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Knowledge Management in Higher Education: Theory and Practice

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ABSTRACT

Knowledge is now recognized as the driving force behind economic growth and productivity. The purpose of the article is study of the theory and practice of knowledge management as the basis for the competitive advantage of a modern organization on the example of a specific institution of higher education — Astrakhan State University. The methodological basis was a categorical apparatus of the knowledge management system, methods of description, analysis, synthesis, content analysis, as well as a systematic approach in relation to the description of the experience of a particular university. As part of the study, the systematization of theoretical views on the management of explicit and implicit knowledge was carried out, the features of this process in the higher education system were studied, and the barriers that prevent the free transfer of knowledge in organizations of this type were identified. The data considered in the article can be used in the institutions of higher education in Russia in the development of strategies in the relevant field of activity.

Keywords: explicit knowledge; tacit knowledge; socialization; externalization; internalization; combination; knowledge management; higher education institutions; Big room.

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INTRODUCTION

The need for creative, intuitive, inspiring leaders capable of managing human intelligence and transforming it into useful products and services continues to grow around the world [1]. At the same time, knowledge, necessary for long-term sustainable competitive advantage and success of any organization, is considered as the most important organizational resource [2].

Knowledge exists in explicit (material) and implicit (intangible) forms. And since the main achievements in the organization largely depend on the tacit knowledge possessed by its employees, an important research question becomes the development and application of strategies that encourage the sharing and ability to manage this knowledge in the workforce.

This is especially true for organizations of higher education, as the academic environment is a "treasure trove" of knowledge, but if it is not properly organized, it loses its usefulness and carries out repetitive activities.

Most existing works in the Russian and foreign literature are mainly devoted to the creation and exchange of knowledge in the corporate sector, without reference to any industry, including higher education [3]. In this regard, the topic of the present study is of particular interest.

EXPLICIT AND IMPLICIT KNOWLEDGE

The importance of knowledge management in the companies is devoted to the works of many foreign and domestic scientists. M.S. Volodkina, systematizing the milestones of evolution of theoretical developments on this topic in the world practice, distinguishes three stages in foreign studies (starting from 1959), while in Russia this direction, according to the author, begins to develop only since 1995 [4].

Among the works of foreign scientists, the approach of I. Nonaka, H. Takeuchi [2] stands out significantly, with the appearance of which the topic of knowledge management in its modern form began to be paid close attention.

I. Nonaka provides two types of knowledge: explicit and implicit.

Implicit knowledge is highly individual, context-dependent, difficult to formalize and transfer from one person to another in the process of written or verbal expression, it is not fixed by language or mathematics, it is also difficult to reduce to a written form — it consists of mental models, values, beliefs, perceptions and assumptions [2]. However, K. Dalkir [5, p. 8] notes that tacit knowledge is rather relative concept: something that is easily formulated by one person can be difficult to externalize to others. That is, the same content may be explicit to one person and implicit to another. E. A. Smith [6], based on the analysis of a number of papers on implicit knowledge, is summarized their properties as follows:

- live in human minds as well as in relationships;
- are acquired through exchange of experience, observation, and imitation;
- rarely documented, being personal and difficult to formalize;
- unstructured, difficult to see, codify, evaluate, research, record, document and accurately transfer;
- hidden in actions, procedures, values, emotions, etc.;
- assimilated through experience, skills, observations, intuition, mental modes, beliefs;
- experience-based (knowledge-action);
- unconscious;
- are transmitted through conversation, storytelling, discussion, analogies, demonstrations;
- are submitted to be practical, job-specific (know-how), experience-based, dependent on the "here-and-now" context and the expert's knowledge.

In other words, tacit knowledge includes skills, ideas and experiences that are difficult to acquire and transfer [7]. They consist of complex,

scattered and mostly "unrefined" knowledge accumulated in the minds of knowledgeable individuals as a unique understanding. Within the company, they represent the underlying array of organizational knowledge, having a priority value and are key to building individual and organizational innovation capability [8]. Decision-making efficiency, production capacity, customer service and task accuracy can be improved by using it. They increase the smoothness of operation and increase quality of work [9]. At the same time, according to some authors, it is difficult to gain access to them and to transfer them — you can only convert them into explicit knowledge [2, 10]. Implicit knowledge is often underestimated and underutilized in the workplace, so it is very important for the organization to determine where it is located. Almost two-thirds of work-related information from direct personal contacts, such as casual conversations, stories, mentoring, internships, and apprenticeships, gradually turns into them. Spontaneous, creative conversations often arise when people exchange ideas and practical questions in a free and open environment.

Explicit knowledge, on the other hand, is easily encoded, transmitted and disseminated within an organization. They can be expressed in a formal and systematic language, easily shared [2]. Most of them are technical or academic data such as manuals, mathematical expressions, copyrights and patents. This systematized knowledge is easily transmitted and disseminated through print, electronic and other formal means. Therefore, they are also otherwise known as "formal" or "formalized" and are technical in nature, requiring a certain level of academic knowledge or understanding that is acquired through formal education or structured learning. An important feature of explicit knowledge is that, according to the views of D. Isaacs, it cannot be transformed into implicit knowledge [11].

Thus, there are two types of knowledge: explicit (formalized) and implicit (unformalized) (see table).

There are four main models of knowledge creation in organizations [2]:

1. Socialization (from implicit to implicit): Learning by observation, imitation and practice or socialization. At this stage, knowledge is not explicit. An example is on-the-job (or off-the-job) learning, for example by mentors or peers.
2. Combination (from explicit to explicit): combining separate parts into a new whole; combining different forms of formal knowledge. Contributes to the creation of system knowledge or samples of it and new technologies, for example, using multiple data sources to write a financial report.
3. Externalization (from implicit to explicit) — recording discussions, descriptions and innovations in a manual, and then using the content to create a new product. Externalization is manifested in the creation of new knowledge in the form of analogies, hypotheses, metaphors, concepts and models, and means finding a way to express the inexpressible [12].
4. Internalization (from explicit to implicit) — reformulating or interpreting explicit knowledge (using the human frame of reference) so that it can be understood and then absorbed or adopted by others, such as creatively applying someone else's unique tacit knowledge to expand, augment, or reinterpret a particular idea. Allows for operational knowledge, often presented in the form of diagrams, guides, etc.

Creation of organizational knowledge is a process of continuous active interaction of unformalized and formalized knowledge. The main role in this process belongs to the team finding new points of view through conversations and discussions. The task of the organization is to provide the necessary conditions for group interaction, such as autonomy, intention, redundancy and

Table

Two types of knowledge

Non-formalized knowledge	Formalized knowledge
From experience (body) Simultaneous (here and now) Analog (practice)	Derived from reasoning (soul) Consistent (there and then) Digital (theory)

Source: [11, p. 86].

diversity of information, shaking and creative chaos. Experts recognize the company British Petroleum as the leader in the field creation and management of knowledge at the corporate level [13]. The leading role in this process, according to K. A. Leontieva, belongs to the human resources management service [14].

In the article "Tacit knowledge for the development of organizations", Mohajan H.K. [15] gives the classification of barriers to the transfer of implicit knowledge:

- individual: the personality of the person, temperament, attitude, interpersonal skills;
- organizational: leaders in some organizations are barriers to the sharing of implicit knowledge as they create bureaucratic and hierarchical organizational structures;
- technological: the cost, speed and accessibility of information technology tools that include the codification, personalization and customization of knowledge and information play an important role in knowledge management [16].

Analyzing the problem of transfer of tacit knowledge for higher education institutions, let us focus on a comprehensive study: "To share or not to share? Research-Knowledge Sharing in Higher Education Institution", which was conducted by a team of staff from Portsmouth University (UK) in 2013 [3]. Two groups of scientists, consisting of eleven researchers[1] and seven research-leaders,[2] representing four different disciplines in the business school of one higher education institution in the country, were interviewed using the purposive sampling approach. By conducting 18 semi-structured interviews, the authors received answers to a series of questions: when is knowledge worth sharing? why? why not to share knowledge?

They identified six main reasons why respondents thought it was worthwhile to share academic knowledge:

1) this contributes to the fulfilment of academic requirements (making a contribution to the development of the university);
2) satisfies personal interests (allows to learn what others are doing and better understand one's own research);
3) increases the productivity of research (the overall quality of its results is improved);
4) helps validate the quality of the research (facilitates getting feedback from colleagues, shapes more creative thinking);
5) ensures the fulfilment of university requirements (primarily, in terms of publication activity);
6) promotes career growth.

This research paper takes a fresh look at the need to create and implement an appropriate mechanism and culture that encourages employees to share their knowledge.

[1] Researchers were identified as academics employed as teachers and researchers on employment contracts and with early-, mid-career, and senior professional status (with 5, 10, and more than 10 years of experience, respectively).

[2] Research-leaders were defined as individuals with formal managerial authority who are involved in repeated research at various levels of the institution: university (e.g., provost for research), faculty or school (e.g., dean) and department (e.g., professor and associate professor).

Since ancient times it was believed that the main source for their creation and application was capital, raw materials and labor. Nowadays, knowledge is regarded as an exceptional fund of economic resources and a factor of long-term advantage in all fields, since it provides the potential for economic and social development and international competitiveness.

Unlike all other industries, the knowledge that is created in higher education is its main task and goal: education includes the training of specialists with certain qualifications, researchers (scientists), who can create new knowledge and as a result of experimental activities and scientific work to develop high-tech products and innovative systems, demanded in modern branches of science and economy.

The purpose of knowledge management in universities is that they serve to innovate, make creative and informed decisions, transform seamlessly, thereby creating more valuable educational products and services and enhancing the overall effectiveness of the organization, supporting an interactive learning environment built on trust and openness. At the same time, building a knowledge management system should imply significant changes in the corporate culture of an educational organization [17].

KNOWLEDGE CREATION EXPERIENCE AT ASTRAKHAN STATE UNIVERSITY

Consider the example of Astrakhan State University (ASU) as a university, which for many years has been forming a new management system that promotes the creation of knowledge.

In the previous 15–20 years, developing and implementing domestic and foreign experience in the sphere of innovation, improving the quality of services and products, ASU faced with the problem of formation of various models of an open space for interaction between managers and employees, the need to create a new structure, which led to an intensive study of the world experience, which generally fits into the paradigm of the university, creating knowledge.

1. Knowledge transfer through the organizational learning system

In order to increase the efficiency of knowledge transfer within the university, a system of organizational learning has been established at ASU, which on the first phase included weekly (on Mondays) meetings of all levels of management, including rector, vice-rectors, deans, heads of departments, managers of departments (legal, accounting, library, administrative and household part, etc.), commandants of academic buildings and dormitories (about 250 people in total), to study the best international and Russian concepts, theories and organizational practices.

The next step included training for institutions, faculties and other units, covering all departments and all categories of staff.

Later moved on to the training of student activists — leaders of student organizations (starting with the seniors and ending with the heads of faculties), chairmen of student councils of faculties (for academic, scientific, sports, cultural and mass work, etc.). To implement this project there were created Territories of student initiatives, on the basis of which there were held faculty events according to a certain schedule.

Further this pyramid was expanded to socialization projects (creative, sports, science, etc.), and almost all students were involved in the process of organizational learning. Thus, on the one hand, there was a transfer of knowledge: through individual speeches, including personal experience, which helped participants to understand the information for further implementation in the workplace; on the other, the development of new

organizational, technological knowledge and skills. Based on this experience, new innovative products and processes were improved and created.

2. "Big room" as a way to improve communication and creative process

The effective experience of the workshops (briefings) was realized based on the created the "large room",[3] i.e. space, where joint operational and strategic planning issues were conducted: pull-out sessions, daily and weekly meetings lasting no more than 40 minutes in stand-up regime.[4] An important element of this space are the "big boards" placed around the perimeter, on which visual information on the issue under discussion is located: graphs, histograms, statistics. The participants in each meeting (session), other than speakers, did not specifically prepare for a particular topic, and learned about it immediately at the beginning of the event and improvised with the help of explicit and implicit knowledge, which was deeply owned and could operate. It kept everyone in the audience engaged.

Working in the Big room allowed to develop intuitive, logical and informal thinking, to train the ability to discuss and find non-standard solutions. The speeches had a strict time limit, which allowed the attendees to "feel" time and not to spray on unrelated issues. If necessary, everyone moved from one point of the room to another depending on the material under consideration and the question under discussion. The presentations welcomed the use of theories studied on organizational training: lean production tools, theory of constraints, Pareto's law, etc. All of this strengthened the connection between theory and practice stimulated managers' ability to apply the knowledge of humanitarian and philosophical theories, engineering training (CDIO), natural science research, recreational activities in the current and strategic activities of the unit (in their training the emphasis was primarily made on three points: the importance of human relations and people involvement, methods and value of continuous improvement of processes and services [18]). Much attention was paid by the speakers to the analysis and development of the industrial culture of the university staff.

An example of using the Big room to solve problems is the experience of collective design and search of design and architectural solutions of the new laboratory complex ASU. The initial deployment to the new facility was: four faculties — two economic (economics and management; business) and two engineering (physics, mathematics and engineering technology; digital technology and cybersecurity), research laboratories and supporting infrastructure (swimming pool, catering center, including restaurants and cafes, gyms, large halls, which could be used for different purposes). The long-term construction of the complex (due to the lack of uniform federal funding) has created new ideas and opportunities for its improvement, including the innovative space, designed in the Big room, which includes the Caspian Higher School of Translation, Territory of development of writing and thinking, modern library and reading room. Creating a new building, the university moved from the only prospect of development of the university as a rigid structure, from simple observation and reflection (Newtonian paradigm) to multiple, multivariate expansion and constant change, to the use of university staff such tools as intuition, ingenuity,

[3] The Big Room experience was studied on the example of Toyota and adapted based on the internship of a group of ASU scientists and employees. The Big Room concept is related to the concept of co-location; in the case of Toyota, co-location of multidisciplinary teams to improve communication and creative process in the creation of cars.

[4] Stand-up is a regular short team meeting held standing in order to save time and increase the productivity of the discussion.

awareness and consciousness. All this testifies to the quantum of the organization, in which there is "a relationship between complexity and self-organizing structures" [19, p. 572–573].

3. Transforming implicit knowledge into implicit in the organization of extracurricular activities

The Cultural Centre of the University, as well as the territory of its outdoor and indoor sports grounds, were experimental areas for the implementation in the educational and extracurricular work of the knowledge and information that were created during the process of organizational learning and socialization: creative, sporting, scientific [20]. Let us consider in more detail the project "Socialization for the development and improvement of physical education of ASU students", which became one of the effective forms of this work and is implemented in ASU starting from 2015. Its organizers proceeded from the assumption of the possibility of physical self-improvement of the individual (students) throughout their life through the formation of a collective interest in certain types of sports based on the basis of relevant knowledge and skills.

The project took place twice a year (in the first and second semesters) in the form of a festival, which includes theoretical training and practical part (mastering the skills of sports games and competitions). The first festival was dedicated to volleyball and basketball (further handball, football, hockey, water polo, lapta, etc.). The theoretical part was devoted to the history of games, their development in different countries and the success of our athletes in international championships and Olympiads, as well as the history of outstanding Russian leaders, winners of the corresponding competitions (including the Astrakhan athletes). Then followed practical training of "beginners" by senior students (student leaders), who had experience and success in a particular sport and organized and held competitions within the framework of the sports festival and sports socialization projects, also acting as judges. When summing up the results took into account, not only the real wins, but also the number of students who participated for the first time in the competition, both as members of teams and as fans.

During one semester about 800 students of the university took part in sports socialization projects: in two months, they could get not only the skills of the game, but also get acquainted with the history of these sports.

The main task was to create a favorable educational environment that develops students' personal and professional qualities, motivation and sustained interest in health promotion. The games provided optimal improvement of physical qualities (including physique), hardening of the body, and harmonious development of physiological functions. The project was implemented on a voluntary basis and was based on the creative initiative. Any student admitted by a doctor to physical training and health-improving activities could become a participant. The atmosphere was informal and friendly, the winners were awarded cups the participants received certificates.

The teams were composed equally of young men and women who had not previously participated in these sports. The long-term objective was to provide students with knowledge, skills and interest in sports, to make this hobby spread among their friends, relatives and family members; to raise loyal fans who enjoy the success of not only Astrakhan people, but all Russians in various competitions in our country and abroad.

The impact of this work is evidenced by the comments of the participants: "The sports socialization was exactly what the university lacked", "The project was held at a high level.

It was interesting to see what the guys learned during socialization", "Projects had a good effect on students — improved skills: in a certain sport, communicative skills (the guys began to communicate more with each other), and team games rallied the teams", "It was nice to get the experience of a leader, interact with students, organize daily routine" [21, p. 2, 3].

As a result, a new technology was created, forming another method of organizing a healthy lifestyle. The project showed that the formation of knowledge and skills development in two or three kinds of sports during education at the university allows adjusting the long-term program of a healthy lifestyle. This experiment is socially significant as it was aimed at important social changes in the student community — popularization of healthy lifestyle, sports; organization of active leisure time and formation of a harmonious personality.

The following facts testify the success of the project:

- it demonstrated specific performance indicators — increasing the satisfaction of consumers of educational services of ASU; involving 10% of students per year in different sports;
- has shown signs of scalability — it was implemented not only within the university walls, but also aroused interest and was applied and further developed in schools of the region;
- has been open to both new participants and those who would like to launch a similar product independently (by colleagues from other Russian and foreign universities).

When assessing the effectiveness of creative socialization, it was also revealed that the implementation of the strategy of innovative management in this area in ASU led to the growth of students' activity and increased their social-role mobility (growth of initiative and leadership competencies) [22].

4. Formalization of new knowledge in ASU

For the development of analytical thinking and systematization of the university experience the newspaper "News of ASU" was published monthly, in which the experience of various ASU divisions and successful Russian and foreign practices were broadcast to students, teachers and staff. The newspaper had the following headings: the latest news, international cooperation, the main theme of the issue, practical application and there was a liner "Organizational training".

In order to better transfer of knowledge, the university started to publish a student magazine "Leadership holding[5]". The publication was conceived and functioned as a platform for leaders of organizational projects, who shared their experience on its pages and helped inspire others to their own achievements. The journal was the result of many years of work on organizational learning and development of the philosophy of learning organization of students and employees, lean management at ASU. The main content tool was an essay.

These publishing projects allowed for a long period to analyze the current activities of ASU and to use the gained practical experience of interaction with Russian and foreign partners to assess the effectiveness of contacts, analysis of quantitative parameters presented in various issues of the newspaper and magazine, assessment of progress the development of the university, implementation of the search for more effective forms of work.

5. "Middle-up-down" management

Taking into account that the greatest impact of knowledge transformation is achieved through the use of the management model "middle-up-

[5] Holding in this context means supporting environment, innovative environment, space of mental and physical retention of students.

down", ASU has implemented and applies the practice where the main role in this process is given to mid-level managers (who lead a team or a working group). Let's consider one of the examples of implementation of this model in the case "Digital Platform for Financial Cybersecurity".

The management of the Astrakhan branch of Sberbank (at the level of deputy manager) asked university researchers to initiate and create a product that would help counter the illegal actions of telephone financial fraudsters against citizens. After a brief discussion by a mid-level manager, a digital cybersecurity simulator platform was proposed as an idea that could contain a number of cases of financial fraud and advice on how to counter it. During the following meetings, it started to take shape and became a complex consisting of three main components: digital materials on countering financial fraudsters (cards with tips, social videos, etc.); simulator on financial cybersecurity and its basics training course; program that was formed during the brainstorming sessions by the project team, composed of psychologists, lawyers, economists, information security specialists, video recording and editing.

The project was approved by the stakeholders.

Its head (leader), who was a mid-level manager, divided the team into two groups. The first was responsible for the preparation of the financial cybersecurity simulator (development of solution logic, content preparation, software implementation). The second was responsible for the preparation of the training course (pedagogical design, schedule of preparation of materials and recording of video, coordination of material, development of the course management system and test implementation, video processing). In turn, the project leader was the organizer and transformer of organizational knowledge, monitored the quality of the created digital product and participated in its development.

A working version of the product was presented to all stakeholders and potential customers: at the open meeting mechanisms for further joint work on the project and its promotion by groups of the identified target audience were discussed. The product received positive feedback from top managers, and support was expressed for its future development.

The project team was characterized by a high level of self-motivation (reinforced, including due to the high social value of the project), self-education (the new direction of the project allowed to delve into the specifics of the new problems under consideration) and self-management (the project leader was the coordinator, allowing participants to realize their creative potential and innovative vision).

Involvement of senior management in the project took place at the final stage (presentation stage) of the project in order to assess the quality and further support. The team created a product, which is in demand (according to the target audience) on the regional market. The middle management acted as the managing creator of knowledge and the release of a demanded product based on the problem, transformers of organizational knowledge into a really working mechanism, managers-integrators and leaders of change in their sphere. Being in the middle of the intra-organizational interaction, such managers are able to initiate direct communication, development of solutions (products) using the accumulated knowledge, experience and expertise in the subject area.

So, through the work of middle-level managers in accordance with the model "middle-up-down", targeted knowledge creation was organized by providing subordinates with a conceptual framework that helps them to comprehend individual experience.

CONCLUSION

As a result of the research on knowledge management in higher education organizations, it should be noted, that:

1. Of the rather impressive number of works on the creation and transfer of knowledge, only a limited number are devoted to the study of conditions, which contribute to this, and concrete successful examples of forming the relevant environment in higher education organizations. Most focus on the knowledge itself (its types), the stages of its transformation and the barriers to its effective transfer.

2. At the same time, purposeful creation of a full cycle knowledge management system in higher education institutions seems necessary, as it will help to support innovators, strengthen research infrastructure, develop new competitive services and educational products, distribute basic technologies inside and outside the organization and promote specific industries.

3. The article reviewed the ASU experience that encourages knowledge sharing at the individual, team, and organizational level. Specific conditions and projects that created a systematic approach to self-learning and knowledge transfer were described. The practice of Astrakhan State University confirms that in order to increase the ability to transfer knowledge, it is important that the structure of the university allows the exchange of information between different units and networks of external experts. In this regard, leaders of public sector organizations should take advantage of decentralized structures and cross-functional teams, project management from "middle-up-down". However, the experience of ASU shows that tacit knowledge can be lost through outsourcing, mergers, and employee layoffs.

According to the authors, an effective environment through which the organization can support knowledge creation and transfer is best formed through the introduction of an organizational learning system, covering all levels of management and categories of staff. In addition, for the implementation of project activities in universities, a special space for intensive interaction should be created, which is an effective source of assistance for knowledge management. At ASU this is the Big room, where a favorable atmosphere was provided for access to updated, higher-quality and "transparent" information, which made it possible not only to avoid a large number of errors and rework, but also to increase the speed and efficiency of decision-making.

Also in the university should be established a process of dissemination of knowledge, formed through formal and informal mechanisms of their exchange. Two periodicals were created at ASU for this purpose, which served as both translators of knowledge and keepers of organizational memory (i.e. providing a knowledge storage function for future use in organizational systems).

4. Development and progress in research are impossible without new technologies and methods, which are actively applied in all spheres of material and non-material production. The transition from the Newtonian, mechanistic model of organization to the learning, quantum model, which began in the developed countries since the 1980s [18], is the main tool of economic transformation and assumes the presence of similar processes in the sphere of higher education. The main characteristics of this transition are: recognition of the value of staff as individuals; problem solving not by focusing on a single segment, but by systemic thinking; learning the experience of leaders and innovations of leadership and finding ways to apply this experience in creating new organizational knowledge; flexibility in solving any situations, etc.

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