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SBS Swiss Business School, University of Applied Sciences Institute,
Kloten-Zurich, Switzerland.
E-mail n.zha@student.sbs.edu

DEVELOPMENT OF KNOWLEDGE MANAGEMENT IN ENTERPRISES TO ACHIEVE SUSTAINABLE COMPETITIVE ADVANTAGES

Zharkinbayeva Nabira Bazartaevna – DBA. Research Associate. SBS Swiss Business School. University of Applied Sciences Institute, Kloten-Zurich, Switzerland, E-mail n.zha@student.sbs.edu. ORCID: 0000-0003-1217-6241;
Wolfs Bert – Ph.D. Academic Dean. SBS Swiss Business School. University of Applied Sciences Institute, Kloten-Zurich, Switzerland, E-mail: dean@sbs.edu. ORCID: 0000-0001-8606-7182.

Abstract. The article outlines the materials and practical mechanisms of corporate knowledge management through the implementation of a knowledge database at industrial enterprises, which are expected to be the key to the successful implementation of strategies for managing their intellectual resources and knowledge assets for the development of sustainable competitive advantage. The research was conducted in three stages. The first stage - quantitative research reflected the variables measured by collecting information through a survey. The second stage involved case study research to identify in the field the opportunities and needs for the development and implementation of a knowledge management database in enterprises. The third stage was the practical implementation of the developed knowledge management model in the enterprise. The obtained results indicate the practicality and workability of the proposed approach; however, it is obvious that future researches are needed on the problematic aspects not covered by this study, and were manifested during the research. In particular, the findings indicate the position of knowledge accounting in enterprises, which, in general, differs from the proposed and existing modern solutions. It was found that the respondents understood knowledge management as the management of existing data, functional documents, reports and others that belong to the informational or structured type of knowledge. Meanwhile, implicit or unstructured knowledge has been ignored when accounting for implicit or unstructured knowledge, which is an integral part of the whole. Thus, this demonstrates that in industrial enterprises there are issues not only in increasing knowledge to create sustainable competitive advantages, but also in managing this

knowledge itself. Solutions to the above gaps and research problems are discussed in this paper.

Key words: knowledge management, strategic management, competitive advantage, intellectual capital, knowledge audit, knowledge assets, organizational management, innovation management, project management, knowledge roadmap.

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SBS Швейцария бизнес мектебі, Қолданбалы Ғылымдар Университеті институты, Клотен-Цюрих, Швейцария
E-mail n.zha@student.sbs.edu

ТҰРАҚТЫ КӨШБАСШЫЛЫҚ ҚАБІЛЕТТІЛІКТІ АРТТЫРУ МАҚСАТЫНДА КӘСІПОРЫНДАРДА БІЛІМДЕРДІ БАСҚАРУ ҚОРЫН ДАМЫТУ

Жарқынбаева Набира Базартайқызы – DBA ғылымдарының докторы, ғылыми зерттеуші, SBS Швейцария Бизнес мектебі, Қолданбалы ғылымдар университеті институты, Клотен-Цюрих, Швейцария, E-mail n.zha@student.sbs.edu. ORCID: 0000-0003-1217-6241;
Вольф Берт – Философия ғылымдарының докторы, академиялық декан, SBS Швейцария Бизнес мектебі, Қолданбалы ғылымдар университеті институты, Клотен-Цюрих, Швейцария, E-mail: dean@sbs.edu. ORCID: 0000-0001-8606-7182.

Аннотация. Мақалада өнеркәсіптік кәсіпорындарда білім базасын енгізу арқылы корпоративтік білімді басқарудың материалдары мен практикалық тетіктері көрсетілген. Бұл тұрақты бәсекелестік артықшылықты дамыту үшін зияткерлік ресурстар мен білім активтерін басқару стратегияларын сәтті жүзеге асырудың кілті болады деп күтілуде. Зерттеу үш кезеңде жүргізілді. Бірінші кезең – сандық зерттеулер сауалнамамен ақпарат жинау арқылы өлшенетін айнымалыларды көрсетті. Екінші кезең – кәсіпорындарда білімді басқару дерекқорын әзірлеу және енгізу мүмкіндіктері мен қажеттіліктерін анықтау үшін кейс-стади зерттеулерін қамтыды. Үшінші кезең – кәсіпорында білімді басқарудың әзірленген моделін іс жүзінде енгізу болды. Алынған нәтижелер ұсынылған тәсілдің практикалық құндылығын және нақтылығын көрсетеді; дегенмен, бұл зерттеуде қарастырылмаған проблемалық аспектілер бойынша болашақ зерттеулердің аса қажет екені зерттеу барысында анықталды. Атап айтқанда, нәтижелер кәсіпорындардағы білім есебінің ұстанымын көрсетеді, олар жалпы алғанда ұсынылған және қолданыстағы заманауи шешімдерден ерекшеленеді. Респонденттердің білімді басқару – ақпараттық немесе құрылымдық білім түріне жататын қолда бар деректерді, функционалдық құжаттарды, есептерді және басқаларды басқару деп түсінетіні анықталды. Сонымен қатар, тұтастың ажырамас бөлігі болып табылатын жасырын немесе құрылымданбаған білімді есепке алу кезінде жасырын немесе құрылымданбаған білім еленбейді. Осылайша, бұл өнеркәсіптік кәсіпорындарда тұрақты бәсекелестік артықшылықтар жасау үшін білімді арттыруда ғана емес, сонымен бірге осы

білімді басқаруда да проблемалар туындайтындығын көрсетеді. Жоғарыда аталған олқылықтар мен зерттеу мәселелерінің шешімдері осы мақалада талқыланады.

Түйін сөздер: білімді басқару, стратегиялық менеджмент, бәсекелестіктің артықшылықтары, зияткерлік капитал, білім аудиті, білім активтері, ұйымдық менеджмент, инновациялық менеджмент, жобаларды басқару, білім картасы.

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SBS Швейцарская школа бизнеса, Институт прикладных наук Университета,
Клотен-Цюрих, Швейцария.
E-mail n.zha@student.sbs.edu

РАЗВИТИЕ УПРАВЛЕНИЯ ЗНАНИЯМИ НА ПРЕДПРИЯТИЯХ ДЛЯ ДОСТИЖЕНИЯ УСТОЙЧИВЫХ КОНКУРЕНТНЫХ ПРЕИМУЩЕСТВ

Жаркинбаева Набира Базартаевна – DBA, Научный сотрудник Швейцарской Школы Бизнеса SBS, Институт Университета Прикладных Наук, Клотен-Цюрих, Швейцария, E-mail n.zha@student.sbs.edu. ORCID: 0000-0003-1217-6241;
Вольф Берт – PhD, академический декан, Швейцарская Школа Бизнеса SBS, Институт Университета Прикладных Наук, Клотен-Цюрих, Швейцария, E-mail: dean@sbs.edu, ORCID: 0000-0001-8606-7182.

Аннотация. В статье изложены материалы и практические механизмы управления корпоративными знаниями посредством внедрения базы данных знаний на промышленных предприятиях, которые, как ожидается, станут залогом успешной реализации стратегий управления их интеллектуальными ресурсами и активами знаний для развития устойчивых конкурентных преимуществ. Исследование проходило в три этапа. Первый этап – количественное исследование, в рамках которого измеряемые переменные определялись посредством сбора информации через опрос. Второй этап включал тематическое исследование, целью которого было определить на местах возможности и необходимость разработки и внедрения базы данных управления знаниями на предприятиях. Третий этап – практическое внедрение разработанной модели управления знаниями на предприятии. Полученные результаты свидетельствуют о практичности и работоспособности предложенного подхода. Однако они также указывают на необходимость проведения дальнейших исследований, направленных на изучение проблемных аспектов, которые проявились в ходе работы. В частности, полученные данные свидетельствуют о положении учета знаний на предприятиях, которые, в общем и отличаются от предложенных и существующих современных решений. Было обнаружено, что респонденты воспринимают управление знаниями как процесс управления существующими данными, функциональными документами, отчетами и другими материалами, относящимися к информационному или структурированному типу знаний. Между тем, имплицитные или неструктурированные знания, которые являются

неотъемлемой частью общего знания, не учитывались. Это демонстрирует, что на промышленных предприятиях возникают не только вопросы приращения знаний для создания устойчивых конкурентных преимуществ, но и проблемы управления этими знаниями. Решение вышеуказанных разрывов и исследуемые проблемы обсуждаются в данной работе.

Ключевые слова: управление знанием, стратегический менеджмент, конкурентное преимущество, интеллектуальный капитал, аудит знаний, активы знаний, организационное управление, инновационный менеджмент, проектный менеджмент, карта знаний.

Introduction.

Knowledge management is located at the intersection of scientific disciplines and represents a rather young but relevant direction in the world economy (Suvorova and Tevanyan, 2019). Within the framework of strategic priorities of economic development, the activity on implementation and functioning of knowledge management processes at the enterprises of the Republic of Kazakhstan acquires special importance (Issaeva, 2018). Industrial enterprises of Kazakhstan, meanwhile, represent one of the least studied objects of knowledge management (Aimagambetov and Karabayev, 2020). Characteristic features, including the prevalence of low-skilled labor, slowly adapting linear-functional model of organizational structure, a high degree of bureaucratization and, in many cases, a significant lag in the application of modern production technologies - make the enterprises of traditional industries least adapted to competition in the period of post-industrial society (Aimagambetov and Karabayev, 2020). According to Isaeva (2018), knowledge management methodology, is able to ensure the reproduction and development of knowledge, sustainable development of organizations and employees. The application of special organizational KM techniques directs management to extract new and update existing knowledge, disseminate the acquired knowledge and on its basis produce competitive products to create a sustainable competitive advantage.

In the country as a whole, there is a clear focus in the direction of knowledge management in enterprises. The Atameken Chamber of Entrepreneurs since 2015 has conducted trainings in the regions, where entrepreneurs in Kazakhstan received not only theoretical information, but also practical knowledge management skills. Also in 2017, universities of the country began to teach knowledge management on the basis of master's programs. Also in 2017, the first international conference "Knowledge Management System in Companies and Universities: Problems and Prospects" was launched with the participation of international experts from Russia and the UK. Its audience includes university professors, researchers and representatives of enterprises. The conference discussed the issues of intellectual capital management in the public and private sectors, as well as what benefits can be obtained by implementing the system, implementation tools.

Meanwhile, on the labor market of Kazakhstan one can observe a scarce demand for knowledge management specialists and so far only among large foreign

enterprises, when skills are required to develop, implement and maintain the company's knowledge management system. However, there is no information about the introduction of knowledge management technology in small and medium-sized businesses on the labor market of Kazakhstan found.

It should be noted that the most researched areas regarding knowledge data base are the construction and IT industries (Olivo, et al, 2016). For the first time in the CIS space, a conference dedicated to knowledge management was held in Moscow in 2019 in the IT industry. Korsokava (2020) in another conference attended to knowledge management noted that there is no complete agreement in the world on the theoretical justification and practical application of the methodology and means of acquiring and sharing knowledge within the organization. She argued that in practice in CIS enterprises there are single independent ways of implementing knowledge management, mainly among IT companies. And they at IT the conferences share their mistakes, achievements, difficulties with the conference participants. And the main tools for implementation are software - Confluence knowledge data base, also Jira and others, which are very little spread among non-IT companies. It was also noted at the conference that there are problems in accounting knowledge of the enterprises in the field, in particular, a practical problem - the lack of a specific specialist to control the maintenance of the database. Often the control passes from hand to hand, which aggravates the situation of knowledge management in companies, she claims. And most importantly, the results of such practical implementations remain behind the scenes of the research literature should be noted.

According to Suvorova and Tevanyan (2019), the key to the successful integration of an enterprise into the modern economy is planning, creating and implementing strategies for managing its intellectual resources and knowledge assets. This trend changes the existing economic regularities and requires a relevant approach to the study of the essence of knowledge and the processes of its management by economic science. It also demonstrates how significant today becomes not only the possession and creation of new knowledge, but also its management, which is necessary to solve both strategic and operational problems, especially in the creation of tangible goods and profitable intangible competitive advantages.

The main purpose of this study was built on the principle of review of tools, technology used in the implementation of knowledge management system in Kazakhstani enterprises, in order to analyze what efforts have already been made, in what direction it is developing, what tools are missing and need to be developed, and in what direction to go deeper in the study. And based on the results of the study to propose practical mechanisms for continuous improvement of the knowledge base and building a system of optimization of business processes at industrial enterprises. As noted above, in many industries except construction and IT industry corporate knowledge management do not use or little use modern technological tools to account for the knowledge assets of the enterprise, which indicates the need for research attention.

Materials and Methods.

The concept of knowledge management was initially considered as a phenomenon relevant only to industries and production, which are characterized by so-called high technologies, manufacturing of new product samples directly on the basis of specific scientific research and technical developments, but the practical application of this approach of innovation processes has become an indispensable condition for the development of all spheres of activity. Thus, knowledge management is a field of management focused on the processes and people involved in the creation, dissemination and evaluation of knowledge necessary for the realization of business strategies (Tomiltsev, 2012). Drucker (1999) defined knowledge as a key resource of the world economy. Traditional components of production - land, labor and capital become limiting factors rather than driving forces. Knowledge becomes the main component of the production process, he argued.

The term "knowledge management" was introduced by Carl Wiig, an American scholar and management consultant, and was first used in 1986 in his presentation at a conference in Switzerland held by the International Labor Organization under the auspices of the United Nations (Wiig, 1993). Core knowledge as applied to organizations is the practice of learning the lessons of knowledge that ensure their competitiveness; as applied to the employee, knowledge that enhances the effectiveness of managerial, communication, production operations and contributes to career development in a given organization argued Wiig (1993). It should be noted that intellectual capital is a type of intangible assets, which includes three subcategories: human capital, structural capital, customer capital. It can include employee knowledge, information about production processes, experts, products, customers, competitors, intellectual property in the form of patents and licenses (Roos and Roos, 1997).

However, when there talks about knowledge management today, the matter is usually quickly reduced to the problem of big data and analytics (Ihrig and MacMillan, 2021). Nowadays, most managers have access to huge amounts of complex and multidimensional data about customers, operations and employees, but this data is difficult to transform into useful knowledge. Only case when the expectation is that if the right experts and the right tools are leveraged on this mega-knowledge, brilliant strategic insights will emerge. And in the absence of a clear understanding of the knowledge drivers of organizational success, the real value of big data will never materialize argue Ihrig and MacMillan (2021).

Ihrig and MacMillan (2021) explore the above issues to answer the questions: what knowledge companies should possess, which knowledge is key to future success, how critical knowledge assets should be managed, and what knowledge areas can be usefully combined. They offered their approach of how to map an organization's strategic knowledge and identify where it can help create value and growth. When knowledge assets are placed on a grid along two dimensions - unstructured (implicit) versus structured (explicit) and unspread (limited) versus spread (shared) - it becomes easier to manage them for competitive advantage in the

future. They argue that, typically, large-scale sustainable growth becomes possible when people take ideas from one knowledge area and apply them to another - for example, when deep technical knowledge in one business division is applied to another business division or, for example, when the best marketing group in its field moves a product development fond into the open area, sharing market information derived from customer data with everyone in the enterprise - a high singularity of knowledge sharing is achieved.

This suggests the possibility of embedding knowledge systematization tools in the management of corporate knowledge in industrial enterprises by implementing a knowledge management database (KMDB). Also, some studies propose ready-made IT solutions: specialized knowledge bases for entering and storing the most important knowledge for organizational results.

Actually, for this purpose, Ihrig and MacMillan (2021) suggest the development of a knowledge assets account in the design and implementation of a KMDB, where one unit is able to share knowledge through this knowledge base with others. Such a base, they argue, should include both 'hard skills' data – for example, technical prowess - and 'soft skills' - for example, culture, the way of doing the job - that support reasonable risk taking. There should also be a record of the necessary knowledge that the company should have, but does not, or that needs to be reinforced.

The next step is to map the company's assets in a simple grid along two dimensions: implicit or explicit (unstructured or structured) and private or widespread (unspread or widespread) in the database. Speaking of unstructured (implicit) knowledge implies a deep, almost intuitive understanding that is difficult to articulate; it is usually based on extensive experience. For example, experienced world-class engineers may intuitively understand how to solve technical problems that no one else can (and may not be able to explain their intuition even themselves sometimes). And structured (explicit or systematized) knowledge is easier to transfer: for example, a company that is expert in using discovery-based planning can quickly familiarize people with the methodology because it has given them a common language and rules to refer to (Ihrig and MacMillan, 2021).

Here, it is necessary to clarify the understanding and distinction of the concept of knowledge management. A group of researchers Shujahat et al (2017) through a qualitative study on knowledge management and competitive intelligence reviewing 447 studies and as well exploring nine leading management science databases - Google Scholar, Science and journals - Direct, Taylor and Francis Journals, JSTOR, Springer Link, Emerald, Elsevier, Willey and Sons and SAGE found that information management is a subset of knowledge management. The reason presented was that knowledge management covers both explicit and implicit knowledge whereas information management covers only explicit knowledge. And the strategic management literature, as Shujahat et al. (2017) argue, still focuses on information management rather than knowledge management. This substitution and its implications for knowledge management and strategic management should be addressed by relevant scholars and practitioners they argue. Also, Shujahat et

al, (2017), noted that there is almost no research on the dynamics of knowledge management and competitive intelligence programs, strategies and functions in the literature space with something to draw on and collate.

Nevertheless, the following study by Sergeeva and Duryan (2021) aimed at exploring the ways in which innovation and development are enabled by knowledge management and sharing has important implications for the creation and sustained building of competitive advantage. Although Sergeeva and Duryan's (2021) study took place in the environment of construction firms, the findings may provide a course of action that can be drawn upon to explore and delve deeper into the area sought. Thus, Sergeeva and Duryan (2021), conducted 30 semi-structured interviews with professionals in the construction sector, whose roles are most important, found a significant relationship between innovative development and knowledge sharing.

However, for a more correct understanding of the terms "knowledge management" and "information management" some clarifications are necessary. For example, the word information - from Latin *informātiō* is "explanation, concept of something", *informare* is "to give form, to teach" (Encyclopedia, 1972) - is knowledge that has acquired the form of representation. On this basis, knowledge is intangible and informalized. It belongs directly to a person, but is available for alienation, becoming a material object or information. This relationship indicates the subordination of information to knowledge, which is initially managed only by person and under his or her influence is transformed into information available for enterprise management. The economic consumption of information in the creation of new knowledge in employees, as well as the reverse process - the creation of new information under the condition of using their existing knowledge, is knowledge diffusion then (Suvorova and Tevanyan, 2019). Consequently, the use of the term knowledge management is relative, as it is not possible for the enterprise to manage knowledge directly, given its informalized nature. In this context, what is important is that knowledge management is not possible, as in reality only the environment in which knowledge is created and used can be managed (Davenport and Prusak, 1998). On this basis, enterprise knowledge management through the maintenance of a knowledge database is that working tool for enterprise knowledge management by mapping the company's assets in a simple grid on two dimensions: implicit or explicit (unstructured or structured) and private or widespread (diffuse or widespread) as mentioned earlier by Ihrig and MacMillan (2021).

It should also be noted that the scientific literature highlights one poorly studied problem in relation to knowledge - it is the obsolescence of knowledge. To assess this phenomenon, a special indicator called the "half-life of competence" has been developed and used in the United States (Ushakova, 2000). This is a nuclear physics term, meaning, the length of time after graduation or learning something when, as a result of the obsolescence of acquired knowledge as new information becomes available, the competence of an individuals and specialists for old knowledge is significantly reduced. To give right solutions of such phenomenon Bakanova and Silkina (2015) propose to keep corporate knowledge relevant to professional tasks

through KM. They further point to such a phenomenon as - evolution of knowledge. Knowledge as such develops according to its own logic - it is objective in nature and does not depend on individuals. But at the same time the knowledge of a particular person is subjective, as it is woven into the structure of his or her personal perception, emotions, experience, beliefs, prejudices and views. Subjective knowledge is always unique and is determined by the cognitive and emotional context. The very nature of a concept and the multitude of its interpretations force to consider the process of knowledge evolution from different positions, they argue.

Therefore, in the context of corporate knowledge management, it has been proposed to divide this process into two complementary levels - knowledge growth per se and knowledge accumulation by individuals (Bakanova and Silkina, 2015). This means that it is necessary to build up knowledge so that one knowledge builds on the previous one and thus builds up and refreshes to avoid knowledge obsolescence. Which once again emphasizes the relevance of knowledge database implementation in enterprises. For the record, Makarov (2009) in his agent-based mathematical model noted about the factor - forgetting knowledge. He argued that over time there is a natural forgetting - "weathering" - of knowledge in individuals, so the need to account for knowledge, its formalization remains an important element for the sustainable development of the enterprises to create competitive advantages in the industry.

Results and Discussion.

The undertaken systematization of knowledge in industrial enterprises through the development and implementation of a knowledge database is a subject to discuss the results. The research in this regard was conducted in three phases. The first stage - Quantitative research reflected the measured variables by collecting information through Survey. The second stage included Case study research in order to determine on the ground the opportunities and necessities of implementing enterprise knowledge management database. The third stage - practical implementation of the developed knowledge management model at one Kazakhstani enterprise.

At the first stage - data collection was carried out by the method of quantitative approach through paper and electronic surveys in 2022. A total of 123 questionnaires from various industrial enterprises were collected during the study period. The items in the main block of the questionnaire reflected the measured variables such as: willingness to share knowledge with colleagues, what ways of knowledge sharing they would like to practice, how they understand the KM and the contribution of knowledge sharing in improving labor relations in the team. The factual data of the respondents including age, gender, education and occupation are presented in Table-1.

Table 1. Profile of Respondents

Variable	Percentage	Variable	Percentage
Gender		Educational level	
male	71,7	high school	16,7
female	28,3	specialist degree	55,1
Age		bachelor's degree	26,8
20-30 years old;	15,2	master	1,4
31-40 years old;	38,4	Current job title	
41-50 years old;	28,3	junior specialist	22,9
51-60 years old;	13,8	leading specialist	24,6
61 – above.	4,3	chief specialist	20,1
		senior manager	22,9
		head of department	7,8
		top manager	1,7

It should be noted that pilot shoots were conducted twice. In fact, the first pilot draft of the questionnaire was fundamentally redesigned when it was found on the initial trial that many employees of enterprises did not clearly understand the strategy of corporate knowledge management, moreover, the questionnaire was designed from incorrect assumption, referred to indications of theoretical materials, that the knowledge management database was already being maintained in enterprises, and the search was initially conducted on the way to improve KMDB. It turned out not to be the case and this changed the structure of the questions in the end. The Table-2 shows the answers of respondents to the variables searched for.

Table 2. Variables of the Survey

Is it true that sharing knowledge will improve the working relationship in the team?	1. totally agree	25	20%
	2. agree	33	27%
	3. partly agree	31	25%
	4. partially disagree	15	12%
	5. disagree	9	7%
	6. completely disagree	5	4%
	7. difficult to answer	5	4%
How often do you share your experiences with others?	1. almost all the time	14	11%
	2. very often	35	28%
	3. often	40	33%
	4. sometimes	16	13%
	5. rarely	15	12%
	6. never	3	2%
	7. keep from answering	0	0%

What ways of sharing knowledge would you like to practice?	1. through computer programs	29	24%
	2. through reports	10	8%
	3. through a mentor	33	27%
	4. through instructions	14	11%
	5. paper notebook entry	24	20%
	6. no idea	8	7%
	7. difficult to answer	5	4%
You are often shared with knowledge.	1. almost all the time	9	7%
	2. very often	37	30%
	3. often	43	35%
	4. sometimes	12	10%
	5. rare	16	13%
	6. never	3	2%
	7. keep from answering	3	2%

Since this quantitative survey tested knowledge sharing skills and willingness to share knowledge in enterprises, one of the questions reflected in particular: is it true that knowledge sharing improves the working relationship in a team? The answers received were in the following order in Table-2. 20% of respondents strongly agreed and 27% of participants agreed. However, a 15% difference of opinion is a good reason to look further. It would seem that almost half agree, especially there are another 25% of respondents who partially agree. To the 15% of those who disagree, it is necessary to include some of those who partially disagree 12% and partially agree 25%. And this is already a lot to manage company knowledge confidently. However, this study did not aim to find out why they do not agree to share knowledge, but to investigate the willingness to share knowledge.

To understand how much respondents are willing to share their knowledge with others, it can be observed that 2% of respondents are not in the habit of sharing their knowledge with others, and 12% rarely share. However, since the companies often practice mentoring system 11% always; 28% very often and 33% often share their skills with others. The 2% of respondents who never share knowledge, the researchers suggests that this picture may be due to young workshop workers who have nothing to share yet. The results obtained will be taken into account in the course of development of the program for implementation of the knowledge database at an enterprise in the third stage.

Further it can be observed the picture of how respondents would feel comfortable sharing knowledge. The most striking thing is that 27% of respondents would like to receive knowledge through mentors, which probably indicates a long-standing successful practice of knowledge transfer at enterprises. However, 24% of respondents are already ready to share knowledge through computer programs. Nevertheless, it is necessary to emphasize the figures that have developed regarding knowledge sharing: 11% of the respondents - through instructions, 20% - through writing in a paper diary, and 7% - no idea at all and 4% found it difficult to answer. This aspect is important for the research element in KM. Also, respondents admitted

that others share knowledge with them in 7% almost always, 30% very often, 35% often. And 13% seldom received help from others and 2% not at all, and 2% of the respondents who abstained from answering presumably did not receive knowledge respectively. Total 72% of the participants share knowledge regularly and 10% sometimes, which is somewhat encouraging for the upcoming work on developing a database for an enterprise.

In the second stage - case study research - 13 senior managers from several Kazakhstani companies participated in the interviews. This phase was an important and active part, involving coding, categorizing and comparing all selected cases with the preliminary industry report for final conclusions using NVivo 2.0. This was expected to provide more control over the interviews in the comprehensive analysis report to understand whether leaders are competent for KM, define their way of knowledge increasing, how they protect their intellectual resources, whether the modern technological tools used to account for the knowledge assets. What way they use keep growing enterprise knowledge. Specifically, the interview participants were - 77% male and 23% female. The fields of education were: Master degree 15%, Bachelor's degree 46% and Specialist degree 38%. As for an age range between 20-30 years old 8%, 31-40 years old 46%, 41-50 years old and 51-60 years old by 23%. Heads of departments 69% and Top managers 31%.

According to the obtained data analysis, at the time of the survey and interviews at all enterprises participating in the study, no special knowledge accounting bases were maintained, knowledge was not documented and formalized in that way. However, it was found that extensive work on the protection and growth of intellectual capital is carried out in other ways. In particular, the enterprises widely practice knowledge sharing through mentoring and training - 62%, professional development programs - 38%, internship - 84% and others. Storage and study of technical documentation or other documents and reports are also practiced - 92%. According to the survey, almost 47% of respondents agree that knowledge sharing improves labor relations in the team. However, 10% noted that they could not say what ways of knowledge sharing are acceptable to them. It is noteworthy that 74% of respondents are often willing to share knowledge with others. This high willingness, however, did not have a positive impact on the practical implementation of KMDB. Nevertheless, the obtained data are a great support for corporate knowledge management in enterprises.

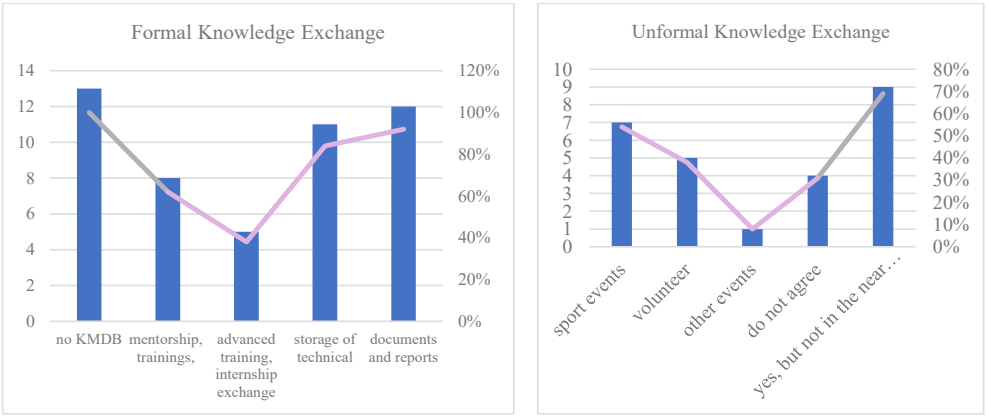

Figure 1. Knowledge formalization and Store

In addition, there are strong corporate informal activities Figure-1, 54% sports activities, 38% volunteering, which, as a rule, dispose to the willingness to share knowledge through non-formal communication. Bykov (2013) from practical field argues that informal communication for effective team management is a valid tool, the informal communication promotes a high degree of trust and understanding, correct prediction of the partner in the situation and acceptance of with all the strengths and weaknesses. And the last item of the interview: do you share the opinion that automated technologies will reduce the workforce? was asked in order to soften the angle to conclude the survey with more unappealing questions, nevertheless it touched upon the topic to what extent automated technologies can reduce the workforce and whether it can have probable consequences on the company's knowledge building and sharing in order to improve the quality of business in developing business potential and strengthening sustainable competitive advantage. Thus, 31% of respondents disagree with this view, but 69% expect this to happen someday, but not in the near future. The data were analyzed and summarized to construct and implement a knowledge management database. Now after the completion of data logging the research took opportunity to demonstrate the results of practical implementation of the designed model in the field.

Thus, *in the third stage* - all the involved data were recorded in a database, which provided an opportunity to look at the studied problem once again from practical perspective. The database included used information directly from brochures, company banners, reports and other sources, as well as interview transcripts and questionnaires. Therefore, this stage was mainly concerned with the issues of enterprise knowledge management, maintaining knowledge records in KMDB database.

Initially it was proposed to keep records on the basis of Microsoft Access database program. However, it turned out that not all employees can be users of this software. Therefore, the data were maintained as scripts on Microsoft Word.

Where the company's employees should have entered their tangible and intangible knowledge shortly after projects or after a task was completed. In the future, it was recommended to develop a special database or to purchase a ready-made software product, which are not burdened with high costs. However, for the start-up period, this approach was acceptable and not at all costly in terms of learning a new program, time and resources.

This approach was inspired by Koenig's (2016) article on knowledge accounting systems in companies, where he cites the immutable factors of knowledge loss. From the retirement of adult staff to the transition of experienced employees to other workplace, irretrievably taking with them the entire intellectual capital of the company. Preservation and multiplication of knowledge is one of the decisive elements of the company's competitiveness. The loss of knowledge can lead to large costs, not visible at first glance, which can strongly affect the cost and quality of the final manufactured product (Koenig, 2016).

Practical Steps. First, the knowledge resources of the enterprise were examined through knowledge audit (Hylton, 2002) Figure-2, which includes the process of systematically investigating and evaluating explicit knowledge centered mainly in documents and implicit knowledge centered in human resource. The knowledge audit also included an assessment of the enterprise's current KM achievements at the time of database development in order to identify further knowledge needs, highlight weaknesses and strengths, identify technological opportunities, reduce redundant processes and increase missing knowledge inputs.

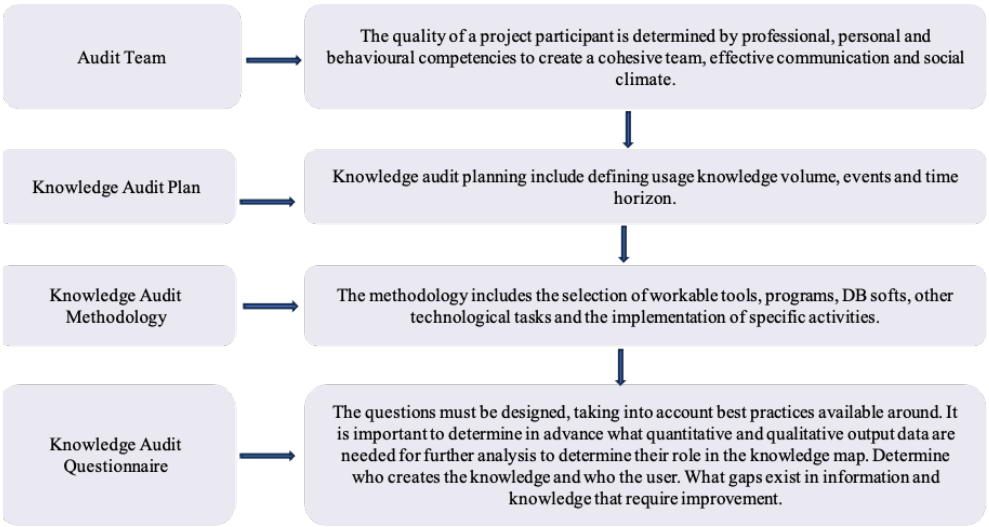

Figure 2. Knowledge Audit Steps constructed by Authors according to Hylton (2002).

Then, based on the audit data, it was necessary to construct a knowledge roadmap (Hylton, 2002) Figure-3, which gives a visual picture and defines knowledge structures, being pointers to more detailed sources of knowledge of the enterprise and containing references to experts and specialists, knowledge owners.

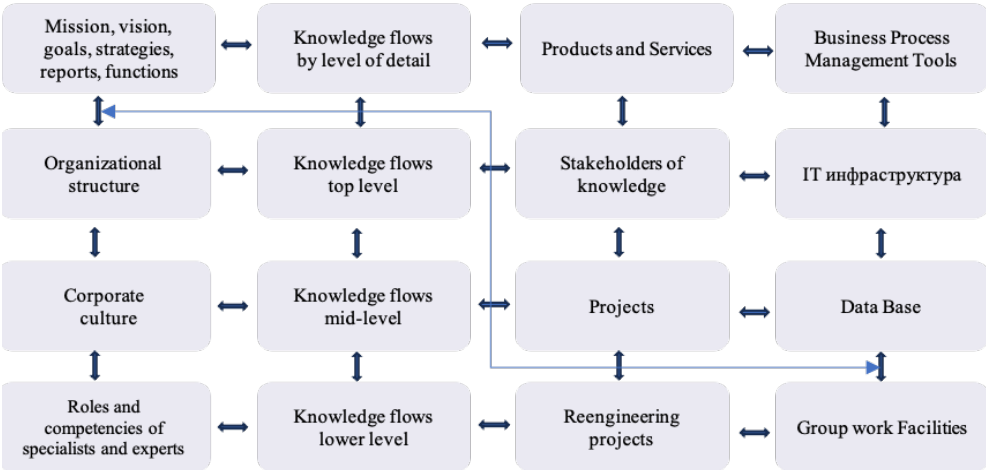

Figure 3. Knowledge Map constructed by Authors according to Hylton (2002).

And following the principles of the designed model, all employees were encouraged to keep knowledge records in KMDB. In addition, employees were encouraged to keep audio or video reports directly with the equipment in the workshop to make it could access for new learners or other staffs when needed and less distract each other. All this software data was shared and localized in the company's technological space.

In general, the results of practical application have shown the workability of this approach for preserving and multiplying the company's knowledge. However, it was found these transformations are labor-intensive and require precise steps in implementation. If KMDB is being implemented for the first time, it may take longer than expected. Practitioners may encounter unexpected twists and turns unaccounted for factors. These cannot be taken into account in advance due to the lack of elaboration of existing problems and the lack of much experience in this respect. For example, at the practical stage, immediately after the implementation of the KMDB, there were no much employee around willing to leave reports on their work in the database, much less great eagerness. This new approach may have caused some of the staff to fear some kind of control. But exploring such a reason was not investigated in this study. Also, workshop workers usually do not sit at a desk with a computer unlike administrative workers, many of them do not have personal access to computers. To overcome this constraint, it was suggested that these workers should visit the enterprise library to record KMDB. Perhaps this solution may have slowed down the work, but it is the right solution in case of industrial enterprises.

However, a little while, when leaders supported such an endeavor KMDB occupancy went on a slight upswing. The researchers expect that such an upswing will continue in the future. This assumption is made on the basis of a scientific article by Vyatkin, Zhuravlev and Kiselev (2004) on the study of Darwin's evolutionary theory and modernity. It is about the mechanism of imitation. Imitation is a natural mechanism of human evolution. By studying the ways of learning and knowledge transfer, scientists point out that when learning is immersed in behavior, imitation mechanisms based on the principle of "do as I do" begin to work (Vyatkin, Zhuravlev and Kiselev, 2004; Darvin, 1928-1959). And since KMDB data are already observed to be replenished, this behavior is expected to become a daily routine in the work environment.

Meanwhile, it was observed how some employees were to record their knowledge on audio, even video. This interest may have been triggered by the global trend towards gadgets and social media. However, investigating the nature of such a phenomenon has not been explored in this paper. In fact, this approach of capturing knowledge on video and audio was suggested by the researchers after watching a popular-science film where scientists and military personnel used video reports in order to preserve knowledge and transmit experience close to its original form. This approach is notable because the fresh experience gained can be captured with all the emotional colors and reflect the smallest details, as well as carry the source effect of the verbal and non-verbal report. The rapid forgetting of which was pointed out by Makarov (2009) in his agent-based mathematical model mentioned earlier.

As the practical part of this study has shown knowledge sharing in the enterprises is possible if it is made profitable, safe, useful. Possession of knowledge is a matter of survival and acquisition of long-term sustainable competitive advantage (Koenig, 2016), (Aimagambetov and Karabayev, 2020). From the subject of history, mankind knows that in the primitive, ancient world and in the Middle Ages people stored and transmitted knowledge through myths, legends, traditions, rock paintings and many other things - they somehow formalized knowledge in order to preserve and pass it on to descendants then. The created database of employee knowledge records is gradually being enriched; the results can be observed. Most importantly, it is expected that the proposed practical mechanisms of knowledge management through the implementation of KMDB in enterprises is going to become a good platform for preserving and sharing knowledge, which can build the foundation of successful implementation of strategies for managing their intellectual resources and knowledge assets to develop sustainable competitive advantage.

Conclusion

Summarizing the studied expert assessments, as well as the obtained data of quantitative and qualitative analysis of research, and practical implementation of the database it can be can assert the relevance and trend of demand for the development of the method of corporate knowledge management. The practical significance of using the proposed solutions to the problem of corporate knowledge management increases due to the use of handy computer programs without the introduction of specialized

database, for example: Microsoft Word (scripts), Microsoft Access (database), which determines the smooth implementation of knowledge database in a short period of time without significant resources. Also filling and updating of the database is possible by own employees without involving third-party consultants. However, off-the-shelf DBMS solutions or the development of a specialized information product is not burdened with large financial resources. The study proposed a technological solution and developed practical steps in the implementation of corporate knowledge accounting database, which consist of the following points:

1. Conduct a knowledge audit. Gather all corporate knowledge according to the model proposed in this study in Figure 2. Or rely on the writings of knowledge audit experts, such as Wiig's (1993) 10 factors or Hilton's (2002) 12 factors or others. Although Hilton's factors are more written under CRM - customer relationship management, however, they can be transposed to the individual characteristics of managing one's own corporate knowledge as demonstrated in the third stage of the research. However, the modification should take into account the characteristics of the enterprise, the existing and unrecorded sources of knowledge, the extent to which this knowledge is used and disseminated among the staff. Since the knowledge audit is a kind of project, it will be necessary to organize Audit Team whose task is to: draw up the audit plan; determine the methodology; draw up the audit questions; draw up the preliminary report. Then, after agreeing this report with the top managers of the enterprise, and perhaps after some revision, it will be possible to draw up a knowledge map. Knowledge audit is a long, but disposable process at the very initial stage of knowledge database implementation and will require deliberate verified steps to prevent unnecessary loss of enterprise resources.

2. Knowledge roadmap. Knowledge mapping involves direct involvement of field specialists. The elements of the knowledge map may vary from company to company according to the specifics and types of activities. For example, it may look like in Figure-3. However, in a modern solutions DBMS - database management system, the map is filled in directly in the database, which significantly reduces time and makes the process of keeping the company's knowledge records convenient.

3. Appoint a responsible employee for KMDB. This moment is the key for preserving and multiplying the knowledge of the enterprise. Korsokava (2020) pointed out the unresolved existing aspects of knowledge accounting in enterprises, when practical problem was the lack of a specific person to control the maintenance of the database. She observed: often the control of such a database pass from hand to hand, which aggravates the situation of KM and may lead to the fact that employees one day stop completing the knowledge base.

4. Continuous maintenance of knowledge records and building up knowledge assets. Continuous improvement of the knowledge base is the key to building a system of optimization of business processes at enterprises. The main solution to the implementation of continuous knowledge accounting is the acquisition of organizational behavioral quality in the staff so that recording the knowledge base would become a daily routine in the working environment.

It should also be noted that this study exhibited unaccounted for limiting factors that were insurmountable in the research process due to time constraints. When researching one area of concern, it is not always possible to squeeze collateral factors into a single study. However, these limitations require the attention of future researches. For example, according to the model developed from the empirical part, at a certain stage a way of knowledge management in the tested company was developed. Employees were encouraged to enter knowledge and experience regarding their work into a database. We encountered that for some time the replenishment of the database was not observed. That is, the process was very slow. Although the research found: 74% of respondents are often willing to share knowledge, this high willingness, however, did not have a positive impact on the practical implementation of KMDB. The concern is that if this process is not monitored, all the work may be lost. Perhaps this new approach has caused some staff to fear some kind of control, or other reasons have prevented knowledge sharing. Knowledge sharing among staff is an important process of building up the knowledge assets of the enterprises. These reasons were not explored in the research process. However, the nature of the true cause needs to be established in future researches to find solutions to overcome such constraints.

Concluding the analysis of the materials studied, it is important to note that the modern economy, which is at a new stage of development, is based on knowledge, which is a qualitatively new factor of production and a key means of achieving socio-economic development results and competitiveness of enterprises. It is expected that the successful implementation of modern knowledge management technology in enterprises through the systematization of knowledge in the database, and most importantly, the continuous improvement of accounting of this knowledge and building up knowledge assets will contribute to the successful implementation of innovative transformations, growth of competitive advantages and sustainable development of enterprises in the long term.

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