledge management projects tend to increase efficiency, effectiveness and innovativeness.

Besides great expectations, individual knowledge management technology can not solve all problems of knowledge management in an enterprise. Thus mix of several technologies should be considered. It is important to understand how creative development of existing technologies connects with new IT products entering on market. The technologies should be integrated under the umbrella of formal strategy of KMS implementation. The strategy must be shaped according to organizational structure and culture. Standards of knowledge exchange, sharing and modeling and standards for the measurement of knowledge work will be critical in that effort.

Information technology infrastructure is crucial for knowledge management. However, if culture of collaboration and knowledge sharing does not exist, the infrastructures will give minimal benefit to organizations. Full effect of knowledge management projects is gained when leadership, culture and organizational structure encouraging learning, knowledge sharing and exchange are developed.

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## CILJEVI I KRITIČNI FAKTORI USPEHA PROJEKATA SISTEMA ZA UPRAVLJANJE ZNANJEM

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Znanje je identifikovano kao glavni organizacioni resurs za generisanje konkurentske prednosti nad rivalima na tržištu. Znanje je unikatni, vredan resurs, koji je teško imitirati i rezultat je istorije, strukture i kulture organizacije ustanovljene tokom vremena. Postoji mnogo informacionih tehnologija koje preduzeće može da implementira, da bi efikasno upravljalo ovim vrednim resursom. Sve ove tehnologije mogu biti organizovane u formi sistema za upravljanje znanjem, koji pored tehnoloških ima i socijalne komponente. Ovaj rad se bavi praktičnim aspektima upravljanja znanjem fokusirajući se na jedan pragmatičan entitet, kao što je projekat sistema upravljanja znanjem. Primarni fokus ovog istraživanja je analiza potencijalnih ciljeva projekata sistema za upravljanje znanjem i sažeto objašnjenje faktora koji na kritičan način utiču na uspeh ovih projekata.

Ključne reči: *upravljanje znanjem, informacione tehnologije, sistem za upravljanje znanjem, kritični faktori uspeha.*