

Role and Objects of Information Technologies in the System of Management of Company's Knowledge

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Abstract

In the article there is demonstrated role of information technologies in implementing of program for management of companies knowledge. There are examined main principles of IT-division work. There are enumerated main stages of managing knowledge, on which IT-division play one of the key roles. There is shown evolution of IT- divisions of the companies depending on their size, stage of life cycle and objects of managing knowledge. There are opened structures of knowledge asset and content of functions for managing knowledge.

Keywords. *Knowledge management, tacit knowledge, implicit knowledge, information technologies, core competence, dynamic abilities.*

1. Introduction

At present moment the company's business in modern economy has become very complex due to lack of homogeneity and variability of factors of outer and inner environment. Dynamic development of labor market, consumer's preference and competitor's behavior and rules of state governing make the problem of getting the competitor's advantages for the companies in the most acute form. Theory of management suggests its solution of this problem with the help of using approach, based on resources (resource-based theory of the firm). This approach suggests system investigation of all the most important for business of this company and for these conditions of resources. In economy, based on knowledge, the most important resources are human and information resources, because they are intellectual asset of the company mostly influence cost of business for their owners and potential buyers (Kortunov and Fedulin, 2013). These resources are used in so called core competences of the company and define what the company does best of all comparing with its competitors. But core competences in the conditions of turbulent environment should be added by dynamic capabilities of the company, that help the company timely change existing core competences, modifying the existing ones, deleting the old and adding the new. Dynamic capabilities of the company can not develop without information background and active participation in the business of the company of its IT-division. (Kharitonova and Chkhikvadze, 2014)

Methods: From our point of view dynamic capabilities of the company are mostly difficult for management type of activity. Authors suggest using for management of dynamic capabilities of the company knowledge management system of the company. As we consider, in the projects about management of company's knowledge, unit of analyses should be knowledge assets, playing the key role in all system of knowledge of the company management. Examination of knowledge assets as unit of analyses is taken because of the following:

1. The main value of knowledge that the company has is in their ability to bring profit to their owners. So we are speaking about an asset.
2. Complicacy of composition of the inter company environment, full of various components, connected with more

various linkages, contributes to motivation of the investigator to simplify this system in models, described in terms of the investigated thematic. So in projects for knowledge management is the strict understanding, that profit to the owner brings not the material asset itself, but implementation of knowledge to this asset (Karaulova and Sizeneva, 2014). Thus at differentiating of material and not material assets there is the possibility to simplify the model by reduction of the material properties of the system to the level of knowledge assets, which in this case act as the unit of analyses.

2. Results

Knowledge assets of the company are the possessed by the company individual and overindividual knowledge, able to bring the company profit from their use. Knowledge assets are the intellectual capital of the company, which acts as integrating form for them. Thus knowledge assets are the unit of analyses of intellectual capital of the company as well as system of management company knowledge in general.

At the basis of intellectual capital are corporative knowledge. We can point out three types of corporative knowledge:

1. Individual knowledge is the knowledge that has certain employee of the company.
2. Collective knowledge is knowledge that has every employee of the company.
3. Distributed knowledge is – «knowledge, that nobody individually has, but which belongs to a group of cooperating agents» (Milner, 2009).

Knowledge is represented in two forms – in the form of tacit and implicit knowledge. Corporative knowledge during functioning of business processes of the company are transferred from one company to the other, demonstrating the dialectic linkage between tacit and implicit knowledge.

At information providing of organization of business processes connected with forming of dynamic abilities (Shokhnekh) and wider with management knowledge, the authors suggest to keep to certain principles:

1. One of the main principles is the principle of unanimity, according to which management of the company needs to examine different processes for management knowledge as the united one. (Karaulova et al., 2013) Optimization of multifunctional linkages and providing of their conformity, got due to unanimity of the implied information technologies make the more productive work for making and commercialisation of intellectual property. Under of unanimity of information technologies the authors understand not use in the company of any single program product, but the ability of program products, used in the company, to cooperative work and conversion of the used data. For example if in the company are implemented systems CRM and ERP, users should be provided with abilities for easier and available combination of data, used in these systems.
2. Principle of flexibility and adaptiveness suggests constructing of management linkages in the company in the way that time lag between changes in outer and inner environment (for example, if competitor gets the patent of providing with within company rationalization proposal) and taking of management resolution about the intellectual property was minimal. Making of flexible organization structures is one of the main targets of top-management of the company, due to solving of which it is able to increase quantity and quality of objects of intellectual property and expanding of sphere of knowledge management. Flexibility and adaptiveness of information technologies means their ability quickly and timely reflect and analyze all relevant data, necessary for management to take optimal decisions.
3. Orientation on finance result orientates all company employees for getting values, guarantying satisfaction of users of all stakeholders of the company. In the economy of knowledge greater value gets not only providing with profitability of the company business, but first of all, growth of market value of business (Murunova). For implementing this principle it is necessary not only combination of interests of owners, investors, designers, manufacturers and customers, but performing of requirements of optimization of expenses and providing with quality of works for making and commercialization of intellectual property. It is quite difficult to calculate economic effectiveness of the implemented information technologies. That is why persons, who take decisions on investing money to the development of the company, see in them only expenses and don't consider them to be investments (Nemchenko, 2009). CIO target in these conditions is demonstration of information technologies abilities for management knowledge, and thus, increasing of competitor's advantages of the company (Denicolai et al., 2014)

Implementation of the abovementioned principles should be done within process of management of the company's knowledge, consisting of the following stages, which are listed in logical, but not time order:

1. Knowledge acquisition. The main targets of these stages are connected, first of all with "collecting" of tacit

knowledge, and second, with getting of implicit knowledge from individual and collective everyday activity. Object of IT-service is collaboration with human resources department and specialist of the company for systematization of professional experience in the available for delivering form.

2. Organization and structuring of knowledge. These stages are connected with solving problem for selecting modification of knowledge database, which is for selecting of the most important classification criteria according to which it is able to do rapid and comfortable request.
3. Maintenance of knowledge database in actual condition. On this stage the main objects of IT-division are correcting, updating, adding and deleting of knowledge from the database.
4. Distribution of knowledge. The objects define need in knowledge, quantity and quality of information, main customers of knowledge and canals for delivering of knowledge are solved at this stage.
5. Implementation of knowledge. At this stage are defined the main directions of implementing knowledge at everyday activity and innovation activity of the company. (Grushevskiy and Gushina, 2011)
6. Making of knowledge. This is uncommon and difficulty formalized (at the conceptual level) and implemented object. But it is possible to solve it by implementing complex system of managing knowledge. Role of IT-service at this stage gets the most creative character, which should be implemented within project management and work of cross-functional team.

The mentioned above stages can be implemented at the same time, forming the uninterrupted processed of management of company knowledge. (Carlucci and Schiuma, 2007). But as base for forming of dynamic capabilities of stages we would like to point out the first, forth, fifth and sixth stages. At the first stage when it is so called inventory of knowledge it is possible to detect knowledge, to which the company didn't pay its attention as to non-essential, or obvious and implicit. At the same time at getting useful features from implicit knowledge (collective or individual) it is possible to have some insight or creation flash, which can be the basis for creation of innovation. (Khnyazev, 2010) The fourth and the fifth stages are connected possible appear of synergic effect, appearing as the result of interrelation of the new actor (receiver of knowledge) and the bearer of knowledge, as well as with knowledge itself. At these stages it is possible to do new knowledge in the form, for example, rational suggestions and not only them. And, finally, the sixth stage is directly connected with making of new knowledge, including objects of intellectual property.

At the same time, depending on the size of organization and stage of its lifecycle the information facilities of knowledge management processes can be on one of the following stages of development. (Shocknekh and Makarova, 2012) At the conventionally null level are such companies, to which management of knowledge are given no resources. Role of IT-service is only in technical moment, such as installation of computer equipment, software, connecting of computers in nets, monitor of work of the equipment and software. But on the first stage are companies in which knowledge management is given partial attention and resources (often under the influence of force-major factors in the form of reaction on calls of outer and inner environment). In such companies attention is paid to security, and specialist and managers of IT-divisions take part in taking resolutions within their professional competence. At the second level are the companies, that purposely do the engineering of business-processes for better use of available massive of knowledge. In such companies IT-division gets additional power within taking part in implemented projects. And finally at the third, the highest level are such companies, that specially develop their dynamic capabilities with the help of making new knowledge for making innovations. (Doroshenko et al., 2013). In such companies role of IT-services has strategic character, which is shown in active taking part of the division on elaboration of strategy of making within company changes.

Using of corporative knowledge in business of a company at production of products (goods, services and works) make these knowledge asset of a company, having not material form. Structure of these kind of "knowledge assets" is considers to be not homogeneous and it can be examined on the basis of approach of professor O.V. Inshakov (table 1) (Inshakov, 2006).

Table 1. Structure of knowledge assets of the companies

Resources of organizations	Field of use
A (human)	Production, delivery and acceptance of knowledge for making IS. Holders of not clear knowledge.
M (material)	-
T (technique and technological)	Equipment for keeping and delivery of data
Ins (Institutional)	Norms and rules of collecting, keeping, delivery and production of knowledge
O (organizational)	Projecting of self-educating organization. Forming of innovative culture.
Inf (information)	Massive of date, forming the system of corporative knowledge and used at acquisition, keeping and delivery of knowledge.

Reference: made by authors

Knowledge of a company does not rise by themselves from nowhere. The main bearer, distributor, user and maker of knowledge is a person with his individual set of knowledge, skills, practice and abilities (as well as the ability for education that is to get new knowledge) (Popkova et al., 2013) At the same time production, distribution and use of knowledge is not in vacuum, but in certain social environment inside and outside the company, and the group as well as a person, is a part of knowledge assets. That is human resources, from out point of view is the main element of knowledge assets. Keeping, distribution and sometimes use of technical media and technological procedures, and that is why technique and technological resources are also part of knowledge assets. Optimal not contradicting social acceptable and divided collectively and individually by employees of the company norms and rules of acquisition, keeping, distribution, use and production of knowledge make institution resources of the company as part of knowledge assets. Used in the company organization structures, communication nets and styles of management, corporative culture and other parts of organization resources are also part of knowledge assets. Finally, information resource should be investigated as massive of tacit knowledge of the company structured in certain way and used in the business of a company. (Zubakova et al., 2014) As for material resources, those are not used in production of knowledge, as the knowledge have not material nature.

Management of knowledge as assets of the company considers using of main functions of management, such as planning, motivation, (Gushina and Markin, 2014), organization and control, whose essence is represented in table 2.

Table 2. Main functions of management knowledge

Function of management	Content and resources
Planning and forecasting	Defining of need in knowledge (<i>Inf</i>). Makin of plans, getting of task and delegating of power for management of knowledge. (<i>A</i>).
Motivation	System of stimulating labor as for system of codes, delivering, keeping, use and making of knowledge (<i>A</i>)
Organization and coordination	System of organization and administration media, norms and riles, defining order of work with knowledge (<i>Ins</i> , <i>O</i>)
Account, analyses and control	Monitoring of the state of knowledge massive and activity of employees in the sphere of knowledge (<i>A</i> , <i>O</i> , <i>Inf</i>)

Reference: made by authors

3. Discussion

Management of knowledge assets has its specifications. For example, classification of knowledge as explicit and implicit sets two different problems for the IT-infrastructure of a company. If we manage explicit knowledge IT should document them, file and code. As the explicit knowledge are originally kept at their media – business-plans, business documents, instructions descriptions of business - processes, regulations and so on – the idea of transforming these knowledge into electronic form is quite simple. But case with implicit knowledge is more difficult, as media of this knowledge are individual and collective conscious of the company employees. (Vasiliev and Kharkova, 2014). As a rule the company in which it is resolved to code implicit knowledge faces the following difficulties:

1. Sometimes the employees, who are bearers of implicit knowledge don't understand that they have this implicit knowledge. In spite of virtual paradoxality of this event, its structure is very simple and studied: we speak about so called subconscious competence, when the employee "doesn't know what exactly he knows". At this level of development of professional competences labor actions of employees are not realized, as they become without cognitive efforts, almost automatically. Professional knowledge becomes unconscious professional habit. To improve its competences till the level of their unconscious use the employee needs temporary go to the level, preceding this one, - level of conscious competence, at which the employee was aware of order and specific features of his professional skills, as he needed to control correctness of their performing. In this conditions the employee can understand which professional competences help him to get the success (Knyazev and Vikulova, 2014).
2. The employees can not describe knowledge, which help them to get the success. For successful management of knowledge assets this skill becomes critical. In general there are several methods of command cooperation within the employees learn common language, understand ideas and values of the company, learn need of other employees within professional knowledge. These methods cover common dictionary of the company employees, metaphorical business games, strategic sessions and some other. Holding of these events is an important stage of coding of implicit knowledge.
3. The employees don't want to share lessons learned. To solve this motivation problem it is important to make comfortable and available IT-infrastructure, but also make the company's atmosphere allowing the employees

voluntary share their experience. The tools for achieving this idea is forming of organization culture on the basis of shared values, improving of motivation system that the employees that can distribute useful knowledge would have incentives, satisfying their needs.

It is obvious that system of knowledge management (SKM), supporting performing of all its key stages is based on the idea of enterprise portal.

Enterprise portal is united media of access to enterprise information, allowing the employees due to making of personal and adjustable interface use the information according to their interests, cooperate with each other and connect the information with collective understanding, system of values and experience.

General architecture of portal can be presented as consisting of personal user's interface, media of integration of heterogeneous sources of information as well as services of access to them via interface.

At the same time it is seem that use of traditional structure of portal would not allow implement procedures of dynamic and adaptive personification of SKM content. For this purposes its functionality should be expanded with the help of following tools.

Ontology. To make the possibility of effective access to the corporative information it should be structured by systematization, making of united hierarchy of ideas, unification of terms and rules of their interpretation. This idea is solved by making of ontology of subject's sphere.

Context models. Personification of information KSM within the portal is done due to placing of necessary areas of content and suggestions on pages for the corresponding roles of users. At the same time this mechanism is not flexible: it doesn't allow rapidly change the content of working areas due to changing of level of knowledge of the users, appearing of new business functions, new interest and need in knowledge. This problem can be settled due to making of dynamically changing models, reflecting the knowledge needs of users while performing this or that business functions, need in knowledge and interests of each user separately, groups of users. Forming of content of interface of KSM users should be done automatically according to parameters of their context models.

Context models should provide the accurate selection and effective access to information, that is considered to be relevant within the certain context, connected with the job, done by the user, his experience, interests, as well as to provide the best interpretation of the information he gets.

Implementation of the indicated functionality is able due to use of intellectual information technologies, implemented in such spheres, as modeling of users, information screening and making of intellectual education systems. (IES).

KSM users prefer to get knowledge they need in one certain place. They don't want to look through piles of documents to find only some information they need. They need to get systematically knowledge, presented in friendly format. The well formed portals are able to meet all mentioned above requirements but only at one condition – if there are developed knowledge stores.

There are four main types of such portals:

- 1) Enterprise portals. They usually belong to core subject spheres of knowledge, that only big companies have.
- 2) Published portals. They are for providing services to different users with different interests. These portals don't have the ability to adjust to user's needs, besides the portals of searching machines, used in Internet.
- 3) Personal portals. They are developed taking into consideration individual interests of certain users. Knowledge, kept in the storage are screened in such way that the user should be provided only with what he is interested in.
- 4) Commercial portals. They are often called «canals», as they transform the information that is in Internet to the standardized format. Commercial portals are oriented to certain subject areas and are for users who are interested in specific information, for example, relevant to quotation of stocks or to news.

To provide effective collective management of electronic data IT-infrastructure of knowledge management should meet certain requirements:

- IT-infrastructure should provide the possibility of correspondence and collective work (requirement of interactivity and dialogueness);
- internal net of an organization (Intranet) should be fully functionally (poly functionality requirement);
- IT-infrastructure should unite work of professional groups on portals, having search media, means of management content, means, providing joint work of users in real time mode, means of data analyses (integratedness requirement).

Competent implementation of information technologies of knowledge management provides company with some positive consequences, to which we should include:

- increasing of effectiveness qualified employees labor;

- increasing quality of technical service and supervising employees work;
- improvement of intercorporate communications;
- improvement of intellectual capital of the company system of management;
- systematization of existing data and making of background for generation of new knowledge.

Systems of knowledge management can help to settle different tasks for some groups of people, connected with IT-infrastructure of knowledge management:

1. For the employees:
 - to select specialists they need;
 - to be aware what knowledge and skills the personnel lacks for their training and upgrading the level of their knowledge to the required one (Fedulin et al, 2013);
 - to make long term planning of selecting specialists;
 - to form level of salaries on the basis of real necessary knowledge and skills of specialists;
2. For the job-seekers:
 - to find job according to their knowledge and skills;
 - independently detect the knowledge and skills they need and find training courses where they can get them (Kharitonova and Chkhikvadze 2014);
 - to choose a career and see its perspectives;
3. For students:
 - make an education process as studying the competences that are really popular at the labor market;
4. For the teachers:
 - to have a clear understanding what they should teach;
 - to make books thanks to which level of student's education would less depend on the personality of the teacher (Gavrilov and Titova, 2012);
 - timely renew courses of education according to requirements on labor market.

4. Conclusion

Thus at forming of competitive advantages it is necessary to consider the abovementioned factors of the competitive ability. For removing of negative effect of these factors while deciding it is necessary to consider the resources of the company: material assets, not material assets, key competences and dynamic abilities, developed within the system of managing the company knowledge. Special role on all stages of the process of management knowledge play IT-branch of the company.

For management of dynamic abilities of the company it is rational to use knowledge management system of the company. Knowledge assets of the company are processed by the company individual and subindividual knowledge, able to give the company profit from their use. There are three types of corporate knowledge: individual, collective and distributed knowledge. Knowledge management process of the company consists of the following stages: knowledge acquisition, organization and structuring of knowledge, maintenance of knowledge database in the actual state, distribution of knowledge, implementing of knowledge and making of knowledge. Human resources are the main element of knowledge assets. Keeping, distribution, and sometimes use and making of knowledge is due to use of certain technical devices and technological procedures, that is why technique and technological resources are also part of knowledge assets. Management of knowledge as assets of the company considers using of main functions of management, such as planning, motivation, organization and control.

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