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KNOWLEDGE APPLIANCE PROCESS: THEORETICAL AND PRACTICAL EVALUATION ASPECTS

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Abstract. The importance of knowledge appliance process is based on the fact that it is related to effective appliance of existing knowledge to solve problems, manage business processes and knowledge about adequate working environment appliance creation. Knowledge appliance process is described as knowledge management implementation stage when knowledge is transformed into specific organizational results. Organizations in order to implement effectively and coordinate the knowledge appliance process often encounter problems of psychological, functional type or loss of knowledge value. To solve this type of problems knowledge appliance process is used, in which it is important not only to know about internal and external knowledge, where is knowledge, who has this knowledge but also to apply existing knowledge to complete work functions and to create value of organization. To solve these problems effective knowledge appliance process is necessary, during which new or existing knowledge has to be suitable to use and apply to increase working performance. In order to implement effectively the knowledge appliance process for organizations, it is necessary to assess this process efficiency affecting factors. The article looks into theoretical evaluation aspects of knowledge appliance process, which are practically evaluated by the example of pre-school education model example. Research methods are scientific literature analysis, survey, expert and multiple criteria evaluation.

Keywords: knowledge, knowledge appliance, evaluation

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1. Introduction

In order to control effectively knowledge, it is necessary to know essential knowledge management components well: processes, methods, measures and their peculiarities, which can be examined in theoretical and practical aspects. Theoretical aspect is expertise about knowledge management components: processes, methods, measures and their combinations. Practical aspect is practical implementation of knowledge process management, excluding the importance of every process in the chain of knowledge value, problematic areas, current issues of evaluation and examples of good practice. Knowledge management in transformation context is an effective measure to increase the efficiency of public management institutions and business organizations activity. Knowledge management is a purposeful and systematic management of knowledge processes, methods, measures, with full extent of knowledge potential for achieving goals, solving problems and making effective decisions. Knowledge management is analyzed in systematic approach, achieved through procedural knowledge management model, which comprises the cycle of processes and shapes the chain of knowledge value creation. Knowledge management model consists of these processes: knowledge goals formation, identification, acquisition, development, distribution, appliance, preservation, evaluation (Raudeliūnienė 2012).

The importance of knowledge appliance process is based on the fact that it is a process related to effective appliance of existing knowledge to solve problems, manage processes and creation of suitable working environment for knowledge appliance. Process of knowledge appliance is described as knowledge management implementation phase, when knowledge is transformed into specific organizational results.

Trying to achieve the increase of innovation level in Lithuania it is very important to evaluate current innovation level and how information technologies are applied in pre-school education institutions. During research it was found out that information technologies in pre-school education institutions are not widely applied and often encounters psychological, social and functional character or knowledge value loss problems.

Psychological and social problems are associated with the blockage by employees for new knowledge appliance process, because they are afraid of showing their existent knowledge gaps, to lose one's position as a specialist in a certain area. Also often employees express distrust about external knowledge and that is why they are not motivated to implement this knowledge in their work.

Functional problems are associated with the fact that employees, performing daily routine functions in a conventional (automatic) way, are convinced that there is no more effective way to complete a function or procedure and therefore pay not enough attention to the new procedures.

Often organizations are faced with the problem of losing the value of knowledge, when existent knowledge is not used in the work environment or applied ineffectively. To solve these problems effective knowledge appliance process is necessary, during which new or existing knowledge has to be suitable to use and apply to increase working performance.

In order to implement effectively the knowledge appliance process for organizations, it is necessary to assess this process complexly. The aim of the article is to identify the factors affecting the efficiency of knowledge appliance process in pre-school education institutions. Research methods are scientific literature analysis, survey, expert and multiple criteria evaluation.

2. Theoretical aspects of knowledge appliance process

To summarize various scientific opinions it can be said that knowledge appliance process is related to the implementation of knowledge management as the knowledge appliance process is carried out when organization has already formed knowledge objectives, identified gaps in knowledge and taken decisions related to the acquisition of knowledge and development.

Therefore, knowledge appliance process is one of the most important knowledge management processes, since the effectiveness of organization's staff employment, fluency of internal processes, the quality of consumer needs satisfaction and organization's value creation depends on the effectiveness of this process.

Scientists define different components of knowledge appliance process. According to K. Dalkir (2011) knowledge appliance process is everything that has been captured, coded, shared and put to actual use (Dalkir 2011). It can be said that scientists defining the knowledge appliance process often distinguish keywords such as adaptation, problem solving and benefit (Table 1).

Table 1. Definitions of knowledge appliance process

| Author, year | Definition |
|--|---|
| Gartner 2015 | Appliance of existing knowledge in business decisions and increase of business development opportunities. |
| Atkočiūnienė 2014 | Efficient use of organization's existing knowledge. |
| Hai 2012 | The appliance of the dimensions and structures (from simple to complex), which exist in a complex space and interact with each other to solve the problems. |
| Allameh <i>et al.</i> 2012 | The use of acquired knowledge in practice. |
| Saufi <i>et al.</i> 2012 | One groups of people knowledge realization and grouping. |
| Bera <i>et al.</i> 2011 | Effective use of organizational know-how to the benefit of the company. |
| O'Dell <i>et al.</i> 2011 | The process when knowledge is arranged in specific forms and adapted to solve specific problems. |
| Smith <i>et al.</i> 2011 | The process for decision making, solving problems and at the same time to lead, coordinate organization's participants. |
| Probst <i>et al.</i> 2006 | Knowledge management process implementation phase, when knowledge is transformed into concrete activity results. |
| Becerra-Fernandez <i>et al.</i> 2004, 2010 | Knowledge management phase, when daily processes in organization are performed saving costs . |

Source: created by authors

G. Probst, S. Raub, K. Romhardt (2006) believe that knowledge is also regarded as the knowledge management process implementation phase, whereas knowledge is transformed into concrete activity results. Scientists offer variety of ways and means how to use knowledge:

- info centers, where information can be found in one place and in different forms, and the employee has the opportunity to actively participate in the creation and management of an information center;
- training in the workplace, where workers easier use of new knowledge that can be applied directly to working life;
- documents that are attractive in their form and content of interest (graphs, summaries, etc.);
- working conditions, taking into account the necessary equipment at workplace in order to use knowledge and when exists a shorter physical distance to the necessary sources of knowledge.

According to K. Sandkuhl (2009), organizations often experience success in opting for a network approach. The essence of this approach is that the more workers will be included in knowledge appliance process, the more knowledge will be valued and workers themselves will be strongly motivated to apply and share knowledge.

Many scientific studies have highlighted that the main reason for people in the organization to use knowledge is the value of the knowledge (expected utility of knowledge) and user-friendly knowledge base, infrastructure, which is easy to use, the possibility simultaneously using knowledge also to create knowledge, saving time, emotional costs (Raudeliūnienė, Radvilaitė 2014).

In the scientific literature, factors affecting the efficiency of knowledge appliance process are variously categorized and classified in terms of content, for example, according to the psychological, functional and social aspects, groups of the resources (factors related with the organization's target orientation, human, knowledge content, technological, financial) and etc. (Table 2).

Factors affecting the efficiency of knowledge appliance process can be grouped in terms of content according to the organization's resources groups when factors occur within the organization's employee motivation and ability to rationally take advantage of the information and knowledge, organizational, technological and financial infrastructure of knowledge appliance to perform work activities (Chlivickas, Raudeliūnienė, 2007; Chlivickas, Raudeliūnienė, 2008; Chlivickas *et al.* 2011; Raudeliūnienė 2012; Raudeliūnienė *et al.* 2012(a); Raudeliūnienė *et al.* 2012(b); Raudeliūnienė, Jaskytė 2014; Raudeliūnienė, Račinskaja 2014).

Factors affecting the knowledge appliance process are associated with such groups of organization's resources:

- factors related to the organization's target orientation: organizational structure, objectives, culture and networks;
- factors of human resources evaluation: motivation of employees, competence;
- factors of knowledge content evaluation: the quality of knowledge, the value of knowledge, the level of knowledge adaptability, knowledge presentation, knowledge appliance process duration, location;
- factors of technological resources evaluation: technology infrastructure and base to use knowledge methods and tools;
- factors of financial resources evaluation: profitability, investment costs, the net sales gain, the cost of knowledge and technology appliance, funding sources, and other techniques.

Table 2. Efficiency evaluation factors of knowledge appliance process

| Group of factors | Evaluation factors of knowledge appliance process |
|--|--|
| Assignment by psychological, functional and social dimension (Poonkundran 2009; Sandkuhl 2009; Evangelista <i>et al.</i> 2010; Shijaku 2010; Turner, Minonne 2010; Woolliscroft <i>et al.</i> 2012; Hasanzadeh, Mahaleh 2013) | |
| Group of psychological factors | Mutual cooperation between the members of organization, training, motivation of members, favorable working conditions, evaluation of importance of the members. |
| Group of functional factors | Implementation of innovations, novelties, technological and technical resources, the possibilities of external cooperation, computerized system. |
| Group of social factors | Staff training intensity, communication, management of documents relevant to the work. |
| Assignment by groups of resources (Chlivickas, Raudeliūnienė, 2007; Chlivickas, Raudeliūnienė, 2008; Chlivickas <i>et al.</i> 2011; Raudeliūnienė 2012; Raudeliūnienė <i>et al.</i> 2012(a); Raudeliūnienė <i>et al.</i> 2012(b); Raudeliūnienė, Jaskytė 2014; Raudeliūnienė, Račinskaja 2014) | |
| Group of factors related to organization's target orientation | Organizational management structure, objectives, culture and networks. |
| Group of human factors | Employee motivation to apply knowledge (material, recognition, self-expression, social, safety factors), the value of knowledge, workers' approach to innovations, competence. |
| Group of knowledge content factors | Knowledge quality and value of the knowledge, level of knowledge adaptability, knowledge presentation, and knowledge appliance process duration, location. |
| Group of technological factors | Technology infrastructure and base to use knowledge, knowledge appliance methods, techniques and tools. |
| Group of financial factors | Operating profitability, investment costs, the net sales gain, the cost, of knowledge and technology appliance financing sources and techniques. |

Source: Raudeliūnienė, Radvilaitė 2014

The most controversially assessed factors related to the group of human resources are the motivation and competence of organization's employees. In terms of content, the groups of factors affecting motivation can be divided into (Raudeliūnienė, Jaskytė 2014; Raudeliūnienė, Račinskaja 2014; Raudeliūnienė, Radvilaitė 2014): material, recognition, self-expression, social and safety factors.

Another important factor affecting the efficiency of knowledge appliance process is the competence of personnel. Many scholars considered competence concept, stressing that human resource competence is complicated and complex phenomenon.

Summarizing the factors affecting the competence and analyzed by various researchers, also on the basis of empirical studies of 2012 (Raudeliūnienė *et al.* 2013), four groups of factors in terms of content can be distinguished:

- personal competence factors: a sense of duty, professionalism, flexibility of mind, emotional stability, efficiency, knowledge, empathy;
- moral competence factors: honesty, responsibility, respect, honor, influence on others, being as an example, tolerance;
- managerial competence factors: decision-making, planning, leadership, teamwork, analytical thinking, initiative and creativity;
- professional competence factors: professional knowledge, knowledge integrity, the military posture, modern warfare basics, physical fitness.

Summing up the results of research it can be said that knowledge appliance process evaluation has the complexity and variety of factors, so in order to evaluate systematically the efficiency of knowledge appliance process, was suggested to assess it by psychological, functional and social aspects.

As knowledge appliance process is characterized by the complexity of the evaluation and a variety of factors, so for the survey there was selected multiple criteria evaluation method, which belongs to a group of decision-making, create preconditions for a comprehensive assessment of knowledge appliance process, and make decisions related to process improvement. Since the influence of individual criterion describing the research object is uneven for analyzed phenomenon, it is very important to determine the significance of the indicators applying multiple criteria evaluation (Podvezko 2008). The most common is the scale of criterion weights in the range [0, 1] (Ginevičius *et al.* 2005), which will be used to determine the significance evaluating factors of knowledge appliance process.

3. The practical evaluation aspects of knowledge appliance process in pre-school education institutions

Pre-school education is an informal education, designed to help a child satisfy natural, cultural as well as ethnic, social and cognitive needs. This education is for children from birth to 6 years old, i.e. until the child begins to attend general education school.

In Lithuania, pre-school education is not compulsory and is only given on the request of parents. Pre-school education can be taken in different places: it can be at home/family or pre-school education institution. General education schools, freelance teachers and all other education providers can provide pre-school education. Pre-school education institutions in Lithuania may be public, municipal and private.

State and local government pre-school education institutions are financed by the state and municipality budgets, by pre-school basket principle, where all education process is financed, and parents pay only for nutrition.

Partially financed education is also possible - parents have to pay for a part of it. In private pre-school education institutions, parents pay for everything: education process, care and nutrition. A part of it is financed by the state, but it a very small part of financial resources.

During 2010-2015 the total number of pre-school education institutions were gradually increased (Fig. 1). In turn, there is noticeable decline in pre-school institutions separation in rural areas. This is strongly influenced by the rural population getting down and parents choice to send their children to the education institutions in the cities.

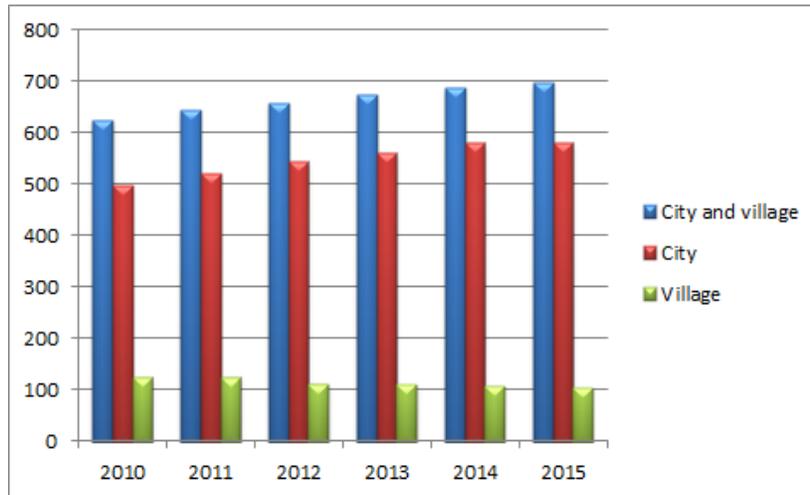


Fig.1. Number of pre-school education institutions (2010–2015)
 Source: Lithuanian Statistics Department www.stat.gov.lt

According to statistics, the use of information technologies in pre-school educations institutions is increasing (Fig. 2) and a variety of innovative solutions such as centralized electronic admission to pre-school institutions, electronic diary, secure e-kindergarten projects, which are directly related to the staff training about information technologies are continuously implemented. However, from the point of view of the staff there is still a resistance to use information technologies in the workplace.

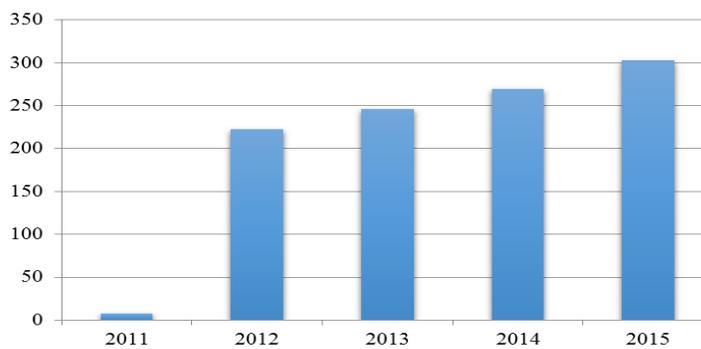


Fig.2. Dynamics of pre-school education institutions which have started to use the electronic registration and attendance sheets
 Source: Data of electronic diary www.manodienynas.lt

JSC “National Education Center”, which implements the solutions of information technologies for pre-school education institutions, conducted a survey of all local educational representatives in 2014. The results showed that the main reasons why it is difficult to implement information technology solutions in pre-school education is the lack of financial investment, lack of computer equipment, additional work training the staff, shortage of specialists and employees, who would be able to work with information technologies.

In order to assess properly the factors affecting the efficiency of knowledge appliance process through the year of 2015 the survey, which included 258 workers of pre-school institutions was carried out. At the same time, expert evaluation with the representatives of municipal education departments (7 experts) who are directly related to the work and maintenance of pre-school education institutions was carried out.

Evaluating the age of respondents, their average age was 34 years, the youngest person who answered - 24 years old, the oldest - 58 years old.

53 percent of respondents are the heads of pre-school institutions and the remaining 47 percent – employees, who monitor institutions’ databases, work with information technology solutions.

The survey results showed that an average number of children in pre-school institutions is 67 while average of employees who are directly involved in the educational process is only 7. This figure also includes the head of the institution. According to the results, 10 children are assigned to 1 employee.

The evaluation of information technology resources in institutions is really interesting. In average, one institution has 3 computers (in survey the minimum number of computers was 1, the maximum - 10).

Respondents were asked to assess the importance of knowledge appliance process in pre-school education institutions, where 68 percent of respondents said that the importance of this process is significant, the rest (30 percent) said that importance of the process is average, and 2 percent did not understand the importance of knowledge appliance process.

Respondents were asked to indicate what are the most significant factors affecting the efficiency of knowledge appliance process in the scale [0, 1]: 72 percent of respondents said that the three groups of factors determines the knowledge appliance process (psychological, functional, social), 28 percent respondents identified only psychological and social factors (Table 3).

Summarizing the results of survey, it can be said that staff evaluation, novelties and competences have the greatest impact on knowledge appliance process in pre-school education institutions. Both the staff evaluation and novelties directly depend on the heads of institutions or even higher units – the municipal education departments. At the same time, competence is associated with employees, their attitude and capabilities to acquire competencies. Respondents were asked to identify the problems encountered in knowledge appliance process implementing information technologies and respondents indicated problematic areas such as: negative attitudes of employees towards changes; not enough financial resources allocated to pre-school education institutions; lack of information resources; shortage of young, qualified personell; lack of computer equipment; lack of motivation; lack of communication between managers and employees; lack of training; excessive workload.

Table 3. Evaluation factors of knowledge appliance process efficiency based on the results of survey

| Factors group | Factors | Significance |
|-----------------------|--|--------------|
| Psychological factors | Training | 0,24 |
| | Motivation program | 0,18 |
| | Decent working conditions | 0,18 |
| | Organizations environment | 0,12 |
| | Employee evaluation | 0,28 |
| Functional factors | Innovations | 0,22 |
| | Novelties | 0,28 |
| | Technological resources | 0,22 |
| | Implementation of external cooperation opportunities | 0,17 |
| | Computer systems | 0,11 |
| Social factors | Communication | 0,25 |
| | Employee training | 0,33 |
| | Competences | 0,42 |

Source: created by Authors according to survey results (2015)

In 2015 was carried out the expert evaluation, which included seven experts i.e. the heads and senior specialists of municipalities education departments in Vilnius, Klaipeda, Jonava, Radviliskis, Ukmerge, Elektrenai and Silale districts.

Experts pointed out that the most significant group of factors affecting the efficiency of knowledge appliance process are psychological factors (0,41), less important are social factors (0,34) and functional factors (0,25) (Table 4).

In the group of psychological factors, the most significant factors are motivation program, training and evaluation of employees. In the group of functional factors, experts distinguish innovations, thanks to which most of the processes in institutions are optimized and implemented more effectively. Technological resources and computer systems evaluation is similar. The implementation of external cooperation opportunities is measured as the factor having the lowest impact on the knowledge appliance process. When we talk about social factors, the most significant factors in the group are the competence and employee training and less important factor is communication. Pre-school education institutions are often faced with a lack of competence and that has been singled out as one of the knowledge appliance process problematic areas. Employee training has a direct impact on the competences, as it increases the competences.

Experts have identified one of the main problems in pre-school education institutions with regard to knowledge appliance process - the lack of qualified personnel when employees fail to implement the knowledge that they have been provided with during the training, so there is a need for additional training directly related to additional financial resources. Another problematic area is the attitude of elder workers and their resistance to changes

related to the implementation of information technologies. In order to implement effectively knowledge appliance process in pre-school education institutions, the following recommendations related to decision-making in problematic areas have been presented. In order to increase the number of qualified personnel in pre-school education institutions is proposed to perform stricter selection procedures of employees, where not only professional competences would be considered but also the computer literacy. In order to reduce the resistance of employees, more time for staff training is recommended and also communicating and justifying the benefits of information technologies in working life illustrating with the best practices. Each pre-school education institution must be given the opportunity for external cooperation with Lithuanian education institutions, which prepare pre-school teachers and always take them for practice. It is recommended to organize meetings with the heads of pre-school education institutions at least once a month (now they are held 2 - 4 times per year).

Table 4. Knowledge appliance process efficiency factors based on expert evaluation

| Group of factors | Factors | Significance |
|------------------------------|---|--------------|
| Psychological factors (0,41) | Training | 0,24 |
| | Motivation program | 0,18 |
| | Decent working conditions | 0,18 |
| | Organizations environment | 0,12 |
| | Employee evaluation | 0,28 |
| Functional factors (0,25) | Innovations | 0,22 |
| | Technological resources | 0,22 |
| | External cooperation opportunities implementation | 0,17 |
| | Computer systems | 0,11 |
| Social factors (0,34) | Communication | 0,25 |
| | Employee training | 0,33 |
| | Competences | 0,42 |

Source: created by Authors according to the expert evaluation results (2015)

During the meetings should be discussed the problems faced by institutions and their solutions. At the same time on a quarterly basis must be organized and joint meetings with the entire pre-school personnel. Employees of municipal education departments who are involved in the coordination process of pre-school education institutions should also take part in these meetings. There should also be presented (highlighted) the opinion of employees on the current situation in the institutions, the need for changes, discussed already pre-made and answered surveys – their results.

Following the recommendations, knowledge appliance process in pre-school education institutions would be implemented more effectively and pre-school environment would become more sophisticated and attractive to the public.

Conclusions

Knowledge appliance process is related to the effective appliance of existing knowledge to solve problems, to manage the process of organization and creation of suitable working environment for knowledge appliance.

Knowledge appliance process is described as knowledge management implementation stage, when knowledge is transformed into specific organizational results.

In order to implement effectively knowledge into the process of pre-school education institutions, it is necessary to identify the factors affecting the efficiency of knowledge appliance process. Such methods as literature analysis, survey, expert and multiple criteria evaluation were applied to make the research.

In literature, factors affecting the efficiency of knowledge appliance process are variously categorized and classified in terms of content, for example, according to the psychological, functional and social aspects, groups of resources (with the organization's target orientation related factors, human, knowledge content, technological, financial) and etc. It was chosen for research to classify the factors of knowledge appliance process by psychological, functional and social aspects.

Summing up the results of survey, expert and multiple criteria evaluation, the greatest impact on efficiency evaluation of knowledge appliance process in pre-school education institutions has psychological and social factors. Survey results show that employee evaluation and training (the group of psychological factors) have the greatest impact on knowledge appliance process in pre-school education institutions, meanwhile in the group of functional factors – novelties, innovations and technological resources, in the group of social factors – the competences and training of employees. Experts distinguish significant psychological factors such as motivation program, employee evaluation, and training, from the group of functional factors they distinguish innovations and computer systems, and the most significant factors in the group of social factors are competences and training of employees.

Surveys of pre-school education institutions' employees and expert interviews revealed the main problems faced by pre-school institutions in order to implement effectively the knowledge appliance process: lack of qualified personnel, the excess of elder employees, negative approach to information technologies, lack of competence and information technology resources. To solve the highlighted problems further solutions were offered: to perform stricter selection procedures with regard to employees computer literacy; more time should be given for employees training and communicating and justifying the benefits of information technologies in working life; pre-school education institutions should be given opportunities for external cooperation with Lithuanian education institutions which prepare pre-school teachers and always take them for practice.

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