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Knowledge Management Practice in General Education Schools as a Tool for Sustainable Development

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Abstract: The already scarce and further dwindling natural resources, increasing environmental pollution, and other environmental, economic, and social challenges that transcend national boundaries necessitate the continuous pursuit of the more responsible implementation of the principles of sustainable development in the public and business sectors, especially in general education schools, as the future and welfare of the society depend on education results. Therefore, the implementation of knowledge management practices in general education schools is one of the efficient ways of achieving the principles of sustainable development and their positive outcomes for society and the state. This research aimed to evaluate the peculiarities of applying knowledge management practices in general education schools for sustainable development. Research methods such as analysis of scientific literature, multiple-criteria assessment, survey, and expert evaluation were used to achieve the goal of the study. The results of the study showed that there is a high potential in general education schools for the application of knowledge management practices to achieve sustainable development. However, general education schools still face a lack of teachers' motivation and a lack of financial resources to apply knowledge management practices and improve knowledge infrastructure for sustainability.

Keywords: knowledge management; knowledge management practice; sustainable development; sustainability; general education schools; evaluation

1. Introduction

Globalization, technological development, environmental, economic, and social challenges and the associated transformation processes from the information society to knowledge society are affecting structural changes in the public and business sectors. With this type of transformation, both public and business organizations are looking for ways to implement knowledge management practices for sustainability [1–4].

Although many scholars justify the benefits of knowledge management practices for both the public and the private sector, there is still a lack of complex research in the scientific literature related to knowledge management practices in the public sector [2,5], especially in the general education sector [6], on the results of which the future and well-being of the state and society depend.

The transformation from the information to the knowledge society in general education schools has changed not only the roles of the teacher and the student and the approach to implementing the concept of lifelong learning but the concept of sustainable development as well [7]. The dynamism of the environment, the transformation processes, and the changing information needs of society have also created preconditions for structural changes in general education schools: the content of knowledge

management, its structure and its management processes, and the information and communications technology (ICT) of knowledge transfer and other factors have changed. Finding the right balance between a modern and responsible state and the development of a dynamic society, integrating the principles of sustainable development with environmental protection, economic development, and social welfare has become important for the education sector.

Therefore, one way to achieve sustainability in general education schools is to apply knowledge management practices. In this study, knowledge management was considered as purposeful and systematic management of processes, methods, and tools, making full use of the organization's knowledge potential to form strategic goals, make efficient decisions, implement, and create value for the organization [8,9]. Sustainable development was defined in this context as development that meets current society needs without compromising the ability of future generations to meet their own needs [7,10]. Knowledge management practices in this study were analyzed through the process-oriented approach, integrating knowledge management processes, the methods, and tools employed in the processes.

This study aimed to evaluate the peculiarities of applying knowledge management practices in general education schools for sustainable development. Research methods such as analysis of scientific literature, multiple-criteria assessment, survey, and expert evaluation were used to achieve the aim of the study.

2. Literature Review

The impact of efficient knowledge management at the operational level of an organization for sustainable development relates to the direct (value creation, return on investment) and indirect (economies of scale and scope, uniqueness) aspects of influence [2–4,11,12]. However, there is still a lack of scientific research results related to the application of knowledge management practices and tools in general education schools for sustainable development [6,13].

The direct impact seeking the principles of sustainable development is related to applying the potential of knowledge to create innovative and unique products and services [3,4,14], which is linked to the creation of mutual value and achievement of financial goals (e.g., cost reduction).

Indirect effects are associated with efficient knowledge management by communicating with the organization's contact audiences for mutual benefit, which forms the conditions for creating uniqueness and leadership in the market through the implementation of sustainable development principles.

The impact of knowledge management on achieving sustainability for the organization's employees is linked to a faster adaptation to the rapidly changing technology environment and customer needs through internal and external learning processes, enabling the knowledge acquired in training to be applied to work and to achieve the goals of sustainable development. As a result, the employee feels more motivated to accomplish the tasks and succeed which is directly related to a higher level of satisfaction with the activity being performed. This enables the organization to more efficiently implement strategic knowledge decisions for sustainable development, manage internal processes, create innovation and more unique products and services, and meet customer needs [3,5,14,15].

The impact of knowledge management on the principles of sustainable development at the level of the organization's internal processes ensures process efficiency (cost and time reduction). It facilitates the realization of creativity through infrastructure [2]. This creates more innovative, sustainable, and unique products and services within the organization [3,4,6,13].

The impact of knowledge management at the product and service level is related to the creation of mutual value through the identification of changing customer needs and the search for unique solutions to meet individual needs and the development, supply, and realization of unique products and services.

The impact of knowledge management on the organization's sustainable development from a customer's perspective is related to understanding and efficiently meeting information and knowledge

needs by offering more unique solutions. As a result, this outcome leads to opportunities to establish long-term relationships with customers, create mutual value, and ensure their loyalty [16] (Table 1).

Table 1. Examples of prior works studying the impact of knowledge management practice on sustainable development. ICT: information and communications technology.

Author(s), Year	Research Variables	Research Findings	Research Limitations	Sector Area
Sheng & Sun, 2007 [4]	Knowledge innovation culture, knowledge creation, sustainable development	Knowledge innovation culture gains competitive advantages and sustainable development through knowledge creation	Small generalizability of the findings	Libraries
Mohamed et al., 2009 [3]	Knowledge management, integrated ICT, sustainable development	Knowledge management and integrated ICT have a positive impact on sustainable development	Small targeted population	Developing countries
Al Yami & Ajmal, 2019 [2]	Knowledge management processes, operational efficiency, sustainable development	Knowledge management processes have a positive impact on operational efficiency and sustainable development	Small generalizability of the findings; data were collected from 30 public sector entities	UAE public sector
Brito et al., 2019 [5]	Knowledge management perception, sustainable development	Knowledge management has a positive impact on institutional changes and sustainable development	One study case analysis	The public university in the Brazilian Northeastern Semiarid Region

In conclusion, it can be stated that knowledge management practice is a critical factor in implementing sustainable development principles [2–4]. Scientific research results show that knowledge management practice has a positive impact on operational efficiency, competitive advantages, and sustainable development [2–5] (Table 1).

Knowledge management practice was explored in this study from a process-oriented perspective through knowledge management processes and the methods and tools employed in these processes.

Scientists [17–23] analyze different combinations of knowledge management processes when examining the knowledge management process approach. Based on the previous scientific research results of J. Raudeliūnienė [8,9,24] and E. C. K. Cheng [6,13] and the results of discussion with Lithuanian general education schools administration, this study examined five knowledge management processes: knowledge acquisition, knowledge storage, knowledge sharing, knowledge application, and knowledge creation. These processes were chosen because they are applied in general education schools' activities as one of the sustainable development tools, they provide a comprehensive and structured assessment of the efficiency of the entire knowledge management cycle, and implement knowledge management practices in schools in order to achieve sustainability.

Based on empirical research, the factors influencing knowledge management practices, according to their nature and content, can be grouped into human (personal, professional, and social competence, the value of knowledge applicability), organizational (culture, motivation system, knowledge products, services), technological (knowledge infrastructure, databases), and financial resources used to implement knowledge management practices [9,25].

Knowledge management practices are also implemented through a variety of methods and tools in knowledge management processes. Based on empirical research, the main methods and tools used in knowledge management processes have been systematized and distinguished [8,22,26–44]. The systematic methods, techniques, and tools used in knowledge management processes are grouped at the individual and group, organizational, and technological levels according to their application nature (Table 2).

Factors influencing the efficiency of knowledge management practices and methods applied in the cycle in order to implement sustainable development principles identified in the scientific literature have been further explored in general education schools.

Table 2. Methods and tools used in the knowledge management processes.

Process	Individual and Group Level	Organizational Level	ICT Tools
Knowledge acquisition	Self-study through lessons learned Semi-structured interview techniques Twenty-questions method Card sorting Mapping Association method Repertory grid	Training Search engines Monitoring best practices in the global marketplace Best practice analysis and imitation Acquisition and analysis of knowledge products and services Reverse engineering Cooperation with external and internal stakeholders	Networks (Internet, Intranet) Search engines and tools Knowledge databases, knowledge repositories
Knowledge storage	Self-study laboratory Development of common terminology and experiences (case studies, good practices, community practice) Creating a relationship between teacher (expert) and student (successor) (instruction, different types of practice) Observation of expert activities (mentoring, case study, simulation of situations)	Advanced training Systematic transfer of competencies (mentoring, supervision, practice) Membership rotation programs Gradual retirement planning and mandatory knowledge transfer process Planning and executing document management (project summaries, best practices, lessons learned)	Networks (Internet, Intranet) Organization resource planning information systems Knowledge databases and repositories Custom database management systems Document management systems
Knowledge sharing	Individual and group learning Community practice Observation of expert activities (mentoring, case study, simulation of situations)	Project management techniques Active participation of the members of the organization in ongoing activities Mentoring, supervision, socialization Arrangement of physical spaces according to operational processes Application of knowledge maps Document management (procedure manuals, studies) Dissemination of good practice, lessons learned Staff meetings Methods of promoting a collaborative culture (training, case study, mentoring)	Networks (Internet, Intranet) Knowledge sharing networks, platforms, and tools ICT (email, smartphones, video conferencing) Knowledge databases and repositories
Knowledge application	Individual and group learning Learning from the experiences of others Work-based learning Community practice	Advanced training Project management techniques Information centers Network method Application of good practice Lessons learned Case studies and feedback	Networks (Internet, Intranet) Search engines and tools Knowledge databases and repositories Simulation game platforms and applications
Knowledge creation	On-the-job training from valuable members of the organization Problem-solving techniques Idea generation techniques (brainstorming, Delphi method, parallel thinking, mind maps, knowledge café) Informal interactions (community practice)	Specific training for generating innovation Mentoring, supervision, expert groups, internships Cross-functional teams, rotation Documentation methods (project summaries, protocols, manuals, procedure manuals) Meetings, gatherings, discussions	Networks (Internet, Intranet) Search engines and tools Knowledge databases and repositories Simulation game platforms and applications

3. Research Methodology

Following the analysis of scientific literature, five knowledge management processes (knowledge acquisition, storage, sharing, application, and creation) were selected for further complex research, and factors, methods, and tools that influence the efficiency and sustainable development of knowledge management processes were identified.

Research methods such as multiple-criteria and expert evaluation (survey) were chosen to carry out the research. Multiple-criteria assessment methods were selected because of the complexity of the research object (evaluation of knowledge management processes in general education schools) and to assess the impact of factors on the research object in more detail.

The expert evaluation was conducted on a survey basis. The survey aimed to evaluate knowledge management practices in general education schools to achieve sustainable development. The survey was based on five knowledge management processes to identify such aspects as problem areas of the knowledge management process; the importance of the knowledge management process in general education schools; the factors (human, technological, financial, and knowledge) that motivate general education schools to apply the knowledge management process to achieve sustainable development; and methods and tools used in the knowledge management cycle. The questionnaire was divided in accordance with five knowledge management processes into five groups and consisted of 20 questions.

The expert evaluation was carried out in the general education schools of Vilnius city municipality in Lithuania, as the principles of knowledge management are applied the most intensively in these schools. The experts were selected on the basis of their professional experience and competence in applying knowledge management principles in general education schools' activities (at least five years of professional experience). This way, a sample of 241 experts was formed for the survey, and 68 teachers of general education schools agreed to participate in this study. The survey was conducted between November 2019 and January 2020. The experts involved in the study were contacted by email, telephone, and in person.

Survey results showed that 47% of the teachers had more than 30 years of professional experience, 40% about 20 years, and the remaining respondents (13%) noted that they had more than five years of professional experience.

The expert teachers participating in the survey fell into the following groups: 35% were teachers of primary education (24), 13% Lithuanian language teachers (9), 18% mathematics (6) and geography (6) teachers, 15% information technology (5) and biology (5) teachers; the remaining part of the respondents (19%) were history (6%, 4 teachers), foreign languages (4%, 3 teachers), music (3%, 2 teachers), art (1.5%, 1 teacher), ethics (1.5%, 1 teacher), physical education (1.5%, 1 teacher), and technology (1.5%, 1 teacher) study subject teachers.

4. Research Results and Discussion

By conducting expert evaluation and multiple-criteria assessment, one of the research aspects was to assess what problematic areas teachers in general education schools faced in applying the knowledge management cycle for implementing sustainable development in their activities on a scale from 1 to 5, where 1 meant a totally insignificant problem; 2, insignificant; 3, moderately significant; 4 significant; and 5, a very significant problem.

The results of the study showed that the main problems in the process of knowledge acquisition for sustainability were related to the fact that training often had no practical value in relation to how to efficiently acquire knowledge in the presence of a large number of information sources, as well as the lack of motivation of employees to acquire new knowledge. Critical issues in the knowledge storage process included a lack of motivation among staff and a lack of financial resources to improve the knowledge storage infrastructure. The results of the expert evaluation showed that knowledge storage required not only an understanding of the knowledge preservation process but of ICT too, which is associated with competence and additional time costs. The knowledge-sharing process identified two major problem areas: the reluctance of staff to collaborate and the lack of a collaborative culture in general education schools. Knowledge application and knowledge creation processes identified a lack of motivation among staff to apply existing knowledge in schools and to create new knowledge due to insufficient financial resources allocated to improving knowledge application and new knowledge creation infrastructure (Table 3).

The study sought to assess which key factors were significant and motivate general education teachers to apply knowledge management processes to achieve sustainability. The experts were asked to rate each factor on a scale from 1 to 5, with 1 being a non-significant factor and 5 being a significant factor. All presented knowledge management process assessment factors were at the same level for the development of sustainability in general education schools. Summarizing the results of the

research, it was found that the motivation of the teachers' competence improvement and development of professional, methodical, and social competences were the most critical factors for knowledge acquisition. The knowledge storage process was most encouraged for experts in general education schools by such factors as the availability of knowledge at any time of the day and the value of applying the preserved knowledge. In order to achieve an efficient knowledge sharing process, the most significant factors were the tangible benefits of collaboration between colleagues and the value of knowledge. Essential aspects of the knowledge application process were the applicability of knowledge and the improvement of the working environment. According to experts, the process of knowledge creation was necessary because it creates preconditions for developing methodical and educational tools and obtaining original results of the created tools (Table 4).

Table 3. Problem areas of knowledge management processes in general education schools for sustainable development.

Process	Problem Areas
Knowledge acquisition	Lack of practical value in training (3.5); lack of motivation of employees (3.44); lack of motivational system (3.39); limited funding opportunities (3.28); lack of knowledge about tools of knowledge acquisition (3.06).
Knowledge storage	Lack of motivation of employees (3.67); lack of financial resources to improve knowledge storage infrastructure (3.56); reluctance of older employees to learn how to use ICT to store knowledge (3.50); lack of competences in applying ICT to store knowledge (2.89); lack of knowledge on how to efficiently store knowledge (2.83).
Knowledge sharing	The reluctance of employees to cooperate (3.78); lack of a culture of cooperation (3.78); lack of purpose of the need for knowledge sharing (3.67); lack of motivational system (2.94); lack of competences for efficient knowledge sharing (2.94).
Knowledge application	Lack of motivational system (3.61); lack of financial resources to improve knowledge application infrastructure (3.33); lack of competences on how to apply knowledge efficiently (3.28); lack of value for knowledge applicability (3.11); lack of competences of older employees (2.94).
Knowledge creation	Lack of motivational system (4.00); lack of financial resources to improve knowledge creation infrastructure (3.50); lack of targeted training (3.50); lack of competences of older employees (3.11); lack of personal motivation (2.67).

The study sought to identify the main methods, techniques, and tools used in the knowledge management cycle (knowledge acquisition, storage, sharing, application, and creation) to achieve sustainability (Table 5). When the ways of acquiring knowledge in general education schools were looked at, 32% of respondents indicated that they acquired knowledge through various external and internal seminars, 16% during meetings (methodical meetings, meetings by interest groups, parent meetings, etc.), 16% through search engines and tools and open-access databases on the Internet, and 10% acquired knowledge through collaboration with colleagues in various activities. Other ways of acquiring knowledge in general education schools (26%) included independent studies, various courses, internships, and educational trips, analysis and simulation of good practice, and different kinds of educational events (exhibitions, conferences, etc.) (Table 5).

The knowledge storage process in general education schools is implemented through ICT-based tools (62%): knowledge databases, networks (Internet, Intranet), document management systems (for example, "Tamo" diary, "Class Dojo," etc.). Of the respondents, 31% preserved their knowledge depending on the nature and purpose of the knowledge in accordance with document management planning and execution practices, and the remaining 7% of respondents stored their knowledge in archives.

Table 4. Knowledge management processes assessment factors in general education schools.

Process	Assessment Factors
Knowledge acquisition	Personal motivation to improve competences (4.56); development of staff competence (4.44); usefulness of training (3.94); improvement of the work quality (3.72); development of employee self-esteem (3.11).
Knowledge storage	Knowledge availability online (4.28); knowledge adaptability value (3.72); analysis of available knowledge (3.44); efficient knowledge search (3.39); management of existing knowledge (3.22).
Knowledge sharing	Benefits of cooperation (4.28); the value of knowledge (4.06); generation of new ideas (3.94); promotion of innovative environment (3.5); promotion of innovative thinking (3.22).
Knowledge application	Knowledge applicability value (4.00); improvement of the working environment (3.61); pursuit of personal development (3.17); improvement of the quality of the activities carried out (3.00); application of knowledge to develop new methodical and educational tools (2.89).
Knowledge creation	Development of methodical and educational tools (4.28); originality of the created results (3.89); uniqueness of professional competences (3.44); encouragement of creativity among employees (3.11); stimulation of students' creativity (3.00).

Table 5. Methods and tools used in the knowledge management processes in general education schools for sustainable development.

Process	Methods and Tools
Knowledge acquisition	Seminars (32%); staff meetings (16%); search engines and tools, open access databases on the Internet (16%); cooperation in various activities (10%); self-study (8%); online courses (6%); internships, exchange programs, and educational trips (6%); best practice analysis and simulation (4%); various events (exhibitions, conferences) (2%).
Knowledge storage	ICT-based tools (knowledge databases, networks (Internet, Intranet), document management systems) (62%); knowledge is stored depending on the nature and purpose of the knowledge, according to document management planning and execution practices (31%); archive (7%).
Knowledge sharing	Mentoring (observation of teacher activities, supervision and mentoring, socialization, simulation of situations, case study) (55%); meetings (25%); cooperation (encouragement of cooperation culture, community practice, discussions, participation in joint activities) (20%); training (workshops) (5%).
Knowledge application	Implementation and discussion of the educational program through planned methodical and educational tools: employee meetings (56%), staff training and workshops (individual and group learning, advanced training, application of good practice, learning from the experiences of others, workplace learning, community practice, lessons learned, case study) (44%).
Knowledge creation	Knowledge creation through teamwork and group work techniques (problem-solving, idea generation techniques, community practice, documentation techniques) (60%); knowledge creation through collaboration with colleagues (mentoring, work-based learning) (20%); individual knowledge creation through the integration of ICT (search engines and tools, simulation game platforms and applications) (20%).

The process of knowledge sharing in general education schools usually took place through mentoring (teaching activity observation, supervision and consulting, socialization, case simulation,

case study, 55%), staff meetings (25%), implementation of collaborative culture (community practice, discussions, participation in collaborative activities, 20%), and through staff training (workshops, 5%).

The importance of the knowledge application process is based on the application of methodical and educational tools to the performance of general education activities. In the analyzed general education schools, the school administration provided the methodical and educational tools (visual, technical, demonstration, laboratory, instruments, materials, computerized educational tools, etc.) for the smooth running of teaching processes within educational programs. The main ways of applying knowledge in general education schools were the implementation of the general education program through methodical and teaching aids and discussion of their application peculiarities in staff meetings (56%), and the performance of training and workshops (individual and group learning, advanced training, the appliance of good practice, learning from others' experiences, work-based learning, community practice, lessons learned, case studies) (44%).

The knowledge creation process in general education schools was usually implemented through teamwork and by using group work techniques (problem-solving techniques, idea generation techniques, community practice, documenting methods, 60%), collaboration with colleagues (mentoring, on-the-job learning from colleagues with valuable professional knowledge, 20%) and individual work (development of methodical and educational tools) by using ICT (search engines and tools, simulation game platforms and applications, 20%). Expert teachers began the knowledge management cycle in schools by creating action plans, adjusting and updating plans, appointing responsible staff and setting deadlines, and concluding with a discussion and feedback of the activities implemented.

Summarizing the results of the study, it can be noted that there is great potential in general education schools to apply knowledge management practices to implement sustainable development principles. However, one of the main problem areas identified was the lack of motivation from general education school teachers and insufficient financial resources to improve the knowledge management infrastructure.

5. Conclusions

Summarizing the knowledge management approaches of researchers and business practitioners, this study defined knowledge management as purposeful and systematic management of processes, methods, and tools, fully exploiting the knowledge potential of an organization to form strategic goals, make efficient decisions, and create value for the organization.

Five knowledge management processes were selected for conducting complex research: knowledge acquisition, knowledge storage, knowledge sharing, knowledge application, and knowledge creation.

The results of the research showed that there was a lack of staff motivation in the acquisition, storage, application, and creation of knowledge in general education schools, as there were insufficient financial resources to improve the knowledge management infrastructure. Problematic areas such as staff reluctance and the lack of a culture of collaboration were identified in the knowledge sharing process.

Teachers in general education schools indicated that the key factors that motivate them to apply knowledge management processes to achieve sustainability in the knowledge acquisition process were the teachers' motivation to develop competences; in the knowledge storage process, the accessibility and adaptability of knowledge; in knowledge sharing, the tangible value of cooperation among colleagues and the value of knowledge; in knowledge application, knowledge applicability and improvement of the working environment; and in knowledge creation, the original results of the developed tools.

The results of the expert evaluation showed that the main ways of acquiring knowledge for sustainability were seminars, meetings (meetings organized by interest groups, methodical meetings, parent meetings, etc.), search engines and tools, and online open-access databases. The process of knowledge storage was implemented through ICT tools: knowledge databases, networks (Internet, Intranet), and document management systems. The process of knowledge sharing was performed through the application of mentoring principles (teacher activities observation, supervision and

mentoring, socialization, situation simulation, case study). The main ways of applying knowledge were to implement the educational programs through the intended methodical and teaching aids and to discuss them at staff meetings. The essential methods of the knowledge creation process were teamwork and group work techniques.

The limitations of the study were related to the fact that this study did not address the evaluation of measures to improve knowledge management practices in general education schools for sustainable development. Therefore, a further research area could be related to the assessment of measures and the development of recommendations for improving the knowledge management cycle in general education schools for sustainable development.

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