

PROFESSIONAL STUDIES:
Theory and Practice
2021 / 8 (23)

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2021 / 8 (23)

Published since 2005

Journal is indexed in EBSCO Academic Search Complete

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EVALUATION OF SUPPLY CHAIN MANAGEMENT PROCESSES OF THE SERVICE SECTOR COMPANY

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Annotation

The article presents the evaluation of the supply chain management of the service sector company using the expert evaluation methodology. The study identified seven strategic and operational supply chain processes in line with the model approved by the Global Supply Chain Forum. The gaps in supply chain processes between the intended and the actual state of management allowed to identify service disruptions and provide opportunities for processes improvement.

Keywords: processes, sub-processes, strategic level, operational level, supply chain, gap.

Introduction

Promoting a more resource-efficient, competitive and high value-added economy is one of the European Union's key priorities for sustainable, smart and inclusive growth. In order to achieve the goals of this priority companies are paying more and more attention to business process management, planning and implementation of efficient supply chains. A supply chain is a network of all individuals, organizations, resources, activities and technologies involved in the development and sale of products or services from the supply of raw materials from the supplier to its final delivery to the customer. The management of this whole chain combines the supervision of materials, information and finances as they operate in the process from the supplier of raw materials to the consumer. This structure consists of a number of possible business combinations and solutions that achieve the overriding goal of operating cost savings. The supply chain management mechanism becomes one of the most relevant factors determining the productivity and efficiency of the company's operations in the business system or company. The implementation of a supply chain management system or the renewal of an existing one requires an assessment of the company's business processes, which makes it possible to determine the state of supply chain management, the rational use of company resources (staff, equipment, time, raw materials, information, etc.). Supply chain management enables business leaders to make more rational decisions, to check whether decisions made in the past were accurate; to base decisions made now or in the future, to obtain the greatest mutual benefits between the actors in the supply chain. Supply chain and business process assessment methodologies developed by Lithuanian and foreign researchers can be applied in conducting research in this field. The scientific literature on these issues focuses on analysing the supply chain itself or assessing its flexibility. There have also been a number of studies examining one or more supply chain management processes, but there is a lack of research to assess the effectiveness of individual companies in managing the entire supply chain. In particular, there is a lack of research on the evaluation of the business process supply chain efficiency of service companies.

The aim of the research is to perform an evaluation of the supply chain management of a service sector company using the expert evaluation method and to provide recommendations for the improvement of business process management.

Research methods: analysis and synthesis of scientific literature, grouping, comparison, generalization of statistical data. Performance research and expert survey, expert compatibility assessment in calculating Kendall concordance coefficient, application of statistical weighted average method. Data ranking, graphical analysis, calculation and evaluation of coefficient gaps. MS Office and SPSS software packages were used to process the data obtained during the study.

Research on Supply Chain Process Management

The company's supply chain is characterized by activities that link the different divisions of the organization which contribute to the development of products and services, production and supply processes (Yusuf et al., 2004). Supply chain management is a complex sequence of organizational processes based on modern technologies which must ensure the smooth

operation of the supply chain and meet customer needs (Slone, Mentzer ir Dittmann, 2007). As Halme (2010) argues, supply chain efficiency assessment is a very important factor for organizations to be competitive. They must measure the performance of the entire supply chain, analyse and evaluate each individual process in order to operate successfully in a competitive business environment.

Supply chain processes, their management, efficiency assessment and improvement opportunities were extensively analysed not only by foreign, but also by Lithuanian researchers. Of great importance in supply chain analysis are the research papers of M. Lambert, S. Rogers, Y. A. Bolumole, K. L. Croxton, who conducted research and singled out supply chain management processes in line with the model approved by the Global Supply Chain Forum (GSCF). This framework is built on eighth key business processes that are both cross-functional and cross-company in nature. Each process is managed by a cross-functional team, including representatives from logistics, designing, manufacturing, purchasing, finance, marketing and product development. While each process will interface with key customers and suppliers, the customer relationship management and supplier relationship management processes form the critical linkages in the supply chain.

V. Darškuvienė and A. Cibulskytė (2007) analysed the relationship between supply chain management efficiency and the value of listed companies in Lithuania. The study of I. Beniušienė and J. Stankevičienė (2007) was performed to determine the role of logistics in the supply chain. The efficiency of individual supply chain process management in Lithuanian manufacturing companies was studied by A. Rakickas, S. Skunčikienė (2007), V. Lembutis (2009), A. Rakickas, R. Čiegis, S. Skunčikienė (2009). R. Jasinavičius and N. Jasinavičius (2011) analysed the possibilities of strengthening the competitiveness of textile companies by synchronizing the supply chain. In her research, J. U. Ventienė (2012) paid more attention to risk management in the supply chain. E. Stonkutė (2012) identified the supply chain management challenges faced by Lithuanian small and medium-sized enterprises and the operational strategies they choose to overcome them. V. Skulskis and V. Girgždienė (2016) examined the development of the supply chain of organic dairy products in Lithuania. Among foreign researchers, there are also many authors who have analysed the supply chain in business or its management processes: Rogers, Knemeyer, Lambert (2004), Sengupta, Heiser, Cook (2006), Mollenkopf, Russo, Frankel (2007), Snow, Fjeldstad, Lettl, Miles (2011), Shaffer, Dalton (2012), Scholten, K., Schilder, S. (2015), Nikfarjam, H., Rostamy-Malkhalifeh, M., Mamizadeh-Chatghayeh, S. (2015), Soheilrad, S., Govindan, K., Mardani, A., Zavadskas, E., K., Nilashi, M., Zakuan, N. (2018).

The role of supply chain process management in service sector companies in achieving competitive advantage is discussed in the scientific literature, but due to the lack of reliable assessment tools there is not much empirical research. This study was conducted under the key assumption that the supply chain is a system of services provided to each other by actors in the supply chain. The production process and the result it produces can affect the whole system, but other processes (supplier and customer relations, demand management, product development and commercialization, etc.) also affect the production process and the whole supply chain, so the study of these processes in the company non-engaging production is meaningful and relevant.

Research Methodology

In order to evaluate the supply chain processes an activity survey was conducted in the largest (in terms of annual revenue turnover) company in this service sector in Northern Lithuania, operating since 2000. The quality management system according to EN ISO 9001: 2008 has been implemented and is constantly being improved in the company, but as the volume of services grows every year, it becomes more and more difficult to coordinate service provision processes, operational efficiency decreases and possible irrational use of company resources. Periodic analysis of the company's individual business processes does not show the state of the entire supply chain, so the evaluation of many key processes using the process performance evaluation methodology provides an opportunity to identify service disruptions and opportunities for improvement.

A supply chain expert evaluation questionnaire was used for the study (Croxton et al., 2001; Lambert, 2008; adapted in Lithuania by Rakickas (2010) which evaluated seven supply chain processes of the company:

- Customer relationship process which consists of 5 strategic level and 7 operational level sub-processes.
- Customer service process which consists of 4 strategic level and 4 operational level sub-processes.

- Order fulfillment process which consists of 5 strategic level and 7 operational level sub-processes.
- Demand management process which consists of 6 strategic level and 5 operational level sub-processes.
- Product development and commercialization process which consists of 6 strategic levels and 8 operational level subprocesses.
- Supplier relations process which consists of 5 strategic level and 7 operational level sub-processes.
- The return process which consists of 6 strategic level and 6 operational level sub-processes.

The questionnaire consisted of two main blocks of questions related to the management of supply chain processes: (1) the demographic and occupational data block (gender, age, occupation, position, job seniority, nature of work), (2) supply chain process (sub-process) management research questions block. Supply chain sub-processes in the questionnaire are reflected in the blocks of evaluation indicators (statements). The evaluation indicators are chosen so that they reflect not only the management status of a particular process (sub-process), but also the links with other processes (sub-processes).

Most of the questions were of the closed or semi-closed type. The Likert criteria scale was used for the expert opinion survey when the subjects evaluate the statements characterizing the process or sub-process by choosing the attribute most in line with the expert opinion from "strongly disagree" to "strongly agree". These scales were transformed into a ranking scale (1 to 5) for a clearer interpretation of the survey results. Nominal and interval scales were used in the demographic data part of the respondents. The study involved 7 experts - employees of various management departments of the company who were selected in accordance with two conditions of the expert survey:

1) managerial work experience, work experience in the company, existing competencies in the fields of strategic and operational management, perception of the supply chain as a whole;

2) direct close contact of the researcher with the experts was ensured: each expert had the opportunity to know individually the purpose of the research and its tasks, to receive answers to all questions related to the research.

All experts have been working for the company for more than 10 years and have managerial experience in managing individual processes (4 experts) or the entire supply chain (3 experts). The consistency of the expert assessment was checked by determining the Kendall concordance coefficient, which was determined to be 0.76, which confirms the reliability of the study results.

The experts noted in the questionnaire statements that show the actual and intended state of a particular sub-process of the company. After transforming the experts' choices into a ranking scale, the survey results were transferred from the completed questionnaires to a gap calculation matrix consisting of two parts:

1) weighted average assessments of the actual state of strategic and operational sub-processes by each expert and all experts;

2) weighted average assessments of the intended state of strategic and operational sub-processes for each expert and all experts.

The determination of the difference between the intended state and the actual state of the supply chain processes (sub-processes) was performed by calculating the difference between the estimates of these states. D. M. Lambert's (2008) supply chain process evaluation scale and recommended management actions were used to interpret the research results:

	[-4; -3] ir [3; 5] – it is necessary to react immediately;
	(-3; -2) ir [2; 3) – it is necessary to react;
	(-2; -1) ir [1; 2) – it is recommended to react;
	(-1; 1) – it is not necessary to react;
	– it is necessary to identify the expert and find out the reasons for ignorance.

Research Results

1. The customer relationship process.

The customer relationship process consists of five strategic-level and seven operational-level sub-processes, which were assessed against 39 strategic-level and 42 operational-level statements (see Figure 1). The gaps in the sub-processes at the strategic level of the customer relationship process are small, so it can be said that they are managed efficiently enough. Most experts indicated that the company has a marketing strategy, but no one analyses how it affects the customer relationship process.

The assessment of sub-processes at the operational level of the customer relationship process is very uneven. The biggest gap between the intended and the actual state was found in the question sk_o6 (execution of the contract for the provision of products and services). This shows that the managers of this sub-process focus their efforts on the execution of individual business operations and the resolution of unexpected situations. Sometimes, on the basis of already concluded contracts for the provision of products and services, projects for the improvement of the provision of services are prepared and implemented, taking into account the current situation. It is recommended to monitor the terms and conditions of the concluded contracts for the provision of products and services together with the customers, to hold periodic meetings, to discuss and jointly make decisions on their improvement.

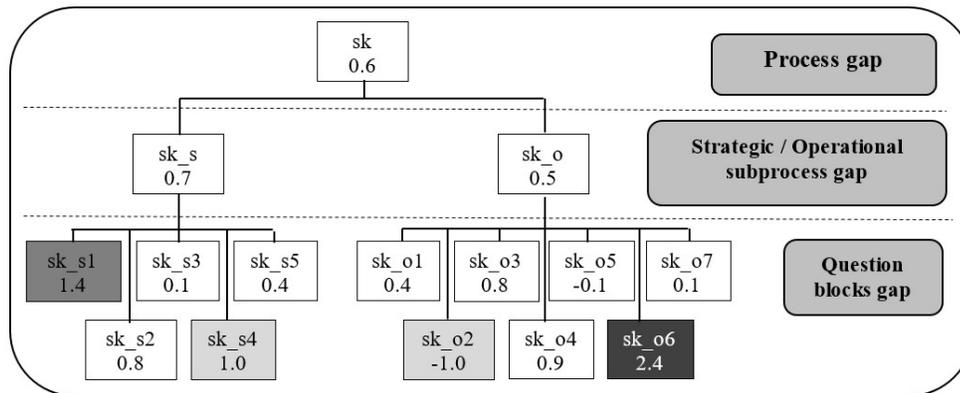


Fig. 1. Gaps between the intended and actual state at the strategic (sk_s) and operational (sk_o) levels of the customer relationship management process.

The results of the study also show that more attention is paid to managing the two sub-processes of this process (working with a client or customer segment team and concluding a contract for the provision of products and services) than the experts deem necessary. This is shown by the negative gaps in these sub-processes. In order to balance the management of these sub-processes, managers should differentiate clients according to importance and other relevant criteria and accordingly allocate human resources to work with clients more rationally.

2. The process of customer service.

The customer service process consists of four strategic-level and four operational-level sub-processes, which were evaluated based on 51 strategic-level and 54 operational-level statements (see Figure 2).

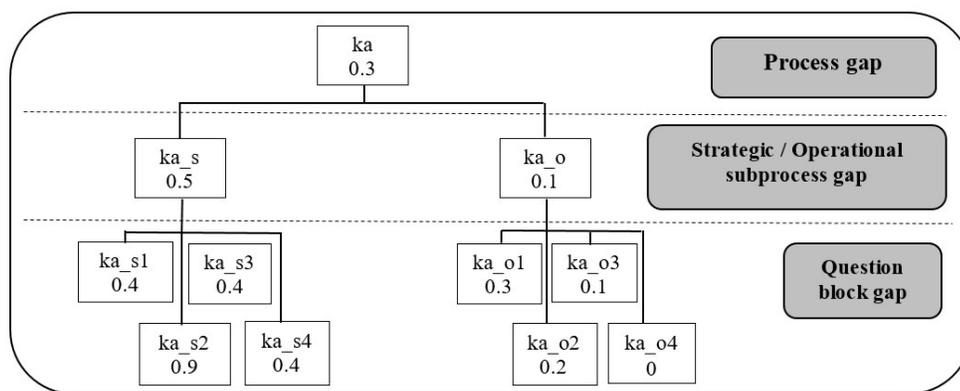


Fig. 2. The gap between the intended and actual state of strategic (ka_s) and operational (ka_o) levels of the customer service management process.

The assessment of the sub-processes at the strategic and operational level of the customer service process did not reveal significant gaps between the intended and actual state. The strongest components of this process in assessing the actual situation at the strategic level are the ability of the company's employees to obtain data on customer service problems both within the organization and from suppliers and customers. The company also has mechanisms in place to identify and respond to some customer service issues before they reach customers.

The strongest component at the operational level is the company's ability to coordinate alternative actions across all functional units to address customer service failures in response to customer service issues. The company is very successful in coordinating actions with the company's shareholders or heads of functional departments.

The company does not have a customer service assessment system in place and does not systematically monitor the development of customer service. It can be stated that the most important factor and guarantor of quality customer service in the company is the competence of the company's employees, their work experience and loyalty to the organization.

3. The process of order fulfillment

The order fulfillment process consists of five strategic-level and seven operational-level sub-processes, which were evaluated based on 45 strategic-level and 63 operational-level statements.

The biggest gap in the sub-processes at the strategic level (see Figure 3) was found in the sub-process "Review of the organization's general and marketing strategies". The results show that the company does not have general and marketing strategies and this is not a management aspiration, therefore the activity (execution of orders) is not planned for more than one year. Thus, the marketing and overall strategies of the company are not reviewed either. When evaluating the order fulfillment logistics structure, managers use standard models ("minimum distance", "least cost", "maximum order", etc.), but the general direction of sub-process management is current period orders or execution of orders under long-term contracts. It is important to note that the organization's employees are only occasionally introduced to customer service goals set by relevant customer segments. Post-order activities are not inspected and evaluated. This indicates that the company's management does not receive feedback on the quality of orders fulfilled. However, the gap in sub-processes is not significantly large, i. y. experts do not provide much importance to feedback.

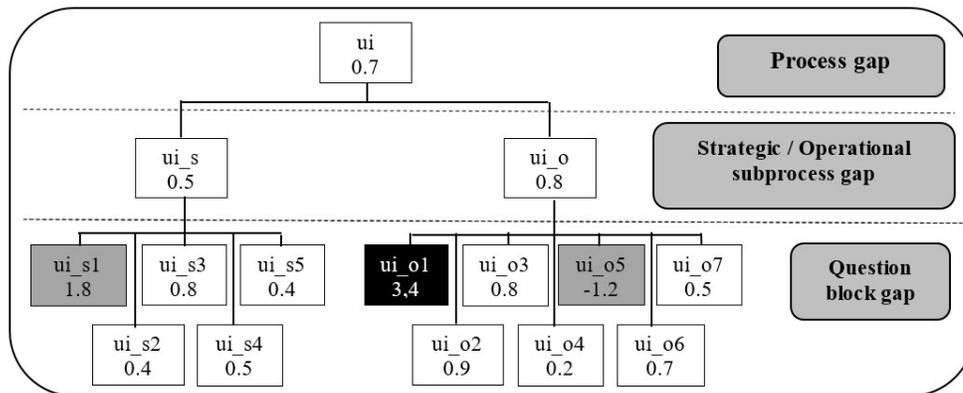


Fig. 3. The gap between the intended and actual state of strategic (ui_s) and operational (ui_o) levels of the order fulfillment management process.

The results of the research show that the biggest gap in the order execution process is at the operational level ui_o1 (order acceptance and its transmitting). Most orders from customers are received by fax or telephone or placed by sales staff. In practice, the possibilities of receiving orders from customers electronically or using an electronic data transmission system are very underused. This shows that order acceptance is still slow and no new improved tools are being put in place to speed up order acceptance and transfer. The ordering rules in the company depend on the customer - the organization itself shows little initiative in this process and may not use its potential as a competent specific service provider.

Company managers should take urgent action to improve the sub-processes of order acceptance and transfer execution. It is recommended to standardize and implement computerized programs that can be used to register customer inquiries and manage actions with customers and their orders. This would make it easier to place orders with existing customers, but would also help attract new users of the company's services.

4. The process of demand management.

The demand management process consists of six strategic-level and five operational-level sub-processes, which were evaluated according to 60 strategic-level and 57 operational-level statements (see Figure 4).

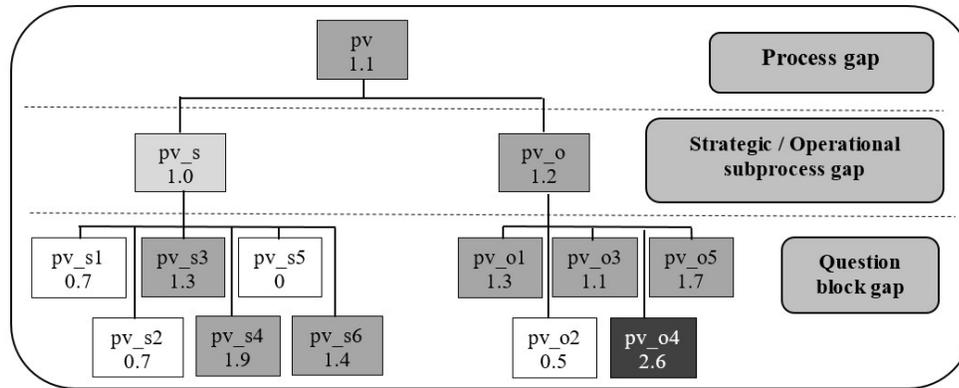


Fig. 4. The gap between the intended and actual state of strategic (pv_s) and operational (pv_o) levels of the demand management process.

At the strategic level even three sub-processes are characterized by significant gaps. It was found that the company has no formal procedures that would allow to align supply with demand. The most significant gap in the operational level subprocess is pv_o4 (reducing volatility and increasing flexibility) which shows that the company adheres to the provision that the demand for services in the market is constantly changing. There are no means to influence it in any way, so there are constant difficulties when it comes to responding to unforeseen changes in demand. To improve the management of this process supply chain managers should:

- 1) to consider how to create a system for collecting data for demand forecasting from internal and external sources which would ensure the sharing of collected information within the organization;
- 2) to establish consistent procedures for synchronization of demand and supply which would ensure the involvement of all functional units in improving demand management;
- 3) to set goals of the organization and functional units related to demand management and to acquaint employees, customers and suppliers with them.

The 3 sub-processes at the operational level also have significant gaps, the analysis of which allowed to clarify the process management problems identified at the strategic level. The large (2,6) gap in the pv_o4 subprocess indicates that the company does not cooperate sufficiently with its key customers to control demand volatility and respond flexibly to changes in demand. Also, in the company data collection is a less formalized and non-systematic process often making informal information based on demand management decisions which sometimes causes problems with the accuracy and timeliness of data.

5. The process of product development and commercialization.

The product development and commercialization process consist of six strategic level and eight operational level subprocess which have been assessed according to 81 strategic and operational level of 105 statements (see. Fig. 5).

There are no significant gaps in strategic-level of sub-processes. This shows that the organization does not have provisions in place to address how suppliers and customers should be involved in the product development and commercialization process and, as assessments of intended status by all experts show this is not important to the company. The company has not analysed the processes of product development and commercialization and has not prepared plans for the need for new products, therefore it can be assumed that the company does not sufficiently use the opportunities provided by this process.

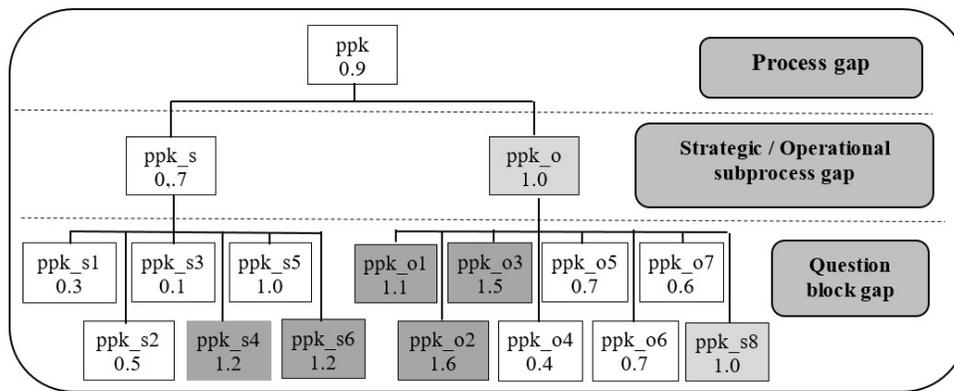


Fig. 5. The gap between the intended and actual state of strategic (ppk_s) and operational (ppk_o) levels of the product development and commercialization process.

The results of the research show that the company does not develop new services and is not interested in developing them. There is also no need to expand and commercialize existing services. The company does not perform analyses of new service markets, does not look for the characteristics of weak and strong service distribution channels. This approach may be due to the relatively stable financial situation of the company and the limited capacity to provide technical services. The specificity of customers can also have an impact - the company's largest customers are budgetary and public institutions whose requirements for services are relatively unchanged. The company's executives say that the company could provide more diverse services, but the largest customers do not want them, so the development of services is not necessary.

6. The process of relationships with suppliers

The supplier relationship process consists of five strategic-level and seven operational-level sub-processes which have been assessed according to 45 strategic-level and 42 operational-level statements (see Figure 6).

The biggest gap in the supplier relationship process is st_s5 (benefit from process improvement sharing with suppliers). The company does not share the benefits of improving the process and this is not a very important aspect as the experts have pointed out. There are no product and service contract criteria for supply workers which can be adjusted according to the supplier's needs. Based on the results of the research, it can be stated that the company does not work closely with its suppliers and does not share the service improvements received or observed, which means that it is not important for it to ensure a smooth relationship between the supplier and the company. Company executives do not take into account the fact that sharing the benefits with suppliers through service improvements could bring even greater benefits to both parties (for the company and suppliers) and thus to customers.

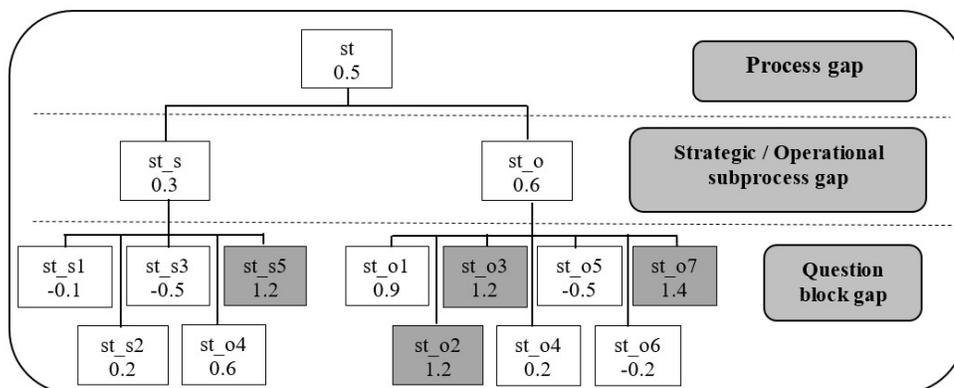


Fig. 6. The gap between the intended and actual state of strategic (st_s) and operational (st_o) levels of the relationships with supplier's process.

An analysis of the gap between the intended and the actual state at the operational level has shown that there is no urgency to review and manage the relationship with suppliers, but

improvements are possible to ensure smoother, faster and more accurate cooperation with existing and possibly future suppliers. It is recommended that the company periodically prepare a separate profitability report for each supplier indicating the balance of income and expenses. It is also necessary to inform employees, customers and suppliers about the results and achievements of supplier relationship management. In this way, the company would gain a competitive advantage in the market for similar services currently provided.

Comparing the assessments of the intended state of customer relationships, customer service and relationships with suppliers, it is clear that the company also pays much more attention to customers more important than suppliers. This orientation is typical for many service companies, but in this company the importance of relations with suppliers was pointed out by experts as low - 1 - 2 points.

7. The process of return

The return process consists of six strategic-level and six operational-level sub-processes which were evaluated against 63 strategic-level and 45 operational-level statements (see Figure 7).

The return process in service companies is specific and usually understood as the re-performance of a malfunctioning service by eliminating discrepancies identified by the customer and / or service provider. The data on returns are used to make improvements to the services and the processes. Return process analysis might result in feedback to the customer relationship management, supplier relationship management or product development and commercialization processes (Croxtton at all, 2001).

The company rarely provides such recurring services - they make up about 1.2 percent from the scope of all services provided. The biggest gaps in the strategic sub-processes of the return process are related to the setting of return targets for goods / services and the development of a strategy and the establishment of return procedures. Experts said that such a low volume of repetitive services suggests that this process is not significant and its management should not be given much attention. The company has not identified the types of returns, does not look for opportunities to avoid them and does not analyse the reasons for their occurrence.

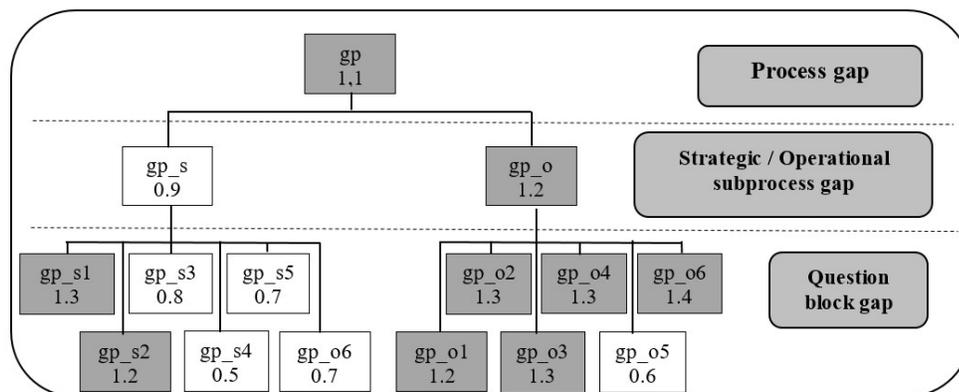


Fig. 7. The gap between the intended and actual state of strategic (gp_s) and operational (gp_o) levels of the return process.

Small gaps between the intended and actual condition were found in all operational subprocesses except gp_o5 (customer and supplier crediting). Customers know how to apply for a return, but the process is very complicated and inconvenient. So, it is difficult to determine the reasons for a service that has not been performed properly. It has been found that the re-performance of services is sometimes done on the basis of the reasons for the return, but this process takes place as a functional activity, during which the information obtained is considered worthless. The management of this process is usually based on such stereotypical assessments as "it is impossible to install modern equipment in an old building" or "using cheap materials will not provide quality services" and so on. Information on the results and achievements of the return of goods / services management in the organization is not made public.

Conclusions

The assessment of supply chain management using a model approved by the Global Supply Chain Forum is usually performed in manufacturing companies. There are not many such empirical research in the companies of the service sector, although the growing demand for services and the number of companies providing services in Lithuania and in the world stimulate interest in the efficiency of such companies.

In this study, after eliminating the production flow management process from the evaluation model, the gaps between the other seven supply chain processes and sub-processes between the intended and the actual state in the service sector company were identified and evaluated. The most effectively managed processes of the company are related to customers - customer relationship and customer service processes. The weakest links are in product development and commercialization, supplier relationships and the return processes. The company's management does not spend much time and efforts to strengthen them, as it considers that this is of little relevance to the service company. Demand management and order fulfillment processes also have shortcomings, but management is not looking for ways to manage them. Insufficient cooperation with suppliers prevents them from gaining a competitive advantage over competitors and entrench in the market for this type of service not only as the oldest but also as the most competent company. In order to improve the efficiency of the company's supply chain processes and sub-processes, it is recommended:

1) it is necessary to monitor the terms of contracts for the provision of products and services concluded with customers, to hold periodic meetings, to discuss and jointly make decisions regarding their improvement;

2) to differentiate customers according to importance, profitability, etc. criteria and in this context to allocate human resources to work with clients more rationally;

3) the company's services are sufficiently unified to be able to implement standardized procedures for some business processes – order submission, recording, transfer to employees – and to implement computerized programs that can be used to register customers and their inquiries, manage actions with customers and their orders;

4) to consider how a system for collecting data for demand forecasting from internal and external sources could be set up to ensure the sharing of information collected within the organization;

5) to establish consistent procedures for synchronization of demand and supply, which would ensure the involvement of all functional units in improving demand management;

6) to set the goals of the organization and functional units related to demand management and to acquaint employees, customers and suppliers with them;

7) together with customers consider the possibility of developing new or improving existing services in order to acquire new competencies and ensure customer support;

8) review relationships with suppliers and involve them in decision-making related to service quality.

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Received: 8 March 2021
Accepted: 31 May 2021

POVERTY REDUCTION MEASURES IN THE CONTEXT OF SOCIAL WORK WITH FAMILIES

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Annotation

The problem of poverty is one of the biggest and most difficult to solve worldwide. Every fifth person in Lithuania experiences poverty. The aim of the article is to reveal the poverty reduction measures in the context of social work with families. The study involved 6 informants: 4 social workers and 2 case managers. The results of the study revealed that most often families experienced poverty due to: alcohol dependence, lack of social skills, and lack of motivation. Individuals experience financial difficulties, their physiological needs are not met. There are conflicts between family members, children are not taken care of. The study has found that reducing family poverty, social workers use the following assistance measures: provision of social services, family involvement in social life, and financial, emotional and material assistance. Providing help, they encounter: clients' reluctance to accept assistance, lack of motivation to work and change, and psychological problems of families.

Keywords: poverty, social work, social services, social assistance, social insurance.

Introduction

Poverty is a situation of a family or person in which the possessed income is not sufficient for a normal life. In 2016, the at-risk-of-poverty rate in the European Union reached 17,3%, while the risk of poverty was experienced by as many as 34% of families consisting of one adult and dependent children, which is more than a third of all families (Eurostat Statistics Explained, 2018). Poverty in Lithuania is also a very burning issue. According to the data of the Lithuanian Department of Statistics, in 2017, the at-risk-of-poverty rate in the country was 22,9%. Comparing 2017 with 2016, the at-risk-of-poverty rate increased by 1%, while in Lithuania, about 650 thousand of the country's population lived below the at-risk-of-poverty threshold. In 2017, the at-risk-of-poverty rate in families with children reached 21,2%; compared with 2016, it increased by 0,2% (Official Statistics Portal, 2017). The European Union has developed a strategy "Europe 2020", which aims by 2020 to reduce the number of persons experiencing poverty and social exclusion by at least 20 million. Member states have set aims and planned actions to help to reduce poverty at the national level. Lithuania has planned to reduce the number of people living in poverty and social exclusion down to 170 thousand (Study on Strategies for Fight against Unemployment and Poverty Reduction, 2014).

People living in poverty are repelled and excluded from public life (National Network of Poverty Reduction Organizations, 2019). In Lithuania, poverty reaches people representing various groups: youth, the elderly, children, the unemployed, employed people, and families raising children. According to economist Lazutka (2014), persons living in poverty do not have adequate income and cannot meet the minimal human needs and therefore experience various problems. Low income does not guarantee a full-fledged life, which may lead to worsening of the person's state of health and quality of nutrition. The consequences of poverty can be painful: people's dissatisfaction with life, lowering of the personality's self-esteem, and social exclusion. Insufficient income can lead to the loss of the place of residence, homelessness, and inaccessibility of education and educatedness (II-5 Study on the Implementation of Social Exclusion (Poverty) Reduction Policy, 2015). Poverty affects not only one person's but of the whole family's quality of life. When material, social or cultural poverty occurs in the family, the family is no longer stable, the psychological climate changes, and conflicts arise (Zabarauskaitė, Gruževskis, 2015). Persons who have acquired lower education and raise children are at higher risk to experience poverty due to less opportunities to participate in the labour market or because of the heavy burden of living costs (Skučienė, Lazutka, Čižauskaitė, Markevičiūtė, 2018).

Problem questions of the study: What measures of the social security system are applied in social work with families experiencing poverty? What measures to increase employment are used in social work in order to reduce family poverty and social exclusion?

What difficulties and problems does the social worker experience in providing assistance to people experiencing poverty?

The object of the research: poverty reduction measures in the context of social work with families.

The research aim: to find out poverty reduction measures in the context of social work with families.

The research objectives: 1. To find out the assistance measures used in social work for poorly living families and difficulties in providing them. 2. To identify the difficulties and problems of the social worker in providing assistance to people experiencing poverty.

Research methods: the analysis of scientific sources and legal documents, semi-structured interview, qualitative content analysis.

Research methodology and organization

The qualitative research was chosen to achieve the aim of the study. The study involved 6 informants: 4 social workers and 2 case managers from the institutions providing social services in Šiauliai region (Lithuania). The investigated persons were selected according to the nature of work: these were social workers and case managers working with families. The study was conducted between December of 2019 and April of 2020. The qualitative research data were analysed employing the qualitative content analysis. Conducting the qualitative content analysis, the informants were encoded, the participants' identities are not mentioned anywhere. The following coding was used: "I1" – the first informant, "I2" – the second informant, "I3" – the third informant, "I4" – the fourth informant, "I5" – the fifth informant, and "I6" – the sixth informant.

Research results

To reduce poverty, it is important to find out what causes it. The study revealed the causes of family poverty. The data are presented in Table 1.

Table 1

Causes determining the emergence of family poverty

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
INTERNAL FAMILY PROBLEMS	Lack of social skills	"<...> due to lack of social skills ..." (I1); "<...> social skills are most often lacking <...>" (I2)	6
	Alcohol dependence	"<...> due to the use of alcohol <...>" (I2); "<...> poverty occurs in drinking families" (I4)	13
	Drug addiction	"<...> due to drug use <...>" (I2); "<...> use <...>drugs<...>" (I2)	2
	Addiction to gambling	"<...> due to direct addition to gambling <...>" (I2)	1
	Family model	"<...> due to the family model seen in childhood <...>" (I1); "<...> because of the way of life <...> seen in childhood <...>" (I1)	3
	A person with a disability in the family	"<...> persons raising children who have disabilities or if they themselves have a disability <...>" (I6)	1
	Lack of motivation	"<...> lack of motivation <...>" (I4); "<...> absence of motivation <...>" (I6); "They are unmotivated <...>" (I5)	5
EXTERNAL FAMILY PROBLEMS	Low education	"<...> because they don't have education <...>" (I6); "<...> lack of education <...>" (I4)	2
	Non-involvement in the labour market	"<...> due to unemployment <...>" (I3); "<...> the attitude of families towards work is lax <...>" (I6); "<...> there is no motivation to work <...>" (I6)	11

The study revealed that families experienced poverty due to internal and external problems. External problems are determined by environmental factors (education, labour market); while internal, by the behaviour of family members.

Summarising authors' and informants' statements, it can be stated that most often families experience poverty due to: lack of social skills, alcohol dependence, and non-involvement in the labour market. *Specialists* encounter alcohol dependence of family members, due to which they cannot get a job, the family's physiological needs remain unsatisfied because all the money received is spent on alcohol. Addictions cause conflicts between family members, parents no longer take care of their children. Social workers pointed out that families usually did not know how to live properly and take care of the family well-being. Research data demonstrated that families often experienced poverty and could not break out of it because they

did not want to look for a job. Adults do not want to perform public interest activities. Poorly living families get used to receiving social assistance and doing nothing. If the employment service offers the job, adults refuse it. This is proved by the statements of the subjects: “<...> *due to unwillingness to work <...>*” (I1), <...> *the attitude to work is lax <...>*”(I4). Families also experience poverty due to drug addiction, addiction to gambling, the family model, the person with a disability in the family, and lack of motivation. It was found that families did not have any motivation to change the current situation. Poverty is also passed from one generation to another – people who lived in poverty in their childhood often experience poverty in adulthood as well. A higher risk of experiencing poverty arises if there is a person with a disability in the family, whose care requires more financial, material, and human resources. Often individuals do not have the necessary education, which makes it more difficult for them to establish themselves into the labour market.

Social work is one of the most efficient measures to tackle the problem of poverty. When the family does not have financial resources, problems are solved by the provision of social services (Bitinas et al., 2010). According to Barčiukienė (2010), social services help individuals to return the abilities to take care of themselves and to integrate into the society more easily. The study sought to find out what social services were provided to families living in deprivation. The data are presented in Table 2.

Table 2

Social services provided for families

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
PROVISION OF GENERAL SOCIAL SERVICES	Consulting service	“<...>consulting <...>” (I1); “<...>consultancy <...>” (I3)	7
	Information service	“We inform what services they are entitled to <...>” (I2); “<...> we provide information to them <...>” (I3); “Of information <...>” (I6)	8
	Mediation and representation service	“<...> various representations <...>” (I3); “<...> there is particularly much mediation <...>” (I3)	11
PROVISION OF SPECIAL SOCIAL SERVICES	Catering service	“Provision with food products <...>” (I4); “<...> Provision with food <...>” (I6); “<...> and with food <...> to help <...>” (I2)	4
	Transport organization service	“<...> transportation service <...>” (I4)	1
	Development and maintenance of social skills	“<...> development and maintenance of social skills <...>” (I4); “<...> we develop social skills <...>” (I4)	8
	Provision of basic clothing and footwear	“<...> we help with clothes <...>” (I3); “... to assist ... by giving footwear <...>” (I2); “<...> we arrange so that they get <...> clothing assistance <...>” (I3)	7

Summarizing the research data, it can be stated that social workers mostly provide general social services to families experiencing poverty: consulting, information, and mediation/representation. Informants stated that they tried to consult family members, provide the necessary information, guide them to other institutions, and mediate for them in other institutions. Specialists provide families with information about social benefits and services they are entitled to. Mediation services are also provided when the family needs assistance of other institutions (non-governmental organizations, medical institutions). This is proved by informants’ statements: “<...> consulting <...>” (I1), “<...> we inform where they can arrange documents <...>” (I2), “<...> there is particularly much mediation <...>” (I3).

Research data indicate that social workers also provide families living in poverty with special social services (organization of catering and transport, development and maintenance of social skills, provision with basic clothing and footwear). To provide families with food, specialists often apply for food assistance to the Food Bank. When families do not have opportunities to go to the shops, social workers arrange transport for them. Social workers organize charity events willingly attended by the community. The study found that most often specialists provided the service of development and maintenance of social skills. The provision of this special social service is their daily routine. Due to social exclusion, individuals do not remember standing rules of the society and its established norms. Social skills of families are

developed so that they can smoothly participate in the social life, take care of their household and family autonomously, and solve the problem of poverty.

Conducting the study, it was important to find out all employed measures that help to reduce poverty. The data are presented in Table 3.

Table 3

Measures helping to reduce poverty

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
MATERIAL ASSISTANCE	Provision of household items	"<...> provision with <...> clothes <...>" (16); "<...> provision with <...> basic household items" (16)	12
	Cooperation with organizations	"<...> afterwards, we cooperated with the Food Bank <...>" (11); "<...> we cooperated <...> with Caritas <...>" (11)	11
	Community assistance	"<...> charity received from people <...>" (11); "<...> we find sponsors who help them, bring <...>" (13)	5
FINANCIAL ASSISTANCE	Social assistance benefits	"<...> we organize benefits <...>" (11); "<...> children's money is also allocated <...>" (11); "<...> we arrange so that they get benefits <...>" (13)	15
	Compensations	"<...> compensations for heating help <...>" (11); "<...> compensations for <...> water help" (11); "The compensations received help <...>" (13)	3
	Social insurance benefits	"<...> maternity benefits <...>" (16); "Unemployment insurance benefits <...>" (12)	5
	Social assistance for pupils	"<...> exercise books are bought for children in schools <...>" (14); "<...> stationery <...> is bought <...>" (14); "<...> free meals <...>" (14)	5
EMOTIONAL SUPPORT	Emotional support	"<...> emotional support <...> help to solve problems <...>" (15); "Emotional support is very important" (15)	20
	Promotion of motivation for change	"<...> through introducing awareness <...>" (11); "<...> it is necessary to motivate families to act <...>" (16)	11

Summarizing the obtained data, it can be stated that social workers and case managers initiate and organize the provision of material and financial assistance to families, inform about the possibility to receive assistance, mediate and provide emotional support. Although Gruževskis et al. (2011) state that the most effective measures to reduce family poverty are financial and material assistance, the research data has shown that, in the first place, emotional support must be provided. Social workers identified emotional support as very important and effective, stating that they tried to motivate families, listen to them, advise them, and help them find appropriate ways of solving problems. It was identified that emotional support helped to solve quite many family problems. Families experience not only material deprivation but also anthropological and social poverty causing psychological problems. Emotional support is a great way to solve them. The study helps to reveal that assistance will not be effective if the family is not motivated to solve its problems and if no connection and trust between the specialist and the client is established. Respondents stated that poverty could only be reduced by changing clients' awareness. If the client lacks self-confidence, does not understand that he/she has problems and does not have motivation to solve them, no assistance provided by the social worker will be of use. The investigated person stated: "... you must establish contact and seek that he understands that he needs that help ..." (13)

The study reveals that social workers inform about social assistance benefits, compensations, social insurance benefits, initiate and organize the provision of social assistance to pupils. Social assistance is aimed at ensuring the minimum standard of living for the family. Information and mediation are also provided regarding allocation of compensations for heating of the dwelling, drinking water and hot water for families, which helps them to save a share of their income. The State Social Insurance Fund allocates unemployment and maternity social insurance benefits. These benefits help when the family experiences a temporary crisis (loses a job), preventing the family from sinking into crisis. Social workers organize social assistance for children: provide the necessary learning tools (stationery, exercise books, sportswear), organize free meals for pupils. The support provided to children helps to reduce children's social exclusion at school. Poor families receive the following material assistance: they are provided with household items (furniture, household appliances, clothes, and other).

Specialists cooperate with various non-governmental organizations (Mother Teresa's House, Food Bank, Caritas, Freedom Gate), which provide various assistance.

One of the most commonly used measures to reduce family poverty is social assistance benefits. However, this measure is not always effective; therefore, it is important to find out the impact of social assistance benefits on poverty reduction. The data are presented in Table 4.

Table 4

The impact of social assistance benefits in reducing family poverty

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
IMPACT OF SOCIAL ASSISTANCE BENEFITS	Poverty reduction	"<...> help <...> to meet basic needs" (16); "<...> cash assistance helps if there is a crisis in the family <...>" (15); "<...> assistance helps the family not to sink into crisis <...>" (15)	11
	Poverty promotion	"<...> abuse benefits <...>" (12); "<...> Benefits promote unemployment" (14); "<...> where there is alcohol I really don't think it reduces that poverty <...>" (14); "<...> really not the cash assistance helps <...>" (15)	30

The sub-category "Poverty promotion" reveals that social assistance benefits do not have an impact on the fight against poverty. Cash social assistance often only exacerbates poverty in families. Received cash assistance benefits enable families to meet their needs, and there is no reason for them to look for a job and support the family on their own. Besides, often, the money received is not used for its intended purpose (food, clothes). It was identified that the income received was not used to meet children's basic needs – clothes and school supplies. It was found out in the study that social assistance benefits promoted family dependence on the assistance of surrounding people, absence of autonomy, and lack of motivation to tackle the poverty problem autonomously. Families do not want to escape from poverty because they know that they will still be taken care of. The subject stated: "<...> they have caught hold of those social benefits and they themselves remain in poverty <...>"(11). The study conducted by the state audit demonstrated that 86% of persons who had been provided with social assistance benefits and advantages had not been guaranteed the minimum level of consumption needs. This shows that the adequacy of social assistance benefits remains relatively low, and the living standards of the poorest households have hardly improved (Public Audit Report, 2019).

The research data indicate that there are cases where social assistance benefits influence the fight against poverty. Cash social assistance benefits the family that is motivated to tackle the poverty problem and that is not interested in becoming a long-term recipient of social assistance benefits. If the family is conscious and ready to use the received social assistance benefits for the family's welfare, then the cash social assistance is beneficial. Financial assistance also helps families who experience a temporary crisis and encounter temporary problems. When family members lose their jobs and steady income, social assistance benefits are an effective measure for poverty prevention. In this case, financial assistance helps to ensure the family's basic needs, not to lose motivation to solve the arisen problems. The investigated person was telling: "<...> cash assistance helps if there is a crisis in the family <...>" (15). Summarizing the data of the study, it can be stated that social assistance benefits influence the fight against poverty if they are used for the intended purpose – to meet the family's basic needs.

One of the most efficient measures reducing poverty is oriented to involvement of people experiencing poverty in activities (II-5 Study on the Implementation of Social Exclusion (Poverty) Reduction Policy, 2015). Conducting the study, it was sought to find out how social workers involved families experiencing poverty into the social life. The obtained data are presented in Table 5.

Table 5

Family involvement in the life of the society

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
PROMOTION OF SOCIAL ACTIVNESS	Project activities	"<...> children have the opportunity to visit a children's day care centre in our service <...>" (12); "<...> we encourage participation in <...> projects" (16)	5

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
	Community events	"<...> and parents are invited to Christmas celebrations <...>" (12); "<...> we organize festive events <...>" (14); "<...> we hold various meetings between families <...>" (15)	11
	Educational activities	"<...> to offer educational programs <...>" (11); "<...> to offer courses <...>" (11); "<...> to offer trainings <...>" (11)	6

The study revealed that families were involved in the life of the society through project and educational activities, community events, and social programs. Respondents stated that children living in poverty often visited day centres where they could do their homework, go on various trips, and participate in educational programs. Families are encouraged to attend festive events. Social workers organize community trips to which disadvantaged people are invited. Trips are free; therefore, families are willing to travel. The subjects stated: *"We organize various events and encourage <...> participation <...>"* (14), *"<...> are invited to go on organized trips"* (14). Children are encouraged to participate in non-formal education, where they will have opportunities for self-realization, spend their free time meaningfully, and get involved in the public life of the school or another institution. Parents are offered to participate in courses, educational programs, where they have the opportunity to acquire new abilities and develop existing skills. Children are involved in the social life and social exclusion is reduced by means of implementing social programmes for children.

Providing assistance to families living in poverty, social workers and case managers perform a wide range of roles. The roles performed are listed in Table 6.

Table 6

Roles performed by the social worker

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
ROLES IN THE PROVISION OF FAMILY SUPPORT	The role of the teacher	"<...> we moralize <...>" (11); "<...> we must speak <...>" (11); "<...> we must <...> consult <...>" (12); "<...> the teacher <...>" (16); "<...> of the adviser <...>" (14)	9
	The role of the mediator	"<...> we mediate <...>" (12); "Of the mediator <...>" (13)	4
	The role of the empowerer	"<...> and we empower <...>" (11)	2
	The role of the lawyer	"<...> to defend <...> in some way <...>" (11); "<...> we represent <...>" (13)	4
	The role of the informant/consultant	"<...> we must inform <...>" (12); "<...> of the informant <...>" (14); "<...> of the consultant <...>" (13)	4
	The role of the family member	"<...> the role is <...> as the mother's <...>" (13); "<...> you become like a member of the family <...>" (13)	4

The results of the study showed that specialists providing assistance to the families performed the roles of the teacher, mediator, empowerer, lawyer, informant/consultant, and the family member. It was found that social workers developed various skills of their clients, taught them how to behave in certain life situations, and provided various advice. Families are taught how to behave in public, how to run a household. Besides, the social worker and the case manager cooperate and communicate with the employees of other institutions, find out the necessary information. Communicating with other institutions, the social worker represents family interests and helps to obtain services in other institutions. Social workers provide the necessary information to their clients about services and assistance they are entitled to and their provision. They also consult on other institutions' work and services that are necessary for families. Social workers and case managers seek to empower clients to solve their problems and be autonomous. Specialists perform more than just these official roles. They usually become sort of a family member. The research revealed that social workers felt responsible for the family's well-being and became mothers of families: they had to take care of family matters, solve their problems alone, without the intervention of family members. Social workers get

involved in the family life and get used to the problems in it. The subject was telling: “<...> you treat yourself as <...> the mother of that family <...>” (13).

Providing assistance to families living in poverty, social workers often encounter difficulties, which is why reduction of poverty existing in families is not always successful. Social workers find it difficult to provide assistance because often the usual measures of social assistance (social services, social assistance) do not help to solve family problems (Žiūkas, 2015). The study sought to find out what difficulties social workers faced in providing assistance to families experiencing poverty. The data are presented in Table 7.

Social workers' difficulties in providing assistance to families

Table 7

CATEGORY	SUBCATEGORY	PROOF STATEMENT	NUMBER OF PROOF STATEMENTS
DIFFICULTIES IN PROVIDING ASSISTANCE TO FAMILIES	Reluctance to accept assistance	“<...> hostile disposition <...>” (11); “<...> when we have assistance <...> they do not accept <...>” (11); “<...> do not even want to accept assistance <...>” (12)	13
	Lack of motivation to change	“Such life is acceptable to them <...>” (13); “<...> lack of motivation <...>” (16); “<...> Don't want to solve problems themselves <...>” (14)	10
	Lack of motivation to work	“<...> it is not worth working, we often hear <...>” (11); “<...> they are very reluctant to seek employment <...>” (13); “<...> they don't even think about work <...>” (13)	11
	Psychological problems of families	“<...> With lack of self-confidence ” (14); “<...> low self-esteem <...>” (16); “<...>with <...> underestimation of oneself” (14)	5

Conducting the study, it was revealed that, in general, providing assistance to families living in poverty, social workers faced clients' reluctance to accept assistance, lack of motivation to work and change, and psychological problems of families. Families living in poverty are often unwilling to communicate and accept the offered assistance. Individuals visit specialists only because they have to, and they do not use the assistance provided to them. Social workers encounter clients who do not want to be autonomous – they demand that everything is done for them and their problems are solved. Poorly living people avoid getting involved in the labour market. The attitudes towards work is lax – they avoid looking for a job on their own. Adults register at the employment service only to receive social assistance benefits rather than to find a job and earn money themselves. Often individuals simulate illnesses: state that they feel unwell and require to make determination of a disability. They also claim that it is “not worth” working for them because the amount of cash social assistance they receive does not differ from their salary. Informants stated: “<...> reluctance to work because it is very convenient not to work and <...> to sit at home <...>” (12). Social workers encounter low self-esteem, self-humiliation, lack of self-confidence and underestimation of abilities in families. Families forget their positive qualities, abilities and remember only their problems. Families living in poverty distance themselves from the society, do not participate in public events of the community and this way lose their communication skills, self-confidence, no longer know how to behave in public, which makes it difficult for them to communicate with specialists. Often individuals are afraid to express their thoughts, reveal feelings, and unburden themselves.

Conclusions

1. To reduce family poverty, social workers provide general social services such as counseling, information, mediation, and representation as well as special social services such as catering, transport organization, development and maintenance of social skills, provision with basic clothing, footwear. Cooperating with organizations and the community, specialists initiate and organize the provision of material and financial assistance for families, pupils, inform about the possibility to receive assistance (social benefits, compensations, social insurance benefits), mediate and provide emotional support. Families are informed and mediation is provided regarding allocation of compensations for heating of the dwelling and drinking and hot water to families. The State Social Insurance Fund provides unemployment and maternity social insurance benefits. It has been found that an important way of promoting families' social activation is their involvement in community, project, and educational activities. The study has found that the financial assistance for families living in poverty has both negative and positive effects. Social benefits often only deepen the poverty existing in families due to the irrational use of assistance, lack of motivation to work, satisfaction of basic needs, which causes

reluctance to get involved in work activities and maintain the family. Social benefits promote dependence of families on the assistance of people around them, their lack of autonomy and motivation to eliminate the causes of poverty. The research data also reveal that the financial assistance benefits families that are motivated to solve the poverty problem and are not interested in becoming a long-term recipient of social benefits.

2. Providing assistance to families, social workers encounter clients' reluctance to accept assistance, lack of motivation to work and change, and psychological problems in families. Families experience poverty due to: alcohol dependence, drug addiction, addiction to gambling, lack of social skills, the family model, lack of motivation, non-involvement into the labour market, low education, and the person with a disability in the family. Individuals experience financial hardship and material deprivation. Conflicts occur between family members, children are not taken care of, which leads to children's problem behaviours. Families living in poverty experience social exclusion.

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Received: 19 March 2021

Accepted: 31 May 2021

THE USAGE OF INFORMATION RETRIEVAL TOOLS: DIFFERENCES BETWEEN LITHUANIAN AND PORTUGUESE STUDENTS

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Annotation

With the development of information technologies, more and more information retrieval tools, containing a wide variety of information, can be found. Internet resources, universal and specialized search engines, virtual libraries are becoming the main information retrieval tools for students. The article introduces an exploratory (pilot) research aiming to find out the differences of information retrieval between Lithuanian and Portuguese students. Šiauliai State College offers a unique study programme Information Management, having a signed contract of a double diploma with Porto (Portugal) Polytechnic Institute Porto Accounting and Business School (ISCAP). 10 Portuguese and 10 Lithuanian students participated in the research. The online questionnaire was forwarded to the students of ISCAP Porto Accounting and Business School and to the second year students of the study programme of Information Management at Šiauliai State College. The research revealed that the respondents Lithuanian students look for scientific papers and books, whereas Portuguese students search for basic information and scientific papers. All the respondents of the survey identified Google Scholar as the most important search engine for scientific information retrieval.

Key words: information retrieval, information retrieval tools, information retrieval systems, Portuguese students, Lithuanian students.

Introduction

The Relevance of the Topic

It is becoming more complicated to find the way to discover the necessary source of information and not to get lost in abundance of information sources and information retrieval systems due to increasing amount of information. Target information retrieval needs more time, moreover, appropriate information retrieval skills are needed. Information retrieval is generally carried out intuitively; it naturally flows into the process of scientific research and provision of its results. Information can be obtained hardly following any rules, simply trying out different retrieval tools and following personal information retrieval experience. The more information sources and retrieval methods, suitable for science and studies are known, the easier it is to select them, following own needs and find appropriate information. Information retrieval is generally described as an activity that deals with information retrieval systems for obtaining of appropriate information, during which reconciliation of user's information needs to data objects take place. Generally, a user, when solving an information problem, selects familiar and useful information resources, proven in the past. Information retrieval is at the core of our daily lives. Modern search, ranking and indexing systems underpinned by enhanced computing power, fast network speeds and near unlimited data storage capacity mean that we have easy access to all the information we need, when we need it (Harman, 2019).

Information retrieval is a constituent part of user's information behaviour. Theoretical issues of information user behaviour, information retrieval tools, choice of sources, motives, influencing the quality of information search, were researched by T.D. Wilson (2000); R. Fidel, A. M. Pejtersen (2004); P. Vakkari, K. Järvelin (2005); A. Spink, C.B. Cole (2006); K. Järvelin (2011), R. Savolainen (2016, 2018). The dominance of the Internet search engines in students' information search strategy and their influence on the quality of studies was analysed by J.R.Griffiths and P.Brophy (2005), H. Weber, S. Hillmert, K.J. Rott (2018); H. Weber, D. Becker, S. Hillmert (2019).

Lithuanian scientific literature provides only a few researches about students' information behaviour (Janiūnienė, 2012), parliament members' information behaviour (Vernickaitė, 2014);

there are several master degree's theses dealing with information behaviour topic. Information retrieval problems have not been analysed at Šiauliai State College.

Research problem

Students may seek information for various reasons: to understand a specific subject matter or to conduct a research. Knowledge is acquired through the use of various information retrieval tools or sources, so their selection and knowledge of how it works is important for the information user. The topic is relevant to the fact, that the first pilot research has been carried out, trying to single out the differences of information retrieval tools usage, between Portuguese and Lithuanian students, as a unique study programme *Information Management* is being pursued at Šiauliai State College, and the students of the programme, following the contract of double diploma, are provided an opportunity to study both in Lithuania and Portugal during the same study period, and are awarded two diplomas – of Šiauliai State College and Porto (Portugal) Polytechnic Institute Porto Accounting and Business School (ISCAP). This academic year two students from Portugal have come to study a part of their degree in this study programme. During their Information Behaviour traineeship, they analysed the way Portuguese and Lithuanian students retrieve information, what information they look for and what retrieval tools they employ.

The problem of the research is described by the problem question – the differences in the use (choice) of information retrieval tools and sources between Lithuanian and Portuguese students

The object of the research is information retrieval tools

The aim of the research is to identify the differences in information retrieval tools usage between Lithuanian and Portuguese students.

The objectives of the research:

1. Describe information retrieval concept and tools.
2. Analyse the differences of information retrieval tools usage between Lithuanian and Portuguese students.

The research methods are the analysis of scientific literature, quantitative research (survey).

The Concept of Information Retrieval

The term 'information retrieval' was coined in 1952 and gained popularity in the research community from 1961 onwards. It describes the process of retrieving information from an organized (indexed) collection of information resources (Chowdhury, 2010). Today this process is most familiarly carried out by search engines, the tools, used to retrieve information from the web. Information retrieval systems originally meant text retrieval systems, since they were designed to deal with textual documents. However, modern information retrieval systems deal with multimedia information, comprising text, audio, images and video. While many features of conventional text retrieval systems are equally applicable to multimedia information retrieval, the specific nature of audio, image and video information has called for the development of new tools and techniques for information retrieval. Broadly speaking, information retrieval encompasses all the activities related to the organization, processing of and access to information resources of all forms and formats (Chowdhury and other, 2007). Information access includes all the typical information retrieval processes and activities ranging from content and data selection, and processing and indexing, to search and retrieval, and use of information and data by a designated user community in order to meet their information requirements (Chowdhury, Foo, 2012). K. R. Chowdhary (2020) states that information retrieval is the identification of documents or other units of information in a collection that are relevant to a particular information need - a set of questions to which someone would like to find an answer. Therefore, information retrieval may be considered, as the quest for content, relevant to a given information need (Goh, 2012).

The Tools of Information Retrieval

Rapid advances in information technologies introduce an increasing number of information retrieval tools, which provide a wide range of information. The enormous growth in the size of scholarly literature makes its retrieval challenging. It is extremely important to choose appropriate information retrieval tools to ensure high quality scientific information sources, meeting the needs of a request for the user information. With the rapid increase of online resources and databases in the modern era, many students read to search and find the required information as fast as possible using these resources. Students now prefer to search the Internet instead of using printed resources in the libraries due to the fast and free access to a large amount of information available online. Internet search engines increasingly serve as the first option for people who want to find information. A diverse range of articles report the results

of studies of the information-seeking and retrieval behaviour observed in search engine environments (Kim, 2009; Thatcher, 2008; Jansen, et al., 2008)

Google is the most popular and the most commonly used web search engine worldwide. It is generally selected by users for its simplicity and the abundance of provided resources. Googling has become synonymous with research (Mostafa, 2005). Recent statistics indicate that Google has become the search interface of choice for many students to address their information needs, far exceeding their use of library catalogues or other online citation databases (Griffiths and Brophy, 2005). Universal search engines are not the most appropriate scientific search measures as they provide millions of sources not related to science alongside with valuable and high quality scientific information, consequently a lot of time is wasted for selection of appropriate resources. A number of important and useful sources of information do not appear among the sources of information, as universal information retrieval systems do not have access to all closed and requiring registration domains (e.g. databases). Universal information retrieval systems are an efficient search technique when looking for popular, entertainment information, but the search for scientific information is much more efficient, when specialized information retrieval tools are employed. Several important aspects have to be taken into consideration when selecting specialized information retrieval tools: majority of these tools are intended for the search of a particular format, type, category or scientific area publications; information retrieval tools are developed by institutions, libraries, international publishers, different organizations and other, therefore, they can be presented of different thematic, linguistic, geographical etc. scope; information sources, provided by information retrieval tools can be available to everyone or only to the users of the subscribing institution (Šarlauskienė, 2014). Different joint retrieval systems or virtual libraries have established a possibility of one-stop principle for the information retrieval. Due to the abundance of information retrieval tools, users take advantage of the easily accessible (open access or subscribed by an institution) sources and the sources, providing the largest choice of necessary literature. The websites of institution libraries provide a sufficient amount of information retrieval tools, intended for science and studies.

General search engines are not always able to search the content of databases as efficiently as specialized information search engines. Specialized information retrieval systems search for a certain type of documents, therefore, the results better meet users' needs. The most popular specialized scholarly literature retrieval system is Google Scholar. Google Scholar provides a simple way to broadly search for scholarly literature. From one place, you can search across many disciplines and sources: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, online repositories, universities and other websites. Google Scholar helps to find relevant work across the world of scholarly research. Google Scholar aims to rank documents the way researchers do, weighing the full text of each document, where it was published, who it was written by, as well as how often and how recently it has been cited in other scholarly literature (Google Scholar, 2021). Today Google Scholar provides its own version of citation information, with a 'ranking' technology that reports how often the item has been cited in other scholarly literature. This certainly tells the reader that authors have found this item valuable enough to cite, and tells the authors how valuable their work has been to other authors (Friend, 2006). Google Scholar has selected the most scientific information resources and is freely available to all Internet users. Google Scholar automatically identifies, based on certain criteria, which information resources are attributable to the production of scientific information and selects all available resources. Google Scholar selects web content and, when it finds the right information resource for the user, directs it to a database, archive, institutional cache, i.e. to the actual content owners (Grigas et.al. 2016).

Libraries across the globe started massively digitizing their collections, either alone or with the active involvement of commercial partners. In 2004, Google announced partnerships with several libraries and started digitizing books, with the ultimate vision of digitizing and making available the entire human knowledge online (Matulionyte, 2016). Keeping up with its innovative approach to large-scale problems, Google has developed the necessary set of enabling technologies, proving quite spectacularly that access to digitization time has indeed arrived. Google Books is a specialized book retrieval system. Books are provided to the system by publishers and authors or libraries, that is why books of different publishing years, types and topics can be found. Information about books, excerpts from the books or the entire text of a book can be provided.

WorldWideScience.org is a global science gateway comprised of national and international scientific databases and portals. WorldWideScience.org accelerates scientific discovery and progress by providing one-stop searching of databases from around the world. Multilingual WorldWideScience.org provides real time searching and translation of globally dispersed multilingual scientific literature. By using existing federated search and complex

translations technologies, WorldWideScience.org allows the user to search multiple scientific sources around the world with a single query. The user can review his result list and proceed to the host site for a particular result for more detailed information such as the bibliographic citation, abstract, and in many cases, full text of the document. Ten languages currently supported are Arabic, Chinese, English, French, German, Japanese, Korean, Portuguese, Russian, and Spanish. Native speakers of these languages now have unprecedented access to the English content. Multilingual translations are powered by Microsoft® Translator (WorldWideScience.org, 2020).

ScienceResearch.com portal aims "to unify the World Wide Web's dispersed science to become the world's most comprehensive portal for science." Additionally, the portal seeks to make "long tail science," the very specialized science that may appear to be of limited interest available to a larger audience through which applications may be found. ScienceResearch.com provides a single point of access to more than 400 high quality, publicly searchable science and technology collections with a new, robust user interface specifically designed for advanced scientific research. ScienceResearch.com also searches Science Conferences, a portal, providing access to some of the best conference proceedings. These results are aggregated with the results returned by individual sources. ScienceResearch.com is divided into 15 categories. Categories have also been created for Science News and Patents. Users can search any number of categories, searching all collections within the categories selected, or choose specific collections within a category to narrow their search. ScienceResearch.com's categories are managed by volunteer moderators who help the ScienceResearch.com team select the best, most authoritative collections to include in each category (Hane, 2009).

The Online Knowledge Library (B-on) provides unlimited and permanent access to research and higher education institutions to the full texts of thousands of scientific journals and online eBooks from some of the most important content providers, through subscriptions negotiated at national level. It started operating in March 2004 giving access to thousands of scientific publications and is today a reference in access to international scientific information. It brings together institutions of different types: higher education, scientific research and technological development, hospitals, public and private non-profit administration. This information retrieval system provides access only to subscribed users.

The abundance of information sources and resources on the Internet has encouraged developing specialized information portals and virtual libraries (Šarlauskienė, 2014). Virtual libraries are characteristic of being intended for meeting the needs of an actual institution, a region or a specific scientific area. They provide information retrieval from different resources (e-catalogues of libraries, institutional e-repositories and other open access resources, subscribed databases and other).

Information retrieval is a creative process, the success of which depends on information retrieval knowledge and skills, the character and type of the required information, properly selected information retrieval tools.

Methodology

Exploratory (pilot) research type was selected in order to find out what information retrieval tools students use to search for information for their studies, what the differences are between Lithuanian and Portuguese students in choosing information sources. Questionnaire survey is the most popular research method used to find out the opinion of the majority of respondents (Kardelis, 2016). The respondents were provided with a questionnaire with closed-ended questions to which they could choose from the options provided. The survey was carried out in December 2020. An online questionnaire was forwarded to the students of ISCAP Porto Accounting and Business School and to the second year students of the study programme of Information Management at Šiauliai State College. Only 11 students study in the second year of the Information Management study program at Šiauliai State College, therefore it was decided to interview an equal number of both Lithuanian and Portuguese students. Twenty replies to the survey were analysed: 10 of Lithuanian students and 10 of Portuguese students. We have to acknowledge that our sample size is quite small, which possibly might affect the validity and generalization of our findings.

Results

As mentioned above, this survey was provided to the students of ISCAP Porto Accounting and Business School and the second year students of the study programme of Information Management at Šiauliai State College. 20 replies were submitted – 10 from Lithuanian students and 10 from Portuguese students. 75 percent of the respondents were female and 25 percent were male. Age distribution of the survey respondents was 19 – 23 years of age.

The results of the research revealed that the most common searched type of information is scientific papers, accounting for 85 percent, followed by basic information, accounting for 70 percent, academic papers and books, accounting for 35 percent and scientific research reports, accounting for 25 percent. The data is provided in the diagram below.

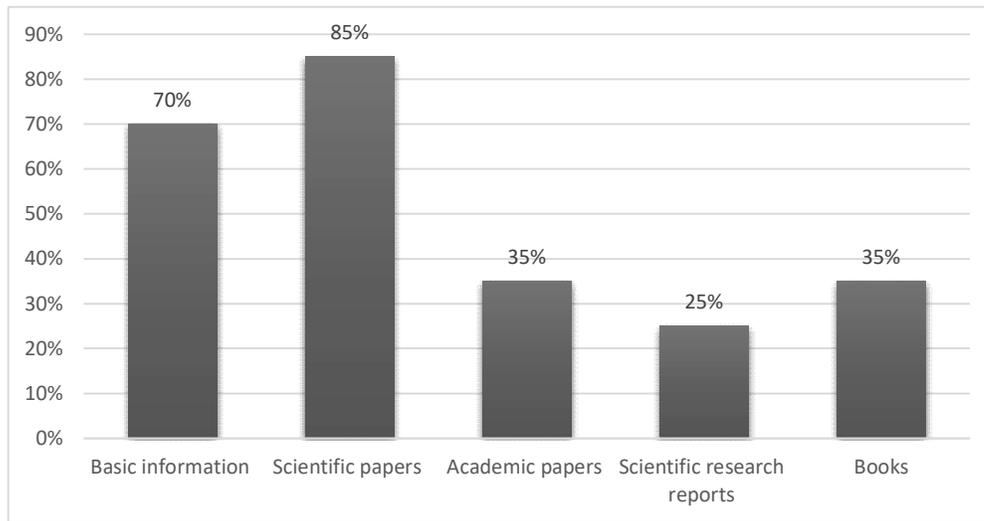


Fig. 1. Information sources necessary for the respondents

The results of the research revealed that the respondents Lithuanian students most often look for scientific papers (90 percent) and books (60 percent), while Portuguese students focus on basic information (90 percent) and scientific papers (80 percent). The research stated that only 10 percent of the respondents Portuguese students tend to look for books. 50 percent of the respondents Portuguese students and 20 percent of Lithuanian students, who participated in the research, look for academic papers. The data is provided in the diagram below.

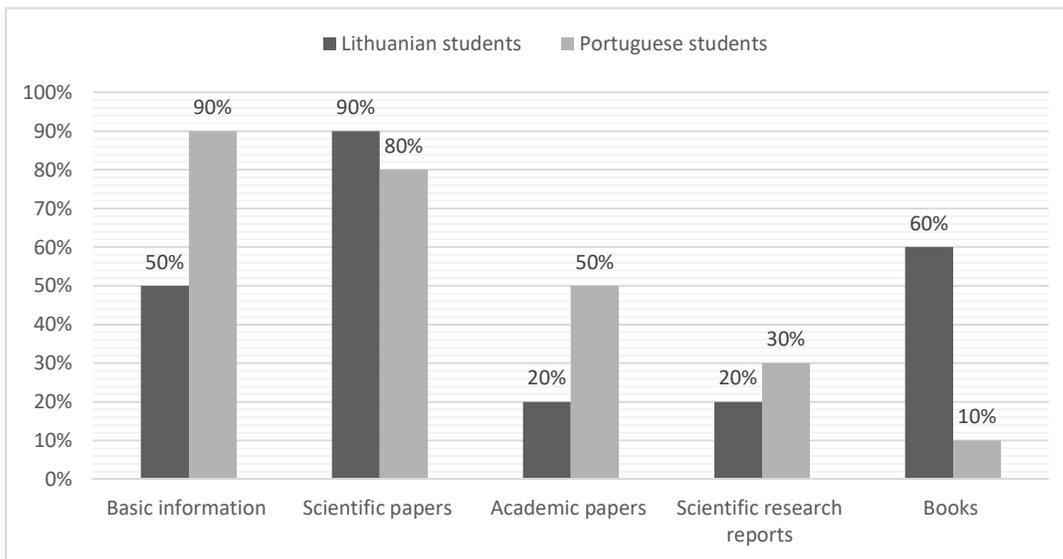


Fig. 2. Information sources necessary for Lithuanian and Portuguese students

It can be implied that information users, when solving information problems, select such sources of information, which would probably provide the solution to the problem task. We can presume that the need of information source is determined by the topic of the studied subject, the tasks, provided by teachers, accessibility of the source of information, or possibility to borrow it from the library.

As for the question “What browsers/platforms do you usually use to carry out your research?” it was found out, that all the respondents take advantage of Google Scholar, this one being the most commonly used browser to search for the necessary information, followed by Google. The data is provided in the diagram below.

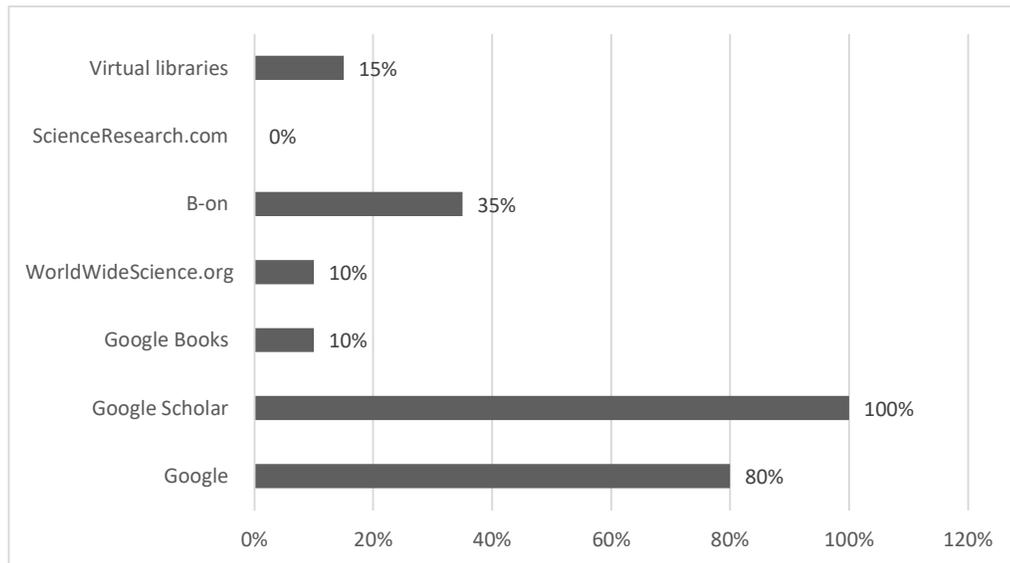


Fig. 3. Browsers/platforms used by the respondents

The results of the research allow stating, that information search engine Google Scholar is always used for the retrieval of the scholarly information or literature. It is very convenient for an information user to look for different documents in one place: articles, theses, books, summaries from different sources of information.

The results of the research showed that all (100 percent) the respondents Portuguese students conduct research in universal search system Google, whereas only 60 percent of the respondents Lithuanian students state to be searching for necessary information in this source of information. The data is provided in the diagram below.

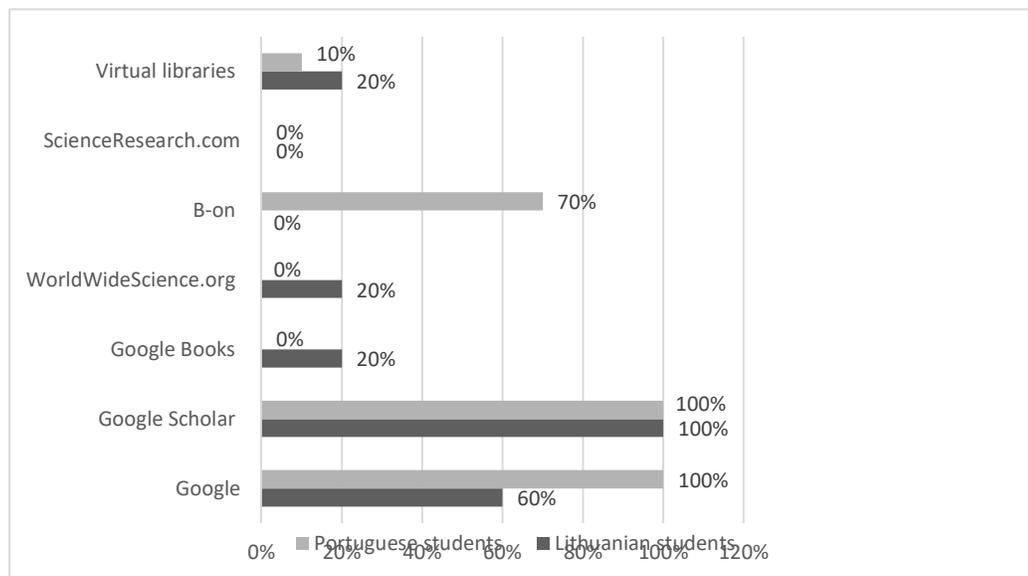


Fig. 4. Browsers/platforms used by Lithuanian and Portuguese students

20 percent of the respondents Lithuanian students carry out information retrieval in specialized book retrieval system Google Books, equally, 20 percent of the respondents

Lithuanian students look for information in WorldWideScience.org – global science gateway, where users can find scientific information in national and international scientific databases and portals from around the world. The respondents Portuguese students claim not to be using such search engines as Google Books and WorldWideScience.org. The given results revealed that neither Lithuanian nor Portuguese students take advantage of ScienceResearch.com information retrieval tool, providing access to more than 400 highest quality science and technology collections, equipped with new and reliable user's interface, specially designed for advanced scientific research. The research found out that 70 percent of the respondents Portuguese students use B–on information search tool for the information search. It should be noted that B–on information search tool provides the Portuguese students access to thousands of different sources of information – periodicals, electronic books and databases, and the possibility to carry out the information retrieval taking advantage of one–stop principle.

The respondents Lithuanian students have never used information search tool B–on, as this source of information is intended for subscribed users only in Portugal. It can be assumed, that in the future this great information search tool will be accessible and used by Šiauliai State College students, as the study programme *Information Management* has a signed double diploma contract with Porto (Portugal) Polytechnic Institute Porto Accounting and Business School (ISCAP), and the students will have an opportunity to join the users of B–on information retrieval tool.

20 percent of the respondents Lithuanian students of the research survey and 10 percent of the respondents Portuguese students stated that they look for information in virtual libraries as well. It can be noted that virtual libraries is not a very popular information search tool, as a big part of the documents introduced there provides only bibliographic description, but does not allow the user to get access to the entire text of the documents.

The research revealed that both Portuguese and Lithuanian students give priority to the sources of information to their native languages.

Conclusions

1. Information retrieval is a creative process, the success of which depends on information retrieval knowledge and skills, the character and type of the required information, properly selected information retrieval tools. Universal information retrieval systems are very convenient when looking for basic information. Specialized information retrieval systems look for a certain type of documents; therefore, the search results better meet the needs of the users. The most popular specialized information retrieval system is Google Scholar.

2. Exploratory (pilot) research was carried out for the first time, in order to find out the differences in information retrieval and information retrieval tool usage between Lithuanian students and Portuguese students. The online questionnaire was forwarded to the students of ISCAP Porto Accounting and Business School and to the second year students of the study programme of Information Management at Šiauliai State College. The research revealed that the respondents Lithuanian students look for scientific papers and books, whereas Portuguese students search for basic information and scientific papers. All the respondents of the survey identified Google Scholar as the most important search engine for scientific information retrieval. The Portuguese students most commonly took advantage of Google and B–on information search tools, whereas Lithuanian students used Google, Google Books, WorldWideScience.org information search tools. However, all the respondents of the questionnaire noted, that they started information retrieval from the sources of information in their native language first. Our findings suggest that students increasingly rely on search engines to support their study tasks. The retrieval tools are increasingly becoming an integral part of their lives, turning them into taken–for–granted background tools.

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Received: 8 March 2021

Accepted: 31 May 2021

QUALITY OF THE GROUNDWATER IN ŠIAULIAI CITY

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Annotation

In Lithuania, only underwater is used for drinking; its resources are large and the quality of this water is higher than that of the surface-water. Moreover, it is better protected from pollution. Implementation of water monitoring is a major state regulated control means to prevent from pollution. The article deals with the analysis of problems of the groundwater quality in Šiauliai city, the assessment of the monitoring results for the underwater in Šiauliai city referring to the investigation of the groundwater.

Key words: underwater, groundwater, monitoring, quality of water.

Introduction

Underwater means all the waters in the Earth's crust which are found in its pores, cracks, underground lakes and rivers. Their importance to the humankind is immense. Underwater is used for various human and industrial purposes. It is the largest treasure of the humankind. Both underwater and surface-water is used to supply the drinking water. The priority is given to the underwater because it is of a higher quality and is better protected from chemical and bacteriological contamination. Only in Lithuania, Denmark, Slovenia, Italy, Hungary identified among European countries, almost solely underwater is used for drinking and domestic needs (>90 %). In other European countries, a part of the underwater in the total balance of the consumed water is lower (50–75 %); whereas in Ireland, Sweden, Norway a part of the consumed water consists of surface-water (even up to 85 %). Thus, Lithuania is one of few countries whose demands of residents and larger part of industrial companies are met by the underground water resources [10].

According to its characteristics and usage, the underwater is of several types. The Law on the Underground Resources of the Republic of Lithuania establishes the following division of the underwater [4]:

Fresh underwater is the water which contains less than 1 gram per litre of the total concentration of dissolved substances or which can be used as the drinking water.

Mineral underwater is the water that contains 1 gram per litre or more of the total concentration of dissolved substances or which is characteristic of specific chemical and (or) physical, and (or) biological features. According to the total concentration of dissolved substances (in grams per litre), the mineral underwater is divided into very low (up to 2 grams per litre), low (from 2 to 5 grams per litre), moderate (from 5 to 15 grams per litre), high (from 15 to 35 grams per litre) mineralisation water and brine (35 and more grams per litre).

A slightly too high amount of iron is perhaps the largest problem of the underground drinking water in Lithuania. This chemical feature does not harm health but causes unwanted effects because, when the water is brought to surface, iron hydroxides precipitate as brown sediment. Therefore, the water is being deironed in large water extraction plants, i.e. iron compounds are removed [8].

Increased concentration of nitrate in the underground water is another frequently manifesting problem in relation to the quality of water, which directly impacts health of people consuming groundwater. Nitrate is a toxic chemical compound found in the drinking water, too. The maximum permissible concentration (MPC) of nitrate in the drinking water should not exceed 50 mg/l [2].

The horizon of the groundwater has formed on top of the first impermeable layer of soil. The depth of the groundwater in different periods of the year is quite different and depends on the rainfall. The quality of the drinking water depends not only of domestic activities maintained by people but also on the chemical composition of rainfall. The underwater is relatively protected from surface pollution; however, sometimes small concentration of nitrates and traces of some toxic substances, such as heavy metals and pesticides, are found [3].

The groundwater stratifies closest to the surface and reacts to the anthropogenic load fastest. Therefore, it is a sensitive indicator of the environmental condition, and its impact on the underground hydrosphere is highly important. The quality of the groundwater is usually negatively affected by high amounts of iron, carbonates and nitrates [2].

The level of the groundwater, its chemical composition and temperature vary under the impact of external factors: climate, surface-water deposits, plants and human activity [1].

The underwater is the most important source of the drinking water in Lithuania; therefore, it is necessary to protect it from pollution and save it. The threat of over-exhaustion occurs when exploitation of the underwater exceeds the resources. A threat of contamination of the underwater is much higher than that of over-exhaustion [12].

In Lithuania, not only larger cities and centres of districts have centralised systems of public water supply to residents but also majority of smaller towns and village-type settlements do. A part of residents extract the drinking water from individually equipped boring wells and dug wells [1].

The monitoring of the underwater is being carried out according to the State Programme for Environmental Monitoring. A major task of this programme is to assess the resources for renewing the underwater resources, chemical condition of the underwater, tendencies of the quality change and determining factors. The Underwater Monitoring Activity Programme comprises continuous measurements of the level of the underwater as well as the taking of underground water samples and laboratory examinations [6].

Relevance of the research. In Lithuania, the underwater is used by every resident; nevertheless, not many think of how this water occurs. It is very important to find out more about the resources of the underwater, their quality, to understand the causes which may reduce the resources of the underwater and its quality.

Research object: the groundwater in Šiauliai city.

Aim of the research: to analyse the problems of the groundwater quality in Šiauliai city.

Objectives of the research:

1. To analyse the resources of the fresh underwater and its extraction in Lithuania.
2. To assess the monitoring results for Šiauliai city underwater by examining the groundwater.
3. To find out the problems of pollution of the groundwater in Šiauliai city.

Research methods. Analysis of scientific literature, data of the monitoring of Šiauliai city underwater and soil for 2019.

Samples of the water from wells were taken using the water-drawing devices equipped near the wells or by using a specific ladle. Samples of water from boring wells were drawn by using a specific electric pump plunged into properly cleaned boring wells.

Resources and extraction of the underwater.

The underwater is a dynamic, renewable natural mineral resource which collects in pores and cracks of solids. The sites which are favourable for collection of larger amounts of the underwater are called underwater deposits. The freshwater, mineralised, industrial and thermal water is extracted from the underground. A part of the deposit where underwater catchment, raising and supply are installed is called the water extraction plant [9].

The resources of the underwater intended for exploitation are the amount of water which may be extracted from the aquifer by technically and economically rational means, i.e. not causing a negative effect on environment. The European Union directives consider resources intended for exploitation as available resources of the underwater [9].

When implementing the measures set in the programme of assessment of the underwater resources and their usage for supplying the drinking water for a period 2007–2025, it was found that the resources of the fresh underwater available in Lithuania comprised 3.72 mln. m³/ day. The part specified for resources of the Register of Underground Resources of Lithuanian Geological Survey registers 1,928 water extraction plants on the entire territory of Lithuania, including 32 plants of the mineral underwater. Currently, all resources of the fresh (drinking and production) underwater have been examined, approved and registered to the Register of Underground Resources [7].

Grounding on the data of Lithuanian Geological Survey for 2019, over 141,033.44 thousand cubic metres of the fresh underwater have been extracted from the underground in comparison to the data for the period 2015-2019; this is the most intensive water extraction over the period (see Table 1).

Table 1

Extraction of the fresh underwater in the Republic of Lithuania [5]

Amount / Year	2015	2016	2017	2018	2019
thousand m ³	132,054.40	130,002.71	121,000.00	104,052.20	141,033.44

Network for the underwater monitoring. Currently, Šiauliai city municipality network for

the underwater monitoring comprises 27 examination points. 16 examination points, including 9 specialised monitoring boring wells and 7 shaft wells belonging to residents, have been installed in the groundwater stratum.

In 2019, the monitoring was conducted in 23 points of the monitoring network. The groundwater, intertill and Permian aquifer deposits were surveyed. The monitoring of the underwater was carried out by M. Čegys' enterprise.

Physical and chemical indicators of the underwater. Before drawing samples of the underwater in field conditions, volatile physical and chemical parameters, such as water temperature, concentration of hydrogen ions pH, potential of oxidation-reduction Eh, electrical conductivity of water (SEL), have been measured in the boring wells and wells of the monitoring network.

Investigation of chemical composition of the underwater. Šiauliai city monitoring of the effect on the underwater includes the monitoring of the ground (in boring wells and wells), intertill and surface Permian (in boring wells) aquifer. In the reported year of 2019, chemical composition of all these aquifer strata was examined.

Quality of the groundwater. The quality of the groundwater is being surveyed in the water of the specifically for the monitoring equipped boring wells and wells belonging to residents. The results of the examination of the groundwater for 2019 are presented in Šiauliai City Municipality Report on Underwater and Soil Monitoring in 2019 [11].

Quality of the groundwater of boring wells. The quality of the water was examined in seven boring wells (no. 1701, no. 1702, no. 2364, no. 35849, no. 35854, no. 60138 and no. 60139). Boring wells no. 60138 and no. 60139 were installed on the territory of the former factory "Elnias", other boring wells are situated around the city. All samples of the water were collected in November 2019.

The total concentration of dissolved mineral substances (TCDMS) in the groundwater in the wells situated in Šiauliai city varied in the interval 353–988 mg/l (723 mg/l on the average). The least TCDMS of the water was found in the boring well no. 2364 situated on Spindulio street; the largest was found in the boring well no. 35849 on Pročiūnų street. Mineralisation of the water of these boring wells did not exceed the maximum mineralisation of the freshwater (1 g/l). Chemical composition of the water in the boring wells remained stable, changes of mineralisation were low.

The index values for amounts of organic substances dissolved in the water of the boring wells were quite different. The permanganate index (PI) varied in the interval 1.48–5.54 mg O/l, and in the water in the boring well no. 35854 it reached 23.8 mg O/l. Chemical oxygen demand according to bichromate (COD) index in the water of this boring well was also higher, i.e. 325 mg O/l. In the water of other boring wells, it varied in the interval <4.64–25.6 mg O/l.

Sulphates in the groundwater were found up to 29.1 mg/l. This concentration is not significant. The amount of chlorides varied in the interval 3.15–392 mg/l; increased concentrations were found in the boring wells no. 1701 (392 mg/l) and no. 1702 (166 mg/l).

Features of low pollution with nitric compounds were found in the monitoring boring wells, and ammonium dominated on this site. Ammonium was found in the water of all boring wells. Its larger concentration remained in the boring well no. 2364 (5.39 mg/l) and found in the boring wells no. 35854 (4.27 mg/l) and no. 1701 (3.03 mg/l). However, such amount exceeded only the MPC applied in the case when the underwater is used for domestic purposes. Concentration of ammonium in other boring wells did not reach 1 mg/l. Traces of nitrates (up to 1.32 mg/l) were found in the water of the boring well no. 35849 only.

In the boring wells no. 60138 and no. 60139 situated on the territory of the former factory "Elnias", features of the groundwater pollution remained. Mineralisation of the water of the boring wells was higher; the TCDMS reached 1726–2832 mg/l. Higher mineralisation of the water was found in the well no. 60138. An especially high amount of dissolved organic substances remained in the water of these boring wells. The COD index varied in the interval 716–912 mg O/l. The PI index varied 369–375 mg O/l. Last year, this index was twice higher and reached 580–748 mg O/l. Causes of changes in the mineralisation are not clear; they may be determined by natural (changes of the seasons, hydrodynamic mode) reasons as well as by domestic activity on the territory.

There is an increased amount of sulphates (319–757 mg/l) and chlorides (99.4–190 mg/l) in the water of the boring wells.

The amount of main cations, calcium, in the water reached 232–313 mg/l. The amount of sodium and potassium was higher; it varied in the interval 168–356 mg/l and 21.8–32.1 mg/l,

accordingly. The amount of these cations in the groundwater is not restricted; nevertheless, the found concentrations are not typical to the water originating in clean natural environment. In the water of the boring well no. 60138, sodium was the prevailing cation. In the water of the boring wells no. 60138 and no. 60139, higher concentrations of ammonium exceeding the MPC remained (5.48–26.1 mg/l). In the water of the boring well no. 61038, the concentration of ammonium increased from 12.1 to 26.1 mg/l. No other compounds containing mineral nitrogen (nitrites and nitrates) were found in the water.

In the groundwater on the territory of the former factory “Elnias”, an especially high amount of chromium, 1000–1100 µg/l, was found. Such concentration exceeded the limit value (LM) 10–11 times. A higher amount of nickel, 75 µg/l, in the water of the boring well no. 60139 was found.

In the autumn of 2019, the quality of the groundwater on the territory of the former factory “Elnias” was poor, features of pollution remained.

Quality of the groundwater of wells. The quality of the water was examined in seven shaft wells belonging to residents [11]. The water samples were collected in November 2019.

The water of the wells was characteristic of moderate and slightly higher mineralisation: the TCDMS varied in the interval 529–1086 mg/l.

In the groundwater of the wells, cations of calcium dominated. The amount of calcium in the water of the wells varied in the interval 101–200 mg/l (146 mg/l on the average). Its largest concentration was found in the well no. 16s. The amount of magnesium in the water of the wells varied in the interval 7.35–52.6 mg/l; the largest concentration of it was found in the water of the well no. 44s. The amount of sodium on the territory continued varying as well (12.5–85.3 mg/l, 36.2 mg/l on the average). A slightly higher concentration of sodium remained in the water of the well no. 1š (85.3 mg/l). In this well, the concentration of chlorides exceeded the background concentration, too. Usually, higher concentrations of sodium chloride in the groundwater occur due to rock-salt being spread on the roads. This year, average concentrations of main cations were found to be higher.

The amount of organic substances dissolved in the groundwater of the wells varied. The PI displaying the amount of easily oxidising organic substance varied in the interval <0.6–40.9 mgO/l. The COD index displaying the total amount of organic substances in the water varied in the interval <4.64–73.9 mgO/l. The highest pollution with organic substances was found in the wells no. 16s and no. 30s.

Pollution with mineral nitrogen compounds found in the groundwater of the wells belonging to residents is observed; nitrate is the main compound. Nitrates were found in the water of all examined wells. Their amount varied in the interval 3.59–130 mg/l (42.9 mg/l on the average). A higher concentration of nitrates was found in the water of the wells no. 44s and no. Pb6s; there, their amount varied in the interval 65.9–130 mg/l. The amount of nitrates in the water of the well no. 44s exceeded the LM (1.3 times). In other wells, the quality of the water was better, found nitrates were 3.59–49.7 mg/l. No nitrites, which are the most easily oxidised compounds of mineral nitrogen, were found in any sample. Traces of ammonium were found in the water of practically all wells (up to 0.029 mg/l). Its concentration did not reach the assessment criteria. Pollution of the groundwater with nitrogen compounds is usually associated with mal-managed local system for wastewater collection, attempts of residents to engage with domestic farming activities.

Conclusions

1. Resources of the fresh underwater in Lithuania are quite large and they continuously renew. In the Register of Underground Resources, the part dealing with the resources, 1,928 water extraction plants situated on the territory of Lithuania are registered. All resources of the fresh underwater have been examined, approved and registered in the Register of Natural Resources.

2. Aiming to find out the problems of the quality of the groundwater in Šiauliai city, the analysis of Šiauliai city municipality underwater and soil monitoring for 2019 was carried out, methods for surveying the groundwater as well as examination points and surveyed indexes of the groundwater were explored.

3. When analysing the information on the indexes of the groundwater and the results of their survey, it was found that major problems of the groundwater pollution were related to the surface pollution, maintained domestic activities, caused by natural reasons and technogenic effect. The boring wells and wells for extracting water should be arranged further from potential spots of pollution present on the territory, following the installation requirements.

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Received: 4 March 2021

Accepted: 31 May 2021

DESIGN AND OPTIMIZATION OF AN AUTOMATED MODULAR SYSTEM FOR DISTRIBUTION, MOVEMENT AND STORAGE OF GOODS

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Annotation

The automation of various processes, the development of technological potential and the ongoing fourth industrial revolution lead companies to digitize and automate business processes. In order to adapt to the fourth industrial revolution, Šiauliai State College representatives, together with the engineering staff of the companies, have taken the initiative in this area. During the implementation of INOSTART projects, automation processes were design, adapted for warehouses and helping workers to transport heavy loads. A logistics system has been created, which integrates a mobile logistics robot using image detection cameras and distance measuring laser systems, as well as optimized system performance.

Keywords: automation, logistic terminal, prototyping, robots, optimization.

Introduction

With the rapid development of technology and innovation, more and more is invested to a digital technology and automated solutions. To increase the efficiency of technological processes, industrial robots are used to perform repetitive and monotonous tasks. These automated devices allow companies to speed up production and logistics processes, use resources more efficiently, increase work speed, productivity and business competitiveness. Increasingly, workers are working hand in hand with robots or robotic production systems. Humans play major role in the design process, development, maintenance, installation and the whole management process. The well-defined allocation between technology and an operator is a contribution alliance for a competitive manufacturing system. The process of automation is expressed in some different cases as the necessity, which will increase the human safety in the production process (Mishev, 2006). Conventional industrial robots are not adapted to work with humans, so for safety reasons they work in designated enclosed areas. Many logistics companies make decisions where robots (collaborative) can work safely in the same environment with humans and collaborate safely. Automated warehouse deployment requires significant investment, so when making decisions, the company must evaluate which process needs to be automated, process capacity, warehouse design, security, and so on (Matta and Semeraro, 2005; Mishev, 2006). It is especially relevant in nowadays of business environment, where companies are looking for ways to quickly and financially sufficiently implement automated technological workforce. Warehouse automation allows achieving high-quality and fast customer service and reduction of operating costs (Mingxing et al., 2018). Some researches show (Barosz et al., 2020; Glaser, 2009) that thanks to robotization, many companies obtained an increase of productivity by 30%. The implementation of automation is usually connected with reduction of the human cost. Many warehouses in Lithuania are still non-automated and that automation is not fast due to high costs.

The purpose of the smart machine is to integrate into the company's warehouse, where it would facilitate human work and reduce the number of errors in the collection of ordered goods. The automation of warehouse processes, which increases the productivity of work in business enterprises, is described in this paper. Dijkstra algorithm for collecting goods on the optimal route was implemented and tested. Solutions that minimize the project costs were chosen during the implementation of this project.

Purpose of experimental tests. To perform experimental tests of the logistics robot orientation system based on the Dijkstra algorithm. Provide recommendations for system optimization.

Methodology for performing experimental tests. The testing of the logistics robots was performed in a real commercial warehouse. The robot moves in the warehouse, orienting according to the lines and barcodes drawn on the floor. The coordinates of the warehouse are coded in the barcodes marked on the floor of the warehouse. Warehouse goods are assigned to a specific warehouse coordinate. After creating a product order according to the list of goods, the route of the robot's movement is created based on the Dijkstra algorithm. The operation of the robot control systems was tested during the experiment.

1. Methodology of order

Creating an order. The warehouse employee selects the ordered goods and their quantities in the Microsoft NAV window. These goods are also assigned to the order box.

Recording of goods. Order execution is assigned to an external device - a terminal. In this case, there may be one or more devices.

When warehouse worker approves, the pick-up instruction is formed and sent to the peripheral device - terminal via wireless connection.

In the business management system is possible to specify the peripheral device number. Depending on the selected peripheral device it is generated a .csv file (TAB delimited) and then it transferred to the directory - "FTP address for export".

If not all goods are in stock, system is showing a question "Do partial selection?", after confirmation the only quantities/goods with sufficient balance are printed, and without confirmation the pick-up instruction is not printed. When creating an order, system is checking possibility to scan goods in packages and creating a line with the quantity in a package, also a line showing a barcode of the package. The remaining quantity is written in the next line with the barcode.

FtpRemoteFileHandling (1.0.16.0) is subroutine for administration of orders in the Programmable logic controller (PLC) FTP server. If the order is not initiated, the import folder is constantly checked, and when the .csv file appears, information about it is transferred to other subroutines.

After receiving the information about the new order, the order is opened using the file opening subroutine (Fig. 1). This subroutine all values in a .csv file convert to variables for PLC.

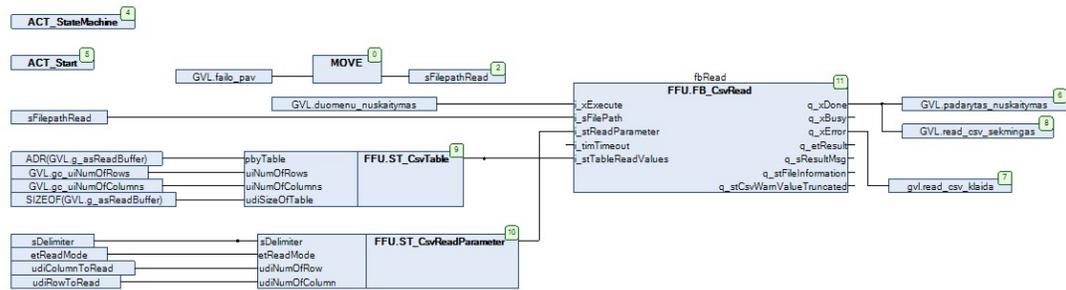


Fig. 1. Scanning a file

A prototype of a mobile logistics robot has been developed for the transportation of goods in the warehouse. Robot operation algorithm:

The camera captures the current location of the device.

The Ethernet / IP scanner reads the information about current position.

From the obtained data is calculated average value which indicates the current location.

The obtained value is transferred to the motor control program (Fig. 2).

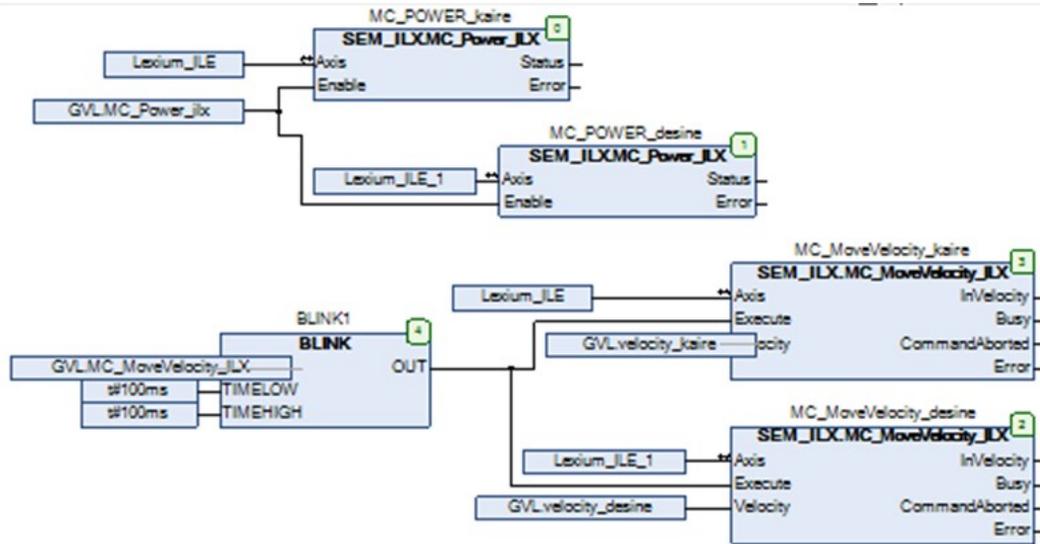


Fig. 2. Engine management program

The information about required order is displayed on the touch screen. When required item is scanned robot moves to another position.

The information from the barcode scanner is transmitted to the PLC.

When the scan is completed, the order is deleted from the import folder.

The order report with the selected quantities of goods is generated and saved in .csv format in the export folder.

The report is run through the job queue, and runs automatically. The quantities of goods are picked up and entered in the "Quantity for dispatch" field. Quantities received during export are recorded and registered in the "Transfer log" file.

2. Path planning method

Path planning techniques are an important aspect of a robot navigation system. The robot must reach the aim in the shortest time by the optimal route. Another important aspect is the computational complexity and resources of the method. Path planning methods can be categorised into global planner and local planner. Global planner is used in static environments as Dijkstra's algorithm or A* algorithm. Local planner is used in a dynamic environment as Neural Network for predictive trajectory, when a sensor system is used to detect and avoid obstacles. Various approaches and its comparisons can be found in the literature Zafar and Mohanta (2018), Patle et al. (2019), Koubaa et al. (2018) and so on.

Commonly used path planning methods for example are A* algorithm or Dijkstra's algorithm. Heuristic A* algorithm is similar to dynamic and is widely used in programming, artificial intelligence and robotics. The Dijkstra algorithm for optimal routing can be applied to the navigation system, which is used to find the shortest path between the node and every other (Lu and Camitz, 2011). The algorithm exists in many variants; Dijkstra's original variant found the shortest path between two nodes, but a more common variant fixes a single node as the "source" node and finds shortest paths from the source to all other nodes in the graph, producing a shortest path tree. The single source shortest path problem can be described as follows (Maw and WaiPhyoEi, 2017):

$$\text{new } d_j = \min\{d_j, d_i + c_{ij}\},$$

where

d_i = distance of current node;

d_j = distance of label node;

c_{ij} = weight set for the edges(i,j).

Algorithm step by step updates the states of the nodes (Fig. 3).

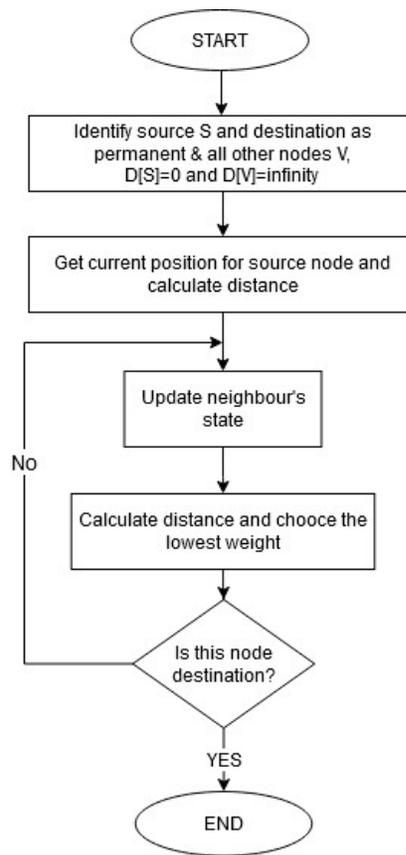


Fig. 3. Flow chart of the shortest path calculation

Dijkstra algorithm was realized by CODESYS system in the project. Fig. 4 shows the shortest path tracking of movement in the warehouse.

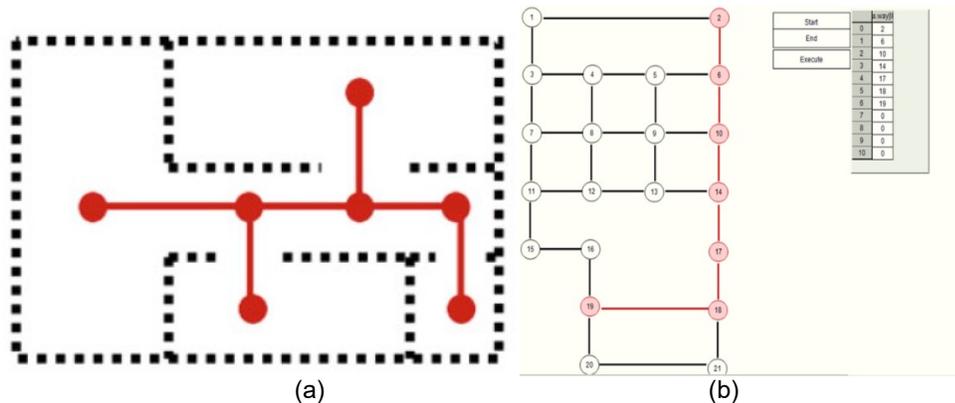


Fig. 4. (a) Qualitative Path Planning (Koubaa et al., 2018); (b) Realization of Dijkstra algorithm

This algorithm specifies by routes from the initial to target location. The robot moves from start node to desired node along the shortest path. Landmarks are any kind of recognizable and perceivable objects that can uniquely identify a location. Architecture of robot orientation in the environment: line-barcode-ultrasonic sensors.

3. Realization of the project

Standard universal tools and instruments were adapted for the project implementation: a standard business management system has been chosen for warehouse management (Navision) and universal controllers instead of specialized ones for robot control.

An automated modular system for business and management orders in logistics warehouses has been constructed (Fig. 5).

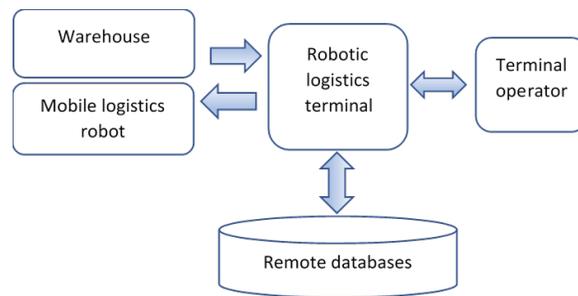


Fig. 5. Control scheme of logistics terminal

The program was written for the controllers based on the Dijkstra algorithm and developed middleware modules for receiving and transmitting commands between controllers and the Business Management System (can be of any type). The project was installed and tested in a typical warehouse of the trading company (with racks and shelves) without large investments.

Conclusions

Tests and trials of the developed automated system were performed in the warehouse of a company, fixed system errors, devices compatible with the business management system. In most cases, warehouses have business management systems in place, so all that remains is to implement additional intermediate models. This reduced project costs by using standard rather than specialized hardware and software. The Dijkstra algorithm has been implemented to collect goods by the most optimal route.

It is also suggested to adjust the gear control systems as they do not work stably at all speed modes. Adjust the operation of electric motor encoders. Perform improvements to the robot's optical systems to increase scanning accuracy and speed.

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Received: 3 March 2021

Accepted: 31 May 2021

PARENTS PARTICIPATION IN CHILDREN DAY CENTRE ACTIVITIES: THE PERSPECTIVE OF THE SOCIAL WORKER

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Annotation

One of the most vulnerable groups in society is children who due to their age, are unable to take care of themselves, so their rights must be taken care of at national level. For children who face a certain social risk because of circumstances of life in which the conditions for their successful education are not fully ensured, appropriate conditions are created in children's day care centers. The aim is to analyze the attitude of social workers to the participation of parents in the activities of the children's day center. The article on the basis of the data of qualitative research presents the experience of social workers working in the children's day care center and the involvement of parents in the activities of the children's day care center. Seven social workers working in Catholic children's day care centers were selected for the research. The results of the research revealed that in children's day care centers, social workers provide various services to children and their parents, including socio-cultural, lesson preparation, social skills development, individual and group counseling, work skills development, and free meals. Parents' participation in children's day care centers is very important, as their values change, new and improved social skills are acquired, communication and creative skills are revealed, they learn to deal with material difficulties, and responsibility for one's children and family is strengthened.

Key words: children day center, a child, social skills, empowerment.

Introduction

The concept of child well-being encompasses both physical and psychosocial spheres. Children growing up in families with problems such as family living conditions (alcohol consumption, violence, neglect, non-compliance with social norms, etc.) are more vulnerable, face poverty, primitive value orientation, negative psychological climate, upbringing mistakes, and are living growing in a stressful environment, where the risk of the child becoming socially vulnerable predominates. Therefore, today it is relevant to analyze the impact of the family on the socio-cultural development of a child's personality, as it introduces social roles, provides with the necessary knowledge and skills that facilitate the child's positive social adaptation in society. However, not all families perform this social role and function delegated to them. Rapid changes in the economic and social situation make it difficult to adapt to changing living conditions that is why some families experience crises, find it difficult to socialize in society and create special conditions for their children to develop and integrate successfully as equal members.

In the Lithuanian Progress Strategy "Lithuania 2030" (2014), the priority is to reduce social exclusion and create a smart society. Contemporary school is not always able to provide equal educational opportunities for all students with unequal experiences, living conditions, and children growing up in families with problems are the most vulnerable. The Children Day Center (hereinafter referred to as CDC) provides such an opportunity because it functions as a mean of ensuring the rights of the child, positive socialization by providing comprehensive assistance to children and their parents who are unable to perform their duties properly.

The activities of CDC organizations are analyzed in various aspects by Lithuanian and foreign researchers. Several Lithuanian authors analyzed the services provided by children's day care centers and their need: I. Liepinskaite, R. Motieciene (2017), V. Gudzinskiene, S. Burvyte, M. Barkauskaite, (2017) (2018) emphasized the importance of mentoring in gaining

parental trust creating a safe environment for participation in the activities of the center and the development of positive parenting skills. N. P. Veckienė and J. Eidukeviciūtė (2015, 2019) emphasized the importance of the relationship between the social worker and the client in children's day care centers and the role of the social worker. S. Cojocar, G. Alexandra, R. Delia, (2015) examined aspects of parental participation in children's non-formal education, A. Ansari, E. Gershoff, (2016) explored the benefits of parental involvement in children's diverse education, D. Wilkins, C. Whittaker (2018) discussed barriers to the successful implementation of child rights protection when working with parents. However, much in-depth research analyzing aspects of parental involvement in children's day care centers activity has not been conducted. The scientific research is more focused on children and their needs as the main clients of children's day care centers.

The object of the research is the attitude of a social worker to the participation of parents in the activities of the children's day center.

The objective is to analyze the attitude of social workers to the participation of parents in the activities of the children's day center.

The goals:

1. Describe the activities of children's day care centers.
2. To describe the services provided by social workers in the children's day center.
3. To study the opinion of social workers about the importance of parental participation in the activities of the children's day center.

The methods:

- * Analysis of scientific literature.
- * Qualitative research - semi-structured interview.
- * Content analysis

Activity of children day centers

Children are the part of society that needs to be given the highest priority, as they depend not only on the current state and characteristics of society, but also on the community and society of the future world or individual countries. The development of the Day care centers sector intensified with the approval of the National Program of Non-Governmental Children's Day Care Centers for 2002-2004. An opportunity to receive funding from the state budget for Day care centers appeared. The main documents are the National Children's Day Centers Programme, 2005-2007, which is still relevant today, the Law on Social Services (2006) and Catalog of Social Services (2006), the Law on Minimum and Average Child Care (2007), Recommendations for the Activities of Children's Day Centers (2015), Child Welfare action plan for 2019-2021 (2018), Caritas Lithuania child protection policy for children and other vulnerable persons (2019). CDCs organize their activities on the basis of the legal framework of the programs, which corresponds to the legal framework of the European Union and Lithuania, as well as the Christian values defined by the teaching and tradition of the Catholic Church.

Grizaite (2011) describes a children's day center as a social service institution with the aim to provide day care, occupation, leisure and other services to children, while improving the quality of life for children from low-income families and normalizing their relationship with the social environment. Day centers act as family support to ensure children's rights if the child's family does not ensure them. According to Gudzinskiene and Railiene (2012), in day care centers children acquire the necessary social skills - they become more independent, gain self-confidence, become more polite, learn to solve their own problems, learn to communicate with others, react more calmly to comments. Their progress in school is improving, they are less likely to miss classes, and relationships with teachers and peers are improving as well. Koivula and Hannikainen (2017) state that in children's day care centers, positive daily preparation habits are formed for children, by participating in collective activities; the child feels part of the community and learns social responsibility. The social skills acquired in a children's day care center help a person to successfully adapt to the life of society, to cope with the needs and problems of everyday life. Social skills, according to many researchers, are the ability to respond in a way that is acceptable to society and to all individuals with whom the child communicates.

According to Gudzinskiene (2014), children's day centers, which provide extracurricular activities and educational assistance, function as a mean to ensure children's rights and positive socialization, i.e. social, psychological, special, pedagogical, informational and etc. In these organizations, children need time to play, research, create, learn new skills, and relax. Therefore, children's day centers should offer the child as much free time as active activities, which should be fun, interactive, helping children to develop, acquire social skills, develop self-esteem, be able to resolve conflicts. According to Targamadze (2017), children's day centers can provide various social and educational services, and the development of their activities

depends on objective factors (legal basis, funding, specifics of activities, etc.) and subjective factors (competencies of the center manager and staff, local community needs and etc.). The attitude of municipalities and their council members has a great influence on the emergence of centers and the development of their activities.

Summarizing the opinion of scientists, it can be stated that a children's day center is a non-governmental organization that provides social, educational and occupational services, preventive and intervention measures that ensure the child's well-being, reduce social risks or other problems faced by families and children, strengthen empowerment in the implementation of the rights of the child, ensuring the positive socialization of children, well-being by developing children's resilience to the negative influences of the social environment and social risk factors. This is emphasized by the Minister of Social Security and Labor of the Republic of Lithuania in the order no. A1-612 of 5 November, approving Child Welfare action plan for 2019-2021, the purpose of which is to create a system of services and measures ensuring the welfare of the child, which would create favorable conditions for the child to grow up in a safe family environment and receive the necessary complex (social, legal, medical or other) services and assistance. The aim of this plan is to create preconditions for the child to grow up in a biological family, to increase the availability of preventive comprehensive services for the child and his / her biological family in crisis situations or victims of violence, and for a child deprived of parental care - by creating appropriate care or adoption conditions, which meet the best interests of the child and the need to grow up in a family environment or in the environment close to the family, to be properly prepared for independent living in the family and society. It should be noted that in order to ensure the child's right to grow up in a family, the activities of children's day centers were developed in municipalities, providing non-residential day care services for children growing up in families at social risk. This document states that since 2017 outpatient day care services are provided to all children, without excluding children at social risk.

The Caritas Lithuania Child and Other Vulnerable Persons Protection Policy Document No.1 approved by the Caritas Council of Lithuania meeting on 28 August, 2019 came into force on 01-01-2020. This document is still being improved and will be used in the structure of Caritas Lithuania, working with vulnerable groups of the society and ensuring their safety, as well as protecting Caritas employees from unjustified discredit. New staff, volunteers and trainees must be familiar with the Child and Vulnerable Protection Policy and the Code of Conduct within 5 working days and start working by signing the Caritas Protection Policy documents, noting that they are familiar with and committed to protection and moral standards. Caritas staff and volunteers are expected to contribute to the creation of a harmonious work environment based on team spirit, mutual respect and understanding.

Caritas Lithuania "Child and Other Vulnerable Persons Protection Policy" is based on the fundamental principles of how everyone has the right to be protected from violence and exploitation, the right to full development, the diversity of each person is accepted and he/she must be able to express himself or herself, workers have a responsibility to promote and nurture the care and protection of vulnerable people.

Eidukeviciute (2019) emphasizes that social workers working in children's day centers, as institutions operating in the community responsible for the protection of the child's well-being, balance between child protection and family support. Children's day centers aim to provide the family with services that enable the family to ensure the child's well-being, to avoid the dismantling of the family as a unit and the transfer of children to the care system, and these services are implemented by social workers working in the centers. The main goal of social workers is to enable the family to change. Therefore, the relationship of adult family members becomes an essential goal for the professional care provider.

According to Dromantiene, Indrasiene and Sadauskas (2016), a social worker must be able to successfully organize the social work process with the client, identifying and assessing social needs and social problems, and this requires constant improvement. This is also emphasized by O'Reilly and Dolan (2016), who argue that professional development in a social worker can effectively help their clients build mutually meaningful and problem-solving relationships. Wilkins and Whittaker (2018) note that the successful implementation of social work with a child and family can be hindered by three main factors: inadequate preparation of the social worker, underestimation of the child's complex situation and non-involvement of parents in the child support process.

In order to help the whole family, children's day centers, according to Ansari and Gershoff (2016), implement a two-generation activity model in which activities are organized for children and their parents. Parental participation in children's day centers is usually implemented in two ways - parental participation in parenting skills development activities or positive parenting programs organized by CDC and volunteering. Parenting skills development activities in children's day care centers focus mainly on managing the correction of child misconduct and

finding forms of nonviolent parenting. Physical violence as a means of punishing a child is often common in families attending children's day centers, which is why children's day centers focus on finding positive parenting tools. According to the researchers, parenting programs are effective when participants are offered the widest possible range of knowledge with practical tasks, help parents discover and exploit the strengths of communication with the child, do not distract the participant from additional services and engage in meetings as much as possible. According to Wilkins and Whittaker (2018), equal participation of parents and children in activities organized by the CDC is seen as a central axis of social work with the family. According to Burvyte and Gudzinskiene (2018), the help provided by social workers to parents must be diverse, intelligent, complex, based on intelligent education and integrating different disciplines, such as psychology, management, sociology, economics and human development.

According to Liepinskiate and Motieciene (2017), one of the key aspects related to the participation of parents in the activities of the center increases the empowerment of parents to solve problems in the family independently. Empowerment is an extremely widely used concept in the social work scientific literature and is associated with the provision of the necessary tools, methods, knowledge and skills to enable a person to deal independently with the problems that lead to specialist help.

Cojocar, Alexandra, and Delia (2015) emphasize that children whose parents participate in CDCs activities change habits of misbehavior more quickly and successfully, and more easily adopt positive forms of emotional expression. Researchers Ansari and Gershoff (2016) note that the educational outcomes of these children improve faster than those of children whose parents do not participate in CDC activities. Parental involvement in the education of children has a positive effect not only on learning achievements, but also on children's future prospects, mental health and social relationships with others. According to Wang (2016), parents' willingness to participate in center activities may be inhibited by negative experiences of such participation, if activities require too much time, energy and involvement of parents, they will tend to avoid active involvement in CDC activities in the future.

In summary, parental involvement in Children's Day Centers activity is crucial for parents, children and professionals working at the center. The benefits to parents are usually associated with improved parenting skills and a wide range of knowledge required in the child's upbringing process and enhanced interrelationships with the child. Parental involvement in CDC activities is a slow process that can be very difficult to start, but once they feel the benefits, parents are willing to spend their free time with their offspring and build harmonious relationships, and social workers have a better understanding of the child's cultural, social environment and home education. It can be said that specialists, acquainted with the child's parents, can better respond to the child's needs and interests, thus ensuring the effectiveness of social work activities, but the incompatibility of the agenda with parents becomes an obstacle for them to participate in the Children's day center.

Research of Social Workers' Opinion on the Importance of Parents' Participation in the Activities of the Children's Day Center

The qualitative research method chosen for the research is a semi-structural interview, which allows getting closer to the perception of people's experiences, the definition of the situation, and the interpretation of reality. The obtained data provide detailed information about the object of the research, which can be clarified by asking additional questions to the research participants. The data obtained during the research are analyzed using content analysis.

The research involved 7 social workers working in Catholic Children's Day Centers Lina, Rasa, Ruta, Daiva and Milda working in the town's Children's Day Center, and Aiste and Vilma in the rural Children's Day Center (the names of the study participants were changed). The activities of these centers are closely related, they carry out various project activities together, constantly cooperate and collaborate. These centers are run by the same person.

The research was conducted in March-April 2020, based on the principles of research ethics: the participants were introduced to the purpose of the research, the method of data collection, and their anonymity and confidentiality were ensured.

Analyzing the answers provided by CDC specialists to the question of what services this organization provides, the category CDC services and 6 subcategories were distinguished (see Table 1).

Services provided by Children's Day Center

Category	Subcategory	Confirmatory statements
Services provided	Sociocultural services	... <i>"We participate in a museum where clay molding lessons are held, we go to a stud farm, in summer, we camp in a rural tourism homestead"...</i> (Rasa)... <i>"We play games, conduct educational classes that teach creativity and ingenuity..."</i> (Ruta)... <i>"children go on tourist trips and journeys together with their parents ..."</i> (Milda)... <i>"Once a week we participate in Holy Mass ,organize various celebrations..."</i> (Daiva)... <i>"Celebrating the holidays, making decorations, parents are also involved in this activity, we watch movies"...</i> (Lina).
	Homework preparation	... <i>"Children prepare lessons"...</i> (Rasa, Milda)..., there is a particular need for assistance for young children"...(Vilma)... <i>"Children are in great need of help with lessons, many of them have learning difficulties"...</i> (Aiste)
	Development of social skills	... <i>"They are taught to behave politely, participating in the events and various activities they get acquainted with the environment and broaden their horizon"...</i> (Lina)... <i>"Social skills development is very purposeful during summer camps, we have been camping in a rural tourism homestead for several years"...</i> (Rasa)... <i>"Through various games, social skills are learned, how to behave beautifully at the table, dress up, and so on."...</i> (Aiste).
	Counseling	... <i>"Parenting training is organized, psychologist and medical consultations are provided for children and parents"...</i> (Rasa, Lina) ... <i>"There is regular individual and group counseling for children and parents, which helps to get to know themselves better, parents are counseled on various issues by various specialists"...</i> (Ruta)..., <i>"We provide consultations to parents on the issues of raising and caring for children, there is no psychologist in the village, although parents are very eager for these services."...</i> (Aiste).
	Development of working skills	... <i>"Children prepare food, serve a table, wash dishes, tidy the premises"...</i> (Ruta)..., In the village, children manage the environment, plant flowers in summer, rake leaves in autumn, and snow in winter"...(Aiste)... <i>"We run a weekly session "Sweet Workshops", during which children make sweets"...</i> (Vilma).
	Catering	... <i>"Children receive free meals"...</i> (Lina, Daiva, Milda, Aiste)... <i>"Children receive food rations at home, and parents provide food before the annual holidays"...</i> (Rasa)... <i>"we provide food for low-income families"...</i> (Daiva)... <i>"Children receive free meals and have the opportunity to bring food home daily"...</i> (Ruta).

The obtained data allow stating that the services provided in both urban and rural areas are similar: preparation of lessons, development of social skills, free meals, trips, camps, consultations for parents and children. Daiva emphasized the participation of children in Holy Mass, as most children prepare for First Communion. Aiste and Vilma emphasized that the consultation of a psychologist is not provided in the rural children's day center, although it is very necessary for parents as well as children. Children in rural areas, due to lack of funds for excursions, have the opportunity to go only once a year. It can be said that the range of services offered in the Day center operating in town is larger and more diverse, as it employs more social workers, volunteers who can provide a wider range of activities, have more opportunities to go on excursions. In a rural area, limited access to the town makes it more difficult for families to get psychological counseling and staff has to organize and take children and parents to a psychologist. The workers try to consult parents and answer their questions.

Social workers told about the children's favorite and disliked activities at the CDC. According to social workers, children living in both rural and urban areas prefer more active activities such as excursions, camps, games, celebrations that give self-confidence, develop communication skills, understanding, friendliness, and a stronger sense of respect. During excursions and trips, children's behavior changes, they try to behave politely, their sense of respect grows, and they learn creativity, organization and decision-making skills. However, the results of the research revealed that children do not want to prepare homework, read books because it requires concentration, book evaluation, learn hygiene skills, participate in St. Mass and First Communion lessons.

Social workers constantly try to keep in touch with parents, communicate on the phone, through social networks, encourage participation in activities, and share information. Building sincere relationships, understanding, provides an opportunity to gain the trust of parents and

thus enable them to participate in activities. Milda emphasized that parents are most motivated to participate in the activities of the CDC by getting food support. According to Ruta, motivation and personal invitation also increase motivation. Daiva stressed the importance of accepting parents without being condemned and immortalized.

Having inquired about the activities in which parents usually participate in, the category Activities for Parents was distinguished and the six important subcategories are events, meetings, handicrafts, parenting skills training, volunteering, individual consultations (see table 2).

Parents participation in Children's Day Center activities

Table 2

Category	Subcategory	Confirmatory statements
Activities for parents	Events	... <i>"Mostly parents participate in festive events such as Christmas, Easter"...</i> (Rasa, Lina)... <i>"We went on a hike with Nordic sticks, parents were willing to participate"...</i> (Ruta)... <i>"On artistic creative afternoons we produce decorations before festivities in which children participate with their parents" ...</i> (Aiste, Vilma).
	Meetings	... <i>"Parents come to meet with doctors, representatives from employment services, a number of parents participate in a lecture about family budget"...</i> (Ruta)... <i>"Parents participate in conversations with a psychologist"...</i> (Daiva)... <i>"There are no many meetings with various specialists in the village, so we take parents to the Day center in town"...</i> (Aiste, Vilma)... <i>"Meeting with clergy take place before Christmas and Easter"...</i> (Lina).
	Handicrafts	... <i>"There are moms who like handicrafts, they knit, braid bracelets, make various things from beads, this activity is especially liked"...</i> (Milda)... <i>"Moms enjoy attending decoupage classes"...</i> (Daiva)... <i>"We went from the village to town to attend decoupage, painting on water classes, mothers liked them very much" ...</i> (Aiste, Vilma).
	Parental skills training	... <i>"Few parents wish to participate in parenting skills courses"...</i> (Lina, Ruta)... <i>"Parents prefer individual conversations about childcare, they do not want participate in group classes"...</i> (Daiva).
	Volunteering	... <i>"They participate very actively in Maistobankas campaigns"...</i> (Ruta, Lina, Daiva, Milda)... <i>" Many mothers volunteer in charity canteen"...</i> (Rasa)... <i>"In the country parents unwillingly contribute with their work, when we ask to help only mother comes"...</i> (Aistem).
	Individual consultations	... <i>"Parents want to talk, they want to be heard, mothers like to talk most"...</i> (Lina)... <i>"Parents trust us, ask for advice on various issues"...</i> (Daiva)... <i>in the country parents really need a psychologist's consultations, we don't have them, so take them to town"...</i> (Aiste).

In summary, it can be said that mothers are more involved in activities, and some discover their favorite activities and are willing to get involved. There are parents who enjoy sports; mothers are involved in handicraft activities. Some willingly participate in Maistobankas campaigns, meetings with various specialists, festive events. Rasa emphasized the mothers 'active volunteering in the charity canteen. Social workers working in rural areas emphasized the need for individual counseling. However, according to all social workers, very few parents want to participate in parenting skills training.

The social workers involved in the research expressed their views on the benefits of parental participation in the activities of the CDC for themselves and their children (see Table 3).

Importance of parents' participation in activities

Table 3

Category	Subcategory	Confirmatory statements
Importance of participation in activities	Social skills training	... <i>"They learn to cope with domestic chore tasks"...</i> (Daiva.)... <i>"The understanding about personal hygiene and dressing style is changing" ...</i> (Ruta) ... <i>"they start to better understand how to handle the financial affairs of the family"...</i> (Milda). <i>"They learn to cook"...</i> (Vilma)

Category	Subcategory	Confirmatory statements
	Parental skills	... <i>"Parents learn to understand their children and recognize feelings" ... (Daiva)... "they learn how to raise children without punishments and how to talk nicely with them"... (Aiste). "They start to notice their talents of their children, because they often do not know what their children are capable of"... (Lina).</i>
	Communication	... <i>"They learn to resolve the conflicts peacefully"... (Ruta) ...,"they acquire new communication skills, their speaking style is changing, they use less swear words"... (Daiva)... "They have more self-confidence"... (Aiste)... "There is an opportunity to spend time in another environment and share the experience and acquire new communication skills"... (Vilma).</i>
	New interests	... <i>"They learn to cook a variety of dishes"... (Milda). ... "While volunteering they acquire new knowledge"... (Rasa)... "By participating in artistic activities they have an opportunity to make decorations for their homes and themselves... (Aiste, Vilma).</i>
	Values	... <i>"The feeling of respect grows stronger"... (Rasa)... "They strive to change the lifestyle"... (Lina) ... "The responsibility for family is growing"... (Milda) ...,"During pastoral classes some parent change their lifestyle"... (Daiva).</i>

The results of the research revealed that parents' participation with their children in the CDC provides them with an opportunity to get to know their children better, spend time creatively in other environment, discover new hobbies, improve work skills, learn to change themselves and change lifestyle. According to the social workers, the participation of parents in the activities of the CDC is beneficial for the parents themselves because it provides an opportunity to change the value attitude towards the family, they can realize themselves. There are fewer cultural events in the rural areas, so the CDC is a place where parents can learn about novelties and have a good time.

Social workers need to make a significant effort to reach the change by collaborating and building relationships with parents. Problems often arise due to lack of parental motivation, lack of responsibility, unwillingness to cooperate and accept help, lack of awareness of one's responsibility for children, unwillingness to change lifestyle by giving up harmful habits, distrust of social workers. Sincere communication, understanding in the provision of various services gives positive results, but change is achieved through long and hard work, which provides peace of mind, helps to learn appropriate behavior and not to be socially excluded.

Conclusions

The Children's Day Center is an institution that provides services to children living in families with difficulties. The goal of the Children's Day Center is to encourage a child to feel a full member of society, to develop his / her self-expression, and to expand a child's cognitive and creative horizons.

In order to improve and normalize the relationship with the social environment, children's day centers organize leisure activities, lessons, free meals, and development of social and hygiene skills.

The research revealed that social workers in children's day care centers provide various services to children and their parents, such as socio-cultural, lesson preparation, social skills development, individual and group counseling, work skills development, and free meals. The most popular activities of children are excursions, camps, table games, watching movies, sports games, celebrating holidays as well as art classes. Children are reluctant to take part in homework assignments preparation, reading books, handicrafts, and pastoral care and hygiene skills.

According to social workers, parental participation in the activity of Children's day centers is very important, as their values change, new and improved social skills are acquired, communication and creative skills are revealed, material difficulties are learned, responsibility for one's children and family is strengthened. Some parents actively participate in events, meetings, handicraft classes, volunteering, individual consultations, but most parents do not want parenting skills training.

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Received: 15 December 2020

Accepted: 31 May 2021

ACTIONS TO ENSURE PERSONAL DATA PROTECTION IN A BUSINESS ENTERPRISE

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Annotation

The General Data Protection Regulation is related to fundamental changes in business enterprises as they need to radically rethink how to process customers' personal data. The following principles of personal data protection have been established: the principle of lawfulness, fairness and transparency; purpose limitation in data handling; the data minimisation principle; the principle of periodicity; the principle of storage limitation; the principle of integrity and confidentiality; and the principle of responsibility. The study revealed problem areas in the implementation of the personal data protection policy in the business enterprise: ensuring management of access to personal data; informing individuals about the nature of the use of their personal data; and development of a description of the procedure for rules on a new consent to the use of personal data. Hiring external experts and leader support in implementing the personal data policy in the organization are to be assessed as the enterprise's weaknesses.

Keywords: General Data Protection Regulation, personal data protection, business enterprise, implementation, problem areas.

Introduction

Relevance and novelty of the topic. The concept "personal data" defines a significant area of application of data protection, which, although is broad, according to W. G. Voss (2016), still needs to be further expanded and applied exponentially due to the growing diversity of situations. This is so because opportunities are created for developing countries to interpret this concept and summarize data themselves, which also means progress in data analysis. According to D. Barnard-Wills (2017), as our environment is rapidly approaching what some call "onlife," where everyday existence is mediated by information technologies, everything in this environment is increasingly "assessed", and literally any data are likely to be personal. The above-mentioned context presupposes the idea of the following fundamental changes related to the field of personal data protection (de Hert, Papakonstantinou, 2016):

- The difference between reality and virtuality;
- Reduction of differences between the man, machine and nature;
- Information lag ranging from the lack of information to abundance of information;
- Transition from separate objects, properties to binary preference relationships, preference to interaction, processes, and networks.

It is noted that the EU data protection law can become an "overall law" aimed at ensuring the highest level of legal protection in all circumstances, but according to Rodrigues et al. (2016), it is practically impossible to comply with it; therefore, personal rights are ignored or discredited, they are abused. Many scholars (Petraitytė, 2011; de Hert, Papakonstantinou, 2012, 2016; Štitalis, 2014; Civilka, Šlapimaitė, 2015; Voss, 2016; Zaleskis, 2017; Purtova, 2018) analysing personal data protection issues criticized the concept of personal data as far too broad.

It becomes clear that most attention is drawn to one element of the concept of personal data – determining the person's identity on the basis of corresponding direction of technological development; i.e., re-identification and de-anonymization algorithms. However, N. Purtova (2018) notes that conducted research shows that, given technological advances in data processing and the amount of data to be analysed, absolute and irreversible anonymity no longer exist. The above-mentioned author draws attention to the difference between identifiable and unrecognizable information. N. Purtova (2018) proposes to keep personal data (or information for determining personal identity) as a security threshold grounded on zero identification risk when the risk of identification is associated with a different degree of information processing. It should be underlined that the above-mentioned author does not distinguish another problem area related to protection of personal data: the concept of personal

data is not limited to simple identification because another essential element of the concept of personal data is related to personal information.

In the age of the Internet of things, data transfer, advanced data analyses, and data management in decision-making determine that any information is related to the person, as defined in the EU data protection law (Barnard-Wills, 2017). From the data protection perspective, it can be seen that all data can affect people; therefore, all data must have some protection against possible negative effect. Based on the said context, it can be stated that it is the novelty of the General Data Protection Regulation (GDPR) that determines the relevance of this topic.

Topic issues. According to G. Miglicco (2018), the GDPR is associated with fundamental changes in business enterprises because they need to rethink fundamentally how they intend to handle customers' personal data. R. Kucęba and G. Chmielarz (2018) emphasize the issues of information and personal data security management in organizations and accentuate the need to analyse personal data security breaches in organizations as an important factor determining the necessity of improving previously applied solutions in this field. In addition, it is important to assess the level of organisational preparedness in the field of personal data protection, seeking to ensure compliance with the General Data Protection Regulation (GDPR) that has entered into force.

Based on the said context, the following **problem questions** can be raised: How business enterprises are able to secure personal data protection implementing the essential provisions of data protection policy? What changes have been undertaken in the business enterprise in the field of personal data protection? What problem areas have been disclosed applying personal data protection in business enterprises?

Exploration of the topic. Theoretical and practical problems of personal data protection are thoroughly analysed in various aspects by Lithuanian and foreign researchers. E. Žiobienė (2002, 2005) raises the issue of privacy protection enshrined in the Constitution of the Republic of Lithuania, revealing differences in the dissemination of information about public and private persons, emphasizes relevant problems of protection of the constitutional right to privacy. I. Petraitytė (2011) reveals the fundamental ideas of legal regulation of Lithuanian personal data protection, shows the link between this field of legal regulation and the person's natural right to privacy (its inviolability, protection) as well as the influence of this link on the system, content and development of legal provisions on personal data protection. D. Štivilis (2014) discusses the current situation and problems of the electronic health record and legal environment in the context of personal data protection. M. Civilka and L. Šlapimaitė (2015) reveal the constantly changing conception of personal data in the electronic space. Analysing the essential components of the concept of personal data, these authors criticize the conception enshrined in the Directive 1995/46/EC of the European Parliament and of the Council on protection of individuals with regard to personal data processing and on free movement of such data, critically analyse the recommendation on the concept of personal data adopted by the Article 29 Data Protection Working Party on June 20, 2007. E. Jarašiūnas (2017) draws attention to the topics of the Charter of Fundamental Rights of the European Union in the jurisprudence of the Court of Justice. J. Zaleskis (2017) defines the framework for the activities of the Data Protection Officer under the EU General Data Protection Regulation.

E. Mraznica (2017) contemporises the issue of harmonization of personal data protection at the EU level, emphasizing the necessity to control management of personal data and ensure greater risk management in this field. M. Goddard (2017) notes the impact of the GDPR on a global scale. N. Purtova (2018) accentuates the broad field of the concept of personal data, emphasizing flexibility, adaptability, and uncertainty of this concept. M. Jaszal (2018) addresses the problem of reducing the risk of the role of internal audit, which is related to personal data protection in implementing the GDPR. A comparative analysis performed by B. Custers et al. (2018) revealed the presence of significant differences in the way the Member States of the EU implemented personal data protection at the levels of national laws, policies, and practices. R. Kucęba et al. (2018) analyse personal data security breaches in organizations as an important factor determining the necessity of improving previously applied decisions in this field. S. Xander et al. (2018) raise the question of the links between confidentiality management and the GDPR: What steps were taken by the organizations in Europe to adapt to new privacy rules?

The object of the research: protection of personal data in the business enterprise.

The aim of the research: to analyse actions undertaken by the business enterprise in fulfilling the requirements for protection of personal data.

Research objectives:

1. To establish the principles of personal data protection;

2. To investigate how personal data protection is implemented in the business enterprise;

3. To highlight problem areas in implementing the personal data protection policy in the business enterprise.

Research methods:

1. Theoretical analysis. The analysis of the scientific literature on personal data protection.

2. The quantitative research. A questionnaire survey of employees of the business enterprise was conducted in order to determine how protection of personal data is implemented in the specific organization.

Literature Review

Advantages of General Data Protection application. The EU Parliament adopted the General Data Protection Regulation (GDPR), which substantially changed the Data Protection Directive valid until then, adopted in 1995. These rules apply to all organizations and enterprises whose activities are related to the EU customers, regardless of their geographical location. According to "Legaltch News", legislation defines new data and privacy rights for the EU consumers, regulates and transmits as well as handles the EU data, seeking stricter implementation of data management by punishing organizations for non-compliance with the rules provided by the GDPR (EU Approves GDPR, 2016).

The GDPR is intended for changing national laws of the Member States of the EU; there will be only one central supervisory institution to monitor access to the EU data. The EU maintains that such standardization will save 2.3 billion euros.

The following advantages of the GDPR are provided (EU Approves GDPR, 2016):

- Gives the EU citizens the right to be forgotten, which means that data controllers, data processors and third parties must delete the EU citizen's personal data online at his or her request, unless there are legitimate reasons to keep such information (historical, statistical, public health, scientific need, the right to freedom of expression or legal or contractual obligations);

- Clear and positive consent is required; e.g., the EU citizen indicates on the website that he or she agrees that his or her personal data are stored or processed;

- Provides the right to EU citizens to transfer data; e.g., allows the exchange of personal data between service providers as information from one e-mail provider to another;

- Demands that the EU enterprises and providers inform their representatives of national supervisory service about significant data management breaches more rapidly;

- Limits the use of profiling that collects personal information to predict the person's behaviour without his/her consent;

- Parental consent is required for children aged 13-16 to create an account on the social media.

General Data Protection Regulations. A new Directive of the EU on handling of cross-border cooperation data as well as on processing of criminal and judicial investigations was adopted along with the GDPR. The Directive lays down minimum standards for handling of data related to the rights of EU citizens and to criminal or judicial nature limitations of data transfer and allows for cooperation between law enforcement agencies of Member States.

According to M. Jaształ (2018), every business organization must implement the new regulation, which will be the basis for handling personal data of EU residents. Any entity can be prosecuted and punished for violating the provisions of the GDPR in every Member State of the EU if personal data have been breached. M. Jaształ (2018) draws attention to the established rules that the data controller should follow each time when processing personal data. The following rules are distinguished:

1. The principle of lawfulness, fairness and transparency, related to the obligation to apply general and national legal provisions in the field of data processing to the person to whom this is related.

2. Purpose limitation in data handling, which means that the collection of data should take place only for specific, explicit and legitimate purposes, except for the prohibition on further processing of data for archival, public, scientific, statistical, and historical purposes.

3. The data minimisation principle related to limitation of data collection; i.e., personal data will be accumulated to the extent that is necessary to achieve the purposes for which they are processed.

4. The principle of periodicity, according to which it is required that the data are accurate, updated and incorrect data are removed or corrected.

5. The principle of storage limitation, according to which the possibility of identification would appear only for that period which is exactly needed.

6. The principle of integrity and confidentiality, related to the obligation to keep personal data protected, in particular against unauthorized persons or their unlawful processing.

7. The principle of responsibility, which defines the responsibility of the data controller for personal data processing in accordance with the provided rules.

Methodology of Personal Data Protection regulation implementation. It is maintained that personal data is any information about the identified or identifiable natural person. An identifiable person is the one whose identity can be established directly or indirectly, in particular by indicating the identity number or one or several specific factors that describe the person's physical, physiological, mental, economic, cultural or social characteristics. Information that allows the person's identification is not taken into account if this requires excessive costs, time or activity. Organizational entities operating in the legal and economic space must perform their tasks reliably, legally, purposefully, economically, publicly and efficiently. The enforcement mechanisms described above are related to all areas of activity, including the activity-related territory, in processing personal data. Tasks need to be performed properly, seeking to ensure appropriate and efficient mechanisms granting the rights and the limits of responsibility in performing tasks, following established rules, and properly supervising data as well as seeking to ensure efficient data protection (Goddard, 2017).

The said context reveals that the most appropriate method for acting objectively and independently in the above-mentioned activity areas is an internal audit investigation. Although, according to E. Mraznica (2017), for many years the internal audit investigation was attributed to the economic sector to familiarize the enterprise's board members, the head of the finance department with the obtained findings so that the latter know in advance what to do in case of at least the least risk. However, it must be emphasized that risk reduction is necessary not only in the economic sector but also in the field of personal data processing in order to prevent breaches and fraud cases in this area. Therefore, it can be stated that the organization also needs professional staff who can control the activities related to personal data processing, including the risks in this field (de Hert, Papakonstantinou, 2016).

The following advantages of the GDPR have been distinguished: it gives EU citizens the right to be forgotten; clear and positive consent is required; gives EU citizens the right to transfer data; requires to inform about important data management breaches more rapidly; restricts the use of profiling. The following principles of personal data protection have been established: the principle of lawfulness, fairness and transparency; purpose limitation in data handling; the data minimisation principle; the principle of periodicity; the principle of storage limitation; the principle of integrity and confidentiality; and the principle of responsibility.

Methodology

To conduct the empirical research, the research aim was raised: to identify the actions that the business enterprise performs in implementing personal data protection. It was sought to determine actions taken by the business enterprise in planning to move to personal data protection under the new Regulation (GDPR) as well as to identify problem areas encountered by the business enterprise in the field of personal data protection. Based on this context, it was decided to investigate how personal data protection was implemented from the standpoint of business enterprise's employees. In the theoretical part of the research, after analysing the scientific literature that is closely related to the topics under investigation, it was decided to conduct a case study by selecting a Lithuanian business enterprise.

In the opinion of K. Kardelis (2016), one of the most important requirements for sampling is the representativeness of the sample, which correctly reflects the proportions of possible values of the studied feature in the population. In this case, the sample of interview participants was formed on the basis of the research aim and on the criteria provided for the participants (Rupšienė, 2007; Bitinas et al., 2008); i.e., their purposeful sampling was applied.

Respondents were selected for the questionnaire survey using the purposeful sampling method because the following respective respondents' selection criteria were developed prior to conducting this survey:

- The employee must be employed by the enterprise for at least 1 year;
- The employee's position must be related to management and/or implementation of personal data protection;
- Employees must by their will and voluntarily agree to complete the questionnaire;
- Employees who have agreed to participate in the questionnaire survey must fully complete the questionnaire checklist.

According to the data of January 1, 2020, the business enterprise has 106 employees. Based on respondents' sampling criteria to conduct the questionnaire survey, 63 employees of this enterprise were selected, for whom the prepared survey questionnaires were provided. 56 questionnaires were selected for the analysis of the research data as not all questionnaires

were fully completed and were assessed as damaged and unsuitable for further processing. It can be stated that the return rate of the questionnaires is almost 100 per cent; therefore, the survey data can be treated as reliable and representative. A quantitative study was conducted on October 19-27, 2020. The analysis of the written survey data was performed by calculating the means of respondents' opinions and applying the method of descriptive statistics.

The questions of the survey questionnaire were designed based on the Likert scale, seeking to measure and determine the extent to which the respondent agrees or disagrees with the presented statements or other indicators defining the phenomenon or process. The answers to the statements in both questionnaires ranged from "strongly agree" (5 points) to "strongly disagree" (1 point). Respondents had to choose one answer and mark it with the symbol "X". The formulated questions in the questionnaire are presented in a certain order. Respondents were asked a total of 8 questions (6 closed-ended questions and 2 open-ended questions). The groups of questions in the compiled research questionnaire were divided into 4 groups.

Conducting the empirical research, the requirements for research ethics were followed. Therefore, in order not to violate the ethics of social research, prior to conducting the interview with the manager of the enterprise and questionnaire surveys of employees, their oral consent was obtained and the possibility of conducting the research was discussed with them during the information meeting. The aims and objectives of the research were clearly and comprehensibly explained to the enterprise's manager and employees, and they were asked to participate in the study. The principles of voluntary participation in the study and anonymity as well as the possibility of self-determination to refuse to participate in the research or to withdraw from it were emphasized to the subjects.

It is assumed that the obtained research results can be applied in other Lithuanian business enterprises due to similarities in managing personal data protection processes.

Results

The aim of this empirical research is to identify the actions the organization undertook in planning the transition to personal data protection under the new Regulation (GDPR). Primarily, it was sought to identify actions related to the analysis of the situation of privacy measures; therefore, respondents had to evaluate the actions of their organization, related to application of privacy measures, undertaken to ensure personal data protection (see Table 1).

Table 1
Actions related to the application of privacy measures, undertaken in the business enterprise, seeking to ensure personal data protection

Statement	Criterion	Strongly agree	Partially agree	Neither agree nor disagree	Partially disagree	Strongly disagree
A personal data processing and review system has been developed		54%	19%	11%	11%	5%
An analysis of gaps in personal data protection has been performed		44%	31%	21%	4%	0%
Personal Data Protection Impact Assessment (DPIA) has been performed		28%	17%	44%	0%	11%
Risk assessment in the field of personal data protection has been carried out		51%	22%	17%	5%	5%
The level of implementation maturity in the field of personal data protection has been identified		32%	27%	43%	0%	0%

As it can be seen from the data given in Table 1, many employees of the business enterprise maintain that the following three steps related to application of privacy measures, undertaken in this business enterprise in order to ensure personal data protection, are the most important:

1. Development of the personal data processing and review system;
2. Performance of risk assessment in the field of personal data protection;
3. Performance of the analysis of gaps in personal data protection.

The analysis of the research data has shown that more than a third of enterprise's employees who took part in the research (44 per cent and 43 per cent respectively) did not have the opinion on the enterprise's actions such as performance of the Personal Data Protection Impact Assessment (DPIA) and identification of the maturity level of implementation in the field of personal data protection, which are related to application of privacy measures, undertaken by the business enterprise, seeking to ensure the protection of personal data. In addition, it has

been found that a share of respondents (11 per cent) strongly disagree with the statement that the Personal Data Protection Impact Assessment (DPIA) was carried out in this enterprise.

In summary, it can be stated that seeking to ensure the protection of personal data, the business enterprise paid most attention to the process of development of the personal data processing and review system; risk assessment in the field of personal data protection was carried out, and gaps in the personal data protection system were addressed. However, this enterprise did not pay enough attention to other areas that were also closely related to application of privacy measures, seeking to ensure protection of personal data: no Personal Data Protection Impact Assessment (DPIA) was performed and the maturity level of implementation in the field of personal data protection was not identified.

This leads to the conclusion that the business enterprise has only undertaken partial actions related to application of privacy measures, seeking to ensure personal data protection. Therefore, it should be assumed that this enterprise underestimated the importance of the field of personal data protection in its activities and did not purify a clear concept of personal data protection, which would be understood by all employees of this enterprise.

This study also addressed the actions of the business enterprise, related to the enterprise's adaptation to the new requirements for processing personal data. During this empirical research, respondents had to evaluate the actions undertaken by the organization, seeking to adapt to the new requirements for processing personal data (see Table 2).

Table 2

Actions undertaken by the business enterprise, seeking to adapt to the new requirements for processing personal data

Statement \ Criterion	Strongly agree	Partially agree	Neither agree nor disagree	Partially disagree	Strongly disagree
Security of address data	57%	28%	5%	5%	5%
Data leakage from the EU has been prevented	33%	28%	17%	11%	11%
Transfer of address data	44%	34%	17%	0%	5%
Use of anonymous data	22%	40%	22%	5%	11%
Purpose limitation of address data	49%	17%	18%	11%	5%

The analysis of the research data has shown that most of the employees of the business enterprise, who participated in this empirical research, distinguish three specific actions that were undertaken in the business enterprise, seeking to adapt to the new requirements for personal data processing:

1. Security of address data;
2. Transfer of address data;
3. Purpose limitation of address data

Analysing respondents' answers to this question, it was identified that more than a third of them (40 per cent) only partially agreed that actions such as the use of anonymous data had been undertaken in their enterprise in order to adapt to the new requirements for processing personal data. It should be emphasized that 11 per cent of research participants even strongly disagreed with the statement that the business enterprise used anonymous data. The same number of enterprise's employees (11 per cent) also strongly disagreed with the fact that the enterprise had prevented data leakage from the EU. Only a third of respondents (33 per cent) strongly agreed with this statement that the enterprise had prevented data leakage from the EU; 28 per cent of the enterprise's employees partially agreed with this.

In summary, it can be stated that seeking to adapt to the new requirements for personal data processing, the business enterprise has prioritized actions that are related to security of address data, transfer of address data, and purpose limitation of address data. It was found that this enterprise had not paid enough attention to the actions related to the use of anonymous data and prevention of data leakage from the EU.

It can be concluded that the business enterprise only partially adapted to the new personal data processing requirements as the enterprise's actions related to adaptation to the new personal data processing requirements do not encompass all areas relevant to personal data processing under new personal data protection requirements. Based on the said context, the following assumption can be made: seeking to adapt to new requirements for personal data processing, the business enterprise became more focused on the field of address data and underestimated the importance of the use of anonymous data and prevention of data leakage from the EU.

This study also sought to identify actions related to the development and improvement of the personal data protection management and control system. Respondents had to evaluate the actions of the business enterprise, related to the development and improvement of the personal data protection management and control system (see Table 3).

Table 3

Actions related to the development and improvement of the personal data protection management and control system in the business enterprise

Statement \ Criterion	Strongly agree	Partially agree	Neither agree nor disagree	Partially disagree	Strongly disagree
Improvement of the privacy policy	46%	38%	11%	0%	5%
Implementation of privacy by activity area	17%	61%	17%	0%	5%
Introduction of privacy by default	51%	27%	8%	4%	0%
Improvement of the security policy	54%	28%	18%	0%	0%
Planning of GDPR implementation	17%	5%	73%	0%	5%
Improvement of outsourcing contracts	29%	17%	21%	11%	22%
Improvement of data log management	47%	24%	12%	17%	0%
Improvement of the continuity plan	54%	28%	13%	5%	0%
Development of Binding Corporate Rules	22%	45%	28%	5%	0%
Training of employees to work with personal data	48%	33%	19%	0%	0%

As it can be seen from the data presented in Table 3, more than a half of respondents (respectively 54 per cent for each statement) emphasize the improvement of the security policy and the improvement of the continuity plan as those fundamental actions that are related to the development and improvement of the personal data protection management and control system at JSC "Lietuvos žinios". A similar number of research participants (51 per cent) strongly agree that the introduction of privacy by default in this enterprise is also to be attributed to the actions related to the development and improvement of the personal data protection management and control system in the business enterprise.

The analysis of the research data has shown that slightly less than a half of respondents strongly agree that the business enterprise is taking steps to improve its privacy policy and data log management and that employees are trained to work with personal data.

It was found that more than a half of respondents (61 per cent) only partially agreed that privacy implementation actions were carried out in this enterprise according to the activity area. In addition, it showed up that more than a third of respondents (45 per cent) only partially saw the enterprise's actions related to the process of developing Binding Corporate Rules, while almost a third of them (28 per cent) did not even have an opinion about the enterprise's actions in this activity area.

Analysing the research data, it should be noted that the majority of research participants (as many as 71 per cent) do not have an opinion on whether the GDPR implementation process was planned in the business enterprise.

It has been found that a share of respondents either partially or strongly disagree with some of the actions related to the development and improvement of the personal data protection management and control system in this business enterprise. Although nearly half of research participants agreed that the enterprise was improving data log management processes, the research showed that 17 per cent of respondents nevertheless partially disagreed with such statement.

Based on the analysis of research data, respondents assess the improvement of outsourcing contracts in this enterprise more negatively than positively: almost a third of them (22 per cent) do not agree that the business enterprise is improving the process of outsourcing contracts, which is also enhanced by 17 per cent of respondents who state that they partially disagree with the statement that outsourcing contracts are being improved in this enterprise.

In summary, it can be stated that the improvement of the security policy and continuity plan as well as introduction of privacy by default are essential steps that are to be related to the development and improvement of the personal data protection management and control system in this enterprise. It has been found that the actions of improving the privacy policy and data log management are taking place in the business enterprise and that employees are being trained to work with personal data. It was found that most employees did not have an opinion about planning steps for implementation of personal data protection under the new regulation. It showed up that this enterprise had not taken any steps related to improvement of its outsourcing contracts as part of its personal data protection policy.

It can be assumed that implementing the personal data protection policy, the business enterprise did not pay enough attention to one of the most important elements of the enterprise's management – planning the implementation of new requirements for personal data processing. Hence, the development and improvement of the personal data protection management and control system in this business enterprise have weaknesses that need to be eliminated in improving the currently employed data protection management and control system as partially adapted to the new requirements for personal data processing.

Supplementing and broadening the scope of actions related to adaptation to new requirements for personal data processing, it was also sought to find out the actions of this business enterprise, related to internal human resources and external partners in implementing the personal data protection policy (see Table 4).

Table 4

Actions related to internal human resources and external partners in implementing the personal data protection policy in the business enterprise

Statement	Criterion	Strongly agree	Partially agree	Neither agree nor disagree	Partially disagree	Strongly disagree
A Data Protection Officer or a person responsible for implementing the personal data protection policy in the organization has been appointed		43%	29%	18%	0%	0%
Informing the employees about the personal data protection policy and training to work on the basis of it		51%	34%	5%	5%	5%
A team has been assembled, whose work is related to introduction, management, and control of the personal data policy in the organization		17%	45%	22%	0%	16%
Cooperation with external partners in implementing the personal data policy in the organization		53%	31%	11%	0%	5%
Hiring external experts in implementing the personal data policy in the organization		22%	17%	28%	17%	16%
Leader support in implementing the personal data policy in the organization		17%	22%	34%	22%	5%

To find out the actions undertaken by the business enterprise with regard to internal human resources and external partners in implementing the personal data protection policy in this business enterprise, it was identified that half of respondents (51 per cent) distinguished informing the employees about the personal data protection policy and training to work on the basis of it in implementing the personal data protection policy in the area of internal human resources and external partners as well as cooperation with external partners in implementing the personal data policy in the organization, as stated by 53 per cent of respondents. More than a third of respondents (43 per cent) note that this business enterprise has appointed the Data Protection Officer or the person responsible for implementing the personal data protection policy in the business enterprise.

The analysis of the research data has revealed that more than a third of respondents (45 per cent) only partially agree that this business enterprise assembled the team whose work is related to introduction, management and control of the personal data policy in the organization, while 16 per cent of research participants strongly disagree with this distinguished statement. This confirms one of the management functions discussed earlier – planning – as the weakness of this enterprise in implementing the new regulation in the field of personal data protection.

Respondents indicated that this business enterprise had not hired external experts for implementation of the personal data policy in accordance with the requirements set out in the new regulation. Assessing the leader support for the implementation of the personal data policy in the organization, one third of respondents (34 per cent) do not have an opinion about it, and almost a third of them (22 per cent) partially disagree with such statement.

In summary, it can be stated that actions related to internal human resources and external partners in the implementation of the personal data protection policy are particularly prominent in the areas of informing the employees about the personal data protection policy, training to work on the basis of it, and cooperation with external partners. However, it was found that there was no specific team in this business enterprise whose work would have been related to introduction, management and control of the personal data policy in the organization and no external experts were hired to help implement the personal data policy in accordance with the

requirements set out in the new regulation. Assessment at the level of internal human resources revealed that during the implementation of the personal data policy in this business enterprise, employees had missed the leader support in implementing the process of adapting to new requirements for processing personal data in the organization.

In the said context, it can be assumed that the process of adapting to new requirements for personal data processing in the business enterprise was not smooth as the enterprise's management did not assemble the team clearly supported by the leader in the internal management structure, which together with hired external experts would be responsible for smooth process of development and improvement of the personal data protection management and control system.

Supplementing and broadening the scope of analysing the situation of privacy measures, it was also sought to find out what specific actions the enterprise had undertaken in implementing the personal data protection policy (see Table 5).

Table 5

Actions undertaken by the business enterprise in implementing the personal data protection policy

Statement	Criterion	Strongly agree	Partially agree	Neither agree nor disagree	Partially disagree	Strongly disagree
Ensuring control of access to personal data		34%	51%	11%	0%	4%
Ensuring security of personal data		51%	33%	11%	0%	5%
Ensuring accuracy of personal data		41%	54%	0%	0%	5%
Ensuring erasure or forgetting of personal data		45%	22%	17%	11%	5%
Development of a database for processing information related to personal data		34%	28%	28%	5%	5%
Informing individuals about the nature of the use of their personal data		44%	28%	28%	0%	0%
Development of the description of the procedure for rules on a new consent to the use of personal data		34%	34%	22%	5%	5%
Application of precautionary measures, seeking to reduce harm due to potential problems related to personal data protection		22%	39%	34%	0%	5%
Monitoring of the location of physical data		22%	11%	57%	5%	5%

Based on the data presented in Table 5, it can be seen that half of respondents (51 per cent) strongly agree with the statement that security of personal data is ensured in this business enterprise as a key action undertaken by this enterprise in implementing the personal data protection policy. More than a third of respondents note assurance of erasure or forgetting of personal data as well as informing individuals about the nature of the use of their personal data, which should be considered as important steps in the enterprise, implementing the personal data protection policy.

It is observed that half of respondents (51 per cent) partially agree that the personal data access control and accuracy of personal data are ensured in this business enterprise.

It should be accentuated that although more than a third of respondents (39 per cent) partially agrees that this business enterprise applies precautionary measures, seeking to reduce harm due to potential problems related to personal data protection, a similar percentage of research participants (34 per cent), however, has no opinion on this matter.

As to monitoring of the location of physical data, implemented in this business enterprise, it showed up that more than a half of all respondents (57 per cent) cannot answer this question – they do not have an opinion on this area.

To sum up, it can be stated that the business enterprise is able to ensure security of personal data by implementing key provisions of the personal data protection policy, one of which is to ensure erasure or forgetting of personal data and informing the individuals about the nature of their personal data use. However, only partial personal data access control and accuracy of personal data are ensured in this business enterprise. Weaknesses identified in the implementation of the personal data protection policy in this business enterprise are as follows: non-compliance with precautionary measures in order to reduce damage due to potential problems related to personal data protection, absence of monitoring of the location of physical data.

Seeking to further supplement and expand the scope of actions related to adaptation of the business enterprise to new requirements for personal data processing, it is important to

identify problem areas that showed up in implementing the personal data protection policy in this business enterprise (see Table 6).

Table 6

Problem areas that emerged in implementing the personal data protection policy in this business enterprise

Statement	Criterion	Strongly agree	Partially agree	Neither agree nor disagree	Partially disagree	Strongly disagree
Ensuring control of access to personal data		44%	34%	22%	0%	0%
Ensuring security of personal data		5%	39%	34%	0%	22%
Ensuring accuracy of personal data		5%	22%	51%	0%	22%
Ensuring erasure or forgetting of personal data		17%	17%	27%	11%	28%
Development of the database for processing information related to personal data		22%	17%	22%	5%	34%
Informing individuals about the nature of the use of their personal data		45%	22%	22%	11%	0%
Development of the description of the procedure for rules on a new consent to the use of personal data		56%	33%	11%	0%	0%
Application of precautionary measures, seeking to reduce harm due to potential problems related to personal data protection		17%	34%	17%	17%	15%
Monitoring of the location of physical data		22%	5%	40%	22%	11%
Training the employees to work with personal data		22%	5%	17%	39%	17%
Cooperation with external partners in implementing the personal data policy in the organization		11%	11%	17%	50%	11%
Hiring external experts in implementing the personal data policy in the organization		12%	6%	24%	39%	19%
Leader support in implementing the personal data policy in the organization		5%	28%	17%	45%	5%
Appointment of the Data Protection Officer or the person responsible for implementation of the personal data protection policy in the organization		17%	5%	22%	11%	45%
Informing the employees about the personal data protection policy and training to work based on it		11%	17%	28%	16%	28%
Assembling the team whose work is related to introduction, management, and control of the personal data policy in the organization		22%	0%	44%	0%	34%

Based on the analysis of the research data, three problem areas that emerged in implementing the personal data protection policy in this business organization can be identified:

1. Ensuring control of access to personal data;
2. Informing individuals about the nature of the use of their personal data;
3. Development of the description of the procedure for rules on a new consent to use personal data.

It has been found that respondents have no opinion on the areas such as monitoring of the location of physical data and assembling the team whose work is related to introduction, management and control of the personal data policy in the organization. Based on the previous analysis of research data, the latter areas are to be attributed to problem areas, which can be considered as a weakness in this business enterprise.

In respondents' opinion, the following areas of the business enterprise should not be attributed to problem areas in implementing the personal data protection policy in this business organization:

1. Ensuring erasure or forgetting of personal data;
2. Development of the database for processing information related to personal data;
3. Training of employees to work with personal data;
4. Cooperation with external partners in implementing the personal data policy in the organization;
5. Hiring external experts in implementing the personal data policy in the organization;
6. Leader support in implementing the personal data policy in the organization;
7. Appointment of the Data Protection Officer or the person responsible for implementing the personal data protection policy in the organization;

8. Informing the employees about the personal data protection policy and training to work based on it.

In summary, it can be stated that problem areas of the business enterprise that showed up in implementing the personal data protection policy in this business organization are related to ensuring the personal data access control, informing individuals about the nature of their personal data use, and the process of development of the description of the procedure for rules on a new consent to the use of personal data. Thus, all problem areas identified in the business enterprise include areas of personal data protection.

Although the previous analysis of research data revealed that hiring external experts and leader support in implementing the personal data policy in the organization were to be assessed as weaknesses, the employees of this business enterprise did not treat them as problem areas.

Based on the said context, the following assumption should be made: the employees of the business enterprise do not have a clear concept of improving the implementation, management and control of personal data protection in the business organization as their answers often contradict each other. The emerging contradiction allows to consider the low maturity level of implementation in the field of personal data protection as there is no uniform approach of all employees to implementation of the personal data protection policy under the new regulation.

Responding to the given questions, employees of the business enterprise had to indicate how, in their opinion, implementation, management and control of personal data protection in this business enterprise should be improved. Three notional categories were distinguished, revealing the employees' attitude to the areas of personal data protection improvement in the business enterprise (see Table 7).

Table 7

Improvement of implementation, management and control of personal data protection in the business enterprise

Category	Subcategory	Proof statement
Assembling the team	–	"I think it was necessary to assembly such team which would be responsible for protection of personal data in our organisation in accordance with its members' positions"
Leader support	–	"It is strongly felt that there is no that key person with an exclusive interest in the protection of personal data; i.e., there would be the one who would advise in that area".
Hiring external experts	–	"I am for hiring an external specialist who would help make the transition to the appropriate personal data policy easier and smoother".

Analysing the responses of business enterprise's employees about the improvement of personal data protection in this business organization, the category "Assembling the team" was distinguished. According to research participants, the enterprise needs such team whose work would be related to introduction, management, and control of the personal data policy in the organization. This is confirmed by the following statement: "I think it was necessary to assembly such team which would be responsible for protection of personal data in our organisation in accordance with its members' positions".

Another important area for improvement, related to improving personal data protection in the business enterprise, is leader support. It came to prominence that the employees of this business organization particularly valued leader support in implementing the personal data policy in the organization ("It is strongly felt that there is no that key person with an exclusive interest in the protection of personal data; i.e., there would be the one who would advise in that area").

Employees also emphasize the need of hiring external experts in implementing the personal data policy in the business organization. This is illustrated by the following statement of the subjects: "I am for hiring an external specialist who would help make the transition to the appropriate personal data policy easier and smoother".

To sum up, it can be stated that employees of the business enterprise associate the improvement of implementation, management and control of personal data protection in the business enterprise with three segments: teamwork, leader, and external consulting assistance.

Conclusions

1. Advantages of the GDPR have been distinguished: gives EU citizens the right to be forgotten; clear and positive consent is required; gives EU citizens the right to transfer data; requires to inform about important data protection breaches more rapidly; and limits the use of profiling. The principles of personal data protection have been established: the principle of

lawfulness, fairness, and transparency; purpose limitation in data handling; the data minimisation principle; the principle of periodicity; the principle of storage limitation; the principle of integrity and confidentiality; and the principle of responsibility.

2. It has been established that the business enterprise is able to ensure security of personal data by implementing the essential provisions of the personal data protection policy, one of which is to ensure erasure or forgetting of personal data and to inform individuals about the nature of the use of their personal data. However, this business enterprise ensures only partial control of access to personal data and accuracy of personal data. Weaknesses in the implementation of the personal data protection policy in this business enterprise have been distinguished: precautions are not taken to reduce the damage due to potential problems related to protection of personal data, monitoring of the location of physical data is not carried out.

3. The research has revealed problem areas in implementing the personal data protection policy in the business enterprise: ensuring control of access to personal data; informing individuals about the nature of the use of their personal data; and development of the description of the procedure for rules on a new consent to use personal data. Hiring external experts and leader support in implementing the personal data policy in the organization are to be assessed as a weaknesses of the enterprise. It is assumed that the employees of the business enterprise do not have a clear concept about the improvement of implementation, management and control of personal data protection in the organization because a share of answers contradict each other. This contradiction allows to consider the low maturity level of implementation in the field of personal data protection as there is no uniform approach of all employees to implementation of the personal data protection policy under the new regulation.

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Received: 4 February 2021
Accepted: 31 May 2021

DENTAL TECHNOLOGY EDUCATION IN ESTONIA: STUDENT RESEARCH IN TALLINN HEALTH CARE COLLEGE

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Annotation

The aim of this article is to give an overview of the best dental technician student research in Tallinn Health Care College. In their graduation theses, students investigated the mechanical properties of available materials in dental technology. The students' main interest was to find out what happens in a situation where dental technology materials are used differently from the manufacturers' recommendations, e.g. if the components are mixed in wrong proportions. Students prepared (7-10 pieces) test bodies in a dental technology laboratory. Tests and measurements were carried out at TTK University of Applied Sciences. The test spectrum using the Universal Material Tester G.U.N.T WP 300 covers tensile tests, compression tests, bending tests, and hardness tests. Expansion measurements are procedures that have been developed using digital calipers and a feeler gauge. The encouragement of student involvement in a research project is most important for dental technician education. Incorrect handling of materials can affect the durability of dental prostheses; weaken the quality of dental prostheses; influence the suitability of dental prostheses in the oral cavity. The reasons for improper handling of dental materials: dental technicians do not read the manual carefully; dental technicians have "a lot of work"; working by force of habit; patient needs the denture as soon as possible.

Keywords: dental technician curriculum, students' research, alginate impression material, cold- and heat-cured acrylic, denture teeth bonding to acrylic, orthodontic wire, dental gypsum, tensile strength, compressive strength, expansion, adhesion strength, flexural strength.

Introduction

Professionalism is a term that has a variety of meanings. Its interpretation is dependent on individual and group perceptions, attitudes and values, education, culture and experience (Evans et al, 2020, 227). Professions are always evolving. Such a profession as dental technician is always evolving. As stated by The dental technician's profession is very important for society as a whole. For example, if the patient no longer has any teeth of their own to fix, the dentist is unable to help in this case. Then it is the dental technicians' turn to show their skills. Appropriate materials, effective techniques and careful design are essential for optimal aesthetics and function (Evans et al. 2010, 227).

The goal of higher education should be to encourage the development of learning characteristics such as critical thinking, self-directed learning, and problem solving. This is also valid for dental education. Students' research projects, by developing these skills, are an integral part of dental education (Güven & Uysal, 2011, 90). The Bologna process largely harmonized the identification of the agreed profile of the dental assistant education in Europe, where the new graduate is required to practice dentistry safely. It helped to harmonize dental education throughout in Europe (Plasschaert et al 2005, 99).

Dental technology is supporting the practice of dentistry. It can be said that "it is the art, science, and technologies which enable the design and fabrication of dental prostheses and/or corrective devices to restore natural teeth and supporting structures in order to fulfil a patient's physiological and aesthetic needs." (Bobich & Mitchell, 2017, eS59). Dental technology education faces with serious challenges, e.g. rapid changes in technology, inadequate government funding for expensive programmes, and the need to develop curricula that reflect current labour market needs.

Studies have shown that students develop better research planning and independent inquiry skills after completing a research project. Guven & Uysal (2011, 94) emphasized in their study results that “beside the understanding the connection between research and clinical practice, students who conducted research, improved their relationship between themselves and academic staff, developed their teamwork skills and gained knowledge how to cooperate more in a team, and contributed positively to their vision of their career. Students with research experience had a better basis for postgraduate academic research, and they improved public speaking skills in many cases. Henzi et al. (2007) found that activities such as research projects in which students are actively involved, prevent rote memorisation and provide opportunities for them to use their knowledge in practice.

Tallinn Health Care College is the only educational institution in Estonia where one can study the specialty of a dental technician. A student who has completed the curriculum of a dental technician is a specialist with applied higher education who, in cooperation with a dentist/prosthodontist, prepares removable dental prostheses and prostheses fixed in the oral cavity. In the framework of their studies, students acquire knowledge and practical working skills, in addition to the preparation of orthodontic treatment appliances and the restoration of different dental prostheses. The study period of the dental technician’s curriculum is 3.5 years. To complete the dental technician’s curriculum at Tallinn Health Care College, the student has to pass all subjects of the curriculum, pass study traineeships in the working world, create and present reports based on evidence-based information. The student also has to prepare and successfully defend their graduation thesis (Kuuse, 2018).

Various dental faculties around the world conduct such student research projects and hold regular conferences. Tallinn Health Care College has twice held a student conference titled “Sharing Student Knowledge”. The first collection of articles were prepared on the basis of student theses from the 2015/2016 academic year, and was published in 2017. But of course, student research projects have a long tradition and history in the college. Every student’s final thesis can be considered as a research project when it follows the requirements which characterise a research work.

Dental technician students at Tallinn Health Care College in Estonia have been engaged in applied research from 2006 to 2018. The aim of the research is to investigate the properties of dental materials and technologies. From 2007-2018, 63 applied researches were carried out: 11 researches on orthodontic wires, 18 on heat cure acrylic, 13 on cold cure acrylic, 19 on gypsum, 2 on alginate, and others were combined researches of materials. Each student prepares an abstract of their research work. Publishing the theses of the research work gives aspiring dental technicians an opportunity to familiarise themselves with the results.

This article gives an overview of the dental technician student research at Tallinn Health Care College by topics.

Literature review

Dental technician education

There is not much research about the history of dental technology and technicians. People have been making dental restorations for health and beauty from the earliest times. Castano (1973, 111-112) has written: “The laboratory technician is the backbone of the prosthodontic practice. Many extraoral procedures are done more effectively by laboratory personnel than by the dentist himself”.

Cassettari (1982, 24) has claimed that “Education of the dental technician has evolved over the years. The education of the ancient dental technician was mostly on-the-job training and experimentation. When a wealthy master desired replacement of a lost tooth, the early (700 BC) Artisan was assigned to the task. He would use a human tooth or one from an animal, tie it to his master’s existing dentition using gold or silver wire, ribbons, or bands. This was done with little knowledge of mastication, articulation, or cusp-fossa relationships.”

By Allukian (2006, 168), “The first dental school in the USA opened in Baltimore, in 1840. Most of these early dental schools were trade schools operating for profit. The practicing dentists were divided into two groups: those qualified on education and experience, and those practicing on experience alone”. By the 1950s, more skills were required to satisfy an increasingly more demanding public. Dentists providing these services developed reputations as skilled craftsmen. Separate laboratories devoted wholly to the production of dental prostheses began to appear. An evolution occurred where dentists, machinists, and goldsmiths started to work together. The demand for specialized technicians grew, and individuals who understood the benefit of this business, entered the field directly, trained by existing technicians. In the 20th century, dentists have come to work together with the expertise and skill of the dental technician to provide knowledge based, well-constructed, and artful dental appliances (Cassettari, 1982, p. 5-8).

The first Estonian Dental Society was established in 1921 in Tartu which united dentists of various nationalities. In Estonia, the work of dental technicians was regulated in 1931 with a law which provided that an Estonian citizen with secondary education could work as a dental technician after passing a required qualification exam (Saag et al. 2008). Written documentation of dental technician studies dates back to the 1940s. It is estimated that there were up to 25 practicing technicians in the Republic of Estonia. In the beginning, goldsmiths' apprentices practiced as dental technicians who started to make prostheses at the request of dentists. With the prostheses of the time, it was possible to somewhat restore aesthetic appearance and speech, but exact occlusion for eating was not possible to guarantee (Niitlaan & Tammes, 2001). Despite rapid developments in the world during the beginning of the 20th century, and the publication of several dental technician handbooks in Europe, Estonian craftsmen lacked theoretical knowledge (Kauba, 2016).

Also, during the post-war period, the developments in the world did not reach occupied Estonia. Many tools of the dental technicians were from the pre-World War II period. It was possible to teach only those technologies the samples of which were readily available. For example, the skill of making steel prostheses was introduced to Tallinn Medical School by a dental technician from Leningrad, and old fashioned synthetic rubber prostheses were made for plastic intolerant patients. Even in the 1990s, stamped caps were made at the medical school which were of the same size and shape, irrespective of the patient's peculiarities (Kauba, 2016).

As to vocational training and education in Estonia, there are still three groups of dental technicians today: firstly, those without professional/vocational education or technicians without a diploma; secondly, those with vocational education; and thirdly, dental technicians with higher education. The share of the latter is constantly increasing. The level of studies improved significantly when the previous vocational training was restructured into applied higher education (Kauba, 2016).

Certain trends are reasonably clear, and restorative dental technologist educational programmes will need to adapt to meet the needs of the industry and the public. The two major trends which will determine the future of the dental laboratory workforce are an improved oral health status, and new technologies. Those and other factors will affect the future education and workforce prospects for restorative dental technologists. The first trend is that the oral health of the population is improving and the demand for dental laboratory services is going to decline and reducing the need for restorative dental technologists. The other trend is that the digital technologies replace traditional methods for constructing dental prostheses. This trend will lead to larger but fewer dental laboratories and will require a workforce that is experienced in these new technologies and with a solid background in dental anatomy, tooth morphology, physiology of mandibular movement, and oral and facial structures (Bobich & Mitchell, 2017, eS62).

Attention to the adaptation and improvement of the dental technician curriculum is constant. The development of dental technology and its application in medicine has developed into an important field to promote public health and ensure wellbeing.

Modern requirements on dental technicians are very high. New materials and methods present new challenges to students. The entry numbers of dental technician students are influenced by the ratio of demand-supply in Estonia, as well as in neighbouring countries. Similarly to nurses, who have received their education in Estonia and leave to work in neighbouring countries, this tendency is also noted among dental technicians (Kauba, 2015).

As stated by Bobich and Mitchell (2017, eS64) "*The profession is challenged with many obstacles related to rapid changes in core technologies, a decline in the demand for dental prosthetic services, a curriculum that does not adequately reflect current industry needs, and an aging faculty that may not be experienced with new digital technologies. The future of the dental technologist profession requires better communication between technologists and dental practitioners, and the dental profession and general public need to give greater recognition to the importance of restorative dental technologists for the effective and efficient practice of dentistry. Not only does the profession of dentistry benefit from this, but, more importantly, so do dental patients.*"

The importance of student research in dental technician curriculum

Dental technicians (or dental technologists as they are often referred to) make the dentures, crowns, bridges, and dental braces which improve patients' appearance, speech, and ability to chew. The dental technician uses their theoretical and practical knowledge to determine the appropriate materials, design, construction techniques, and positioning of various components in order to meet the patient's needs for the restoration of function and aesthetics (Evans et al. 2012, 240). To achieve these skills and knowledge described here, dental technician students have to complete a special curriculum.

The objective of the dental technician curriculum at Tallinn Health Care College is to train dental technicians to achieve a level of knowledge and skill which enables them to produce contemporary and quality dentures (dental restorations). Auditory tuition is organised in auditoriums and dental technology study-labs with contemporary furnishing, using quality materials and study-instruments. Every year at the end of a basic subject, students practice their knowledge and skills at training bases in real working conditions under the supervision of experienced dental technicians.

The curriculum is based on modern evidence-based information, the thorough knowledge and application of which will ensure aesthetics, functionality, and hygiene of dental restorations and orthodontic appliances. The dental restorations and orthodontic appliances manufactured on this basis improve a person's quality of life, and do not entail any significant risks to their health and the surrounding environment. In all specialty subjects, students will be familiarised with professional terminology, clinical and laboratory stages of preparing dental prostheses, the classification of dental restorations and orthodontic appliances as well as materials, apparatus and other equipment used. With every type of restoration, the student has to complete basic laboratory stages, consider principles of function, occlusion, and aesthetics. The student must be able to evaluate the stages of work and analyse all aspects and qualities of the prepared work as well as be able to document it.

Although applied higher education cannot be expected to feature all the same components which are characteristic of a university education, the earlier vocational education level or manual skill cannot be the main learning outcome. The curriculum cannot deal with the training of specialists in the narrow sense of the word, a modern graduate must also be able to comprehend various connections, be able to compare different phases and processes of producing prostheses, and be knowledgeable and aware about everything that is happening in their field around the world (Kauba, 2015). Students study specialised terminology, the clinical and laboratory phases of making prostheses, and use technologies. Today's graduate must be able to assess work stages, analyse the properties of prepared pieces and document them reliably. Much emphasis is put on the search and analysis skills of specialist literature. All this prepares them for their first independent work – the final thesis (Kauba, 2015).

The curriculum ends with a graduation thesis, the purpose of which is to acquire skills for using professional knowledge to research independently and analyse critically a particular problem or situation in practice, and to show the student's ability to apply their knowledge and practical skills developed across the curriculum, and to carry out research using different research methods. Successful graduation research shows that the student:

- is able to independently plan and carry out research, and properly present its results;
- can pay attention to professional problems and research focuses;
- understands research ethics and principles of reliability, and considers them when carrying out the research;
- is able to sort through and analyse scientific literature associated with a research problem;
- understands proper data collection and methods of analysis used in the research;
- can explain research results and the importance of them in their specialty;
- is able to critically analyse and defend their viewpoints presented in the research, and discuss the researched topic;
- is able to give research-based recommendations for solving professional problems.

The development of technologies requires activity where qualitative changes enable those who require those who need them, to get new kinds of products, or the same product through new technological solutions.

Therefore, the modernisation of curricula is always connected to developmental activities – acquiring, consolidating, formulating, and using existing scientific, technological, and other relevant knowledge and skills with the creation of plans and orders or projects with the purpose of creating new or improved products or processes.

The more practically oriented the student's final thesis is, the better prepared they are to start working in such a high responsibility position as that of a dental technician undoubtedly is. There are an increasing amount of papers based on clinical cases with which the student obtains experience to cope in, so to say, real working life (Kauba, 2015).

Table 1

Theses defended at the Chair of Dental Technology 2009-2018

Research topics 2009-2018	No	%
Research on heat-cure acrylic	17	30%
Research on dental gypsum	13	23%
Research on cold-cure acrylic	12	22%

Research topics 2009-2018	No	%
Research on orthodontic wires	7	13%
Research on alginate	4	7%
Research on other materials	3	5%
Total	56	100%

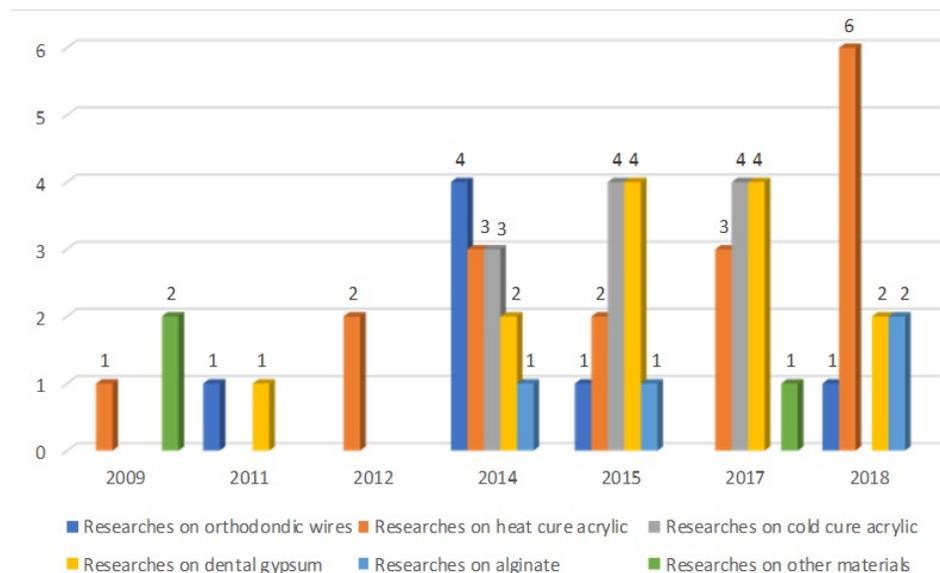


Fig. 1. Experimental studies at the Chair of Dental Technology divided by topics during the years 2009-2018

Experimental studies at the Chair of Dental Technology over the past ten years have excluded referative overviews. Several findings give rise to new studies, systematic and vital new information for the specialty can be obtained only by implementing innovative topics and methods (Kauba, 2015).

Student research at Tallinn Health Care College

Research on orthodontic wires

In the past, present, and also in the future, soldering as a joining technique has been and will be an important part of dental-lab procedures, as soldering is the most frequently used joining technique for metals. In order to obtain a soldering joint, the necessary materials must be processed with utmost care. It also involves thorough knowledge of the materials and their correct technical application. Nevertheless, the ultimate objective of the users should be to work in such a way that joining metals is largely unnecessary (Ivoclar vivadent, 2015). *“In the field of Dental Technology, soldering continues to be the prevailing joining technique for removable orthodontic appliances. The strength of the soldered joint, however, is a growing concern to dental technicians, as the commonly employed silver solder undergoes accelerated corrosion and ultimately influences the success of orthodontic appliances intraorally.”* (Vahed et al. 2007, 855).

The term welding is used if two pieces of similar metal are joined together without the addition of another metal; that is, the metal pieces are heated to a high enough temperature for them to be joined together by melting and flowing (Manappallil 2016, 392).

In dentistry, soldering has been used for more than 100 years. Given its universal application possibilities in dental-lab technology, soldering has not lost its importance, despite modern welding techniques and adhesive procedures. In dental laboratories, the number of daily soldering procedures still clearly exceeds that of other joining methods. (Ivoclar vivadent, 2015, 2-4)

Joints created using soldering and welding have been compared and researched in many international research papers (e.g. Lucchese et al, 2011; Erdogan et al, 2015; Bandyopadhyay et al, 2016; Saravana, 2017). There is little research that has been done on joints created using the soldering method (e.g. Loke & Tan, 2011; Gonçalves et al, 2014;). In addition to those, there is research which gives an overview of the properties of orthodontic medical devices (Khamatkar et al, 2015).

Student research done at Tallinn Health Care College during 2011-2018 has addressed the following topics connected to orthodontic wire: the tensile strength of orthodontic wire

(Hollas, 2015; Asu, 2014), the tensile strength of the solder joint of orthodontic wire (Toom, 2011; Käärdi, 2014; Paas, 2014; Uibo, 2018), the tensile strength of heat-polymerisable acrylic reinforced with orthodontic wire (Kelk, 2014).

The durability of the orthodontic wire solder joint during tensile strength testing is supported by research. E.g. Toom (2011) has researched the effect of processing techniques to the properties of orthodontic wires and solders. While testing tensile strength of soldering, it became apparent that solder joints created using flux and silver solder and abraded using a router can tolerate higher stress than solder joints created using silver solder paste and abraded using a sand blaster.

Many studies have used orthodontic wires from different manufacturers to create test specimens (Paas, 2014) of orthodontic wire compared to non-orthodontic wire (Volmer et al, 2011). The material that was joined broke after the measurements taken during both studies, while the solder joints did not. In addition, using solder by different manufacturers had no significant effect on the measuring of solder joint tensile strength. The numerical measurement values show no large discrepancies (Käärdi, 2014).

The tensile strength of orthodontic wire has also been researched at Tallinn Health Care College. Asu (2014) heated orthodontic wire from different manufacturers for five seconds and measured the tensile strength of the heated wires. The results showed that wires from both manufacturers could withstand similar stress while overheated. Alango et al (2011) heated orthodontic wires for three and five seconds. The results of the measurements showed that overheated orthodontic wires were more elastic, and could withstand less stress than non-overheated wire.

In addition to heating wire, tensile strength has also been measured in flattened orthodontic wires. This was studied by Hollas (2014), who measured the tensile strength of flattened orthodontic wire. The results showed that deformed orthodontic wire could withstand less stress than described by the manufacturer. The goal of Uibo's (2018) study was to find out if the tensile strength of the solder joint of orthodontic wire depended on overheating the solder during the soldering process. The results of the measurements show that in all the test specimens, the wire fractured right next to the solder joint. In no test specimen did the solder joint itself break. Overheating the solder during the soldering process did not reduce the tensile strength of the solder joint, which meant the hypothesis was not proven to be correct. During the measuring process, the material to be joined fractured instead of the solder joints (Uibo, 2018).

Kelk (2014) has studied the tensile strength of heat-cured acrylic reinforced with orthodontic wire. The author analysed the mechanical properties of orthodontic wire and acrylic and detailed their positive and negative features. The hypothesis of the study claimed that the test specimen reinforced with wire had higher tensile strength than the test specimen without the reinforcement. The tests that were run did not prove the hypothesis to be correct. Orthodontic wire did not strengthen heat-cured acrylic. The measured tensile strength was lower than the manufacturer's standards. During the testing acrylic part in all test specimens broke in a way that left the orthodontic wire intact (Kelk, 2014).

Research on alginate

Alginate was first discovered by E.C.C. Stanford in 1881, while searching for useful products from kelp. He developed the process of alkali extraction of a viscous material, 'algin', from the algae and later precipitated it using mineral acid. In 1934, the use of alginate for foods (as an ice-cream stabilizer) became important. In 1944, propylene glycol alginate (PGA) was developed and produced commercially. Later, alginate-production plants were established in the USA, Europe, and Japan (Nussinovitch, 1997, 19). Nowadays alginates are the most widely used impression materials in dentistry.

Alginate is a biomaterial which has found numerous applications in biomedical science, engineering and dentistry due to its favourable properties, including biocompatibility and ease of gelation (Lee & Mooney, 2011, 106). Alginate is a naturally occurring anionic polymer typically obtained from brown seaweed and has been extensively investigated and used for many biomedical applications and in the food, pharmaceutical, cosmetic industries and beverage industry as a thickening agent, a gelling agent and a colloidal stabilizer (Gombotz & Wee, 1998, 195). Cervino et al (2018, 1) states that "*The advantages of using alginate includes better tolerability on the part of the patient, the ease of manipulation, the short time needed for execution, the instrumentation, and the very simple execution technique and possibility of detecting a detailed impression in a single step.*"

O'Brien (2002, 172) emphasize that "*Alginates are easy to use, low-cost, well tolerated by patients, excellent for primary prosthetic, orthodontic, and design imprints. They come in the form of a powder to be mixed with water in appropriate doses. Once mixed, the alginate turns into a soft paste that is placed on the tray and introduced into the oral cavity for the detection of*

the impression". O'Brien (2002, 172) also highlights the disadvantages of the material: it requires the use of expensive equipment and must be prepared in advance. They tear easily, must be poured immediately, are dimensionally unstable, can only be used for single casts, and cannot be electroplated. The surface of stone casts will be weakened by compositions containing borax. Alginates are not accurate enough for fixed partial denture impressions (O'Brien, 2002, 173).

Internationally, the study of alginates was very popular decades ago – the high points were in the 1980s, 1990s, and to some extent, the first half of the 2000s. Newer studies are mostly from third countries. International studies have looked at how time and temperature affect alginates (e.g. Sedda et al, 2008; Farzin & Panahandeh, 2010; Todd et al, 2012; Kulkarni et al, 2015;). Additional studies have also been done on the dimensional changes and stability of alginates (Martin et al, 2007; Rubandeeep & Bhide, 2018).

Student research done at Tallinn Health Care College during 2014-2018 has addressed the dimensional changes of alginates (Järve, 2015; Kurbatova, 2018; Gross, 2018; Lääts, 2014). For example, research has been done on the dimensional changes of alginates at low temperatures (Lääts, 2014; Kurbatova, 2018) and after being frozen (Järve, 2015).

In the first study mentioned, five test specimens that were held at 1.5 °C for 30 minutes were measured. The results showed the alginate did not swell, and all test specimens retained their original shape (Järve, 2015). In the second study, six specimens were prepared using the manufacturer's water and powder ratio specifications and held in a refrigerator at 4 °C for two hours before being measured using a Vernier caliper. The results showed that the hypothesis was not proven to be true. No test specimen made of alginate showed any dimensional changes, all test specimens retained their original shape (Kurbatova, 2018). In the third study, eight circle-shaped test specimen moulds were created and filled with alginate. The test specimens were held at -13.5 °C for 24 hours. The results of the measurements showed that the dimensions of the test specimens decreased after being frozen (Järve, 2015).

One study (Gross, 2018) looked at the dimensional changes of alginates when not following the manufacturer's specifications. The object of the thesis was to find out what happens to the alginates when the amount of water used was increased relative to the manufacturer's specifications when mixing alginate powder and water, and additionally the manufacturer's instructions for storing the impression material were not followed. The hypothesis stated that the alginate test specimens will have dimensional changes. Six test specimens were prepared from alginate. The amount of water used for mixing the alginate was increased by 25% from the manufacturer's specifications for 72 g of powder and 180 ml of water and the impression material was kept at room temperature for one hour. The results from the test specimens varied, but all test specimens decreased in size (Gross, 2018).

The authors of both international and local studies found that the dimensional stability of alginates is very heavily dependent on the conditions and time of storage and that alginate impressions should be poured immediately, because they start to lose in stability in 12 minutes.

Research on dental gypsum

Anusavice et al (2013, 182) introduces gypsum as "*A mineral found in various parts of the world, but it is also produced as a by-product of flue gas desulphurisation in some coal-fired electric power plants. Various crystalline forms of gypsum, such as selenite and alabaster, exist in nature. Gypsum products are supplied as fine hemihydrate powders that are produced by heating ground gypsum particles. After mixing with water, the mixture reverts back to gypsum*". By Earnshaw (2002, 74) "Although not directly employed in dental restorations, gypsum products are important accessory materials used in many clinical and laboratory procedures."

Hatrick et al (2020, 205-205) state that "*Type I and type II gypsum are the weakest and also the cheapest gypsum products. Type I is rarely used in today's dentistry, type II gypsum plaster, is strong in compression but weak in tension. Type II is frequently used for diagnostic casts and articulation of stone casts. Dental stone type III is ideal for making full or partial denture models, orthodontic models, and casts that require higher strength and abrasive resistance. Dental stone is about 2.5 times stronger than plaster.*" "*The type IV high-strength dental stone is widely used to fabricate the dies and master casts for fixed and removable partial prostheses, due to its superior mechanical properties such as compressive strength, hardness, and expansion properties when compared to other dental stones*" (da Silva, et al, 2012, 589). The popularity of type IV gypsum is attributed to its ease of use, relatively quick setting, and reasonable accuracy. However, there are several disadvantages to its use, for example, poor abrasion resistance, potential variability in fine detail reproduction, inadequate tensile strength, and need for a waiting period prior to initiation of laboratory procedures (Auj, 2003).

Type V is a recent addition to the list of gypsum products. It has been developed in response to the need for even higher-strength and higher-expansion dental stones. This material is the costliest of all the gypsum products (Hatrack, et al, 2010, 204-205).

“Generally, the strength of gypsum products is related to the water/powder ratio, mixing time, volume of mixture, chemical composition, and elapsed time after the cast is poured” (Sharma, et al, 2012, 525). Therefore, it is very important to exactly follow the instructions given by the manufacturer, because otherwise the physical and mechanical properties of the material may change (Peltser, 2018).

Hatrack et al (2010, 204) emphasize that one aspect of gypsum products is expansion. For all gypsum products, the expansion is set. Plaster is the most expanded 0.30% and high strength stone the lowest 0.10%. Although some expansion is acceptable for plaster, expansion of moldings would be a source of costly errors.

Internationally, gypsum swelling has been researched from different aspects, for example by adding different kinds of water (distilled and/or tap water) to type IV gypsum (e.g. Birnbaum & Aaronson, 2011), testing the effect of different temperatures to gypsum swelling (Michalakis, 2012; da Silva et al, 2012), testing the impact strength and compressive strength of gypsum (Hersk, et al, 2002; Azer et al, 2008; Anaraki et al, 2013). Furthermore, the effect of different lubricants and chemical materials on the compressive strength of gypsum has also been researched (Urapepon et al, 2015; Taqa, et al, 2015).

Student research done at Tallinn Health Care College during 2011-2018 has addressed the following topics: measuring the compression strength (e.g. Kangur, 2017; Peltser, 2018) and impact strength (e.g. Laurik, 2017; Harusoo-Ivanova, 2017) of type III and IV gypsum and studying gypsum swelling (e.g. Lättemaa, 2014; Eisen, 2014; Orlov, 2017; Kübarsepp, 2018).

Harusoo-Ivanova (2017) emphasised that the impact strength of type IV gypsum is higher than the impact strength of type III gypsum, although the difference is not very great (the maximal impact strength of type III is higher than the arithmetic mean of type IV impact strength by 0.1 kJ/m²). Test specimens need to be the same size and the measurements need to be taken using the same tools when researching impact strength, otherwise the results are incomparable (Harusoo-Ivanova, 2017). There was less swelling in manufacturing test specimens with distilled water as compared to tap water. When comparing the swelling of two types of gypsum (types II and III), it becomes apparent that type II swells less than type III. Type IV gypsum swelled more in an aquatic environment than in normal conditions (Eisen, 2014). Manufacturing type IV gypsum with tap water and measuring expansion changes confirmed the author’s hypothesis that on a low temperature gypsum swells by less than 0.1% (Lättemaa, et al, 2014). Mixing the gypsum by hand can cause larger swelling, therefore a vacuum-mixing machine needs to be used (Orlov, 2017; Kangur, 2017). The compressive strength of gypsum remains the same after being dried in a microwave oven; it does not display any noticeable changes. In some cases, the measured results were higher than the data provided by the manufacturer – the compressive strength was upwards of 60 MPa per unit of area. That is a good result, since working with type IV gypsum assures that the model will not break upon pressing a restoration on it with moderate force, and gypsum teeth stay in place (Kangur, 2017).

The authors of both international and local studies have arrived at the same conclusion that the measured results of gypsum’s compressive strength depends on the specific chemical makeup of the specimen and hardening time. The compressive strength of gypsum is influenced by the ratio of water and powder, mixing time, texture of the mixture, chemical makeup, relative humidity, ambient temperature of the room used to store the material, and hardening time.

Research on acrylic

Based on the amount of literature reviewed, acrylic resin is one of the most studied materials in dental technology.

Acrylic resins were first synthesised around 1900 as a result of the work of Dr Otto Röhm in Germany. They were introduced commercially in the United States in the early 1930s (Sastri, 2010) and first used in dentistry in the 1940s. They quickly replaced materials previously used in the construction of dentures (Gladwin & Bagby, 2013, 153).

By Yadav et al (2015, 54): *“Acrylic teeth have long been used in the treatment of a complete denture. One of the primary advantages of acrylic teeth is their ability to adhesively bond to the denture base resins. Although the bonding seems satisfactory, however, bond failures at the acrylic teeth and denture base resin interface are still a common clinical problem in prosthodontics”*.

Noort (2013) highlights some advantages and disadvantages of acrylic resin. Among advantages is the fact that the material is cheap, and easy to process using inexpensive techniques while being aesthetically pleasing. The life expectancy of acrylic prosthesis is 4-5

years (Noort, 2013, 175-179). The disadvantages of acrylics are its physical properties such as low thermal conductivity, which may cause burns, in the case of hot drinks, for example (Noort, 2013, p. 179-180).

Because it is expensive and time consuming to remake the dental prosthesis, patients often prefer to repair old prostheses instead of making new ones. A satisfactory repair should have adequate strength and colour, and should be easy to undertake, quick, dimensionally stable, and cost effective (Alkurt et al, 2014, 72). Considering all of the above, the strength and mechanical properties are very important in denture design and material selection to be certain that the prosthesis is functional and working for a long time (Anusavice et al 2012, p. 49).

Impact strength is the energy required to fracture the material under an impact force. It can be measured with a Charpy-type impact tester, which has a heavy pendulum which swings down the fracture in the specimen. Another instrument called an Izod impact tester can also be used (Manappallil 2016, p. 18). The difference between these two methods is the placement of the test pieces on a machine – in the case of the Charpy-type test, the pieces are placed horizontally and in the case of the Izod test, the pieces are placed vertically (Anusavice et al, 2013).

Tensile strength is determined by subjecting a rod, wire or dumbbell shaped specimen to a tensile loading (a unilateral tension test). Tensile strength is defined as the maximal stress the structure will withstand before rupture (Manappallil 2016, p. 19).

Yilmaz et al (2007, 121) emphasize that Flexural strength is one of the core values in the assessment of material stability. The fracture toughness of flexural strength characterizes the response of materials, such as brittle dental ceramics, to load forces and the propagation of cracks. Flexural strength indicates how much force is required to break a test specimen of diameter. As soon as this value is exceeded, the test piece breaks. The higher the value, the more impact the material can withstand.

Galvão et al (2013, 2) indicate that “the compressive strength indicates the ability demonstrated by a material to withstand vertical stress. It is known that during the act of chewing, the forces that are transmitted to the restorations can break them or promote tooth fracture”. Compressive strength is used as a measure of the ability of a material to withstand the forces of mastication (Ginjupalli et al, 2012, 48).

Research on heat-cure acrylic

Acrylic resin is a material that has been used extensively in dentistry, especially as denture base material. Acrylic resins can be divided into 3 types based on the activation of its polymer bonds, which are cold cured, light cured, and heat-cured acrylic resins (Sofya et al, 2017, 58). Since 1946, the material most commonly used for the construction of complete dentures is a heat-cured acrylic resin (Jagger, et al, 2003). The heat-cured acrylic resin has a favourable combination of properties that accounts for its popularity of use, such as being non-toxic, non-irritating, and insoluble in oral fluids, being easily manipulated, easily repaired, and slightly changed in its dimensional aspect, while having satisfactory aesthetics (Sofya et al, 2017). However, it is not without its limitations. The shortfalls of heat-cured acrylic resin are in its weakness to resistance and its high permeability (Jagger, et al, 2003, 231). The widespread use of acrylic should take into account the toxicity of this material to the human body. The largest risk group is the staff who is working with this material on the daily basis, and the patient being the recipient of the restorative materials (Gosavi et al, 2010, 82).

Sofya et al (2017, 58-59) “The acrylic resin has lower hardness compared to metal, and which makes it easier for the material to be scratched and have abrasions”. It must be emphasised that overheating can cause further porosity and bubbles in acrylic.

In order to strengthen heat-cured acrylic resin, several methods have been tested. International studies have concentrated on the adhesion strength between heat-cure acrylic and acrylic teeth (e.g. Mahadevan et al, 2015; Yadav, et al, 2015), impact strength (e.g. Wady 2011), the effectiveness of adding fibres to acrylics and composites (Raszewski et al, 2013; Fonseca et al, 2015; Nayar et al, 2015; Yu et al, 2015), flexural strength (Doi et al, 2011; Reddy et al, 2014; Roulet et al, 2015), tensile strength as a result of different cooling methods (e.g. Bortun et al 2010).

The students of Tallinn Health Care College from years 2009 - 2018 have dealt with the following topics: impact strength (e.g. Randmaa, 2017; Mürk, 2017; Abdulina, 2018; Lindsalu, 2018), tensile strength (e.g. Saare, 2017; Muravjova, 2018; Tamla, 2018), compressive strength (e.g. Reigo, 2014; Hinn, 2015), flexural strength (Pavlov, 2015), adhesion strength (Türkson-Zujev, 2017; Rooleht, 2018). Certain periodicity is notable in the choice of the topics of the final theses, e.g. the studies of impact resistance of heat-cured acrylic started in 2017, and adhesion strength studies have been conducted only since 2018. At the same time, compressive strength and tensile strength have been popular over the years.

The studies of both international and local authors have reached the conclusion that tensile strength between a heat-cured acrylic and unroughened acrylic tooth is bigger than the tensile strength between a cold-cured acrylic and unroughened acrylic tooth. Test specimens broke in the middle of the molar, not at the joint of the heat-cured acrylic and unroughened acrylic tooth. On this basis, it can be concluded that the adhesion strength of heat-cured acrylic and unroughened acrylic tooth diminishes (Türkson-Zujev, 2017; Rooleht, 2018). Removable prostheses are made of heat-cured acrylic for the good properties of this material, which are aesthetics, affordability, and easy processability. The strength characteristics of heat-cured acrylic are diminished by the method of rapid cooling which renders the material more brittle and susceptible to breakage. The tensile strength of heat-cured acrylic diminished with the use of quick cooling method (Viitkar, 2014; Tamla, 2018). At the same time, when researching the effects of rapid cooling on the compressive strength of heat-cured acrylic, it appeared that the test specimens did not break as a result of applying maximum force, only cracks were formed (Reigo, 2014; Hinn 2015). Adding metal mesh to the heat-cured acrylic denture basis does not render the denture more resistant to tensile strength (Saare, 2017). Variations in the ratio of powder and liquid do not affect the resistance of heat-cured acrylic to compressive strength (Kallas, 2012).

The studies of impact resistance using the *Charpy* and *Izod* method have led to a conclusion that the excessive addition of monomer to the acrylic powder increases the material's impact resistance and diminishes its resistance to breakage. Adding less than the recommended amount of monomer makes the heat-cured acrylic more brittle (Randmaa, 2017; Mürk, 2017). At the same time, the measurement of test specimens and selected measurement methods do not affect the impact resistance of the material. The authors recommend in the future, using measurements of heat-cured acrylic impact resistance numerically, as more test specimens get trustworthier statistic indicators of the material's properties. Heat-cured acrylic is widely used in prosthetic dentistry, particularly for the making of removable partial and complete dentures, but the mechanical properties of the material are not the best. Heat-cured acrylic has better mechanical properties than cold cured acrylic, but the accidents of patients may cause the breakage of the basis of the denture. Studies have shown that the failure in the strength and toughness of acrylic prosthesis causes breakage of the dentures in up to 10 % of the patients during 3 years of use. (Lindsalu, 2018)

Glass fibres fortify acrylics; however, there exists a linear connection between the length of the fibre and the impact resistance. The longer the glass fibre, the better the resistance to impact. The percentages share between the fibre and the acrylic is emphasised as these define the mechanical properties of fortified acrylic (Abdulina, 2018; Muravjova, 2018).

Arula (2009) studied the tensile strength, compressive strength, and toughness of heat- and cold-cured (Meliodent) acrylic. Three test specimens were prepared for three tests from heat-cured acrylic and 3 test pieces from cold-cured acrylic. The results obtained proved that the mechanical properties of heat-cured acrylic have better characteristics (Arula, 2009).

Pavlov (2015), in his final thesis, studied the flexural strength of heat-cured acrylic fortified with orthodontic Z-shaped wire. The author formulated a hypothesis that the flexural strength of heat-cured orthodontic acrylic, fortified with Z-shaped wire, is better than the flexural strength of heat-cured acrylic. The achieved results proved that the manufacturer's data indicated higher flexural strength of heat-cured acrylic than the flexural strength of heat-cured acrylic fortified with orthodontic Z-shaped wire (Pavlov 2015).

Researches on cold-cure acrylic

The chemistry of these resins is identical to that of the heat-cured resins, except that the cure is initiated by a tertiary amine rather than heat. Cold systems are supplied as a powder and a liquid. This method of curing is not as efficient as the heat curing process (van Noort, 2013, 176-177). The presence of Amine facilitators in cold-cured acrylic resins can be problematic in the colour stability of the teeth. They produce colour products by oxidation; thus, the colour stability of chemically cured types is not as good as heat-cured types (Imirzalioglu et al, 2010). Also, the material is highly susceptible to creep, and this can contribute significantly to the eventual distortion of the denture when in use (van Noort, 2013, 177).

International studies have been conducted on the effect of mechanical and chemical pre-treatment on the tensile strength between an acrylic tooth and a cold-cured tooth (e.g. Cunningham & Benington, 1999; Palitsch et al, 2012), impact resistance (Kassim et al, 2011).

Between 2014 – 2018 the papers of the students of Tallinn Health Care College dealt with the following topics: impact strength of cold-cured acrylic (e.g. Piirimees, 2017; Laurimäe, 2017), tensile strength (e.g. Kallaste, 2017), compressive strength (Kruut, 2018; Vene, 2017), adhesion strength (Pärnakivi, 2015; Reinson, 2015; Koch, 2015). Here, too, based on the chosen topics, it can be noted that, for example, adhesion strength was studied only in 2015,

the studies of impact strength started in 2017. At the same time compressive strength and tensile strength have also been popular topics over the years.

On the basis of tensile strength research, it can be stated that the mechanical and chemical pre-treatment of the base surface increase the tensile strength between an acrylic tooth and cold-cured tooth in comparison with the tensile strength between an acrylic tooth that has not been pre-treated or only mechanically pre-treated acrylic tooth and cold-cured acrylic. Although a chemical joiner which has exceeded its limitation period does not lose its efficiency, all authors recommend to strictly follow the limitations specified by the manufacturer in the practical work of chemical treatment (Kallaste, 2017; Koch, 2015).

Cold-cured acrylic is a common material used in dental technology, and it is important to know how resistant acrylic is to the rapid breakage caused, for example, if the prosthesis is dropped during cleaning. Rapid breakage can be measured with impact strength.

The results of the studies on impact resilience show that light-hardening acrylic has higher strength properties than heat-cured acrylic, and cold-cured acrylic has lower strength properties than the previous two. The effect of the time of polymerization on the impact resilience of cold- and heat-cured acrylic was looked into, and it was found that cold-cured acrylic was the most resistant to impact when the polymerization time was 45 minutes. Excessive monomer in the preparation of cold-cured acrylic increases the impact resilience of the acrylic. Adding monomer in the preparation of cold-cured acrylic increases its impact resilience by 15.8% on average. The authors of the studies emphasise that the test method of impact resilience is comparable if the testing has been done in exactly the same conditions and with exactly the same equipment (Laurimäe, 2017; Piirimees, 2018).

On the basis of the results of compressive strength research, it can be stated that in case of test specimens that had been cold-cured longer than the manufacturers' specifications required no test, as the piece was destroyed in the course of compressive strength tests. The test specimens which had been prepared while ignoring the manufacturer's specifications possessed lower compressive strength values than the test specimens which had been prepared while following the manufacturer's specifications. The mechanical properties of test pieces did not change when prepared under compression and in boiling water (Vene, 2017; Kruut, 2018). Arula (2009) research results suggest that cold-cured acrylic is weaker, but its compressive strength and tensile strength are higher than those of heat-cured acrylic (Arula, 2009).

The results of the studies on adhesion strength between an acrylic and a cold-cured acrylic tooth have shown that the average strength that was exerted on the test pieces before the prosthetic tooth became detached from cold-cured acrylic had been very different – 0.09 kN (Pärnakivi, 2015) and 0.33 kN (Reinson, 2015). At the same time, a Türkson-Zujev (2018) study measured the average adhesion strength between heat-cured acrylic and a roughened acrylic tooth 0.71 kN. Different surface treatments of an acrylic tooth can cause shifts in the adhesion strength of an acrylic tooth and composite resin, which is a restoration material. It certainly should be kept in mind that the contamination of the tooth's baseplate surface reduces adhesion strength.

Conclusions and further discussion

The dental technician profession is certainly one of the oldest in the world, dating back to 700 BC. In Estonia, no exact data about the first school(s) for dental technician education is available. Only the fact that the work of dental technicians was regulated in 1931 by law, is well-known. Written documentation of dental technician education dates back to the 1940s.

In their everyday work, dental technicians do not often meet their patients. The dental technician follows the written and oral guidelines of the dentist to solve the patient's case and the prosthetics in the best possible way. The dental technician works with different dental materials, the mechanical qualities of which have been researched at Tallinn Health Care College and presented in this article.

In real-life work situations there are many cases when dental technicians do not follow the manufacturer's specifications exactly. Students have investigated the effects on the mechanical properties of dental materials. With this research, Tallinn Health Care College has confirmed and refuted different hypotheses. New topics for research, which the College has started to investigate, have arisen from the recommendations of on-going and already completed research.

In forthcoming research work we will focus mainly on the two most important themes:

1. The study of the different properties of acrylic plate with metal mesh. Namely, the research paper "Tensile strength of heat-cured acrylic plate fortified with metal mesh" (Saare, 2017), which indicated that metal mesh does not actually fortify the acrylic plate as was believed

among dentists and dental technicians. The research paper recommended to focus in future research work more on other mechanical properties of the acrylic plate, such as impact resistance, compressive strength.

2. The awareness of pharmacists about the maintenance of dentures. Upkeep of regular and accurate denture hygiene is important to ensure the person's general good health, and prevent diseases of soft oral tissues. Therefore, it is vital that each user of dentures knows the principles of accurate cleaning of the dentures. Nowadays the first instance of help and consultation is expected from nearly every practicing health care worker, including pharmacists. A visit to a pharmacy before going to an attending physician is, for many people, the first choice, be it for lack of time, financial difficulties, slight anxiety against the dentist, or for some other reason. This is one possibility to get a quick and also an affordable solution to a problem. For this reason, the College has undertaken a new branch to find out if and what pharmacists know about the maintenance of dentures. It is important to clarify the awareness of pharmacists about the maintenance of dentures in order to offer comprehensive first instance help on the topics of the maintenance of dentures in the pharmacy.

The dental technician's curriculum of Tallinn Health Care College plans to conduct many more studies of the topics which will be formulated on the basis of the students' final theses recommendations.

The importance of student research for the profession of dental technology in Estonia: students learn how to think critically, learn how to explain their opinions, and their generalization skills develop and improve. The importance for the Estonian health care development is noted as follows: the presentation of research results, the publication of results, and research is valued and supported by dentists and dental technicians.

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Received: 5 January 2021

Accepted: 31 May 2021

LITERACY PROBLEMS OF INFORMATION MANAGEMENT STUDY PROGRAMME GRADUATES

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Annotation

The article analyses literacy problems of Šiauliai State College Information Management Study Programme graduates. These graduates fall into the category of employees, for whom writing without errors is not a choice, but a necessity. The language study of the graduation papers showed that the students' literacy is average: more than half (54%) of the papers were assessed as of typical or threshold level. Left spelling, punctuation, language errors, typographical errors have been found in the papers, the text is not always formatted in accordance with the requirements of the scientific style.

Key words: information management, study programme, learning outcomes of the programme, literacy, spelling, punctuation and language errors.

Foreword

Topic relevance. Šiauliai State College (hereinafter - the College) Information Management (hereinafter - IM) Study Programme graduates are specialists capable to work both in traditional information storage and management institutions (libraries, archives, museums, etc.) as well as in modern (businesses, various organisations, large data management institutions, etc.) (Description of *the Information Management* Study Programme, 2021). One of the main tools of their work is spoken and written Lithuanian, which is used for creation and processing of various information. Aim of *the IM* study Programme and intended learning outcomes emphasize special skills to provide information services, **utilize various social media platforms, organize informal information and cultural literacy education**, emphasizes social ability to act effectively and communicate in writing and orally in Lithuanian and foreign language in an unfamiliar, changing, interdisciplinary environment (Description of *the Information Management* study Programme, 2021). Thus, graduates of *the IM* study Programme are those representatives of Social Sciences, whose activities are often related to the creation of texts of different functional styles and genres: they have to write various documents, business and personal letters, press releases, advertisements, etc. This means that the literacy of these graduates should be excellent.

The College pays great attention to improving students' literacy: *Professional Language* subject is taught, consultations on language issues are given to the Graduation Paper developers (hereinafter - GP), literacy of all study programmes GP or Graduation Project developers literacy is assessed, which influences the final assessment of the Graduation Paper or project. In particular, it is important to achieve an excellent level of literacy for students of various study programmes of the Social Sciences study field group implemented at the College (including *IM*), whose future work often requires good text creation and presentation skills.

One possibility to test such students' skills is language assessment of GP. Graduation paper - is "a qualifying work of learning outcomes assessment of academic research or project character, analysing a relevant topic according to the requirements of the study programme and the Description developed by the student independently" (Description of the GP Development Procedure, 2019, 1). As the GP is classified as a work of a scientific nature, its language should comply with the requirements of the scientific functional style, and the GP itself should be written in accordance with the norms of Lithuanian language culture, writing, punctuation and typing.

Therefore, for the reasons listed, it is important to know the level of literacy of the College graduates in order to be able to assess one of the aspects of their preparation for paper writing in future.

Literacy of the GP developers of the College *IM* study programme has not yet been analysed in detail, therefore the topic of the study is relevant not only to the students themselves, but also to the teachers who teach *Professional Language* subjects or who have included the use of correct language as the criteria of student works assessment, in order to determine what needs to be corrected in order to achieve the intended study aim and outcomes.

Research problem. A significant part of the students of *IM* study Programme, who have chosen a part time study mode, are middle-aged, i.e. have graduated secondary school a while ago and remember the rules of the Lithuanian language, only if they do self-study. After graduating from the gymnasium, young students coming to the higher education institution in the same or next year are also somewhat forgotten the writing and punctuation, because they were studying in the gymnasium and classes are repeating in the gymnasium. For the above-mentioned reasons, students leave various errors in the Lithuanian language in their written works. These observations prompted to carry out the study and answer problematic questions – what is the literacy of the *IM* Study Programme graduates? What Lithuanian language culture, spelling, punctuation errors and typographical errors are most common? What Lithuanian language learning gaps at school do mistakes reveal? What impact does scientific text make for occurrence of errors?

Research object: *Language of the graduation papers of the Information Management Study Programme.*

Research aim: *to analyze the literacy of the graduation papers developers of the Information Management study Programme.*

1. *Review scientific literature on literacy issues.*

2. *Characterize the literacy problems of the developers of the graduation papers of the Information Management Study Programme.*

Research methods:

1. *Analysis of scientific literature.*

2. *Document content (semantic) analysis.*

3. *Descriptive analytical method.*

Literature review

The topic under discussion is not entirely new in scientific literature, but is still gaining attention. One of the reasons for the analysis of literacy problems is the deterioration of the results of the state examination of the Lithuanian language and literature. In recent years, the number of failed exams was slightly higher than in previous years: in 2020, 10.77 per cent of graduates did not pass the exam, in 2019 – 9.03 per cent of graduates, and in 2018 – 8.75 per cent. The limit for passing the Lithuanian Language and Literature State Maturity Examination is 30 per cent of the task points. In 2020, the average number of points was 53 points (in 2019 and 2018 it was 54.4 points), and even 107 people who failed the exam did not score any points (Lukšytė, 2020). Such results clearly show not only pupils' inability to create text, formulate thoughts, but also a lack of basic literacy knowledge and skills, which are acquired even in primary classes. It is obvious that a part students who have come to higher education institutions to study often continue to demonstrate gaps in Lithuanian language culture, writing and punctuation.

The language of students' scientific works in Lithuania was mainly analyzed from the point of correctness. Numerous linguists discussed students' and pupils' literacy problems: A. Zabarskaitė, A. Smetona, A. Rimkutė, J. Macienė (see Macienė, Rimkutė 2014), J. Vaskelienė (2015), S. Damanskienė (2016), L. Vilkienė (2019). A. Malakauskas (2013) analysed the most common grammar and lexical errors in common spoken and written language, based on texts created by students and other authors. The subject under discussion is interesting not only for scientists, but also for practitioners, i.e. teachers of Lithuanian language (Markevičius, 2019a; 2019b), as well as for an educated part of society not directly related to the teaching of the mother tongue (see Macienė, Rimkutė, 2014). gimtosios kalbos mokymu (žr. Macienė, Rimkutė, 2014). Researchers note that one of the reasons for poor literacy among pupils is the early discontinuation of language classes, because in higher classes "there is taught almost exclusively literature and too little care is taken for literacy" (Markevičius, 2019b, 83). Another reason is "low overall literacy, low self-reading, lack of interest in culture," among pupils who later become students as well as negative relationship with written text or book" (Macienė, Rimkutė, 2014, 55). It also could be noted a technological incapacity "to ensure the use of Lithuanian characters in electronic media (in mobile devices and on the Internet) (Kulbeckienė, Macienė, 2019, 35). Other aspects of literacy are also analysed in the scientific articles. Shortcomings of public language (students and others), which violate logic, were more broadly discussed by I. Jurgaitytė and K. Župerka (2015; 2016), poor student literacy as an obstacle to effective communication by J. Macienė (2016). The shortcomings of the scientific style of students' works were reviewed in more detail by J. Macienė (2018). The topic discussed in this article is an attempt to investigate the literacy of a specific target group – the College *IM* Study Programme GP developers - and to describe the most common errors and typos in the Lithuanian language and present quantitative results.

Methodology

The College pays considerable attention to improving students' literacy: students of all study programmes have 3 credits subject *Professional Language*, the criteria for evaluating written independent tasks related to social or management sciences include the requirement to use a correct language. In addition, one of the criteria of the evaluation of GP or final projects of all study programmes (e.g., The Description Of The Procedure For Developing of GP (2019)) is formulated as "compliance of the paper with the formal requirements of structure, format and correct language".

Since 2019 the college participates in the project "*Consultation of Graduation Papers Developers*" supported by the State Lithuanian Language Commission. The idea of this project is to give GP developers possibility to consult on Lithuanian language issues and to improve literacy competence. As a feedback showing students' level of literacy, GP language is assessed.

In accordance with the Description approved by the College (2019), three GP pages are selected at random for the final assessment of the GP language and errors of spelling, punctuation, language culture and proofreading are calculated therein. It is assessed whether the GP is written in accordance with the requirements of the scientific functional style. Recurring errors of the same type (for example, writing singular accusative case form without a nasal letter for the same word or not distinguishing same parentheses) are counted as a single error. Summary of all found errors leads to the conclusion that literacy is excellent – up to 4 errors, typical – 5–9 errors, threshold – more than 9 errors. A paper written not following the requirements of scientific style cannot be considered of excellent literacy. The research described in this article follows the same error calculation procedure.

Taking into account the provisions of the Description (2019), it is recommended that the members of the Qualification Committee take into account the conclusion of the report on the assessment of the correctness of the GP language and not to evaluate the paper with the highest score (9, 10) which literacy is of a threshold level.

The research material described in this article – 11 graduation papers of the College *IM* Study Programme defended in 2020. Since the College participates in the project only from 2019, and no *IM* Study Programme students graduated in that year, it is not possible to perform comparative literacy analysis of *IM* Study Programme GP developers.

The examples discussed in the article are presented by copying sections of longer texts. Language errors are corrected, analyzed, and commented.

Results

Having analysed the errors of Lithuanian language culture, spelling, punctuation and proofreading found on three pages of each of the eleven GPs of *the IM* Study Programme, it was found that at least one error was found in all GPs, and the maximum number of errors found was 15. Two (18.2 per cent) GP were written only partially in accordance with the requirements of the scientific style. The literacy of five GP developers was rated excellent, four - as typical and two - as threshold. Thus (54 per cent) of GP developers made 5 or more mistakes and 18.2 per cent of GP were not even recommended to be evaluated for the highest scores (9 and 10).

The distribution of results by types of errors is following (see table):

Table 1

Number of errors in eleven *IM* study programmes GP

No. No.	Error type	Total number of errors
1.	Spelling (nasal vowels, long and short vowels, writing words together and separately, capitalization, etc.)	3
2.	Punctuation (punctuation of subordinate clauses, parts of sentence, etc., i.e. compulsory punctuation)	24
3.	Language culture (major lexical, word formation, morphological and syntax errors)	18
4.	Formal (proofreading errors)	22
Total errors		67
5.	Weaknesses in scientific style (clarity, precision, conciseness)	Nine of GP were written in accordance with the requirements of the scientific style; two were written partly in accordance with the scientific style.

The table shows, that GP developers mostly make **punctuation errors** – 35.8 per cent of all errors found. The most common cases of mistakes when typing or not typing punctuation marks are:

1. Punctuation marks are omitted where they should be:

1.1. Separating the subordinate clause from the main clause or when the subordinate clause appears in the main (<...> *turinio iškraipymas yra pagrindinė priežastis dėl ko sutrinka <...>* (= <...> *turinio iškraipymas yra pagrindinė priežastis, dėl ko sutrinka <...>*); <...> *populiariausia paslauga, kuria dažniausiai naudojasi vartotojai yra kultūriniai renginiai* (= <...> *populiariausia paslauga, kuria dažniausiai naudojasi vartotojai, yra kultūriniai renginiai*).

1.2. Separation or emphasis of extended attributive after attributive word (*Įmonės teikiančios paslaugas tikslai gali būti komerciniai arba nekomerciniai* (= *Įmonės, teikiančios paslaugas, tikslai gali būti komerciniai arba nekomerciniai*).

1.3. Separating or emphasizing an insert (*Anot D. Baltrušaičio (2011) <...>* (= *Anot D. Baltrušaičio (2011), <...>*); *Pasak Z. Atkočiūnienės (2009) <...>* (= *Pasak Z. Atkočiūnienės (2009), <...>*).

2. Punctuation marks are put in an unreasonable manner:

2.1. Before conjunctions *ir, bei, arba* (*Taip pat svarbi kliento, bei paslaugos tiekėjo pagalbos integracija* (= *Taip pat svarbi kliento bei paslaugos tiekėjo pagalbos integracija*).

2.2. Before parts of the sentence not separated by comma (*Norint išlikti konkurencingiems, tarp kitų įmonių, reikia <...>* (= *Norint išlikti konkurencingiems tarp kitų įmonių, reikia <...>*).

On the basis of the results of the study, it can be stated that the GP developers of the IV Study Programme type the text inaccurately or lack computer literacy skills, because even 32.8 per cent of the errors belong to the **errors of formal group of errors** (proofreading, typing). The following errors are assigned to this group:

1. Confusion of long and short hyphen (*Sudaryta remiantis 16-17 psl. pateikta teorine medžiaga* (= *Sudaryta remiantis 16–17 psl. pateikta teorine medžiaga*); *Šiuolaikinė biblioteka _ tai ne tik ta vieta <...>* (= *Šiuolaikinė biblioteka _ tai ne tik ta vieta <...>*); *informaciniai = publicistiniai renginiai* (= *informaciniai-publicistiniai renginiai*).

2. Writing non-Lithuanian quotes (*„Sukūrus naujas ir teikiant tradicines paslaugas <...>“* (= *„Sukūrus naujas ir teikiant tradicines paslaugas <...>“*); termino „pasitenkinimas“ reikšmę (= termino „pasitenkinimas“ reikšmę).

3. Inaccurate use of word forms (*informantai dalyvauja daugumoje bibliotekų organizuojamuose renginiuose* (= *informantai dalyvauja daugumoje bibliotekų organizuojamų renginių*).

4. Skipping gaps (*tyrimo objekto, t.y. informacinės elgsenos* (= *tyrimo objekto, t. y. informacinės elgsenos*); *dalyvavo pristatymuose/parodose* (= *dalyvavo pristatymuose / parodose*).

Just over a quarter – 26.9 per cent of errors found in GP texts make **language culture¹ errors** such as:

1. Errors of the words meanings² (*O viena iš geriausių šio modelio savybių yra ta, kad jo dėka galima palyginti <...>* (= *O viena iš geriausių šio modelio savybių yra ta, kad ji taikant galima palyginti <...>*); kurie **apjungti**³ į tris pagrindines dalis (= kurie **su**jungti [suskaityti] į tris pagrindines dalis).

2. Syntax errors:

2.1. Invalid declension (*Organizacija, teikianti tokias pat ar aukštesnės kokybės paslaugas, <...> tampa patrauklesnis darbdavys* (= *patrauklesniu darbdaviu*).

2.2. Incorrect verb form usage (*Remiantis šiais atsakymais galime daryti prielaidą <...>* (= *Remiantis šiais atsakymais galime daryti prielaidą <...>*)⁴.

3. Morphological errors when using the wrong form of gender (*Šiam tikslui imonės yra sukūrę <...>* (= *Šiam tikslui imonės yra sukūrusios <...>*).

The smallest number just 4.5 per cent – GP developers made **spelling mistakes**:

1. Nasal letter is not written in the plural accusative form ending (*išimčiu* (= *išimčių*)).

2. The rule of spelling words together and separately is not followed (*iš kart* (= *iškart*)).

3. Writing nasal letters in the root is mixed (*savybių* (= *savybių*)).

¹ **Language culture** is a branch of linguistics that deals with the management of language facts and codification of language norms and the practice of their use; compliance of speech with established language norms (pronunciation, formation, use of words, etc.) (Gaivenis, Keinys, 1990, p. 96).

² **Word meaning errors** are considered to the **dictionary** (lexical) errors group. It also includes not recommended for usage foreign words, their derivatives and not recommend translations.

³ The word **apjungti** is attributed to errors in the meaning of words and compounds and not to errors of the structure of words (see <http://www.vlkk.lt/aktualiausias-temos/didziosios-klaidos/zodyno/zodziu-ir-junginiu-reiksmes-error>).

⁴ Possible correction of this sentence *Remdamiesi šiais atsakymais galime daryti prielaidą <...>* is not advisable to use in scientific style texts where the personality, i.e. the first person forms, should be avoided.

Two GPs – 18.2 per cent of all GPs of the *IM* Study Programme papers were written only partially in accordance with the requirements of the scientific style. *Scientific style* is „a language of scientific works characterized by subject accuracy, logic, conciseness, generalization, objectivity, completeness, clarity, use of scientific terms, concepts, logically based syntax“ (Vaskelienė 2007, 15)⁵. Considering this, if some of the above mentioned characteristics are not followed by the GP developer, it can be said that the scientific style requirements are not fully or only partially met.

The requirements of the scientific style are closely interrelated, so when discussing one of them, the others are often mentioned. For example, a logically formed text is usually also clear, scientific terminology is used for accuracy of subject, and a comprehensive text often leads to summarisation. Unfortunately, if one of the requirements is not met, the others are usually met as well.

GP developers of the *IM* Study Programme in the text violate the following requirements of the scientific functional style:

1. Clarity and logic (<...> didžioji dauguma klientų teigiamai vertina <...> (= <...> didžioji dalis, dauguma klientų teigiamai vertina <...>) – “dauguma” can not be neither big nor small).

2. Clarity and correctness (<...> kurie pateikė pagrindines socialinių tinklų populiarumo priežastis internete (= <...> kurie pateikė pagrindines socialinių tinklų populiarumo internete priežastis) – it is not clear from the sentence whether reasons are provided on the Internet or whether the social networks themselves are popular on the Internet); kurie apjungti (= sujungti) i tris pagrindines dalis (= kurie suskaidyti i tris pagrindines dalis) – it is not clear what is meant from the sentence - the merging of small elements into larger groups or the initial separation of elements according to certain attributes).

3. Objectivity (Išanalizavus šiuos argumentus, galima teigti, kad SERVQUAL metodas yra nuostabus dėl savo efektyvumo <...> (= Išanalizavus šiuos argumentus, galima teigti, kad SERVQUAL metodas yra tinkamas dėl savo efektyvumo <...>); (Tai yra džiuginantis rezultatas imonei (= Tai yra teigiamas, geras, puikus rezultatas imonei) – when using words that describe strong emotions, objectivity is lost, a subjective attitude of the author is presented, which brings the text closer to the publicist style⁶).

4. Logic, logically based syntax (Bibliotekos, kaip organizacijos įvaizdžio formavimas, gali būti gana efektyvi priemonė potencialių vartotojų elgsenai veikti (= Bibliotekos, kaip organizacijos, įvaizdžio formavimas gali būti gana efektyvi priemonė potencialių vartotojų elgsenai veikti) – improperly placed punctuation marks destroy logically based syntax, so the sentence becomes confused, the idea is formulated unclearly, the text seems illogical).

Summarizing the analysed study results, it can be stated that the GP developers of the *IM* Study Programme are best proficient at Lithuanian language spelling rules, but often make mistakes when placing punctuation marks, make a number of linguistic errors and print text inaccurately or do not have computer literacy skills.

Since at the College, *Professional Language* subject focuses on the language of science, professional language and texts, and does not review spelling and punctuation rules, it can be assumed that assessment results for literacy are partly due to the gaps in spelling, punctuation and language culture taken from school.

The results of the assessment of literacy of GP developers of the *IM* study programme suggest that the use of scientific style does not have any significant impact, since the errors found in BD are mainly related to the lack of skills in punctuation, language culture and text typing on a computer.

Conclusions

1. Graduates of Šiauliai State College *Information Management* Study Programme are specialists, and in their activities literacy is one of the main competencies, therefore the aim and intended learning outcomes of the studies, the content of the programme and additional measures are also focused on the development of this competence.

2. When assessing the literacy of GP developers, the language of GP is assessed and the results obtained affect the final GP assessment.

3. On average, the literacy of the GP developers of the *IM* Study Programme is typical when 5–9 errors are found in the GP pages being analyzed. No GP was written without errors, the maximum number of errors found was 15. Two GPs were written only partially in accordance with the requirements of the scientific style.

⁵ Similarly, the scientific functional style is described by other linguists: K. Župerka (2012), A. Bitinienė (2013).

⁶ One of the most important functions of the publicist style is the influence, which is achieved both by arguments and verbally (see Bitinienė, 2007).

4. According to the types of errors, more than a third of errors in the GP of the IM study programme are punctuation errors, and almost a third are formal errors. The smallest number of errors are spelling errors in GP. The main errors are punctuation of subordinate clauses, attributives, explanatory parts, insertions, cases, usage of verbs errors, incorrect usage of words *įtakoti*, *gautis*, *sekantis*, etc. The results of the assessment of literacy suggest that the use of scientific style does not have any significant impact, since the errors found in GP are mainly related to the lack of general language usage and typing on a computer skills.

5. It is recommended that teachers delivering the subject of the Professional Language for the IM Study Programme or teachers who include the use of correct language as the criteria for the assessment of students' works pay more attention to the development of students' literacy competence: discuss mistakes, clearly define the impact of mistakes on the final evaluation of the paper.

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THE EXPRESSION OF THE POTENTIAL OF LITHUANIAN MUNICIPALITIES IN THE FIELD OF SMART PUBLIC GOVERNANCE AND SMART SOCIETY

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Annotation

The article analyses the fields of smart public governance and smart community in the Lithuanian municipal system. Based on the authors' works, that investigated the concept of a smart social system and such smart systems as smart public governance and smart community, the appropriate models of these systems were developed for Lithuanian local self-governance. It was found that in the case of municipalities, in the field of smart public governance, strategic dynamism, inter-sectoral cooperation/networking, and empowered citizenship are treated similarly, and the dimension of inter-institutional cooperation is slightly weaker compared to the other mentioned dimensions. In the case of the smart community, digitalisation, knowledge-driven, learning, and sustainability dimensions stand out, while the dimensions of networking, innovation, and agile response are rated slightly lower, while intelligence and social responsibility are rated the lowest of all the dimensions assessed. Such insights have been based on expert interviews.

Key words: smart social system, smart municipality, smart public governance, smart community.

Introduction

The conceptual model of the smart region proposed by Sinkienė and Grumadaitė (2014) distinguishes three areas: public governance, community and economy. The author of this article states that a municipality is a precisely-defined territory that performs the political and administrative functions of the state sub-national government level, therefore the concept of a smart region is considered appropriate to analyse the concept of a smart municipality as a territorial unit. Hereby, the objective of the work is to justify the trajectory of change in the expression of municipal potential in the creation of a smart social system. Therefore, this article focuses on two areas identified in Sinkienė and Grumadaitė's smart region model – smart public governance and smart community (2014) as well as their expression, at the level of municipalities as a smart social system.

To achieve this goal, the author introduces the model of smart public governance, its dimensions and analytical approach at the beginning of the study. Subsequent analysis of the model of smart public governance shows how it can be applied to local self-governance, what quantitative and qualitative characteristics can be used for the analysis of this social system.

In the case of a smart community, the author could not find a suitable model already developed, similar to the one used in the case of smart public governance, so he returned to the characteristics of a smart social system proposed by Jucevičius (2014). Based on the works of Jucevičius and other authors, a system of quantitative and qualitative characteristics of a smart community has been created.

An empirical study was conducted using the quantitative and qualitative characteristics of the systems of smart public governance and smart community. The article presents its results revealing the expression of the dimensions of the mentioned areas at the local level.

Smart public governance in the case of local self-governance

Šiugždinienė, Gaulė and Rauleckas (2019) in their article *In search of smart public governance: the case of Lithuania* state that governments must react proactively to new economic and social challenges and complex public policy problems and seek new solutions to such problems. This type of thinking is described by the authors as smart thinking. In order to understand how to describe smart public governance, the model of a smart public governance system with 4 dimensions and 9 characteristics developed by Stanislovaitienė, Gaule and Šiugždinienė (2017) could be taken into consideration (Fig. 1).

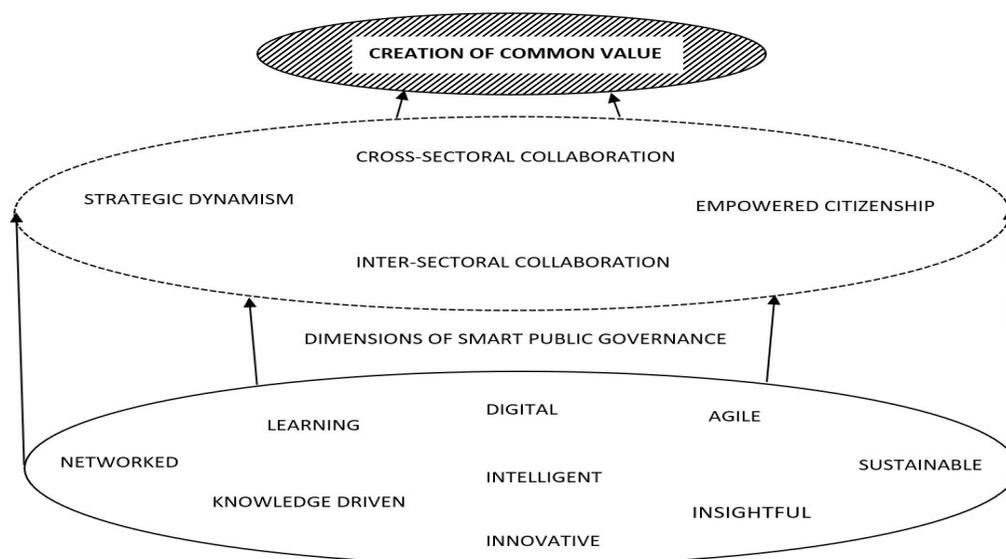


Fig. 1. A model of a smart public governance system with 4 dimensions and 9 characteristics
Source: Stanislovaitienė, J., Gaulė, E., Šiugždinienė, J. (2017)

Šiugždinienė, Gaulė and Rauleckas (2019) presented these dimensions in more detail:

Strategic dynamics is defined as the ability of leaders to see complex policy challenges and to respond proactively and flexibly to emerging crises. It also requires the ability to recognize strategic and structural changes, to respond in a timely and organized manner. In addition to strategic dynamism, two characteristics that define it are distinguished: a) strategic insight, b) sensitivity and flexibility of resources.

The second dimension of smart public governance that has been identified is **cross-sector collaboration**. It is a form of action between different sectors (public, private, NGO) that acts in decision-making in the public sector. It is based on the belief that the sharing of information and resources enables the best possible result to be achieved, which would not be possible for organizations from different sectors acting alone. This dimension has three distinct characteristics: shared leadership, collaborative platform, and shared responsibility.

The networking is third dimension, distinguished by Šiugždinienė, Gaulė and Rauleckas (2019). Cooperation with ministries, their departments, agencies and different levels of government needs to be coordinated in the form of a network. The importance of coordination competencies is highlighted. The success of networking depends very much on the use of network management abilities, skills, integrative working methods. Networking requires strong communication competencies within the civil service. Leaders of society are expected to communicate humanly, impartially, which would replace the established autocratic model of communication. The impact of modern information technologies is important in promoting closer communication, exchange of experience and knowledge between different institutions.

The last dimension of smart public governance emphasized by Šiugždinienė, Gaulė and Rauleckas (2019) is **empowered citizenship**. It is a specific form of communication between the government and citizens in the decision-making process, ensuring the transparency, openness and empowerment of citizens in the general development of public services. In the context of smart public governance, there is a change of direction from the responsibility of the government to inform and consult citizens towards cooperation between the government and citizens, towards empowerment of citizens. For this to be successful, two essential characteristics need to be considered: the opportunity to participate and the feedback.

Considering the presented model of smart public governance and the descriptions of dimensional expression, an attempt can be made to adapt it to the local level (Table1).

Table 1

A system of smart municipal public governance characteristics

Criteria	Qualitative characteristics	Quantitative characteristics
Strategic dynamism		
Strategic insight and sensitivity	External changes in the environment are monitored regularly Risks, challenges and opportunities are assessed in a timely manner	Environmental changes are monitored and regularly systematized, analysed and evaluated There is an institutionalized system for assessing external environmental changes

Criteria	Qualitative characteristics	Quantitative characteristics
	Fact-based and knowledge-based strategic decision making Speed of strategic decision making	Strategic decisions are made according to analytical assessments Different data sources are used, experience based on different sources Strategic decisions are made in a timely manner
Resource flexibility	Flexibility in the redistribution of financial resources Level of autonomy of government organizations The human resource management system guarantees mobility and opportunities to attract external resources	Active prioritization system Resources are reallocated to achieve strategic goals Public authorities can manage human and financial resources independently Public authorities can use internal and external resources to achieve strategic goals An existing staff rotation and mobility program
Cross-sectoral cooperation/networking		
Shared leadership	The principles of shared leadership are revealed in the actions of leaders Leaders encourage collaboration and involve other stakeholders	Leaders act as political entrepreneurs, promote new ideas, innovation, forgive for mistakes Leaders can agree with stakeholders to reach a consensus Leaders encourage and engage stakeholders in building mutual trust
Collaboration platforms	Stakeholders are involved in the process of preparing and making strategic decisions There are different platforms for collaboration Strategic decision-making is based on negotiation and consensus Strategic decision-making is based on quality information	Different interest groups are involved in decision-making There are different platforms for collaboration Representatives of different interest groups are empowered to represent their institutions Strategic decisions are made by consensus Strategic decision-makers share all available information with each other
Shared responsibility	There is mutual trust between the partners in the decision-making process General responsibility for the assumed goal General understanding of the problems	Representatives of different interests are involved in the development of strategic decisions and trust in the process Representatives of different interests share the responsibility for the decisions made Participants in the decision-making process share a similar vision, speak a similar language
Inter-institutional cooperation		
Collaboration platforms	Inter-sectoral inter-institutional cooperation is taking place Flexible, supportive, hybrid structures and teams are developed	There are horizontal integrated inter-institutional programs Public authorities work together to achieve strategic goals, even if this conflicts with the direct interests of their authority Public authorities work closely together to develop cross-sectoral programs Representatives of different authorities successfully share information There are systems in place for accountability for commitments
Collaborative competencies	Shared leadership	Leaders understand the importance and benefits of cooperation There is trust between the representatives of the different institutions Different authorities have the possibility to connect to common information systems
Empowering citizens		
Opportunities for participation	There are appropriate conditions for citizen participation Competencies for active citizen participation are developed	There are communication and citizen participation strategies to help make decisions There are procedures for citizen participation in public governance There are different platforms for citizen participation Different citizens' initiative programs have been set up to encourage citizen participation The government cooperates with different civic communities in decision-making
Feedback	Quality feedback reaches citizens Government is open, accountable and transparent	Government websites are clear, easily accessible, and the information provided is relevant and transparent The government shares all information relevant to citizens Citizens receive appropriate, comprehensible and clear answers to the questions asked

Source: compiled by the author according to Šiuoždiniene, J., Gaulė, E., Rauleckas, R. (2019)

Smart community in the case of local government

The third part of the smart region model according to Sinkienė and Grumadaitė (2014) is the *smart community*, which in many smart social systems is treated as a society. However, such a clear definition of the concept of a smart society as in the case of a smart economy or smart public governance has not been found in an analysis of the academic literature. We have to follow the already existing models, in which the dimension of the smart society is at least partially represented.

Analysing the development of smart cities, Borkowska and Osborne (2018) underlined the role of society in the process of smart city development. According to them, the human factor has the potential to drastically improve local development by ensuring that the vision of a smart city would not be separated from citizens and society. The human factor, i.e. society, guarantees that information and communication technologies will make a significant contribution to the common welfare. The above mentioned authors argued that the concept of a smart city in the sense of a relationship goes much further than the relationship between citizens and a service provider. In the case of the smart city concept, society becomes much more active and engaging, for example, by providing feedback in terms of service quality, state of infrastructure or the environment created. It commits to ensure the environmental sustainability and seek a healthy lifestyle, participates in voluntary public services and assists various minorities. It is society that can be the driving force that enables innovation to move from narrow technological progress to tackling urban challenges alongside with sustainability. The public is involved in the planning, implementation and evaluation of various smart city initiatives.

Cortes-Cediel, Cantador and Bolivar (2019), analysing citizen involvement and participation in smart cities in Europe, noted that public involvement in smart city initiatives has been growing significantly across Europe since 2015. This is confirmed by the growing number of studies on this theme under analysis. Public involvement and cooperation lead to increasing participatory democracy in our countries.

However, in the absence of a clearly defined model of smart society, we have to look back at eight dimensions of smartness of the smart social system proposed by Jucevičius (2014) and try to apply them to the case of smart society as a separate smart social system.

Regarding the dimension of digitalisation, Jucevičius, Patašienė and Patašius (2014) emphasized that many social systems can be smart, based on information and communication technologies, but these technologies operate taking into account and adapting to environmental conditions. Digitalisation is highly dependent on the environment.

Jucevičius and Liugailaitė-Radzvickienė (2014) emphasized that smartness in the case of society first manifests itself in the perspective of economic value creation. In this concept of smart society, the authors also took advantage of other characteristics of a smart social system.

Based on the characteristics of a smart social system according to Jucevičius (2017) and Stanislovaitienė (2016), similarly to the case of smart public governance, the author of this article compiled a system of characteristics of a smart community (Table 2):

Table 2

A system of smart community characteristics

Dimensions	Qualitative characteristics	Quantitative characteristics
Intelligent	The community understands the benefits of smart initiatives, is willing to participate in them, is able to scan the environment to achieve its goals. The community has a clear understanding of its strengths, is able to present and use them, has a clear identity of its own. Attitudes of members of society towards digital technologies, their use for their own purposes.	The amount of open data shared by the local community. The number of initiatives of smart social system (city, region, municipality).
Knowledge-driven	How the prestige of higher education is valued in society. The public is willing to use the latest technology. Representatives of the community willingly share and look for examples of good practice; they successfully apply them in their activities.	The part of society with higher education. Involvement of the community, its representatives and members in good practice sharing activities. The part of society that has a personal computer, an internet connection, uses smart technology.
Learning	How active people tend to be in lifelong learning. The community is willing to get involved in pilot project activities.	The number of third age university visitors. The number of pilot initiatives implemented.
Networking	The public clearly supports increasing networking, willing to provide their public data. The community tends to form associated structures.	The number of active communities in the municipality. Amount of open data, their availability. Involvement of the community in the

Dimensions	Qualitative characteristics	Quantitative characteristics
Innovative	The public is willing to accept digital services, to use them boldly. The community provides feedback to the government on the quality of services received, is willing to accept innovations, and tends to improve them.	activities of associated structures. The number of people using the e-services. Feedback from people who have used the services.
Digital	The public supports digital government initiatives, willingly providing feedback.	Proportion of households using computers and the Internet.
Sustainable	How well the public understands the decision-making process at the local level. Does the community tend to involve young people in its activities, give them responsibility. Public attitudes towards renewable energy sources. Is the public's attitude towards environmental pollution changing in a positive direction?	Share of sorted waste from total waste stream. The number of members of society using renewable energy sources for energy production. The number of young community members and young leaders.
Agile	Do people tend to sign various petitions, actively collect signatures needed to identify various problems. How willingly and quickly members of the community are able to focus in the face of a threatening situation in the community.	Unemployment rate in the municipality. The number of petitions, complaints, feedback received.
Socially responsible	How willingly people participate in social mutual aid campaigns. Representatives of the public willingly participate in project publicity events. Initiatives to reduce inequality are organized in the community.	The number of non-governmental organizations in the municipality. The number of social business initiatives in the community.

Source: according to Stanislovaityienė, J. (2016)

The evaluation of Lithuanian municipalities in the fields of smart public governance and smart community

In order to find out the expression of the dimensions of smart governance and smart community of local self-governance, expert interviews were conducted, using the developed systems of quantitative and qualitative characteristics. The experts interviews were conducted on the basis of a questionnaire. The questionnaire consisted of indicative questions, which were specified or clarified during the interviews, therefore they were called guidelines. The questionnaire was based on conceptual model of smart region proposed by Grumadaitė and Sinkienė (2014). According to it, the questionnaire was divided into three blocks: smart economy, smart public government and smart community. The questions of smart public governance was based on the work of Stanislauskienė, Gaulė and Šiugždinienė (2017). In order to examine the smart community in the absence of academic access, the author returned to the characteristics of the smart social system proposed by Jucevičius (2014) and, based on the works of Jucevičius (2017) and other authors, compiled the relevant questions. The clear guidelines of the questionnaire helped to reveal clear and specific views of the experts on the issues of concern. Experts provided answers to open questions using semi-structured interviews as the preferred method of collecting qualitative data, allowing for detailed data based on pre-formulated survey questions.

Experts were selected by method of criterion selection, according to the smart region model (2014) proposed by Sinkienė and Grumadaitė (2014), selecting experts who would represent all 3 dimensions smart public governance and smart community included. It was also sought that the experts in their of activity should be closely related to local government, by participating in municipal policy creation or administration, researching self-government institutions through research or closely cooperating with municipalities in their activities. All experts, despite their high level of employment, agreed in good faith to participate in the study. The list of experts involved in the study is presented in Table 3. The analysis of the data obtained during the research was performed by classification: the identified statements of the experts were divided into areas and dimensions, reflecting the concept of an smart social system. A total of 3 main areas and 24 dimensions have been identified, thus structuring the information provided by the experts. The answers of the experts enabled the author of this study to assess the expression of the potential of municipalities in creating smart social system.

Table 3

List of experts

Expert	Experience in municipal field, by years
The head of the Chamber of Commerce and Industry	23
The director of Business Incubator	21
The mayor of local municipality	13
The head of local communities' action group	10
The academic, doctor	6
The member of Lithuanian parliament member of the Committee on Local government and Municipalities	5
The representative of the Council of Lithuanian Youth Organizations	4
The adviser of the Association of Lithuanian Municipalities	2

Source: compiled by author

Based on the obtained results, dimension expression tables were compiled. Summarizing the obtained data, it can be stated that in the case of smart governance, significant progress has been made in all four dimensions, but still there are slight shortcomings in each dimension. The expression of all dimensions was rated as average. Although inter-institutional cooperation is also rated on average, it appears to be somewhat weaker compared to other dimensions. The table below summarizes the expression of all four dimensions. Strategic dynamism, cross-sectoral cooperation and citizen empowerment are highlighted in yellow, while inter-institutional cooperation is highlighted in orange. In the case of the smart community, the expression of these dimensions at the local self-governance level was evaluated after conducting expert interviews. All nine dimensions were rated as average according to the experts. Digitalisation, knowledge-driven, learning and sustainability were rated as strongly moderate (highlighted in light green), intelligence and social responsibility – as moderately weak (highlighted in orange). The other dimensions – networking, innovation and agile response – are just average (highlighted in yellow). The information of dimension expression for these areas is presented below (Tables 4 and 5):

Table 4

The evaluation of smart public governance in municipalities

Field	Smart public governance	Evaluation of Experts
Smart Public Governance	Strategic dynamism	Average
	Cross-sectoral collaboration	Average
	Inter-sectoral collaboration	Weaker than average
	Empowered citizenship	Average

Source: compiled by author according to the evaluation of experts

Table 5

The evaluation of smart society in municipalities

Field	Dimensions	Evaluation of Experts
Smart Society	Intelligent	Weaker than average
	Digital	Stronger than average
	Knowledge driven	Stronger than average
	Learning	Stronger than average
	Networked	Average
	Innovative	Average
	Sustainable	Stronger than average
	Agile	Average
	Socially responsible	Weaker than average

Source: compiled by author according to the evaluation of experts

Conclusions

Governments must respond to new and emerging public and public policy challenges and seek new and effective ways to address them. In such a situation, a need for smartness arises. Researchers distinguish the areas of smart public governance and smart community when examining the concept of a smart region. However, their most frequently investigated subjects were cities, regions, and states. This article looked at the areas of smart community and smart public governance through the prism of local self-governance. Therefore, on the basis of academics' studies as well as similar concepts, the systems of quantitative and qualitative characteristics of smart community and smart public self-governance at the local level have been substantiated in the present article.

After designing the models of these systems, expert interviews were conducted to assess the current expression of the dimensions. Summarizing the obtained data, it can be stated that in the case of smart governance, significant progress has been made in all four dimensions, but there are still some shortcomings in each dimension. The expression of all dimensions was rated as average. Although inter-institutional cooperation was also rated as average, it appears to be somewhat weaker compared to other dimensions.

In the case of the smart community, all nine dimensions were rated as average according to the experts. Digitalisation, knowledge-driven, learning and sustainability were rated strongly moderately, intelligence and social responsibility as moderately weak. The other dimensions – networking, innovation and agile response – were rated as average.

Such an analysis of the expression of the dimensions of smart public governance and smart community in Lithuanian local self-governance allows to properly evaluate the current situation, envisage areas for improvement and plan actions to increase smartness at the local level, but this is not the subject of this article.

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Received: 24 March 2021

Accepted: 31 May 2021

MEDIATION PRINCIPLES IN SOCIAL WORK

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Annotation

The article presents mediation concept and its expression in social work. Mediation principles applied in social work when solving family social problems have been analysed. Mediation is analysed as a procedure of dispute resolution when one or more mediators help the parties to settle the dispute amicably. The main family mediation principles applied in social work practice while implementing mediation process have been analysed.

Key words: mediation, social work, mediator, mediation principles.

Introduction

Trying to solve the conflict it is necessary to communicate, however, improper communication may provoke a conflict. Social worker working in a family can help families and their members to survive difficult periods by providing support. Social worker – mediator, who consults disagreeing and conflicting parties, intermediates resolving their disputes. This process is defined as mediation. One of the most relevant skills of conflict resolution – effective communication. Mediation concept emphasizes that proper communication can help to solve a conflict when family members make amicable decisions. Mediation is an alternative to court, voluntary, confidential procedure of dispute resolution where one or several third-party independent, impartial persons – mediator and/or mediators help the disputing parties to achieve acceptable dispute solution (Kaminskienė et al., 2013). According to Zaksaitė and Garalevičius (2009) family conflict mediation is the conflict solution process when the third neutral party (mediator) stimulates and helps the conflicting parties to reach a mutual agreement.

The topic of mediation is also actualized by practical context. According to the data of Lithuanian court information system, 483 judicial mediation processes were initiated in 2018, i.e. compared to 2017, there were 11% less of judicial mediation processes indicated in statistical reports (540 cases in 2017, 313 - in 2016, 123 - in 2015). In Lithuania mediation in social work is not yet widely applied. However, while analysing the order of the Minister of Justice of the Republic of Lithuania, “On the Approval of the Conception of Development of Applied Mediation System”, it is indicated that in Austria, Belgium, Latvia, Poland mediation is voluntary; in case of judicial mediation, the court may refer the dispute to mediation only upon the consent of the parties. If the party does not participate in mediation, there are not any negative consequences. In Finland mediation is not compulsory. The court may offer the parties to resolve the dispute in such a way however, it cannot oblige them. In Germany, Estonia mediation is voluntary, however, the court may suggest it. In France mediation is voluntary and may be applied in all disputes if this does not violate public order. In Croatia in many cases mediation is voluntary, however, the compulsory mediation cases are also foreseen. In Norway mediation is compulsory in some family cases (when the spouses or couples living together are getting divorced and have children under 16 years when the issue of parents' duties, child's place of residence, parental meetings with children are being solved).

In Lithuania Kaminskienė (2010; 2013) was the most interested in the topic of mediation. She investigated mediation process as an alternative solution of disputes in civil and commercial law, analysed the opportunities and challenges of compulsory mediation. Sondaitė (2004) performed a comparative analysis of mediation styles, later in 2006 she analysed the experiences of foreign countries in the sphere of family mediation. T. Milašius (2007) considered mediation as a reasonable way of dispute resolution. Zaksaitė, Garalevičius (2009) disclosed the opportunities of judicial and nonjudicial mediation of family disputes, Žukauskaitė (2012) analysed the opportunities of application of mediation in the process of adolescent crime interpretation, Mačiulienė, Venckevičienė (2016) laid emphasis on expression of mediation in probation, Čiuladienė, Lasinskas (2018) analysed conflict resolution through mediation at universities. The following foreign authors have researched mediation process in various aspects: Haynes, G. L. Haynes, Fong (2004) analysed mediation process as positive conflict management, Cremin (2007), Smithson et al (2017) – mediation in the family. Phillips (2001)

analysed mediation in business, organization, family life. Prūžinská (2013) emphasized social and educational mediation aspects. Having analysed theoretical and practical insights and aspects of various authors, it has been noticed that there is still little discussion in scientific literature about mediation in the context of social work. Therefore, in the article the following **problematic research** issues have been formulated:

1. How the concept of mediation is defined and analysed by various researchers?
2. What are the principles of mediation in social work practice?

The object of the research – principles of mediation in social work.

The aim of the research – **to analyse the principles of mediation in social work practice.**

The tasks of the research:

1. To conceptualize the concept of mediation referring to the scientific information sources.
2. To determine the expression of mediation principles applied in social work when solving social problems of a family.

Research methods: **scientific literature analysis, semi-structured interview, qualitative content analysis.**

Expression and regulation of mediation

The European Code of Conduct for Mediators (2004) mentions that mediation in a family is a valuable alternative means of family dispute resolution under certain circumstances considering that it is not the only means for resolving all family problems.

Mediation – the court alternative, voluntary, confidential procedure of dispute resolution where one or several third independent and impartial persons – mediator or mediators – assist in reaching acceptable solution of the dispute for the disputing parties (Čiuladienė, Lasinskas, 2018, p. 81). Therefore, first of all mediation should be considered as an alternative phenomenon that helps to resolve a conflict situation of dispute out of the court. Tvaronavičienė and Kaminskienė (2019) also emphasize that mediation is one of the fastest developing method of dispute resolution in the world. This process is suitable and perfectly applied in various cultures and jurisdictions. In some countries mediation consolidates naturally and is widely applied as an inseparable part of juridical culture (many countries in Africa, as well as Japan, China, Vietnam, Australia). In other countries it is necessary to consider additional means so that this alternative method of dispute resolution would become more popular and would be widely applied. Lithuania also belongs to the group of these countries (p. 53). Referring to these aspects, we may presume that application of mediation in Lithuania in practice is still at the initial stage. In Lithuania from 1 January, 2020 the Provision of the Law on Mediation on **mandatory mediation** in family disputes entered into force. According to it, it is mandatory to contact the other dispute party with a proposal to solve the conflict through mediation before going to court.

According to Tvaronavičienė and Kaminskienė (2019), mandatory mediation in Lithuanian Law appeared as the means stimulating application of mediation in emotionally sensitive disputes among the persons who are related by long-term relationships and when it is necessary to ensure children's interests. This change has been determined by inefficiency of previous legal regulation, because before the adoption of the Law on Mediation on 29 June, 2017 out-of-court mediation was not developed and unlike in other countries it did not provide actual benefits to the society. In methodical publication of mediator's guide (2019) the question what constitutes mediation is usually answered following the definition provided in Part 3, Chapter 2 of the Law on Mediation stating that mediation is the procedure of dispute resolution when one or several mediators assist the parties to resolve the dispute amicably. Mediation is a professional activity excluding the judicial mediation implemented by the judges⁷.

While analysing mediation and its position in social work, it is necessary to define the term "conflict". Conflict is a state of persons' relationships occurring as psychological tension, it is a struggle of resistance between principles and aims, feelings and interests (Budeva, 2019). Routine work of social workers involves various conflict types between the clients and their social environment. An important part of professional responsibility of a social worker is to productively manage conflicts. Mediation and social work have a similar aim: to help to solve person's problems (Budeva, 2019). Thus, mediation between the conflicting parties is essential and may help to find a way out of a conflict situation.

Osmuk (2014) emphasizes that interpersonal conflicts usually are solved by one out of the three processes: negotiations, arbitration or mediation: a) *negotiations* are a process when

⁷ The Law on Mediation of the Republic of Lithuania. 2008. The current consolidated version came into force on 1 January, 2020. Internet access <https://e- January, seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.325294/asr>

the parties themselves try to resolve the conflict through the direct discussion with each other; b) in case of *arbitrage* the third party (court, supervisory or other institutions) control not only the process but also the end of the process. The arbitrator(s) sets the result of the process; c) *mediation* is a form of conflict resolution with the help of the third, neutral, impartial party whose aim is to help the two parties to resolve conflict situation. Mediation is a “peaceful” means of dispute resolution. The mediator motivates the parties to look for a constructive dispute resolution acceptable to both parties. Each mediation process contains two aspects: managing the process of dynamics and understanding the essence of the conflict. When analysing the main practical principles of Family Mediation Council⁸ the following family *mediation principles* have been distinguished:

The *principle of impartiality* shows that the duty of a mediator is to ensure impartial treatment of a family and not to violate family’s interests with his/her conduct. It means that a mediator should not be bound by personal benefits of the outcomes of the conflict. While solving family’s situation it is very important to remain impartial because it is one of the most important requirements for a mediator. Hence, while analysing family’s situation and resolving a conflict it is essential not to support one of the parties or distinguish the right and wrong family members, but to consider the essence of the situation. When making decisions it is purposeful to formulate them for the whole family not distinguishing one member whose fault or responsibility can be less or bigger.

The *principle of voluntary participation* shows that mediation is a voluntary process and conflict parties can withdraw from this mediation process at any time.

The *principle of neutrality* shows that a mediator must always remain neutral as to the outcome of the conflict. In the process of mediation it is not necessary to offer a result but one should seek that conflict parties themselves would find the most acceptable decision.

The *principle of confidentiality* is very important. Following it, the mediators may not reveal any information to the third parties except the cases when dispute resolution reaches the court. Moreover, in case of a risk to child’s safety, the mediator may send the information to the children’s rights enforcement services. The confidentiality of client’s information and data is necessary because mediation is applied to resolve very delicate situations and the facts that appear in public may cause difficulties in communication with the family and the outcomes may be unfavorable due to mediator’s fault. The CEPEJ document of assurance of implementation of mediation guidelines (2018) emphasizes that all information related to mediation is confidential, the providers of mediation services are to take all necessary reasonable measures to preserve confidentiality determined by appropriate laws and rules and (or) agreed by the parties (Mediation Development Toolkit, 2018).

The mediator also has to follow such principles like *children’s welfare* that must be given special attention during the process of mediation. In addition, mediators have to be careful about the disbalance of power in the family. In all cases mediators must try to ensure that all participants would participate in mediation willingly without fear of violence or any harm.

Mediation practice in foreign countries

In foreign countries mediation process in social work is not a usual form of work of social workers. However, mediation process actively entrenches in social work when solving family problems and every country emphasizes similar principles. Mediation and social work have many methods, similar aims, for instance to provide more opportunities to people regarding the principles of equality, justice and social welfare as well as pursue consensus and comprehension of people, groups and communities. In mediation and social work confidentiality is the fundamental value.

In foreign countries mediation is applied in various ways: in some countries it is a well-known process whereas in other – only the first attempts to implement it. P., Th. Kalliath, Xi and Ch. Chan (2019) state that when working with families social workers often experience stress what negatively affects their satisfaction with work. Therefore, mediation while solving family disputes may be considered as one of the aspects of social workers’ satisfaction with work. The research carried out by the above-mentioned authors has revealed that social workers’ experience satisfaction with performed activity when the dispute is solved in a family-friendly way.

Fan and Lu (2019) analysed the influence of social workers’ mediation on children left by their parents. The results of this study revealed that mediation of social workers when they help

⁸ General Principles for mediators and mediator. Internet access: <https://www.familymediationcouncil.org.uk/us/code-practice/general-principles/>

children abandoned by their parents to communicate with their peers and adults has a favourable impact on children's psychological condition and welfare. Hence, mediation process can occur not only in the family but also outside it, but the essential issue is that a mediator has to help to solve various conflicts.

Zhou, da, Zhang (2016) researched the conflicts in the families of working and non-working women raising their children. The mediators of social work analysed the reasons of conflicts in the families. Their research has revealed that women raising children are more likely to have conflicts in the family if they work because job issues influence their psychological welfare and health. Therefore, mediator's help is necessary trying to distinguish work and family problems, to help conflicting parties to understand that work problems do not have to cause problems at home. Mediator's help is essential when realizing the essence of the problem, providing opportunities for both conflicting parties to perceive the origin of the problem and solve it.

Martingo (2018) states that in Portugal family mediation is just an alternative method of conflict resolution which has only recently been introduced. However, according to the author, mediation may help families to carefully evaluate motives and provisions of the conflicting parties. When implementing mediation, resolution of family problems is performed avoiding the court, finding the solutions. According to the mentioned author, mediation process should be applied more often especially when solving conflicts in the families where there is no high social risk and it is possible to find the ways and opportunities to search for real solutions of the problems.

Trenczek and Loode (2012) emphasise that mediation in Germany is based on the practice of Australia and other countries, however, it is distinguished by originality since in many cases mediation processes are completed by signed peaceful treaties and an implemented peaceful social dialogue. In Germany mediators look for a closer relationship with conflicting parties by organising meetings so called "parties". Such meetings allow a mediator to get a better view of both parties and help them to understand each other better. In Germany social mediators try to create the atmosphere of trust. When communicating separately with each conflicting party, a mediator has an opportunity to clarify the situation and present personal insights.

Presenting the mediation in France Grima and Paile (2012) state that first of all mediation is emphasised in work relations. However, recently social problems are started to be solved. With the help of mediation initial surveys are carried out, opportunities of peaceful negotiations are sought. If a mediator fails, all collected material is sent to the court.

Research results and their analysis

Semi-structured interview has been selected for the research. In the survey we used a targeted convenient sampling with eight mediators who have a degree in social work and apply mediation in the practice of social work. Research participants have been coded (I1-I8), trying to preserve the principles of ethics, confidentiality and anonymity. The obtained data was analysed using qualitative content analysis.

While analysing the experiences of respondents, it has been noticed that the clients participate in mediation process only voluntarily since the main principle of mediation is volunteering. Sometimes doubting clients are persuaded to select participation in mediation process when they find out the benefits, there is no forced mediation. Having analysed the participants' responses, it became obvious that in case at least one participant refuses to participate in mediation process, mediation is not implemented. According to the informants, in case of voluntary process there is an opportunity to withdraw from it. Therefore, mediation is not an established procedure where participation is inevitable, it is a kind of a process that conflicting parties should voluntarily ask for themselves or select from suggested options.

Mediation is usually applied in conflict situations, therefore, we tried to analyse in what situations mediation is effective (see Table 1).

Table 1

Situations when mediation is effective

Category	Subcategory	Number of statements	Confirmative statements
Effectiveness of mediation	The start of the dispute	3	<i><.while solving the problems of family relationships when the crisis in the family does not yet have negative consequences for family's future..> [I1]; <.conflicts of the parties appear not because of certain facts, but because of parties' principles..>[I6].</i>
	The beginning of mediation	1	<i><.there are various techniques how to get out of</i>

Category	Subcategory	Number of statements	Confirmative statements
	after overcoming the crisis		<i>a crisis situation so the mediation can take place..>[12].</i>
	Dispute parties' respect to each other	1	<i><..in which persons are related by personal relations and these relations are tried to be preserved..>[14].</i>
	Compliance with the taken decisions	1	<i><..when all participants of a crisis situation willingly accept help and follow the agreements ..>[17].</i>
	Dispute parties are not able to solve the conflict	1	<i><..where the conflict prevails and conflict parties are unable to resolve the conflict themselves..>[15].</i>
	Agreements regarding communication with children	1	<i><..they have to communicate because of children, so they have to make agreements acceptable to both parties..>[18].</i>

According to the informants, the effectiveness of mediation process might be expected when the help is sought at the very beginning of the conflict. It means that as long as the conflict among family members is not old enough there is still an opportunity to find the solutions: "For instance, a family experiences crisis when both parents who had jobs lost them not because of their fault. The family had the loan, the debts for utilities occurred, they were unable to buy necessary items, sometimes they ran out of food. The family had two children. Parents who were in a crisis situation began arguing more often directing their anger towards insulting each other, sometimes towards alcohol. In this situation mediation was extremely effective. When we prepared a plan/agreement who has to do what and how in order to change the situation, everything was resolved" [11]. Thus, help provided on time, the foreseen action plan and its implementation can lead to an effective outcome of the conflict. The informants have noticed that mediation is not applied in a crisis situation. First of all, crisis solution methods are to be applied and then a decision regarding mediation has to be done.

The study has shown that mediation process is effective when the issues regarding the family member's communication with children are being solved. In these situations it is very important to make decisions that would help parents to preserve good relationships not only with children but with each other as well (see Table 2).

Table 2

The change of crisis situation with the involvement of a mediator

Category	Subcategory	Number of statements	Confirmative statements
Support provided by mediators in case of a dispute	Possibility to figure out the problem	5	<i><..the parties have an opportunity to present their position, to be heard, listened to what often influences their further actions to avoid the repetition of conflicts..>[14]; <..the parties may start to understand each other better what results in a more effective conflict resolution..>[16]; they express how they feel, what they expect from other people, what irritates them and start to hear each other..> [17]; the person emotionally "ventilates" oneself as if leaving a tunnel, starts seeing more widely..> [18]; it helps the clients to see crisis situations from a different side [11].</i>
	Reduced dispute risk	2	<i>The first aim is to ensure that the situation does not worsen [12]; Mediator's actions facilitate, help the parties to overcome crisis situations [12].</i>
	Cooperation with other institutions is important	1	<i><..close cooperation of various institutions such as Child's rights, school representatives, officers, doctors, dependency consultants is essential..>[13].</i>
	The process is simplified	1	<i>The process is simplified [5].</i>
	Offered help	1	<i>Received help..> [15].</i>

Referring to the respondents' experience it is possible to state that when a mediator is involved in a conflict resolution, family members may speak up with an impartial person, hear each other, emphasize the problems what helps them to understand each other better and even to perceive why they argue: "*<..parties have an opportunity to express their positions, to be heard what influences further actions to avoid the repetitions of conflicts..>[14]; <..the parties may understand each other better what leads to a better conflict resolution..>[16]; they express how they feel, what they expect from other people, what irritates them and start to hear each other..> [17]; the person emotionally "ventilates" oneself as if leaving a tunnel, starts seeing more widely..> [18]; it helps the clients to see crisis situations from a different side [11]*". When

family members speak with each other in presence of a mediator, it leads to an easier conflict resolution and more effective steps to be taken to resolve the conflict.

Mediation processes end differently therefore, we tried to find out what factors lead to a successful mediation process (see Table 3).

Table 3

Factors that help to succeed in the mediation process

Category	Subcategory	Number of statements	Confirmative statements
Factors determining successful mediation process	Competences and abilities of a mediator	3	<i><..an ability to create relationships of trust and trust of dispute parties...>[13]; Mediator's ability to create a relationship with the parties of a conflict...> [15]; Mediator's competence [16].</i>
	Consistent implementation of the process	2	<i><..it is important to follow consistency, specificity, transparency, confidentiality, empathy of mediation...>[11]; friendliness, empathy, respect, attention, sincere care about parties' concerns and interests are essential [12].</i>
	Benevolence of the parties	2	<i>Benevolence of the parties, their wish for a fast, mutual and beneficial resolution of a conflict [14]; Involvement of conflict parties [15].</i>
	Understanding of the client	1	<i>Recognition of a person, his/her feelings, fears, worries...>[12].</i>
	Influence of impartial parties	1	<i>Influence of other individuals on the parties...>[17].</i>

According to the respondents, competence and abilities of a mediator are important factors: “<.. an ability to create relationships of trust and trust of dispute parties...>[13]; Mediator's ability to create a relationship with the parties of a conflict...> [15]; Mediator's competence [16]”. Thus, if a mediator is competent, possessing all necessary abilities (discussed in Table 3) it is possible to expect a successful completion of the process. If a mediator creates the atmosphere of trust between him and family members, a favourable completion of resolution may be expected. As the analysis of scientific literature and respondents' answers have revealed, mediation process is implemented in stages. Therefore, the success of the process may be determined by purposeful planning of activities and consistent implementation of planned steps. Understanding of dispute parties and ability to feel the situation may help a mediator to successfully complete mediation process. Sometimes the help of external participants may also influence a successful completion of the process. Therefore, the success of mediation process is determined by the majority of the above-mentioned factors and mediator's competence.

The research has revealed that not only mediator's competence and other abilities are important in mediation process but also the principle of clients' benevolence. Therefore, we tried to analyse the expression of volunteering principle of mediators' clients (see Table 4).

Table 4

Expression of volunteering principle among the participants

Category	Subcategory	Number of statements	Confirmative statements
Expression of volunteering principle	Positive benefits of mediation are perceived	2	<i><..when clients find out positive solutions of a problem through mediation...>[11]; they believe in the benefits of mediation process [14].</i>
	Written agreement is presented	2	<i><..written agreement regarding mediation implementation...> [12]; <.. they come voluntarily without being forced by anyone...>[15].</i>
	Using the opportunity, making decision regarding mediation	2	<i>Clients may decide if they want to solve their conflict situation through mediation...>[13]; <...parties themselves decide whether they want to participate in mediation process or not...>[14].</i>
	Favourable communication and collaboration	1	<i><..carry out the obligations during the implementation of a plan, willingly communicate and cooperate[17].</i>

The expression of volunteering principle occurs when the participants themselves choose an opportunity to participate in mediation process. Volunteering principle is confirmed in a written form, i.e. the parties who agree to participate in mediation process sign the consent. The mediator may help the dispute parties to make the decision about participation in mediation

process by explaining what benefits the parties will receive participating in this process. Therefore, favourable and appropriate communication help the dispute parties to decide, but the final decision to participate in mediation process is made voluntarily.

Research revealed one more important principle of mediation in mediators' practice – impartiality. The aim was to find out how the principle of impartiality is important in mediation practice. The principle of impartiality does not allow to evaluate the situation through emotions and feelings therefore, it is necessary to collect facts, analyse them and to provide the court with actual information not mediator's personal attitude. This is based on the experience of one of the research participants.

"Impartiality is one of the basic mediation principles, therefore, it is important that the mediator does not give preference to one of the parties. It is essential to work with ourselves in order not to be hostile to the clients but to treat them equally and with respect. It is recommended to withdraw from mediations if the mediator feels that he/she cannot manage negative emotions towards one of the parties, for instance, there are mediators who cannot work with individuals who have committed crimes such as freedom of sexual choice or murders" [13].

Each dispute party has to be assessed objectively, not on the basis of mediator's attitude or opinion. This shows that impartiality is gathering of facts and evaluation of the situation.

"In all the situations a mediator has to follow the principle of impartiality, I could not distinguish one situation. If after reading the case I understood that I would not be able to follow the principle of impartiality due to certain reasons, I would refer the parties to another mediator" [14].

Referring to the practice of this respondent, we may presume that impartiality is related to honesty because the cases when mediators cannot find facts and refer only to emotions and feelings have to be abandoned.

"I am impartial in all mediations. Problems that sometimes arise when trying to ensure this principle are as follows: Men's perception that all women are in solidarity and children's attitude towards me as one more specialist condemning their behaviour" [16].

Another important research aspect was to analyse the practice of implementation of mediation stages where the volunteering principle is highlighted. Therefore, the informants revealed their experiences how the clients voluntarily get involved in mediation process (see Table 5).

Table 5

Stages of implementation of mediation activities

Category	Subcategory	Number of statements	Confirmative statements
Stages of mediation process	Volunteering is the main mediation principle	5	<i>Some are brave and show more initiative while resolving a dispute..>[11]; One of the main principles of mediation – volunteering..>[12]; Only voluntarily, no other options..> [14]; Always [16]; One of mediation principles is volunteering..> [18].</i>
	Mediation is not implemented	2	<i><.if one of the parties refuses to participate in mediation, mediation is terminated...> [13];<.due to the absence of volunteering mediation cannot be implemented [15].</i>
	Participate after being persuaded about the benefits of the process	2	<i><..others – do not want..> [11]; A very little part because emotions are strong..>[17].</i>
	Opportunity to withdraw from the process	1	<i><..may withdraw from it at any time..> [12].</i>

Considering respondents' answers, we may state that the lack of mediators is the main drawback of mediation process in social work. Consequently, purposeful training of mediators is not yet implemented. The mediation process itself is being initiated but there is a lack of human resources. When implementing quality mediation in social work, cooperation with other specialists who could provide the family with more psychological help is necessary. Therefore, solving social problems which are usually related to families at social risk multidirectional help is necessary.

The establishment of mediation in social work's practice is hindered by the fact that very little information is provided to the society. If receiving more favourable information about positive benefits of mediation process people themselves would start looking for opportunities to meet and communicate with mediators.

Usually, mediation services are paid. Hence, in social work when the clients are financially deprived persons this procedure is not really accessible. Consequently, municipalities should provide mediation services to the individuals who are at social risk.

Generalising the research results we may state that mediation is the role of social help where the planning of professional activities is very important. The respondents highlight that legal and psychological knowledge is the most necessary to the mediator and volunteering is the main principle of mediation. The model of mediation process consists of stages that exist not only in theory but are implemented in practice of social work. Research results have revealed that the need for mediation in social work is necessary in resolution of family disputes and quarrels and in everyday social work providing social services to the family. The respondents indicated that their biggest practical mediation experience is in resolution of family conflicts and investigation of divorces. It is worth to mention that at the beginning of the conflict mediation is very effective, it is the biggest opportunity to resolve the problems. The participants of the research indicated mediator's competence and abilities as the factors that help to succeed in mediation process. Inappropriate training of a mediator and unfavourable behaviour of dispute parties disturb the mediation process.

Conclusions

1. Scientific literature analysis revealed that mediation process that helps to resolve the conflicts has been known for many years. Earlier the term "intermediating" was used to indicate mediation. Since 2000 this process has been called "mediation" and was firstly emphasised in the court practice. However, during the recent years it covers more spheres of society's activities including social work.

2. The study revealed that principles of volunteering and impartiality are the most important in mediation process. Application of these principles in mediation process reveals the essence of mediation process, helps the parties to understand and clarify conflict's reasons and to make decisions. The principle of volunteering is followed by conflict parties when they decide to participate in mediation process. The principle of impartiality is followed by the mediators when resolving the conflict situation.

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Received: 1 March 2021
Accepted: 31 May 2021

ASSESSMENT OF THE ECOLOGICAL STATUS OF NEVĖŽIS RIVER

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Annotation

Upon Lithuania's accession to the EU, water bodies are managed and protected according to hydrologically defined natural river basin boundaries, as the quality of river water is determined by natural processes taking place in the territory of a river basin and the overall impact of economic activities. A river basin is an area from which all surface water flows into a single river. By implementing the requirements of water protection legislation, Lithuania has to achieve good status in all water bodies in the country by 2021. This article discusses the ecological status of Nevėžis river in Nevėžis sub-basin. Summarising all the parameters assessed (BOC₇, NO₃-N, Pb, Nb, O₂, NH₄-N bei pH) and assessing the water quality of Nevėžis river according to its ecological classes, it is from average to very good condition.

Key words: river basin, Nevėžis river, Nevėžis sub-basin, ecological status of a river.

Introduction

Water is one of Lithuania's most significant natural resources. Open inland water bodies cover an area of 26 000 km², which represents around 4% of country's territory [4].

Upon Lithuania's accession to the EU, water bodies are managed and protected not according to administrative, but according to hydrologically defined natural river basin boundaries. Implementing the requirements of water protection legislation, Lithuania has to achieve good ecological status in all water bodies in the country by 2021 [9].

Anthropogenic pollution affects surface water bodies the most. The analysis of pollution sources and the assessment of their impact on the status of surface water bodies identified the following main factors affecting the status of surface water bodies in Lithuania [8]:

- dispersed pollution, which is largely caused by pollution from agricultural activities and which is one of the main sources of nitrate nitrogen pollution, and
- concentrated pollution, the most pressing problem of which is pollution with total phosphorus and ammoniac nitrogen.
- According to the State Monitoring Programme, more than 180 river sites in Lithuania are tested for water quality. The results of the national monitoring show that as many as 51% of rivers and 40% of lake bodies do not meet the criteria for good status. Following the modernisation of wastewater treatment plants in larger cities of Lithuania, the impact of concentrated sources of pollution (urban or corporate wastewater) on the status of water bodies has significantly decreased. However, pollution from agricultural fields (dispersed pollution sources) is only increasing [18].
- The rivers in the Nevėžis basin are subject to high dispersed agricultural pollution loads. Nevėžis is the most important river in Central Lithuania – its length is 208.6 km, basin area is 6140.5 km². The river starts in wet forests about 6 km southeast of Troškūnai town [6]. Nevėžis flows north-west through „Raguva”, through „Panevėžys”, then turns south, and meanders towards „Kėdainiai” [16]. Nevėžis belongs to Nemunas basin and flows into Nemunas 199 km from its mouth at „Raudondvaris”. Nevėžis flows in the middle part of the middle lowlands and therefore has a rather symmetrical pool: 43% of the basin area on the right and 57% of the basin area on the left [5]. Such a river bed makes it possible of pollution due to agricultural activities. The largest pollutant load on the Nevėžis river in „Panevėžys” town is caused by agricultural activities around „Panevėžys” town due to intensive use of manure and mineral fertilisers (72 %), background pollution (24 %), pollution of industrial plants and surface water networks (concentrated) (1%), population whose households are not connected to wastewater collection networks (dispersed) (3%) [12].

Research object: nutrients pollution of Nevėžis river.

Research aim: to assess the ecological status of Nevėžis river.

Research objectives:

1. To establish indicators characterising the water quality of Nevėžis river biochemical oxygen consumption over seven days (BOC_7), nitric nitrogen (NO_3-N), change in total phosphorus (P_b), change in dissolved oxygen (O_2), change of total nitrogen (N_b), ammonium nitrogen (NH_4-N).
2. To assess the ecological status of Nevėžis river in individual sections of this river.

Literature review

For the solution of surface water quality problems and convenience of management in Lithuania, 4 river basin districts (RBD) are distinguished, which are composed of one or more river basins [9, 13] :

- **Nemunas RBD** is a part of the Nemunas river basin located in the territory of Lithuania, a part of the Sea rivers basins (except the Šventoji and Bartuva river basins), a part of the Prieglius river basin, a part of the Curonian Spit and coastal waters of the Baltic Sea;
- **Lielupė RBD** - includes a part of Lielupė river basin located in the territory of Lithuania;
- **Venta RBD** - includes: parts of Venta, Bartuva and Šventoji river basins located in the territory of Lithuania;
- **Daugava RBD**, - includes a part of Daugava river basin located in the territory of Lithuania.

Nemunas RBD. Nemunas RBD occupies the biggest part of the territory of Lithuania. The total area of the Nemunas basin covers 97 928 km², of which 46 700 km² is in the territory of Lithuania, 45 450 km² in the territory of Belarus, 2 520 km² in the territory of Poland, 3 170 km² in the territory of Russia and 88 km² in the territory of Latvia. The length of Nemunas river is 937 km, it flows 475 km through Lithuania and flows into the Curonian Spit which connects via strait to the Baltic Sea. Nemunas basin covers about 75% of the Lithuania's territory. Nemunas RBD consists of: Neris little tributaries (with Neris) sub-basin; Merkys sub-basin; Nemunas little tributaries (with Nemunas) sub-basin; Žeimena sub-basin; Šventoji sub-basin; Nevėžis sub-basin; Dubysa sub-basin; Šešupė sub-basin; Jūra sub-basin; Minija sub-basin; Prieglius sub-basin; Lithuanian seaside rivers basin; interim and coastal waters [1,9].

Nemunas rivers basin district is characterised by high socio-economic indicators, as it is home to the largest and economically strongest downs in the country. The following industries are mainly developed in the territory of Nemunas river basin in Lithuania: food, wood processing, textiles, chemistry, metal processing, machine manufacturing, appliances manufacturing. There are 32 hydroelectric power plants in Nemunas basin area in Lithuania, the largest of which is Kaunas HE [10].

Nemunas RBD has a large concentration of licensed Integrated Pollution Prevention and Control companies in poultry and pig farming, aquacultural companies and other industrial facilities [11]. Following the update of the RBD management plan in 2015, it was found that more water bodies in Nemunas RBD river are identified as significantly affected by dispersed agricultural pollution. Agricultural pollution has a very clear geographical spread in Nemunas basin – the largest agricultural pollution is found in the northern and central Lithuanian river sub-basins, where farming and livestock farming are the most intensive due to favourable farming conditions [7].

Nevėžis sub-basin. Nevėžis basin spreads in the lowlands of Central Lithuania, and the basin of its largest tributary – Šušvė – drains the lowlands of the „Žemaičiai“ highlands. The surface is dominated by heavier mechanical carbonated rocks, with 10 % of the pool surface covered with sand [2].

The longest and largest Nemunas tributaries in Lithuania are rivers Merkys, Neris, Nevėžis, Dubysa, Šešupė, Jūra and Minija. Lengths and basin areas of the main RBD rivers running on Lithuanian territory are listed in Table 1. They differ in size, economic development and their impact. The total length of the rivers is 8162 km. The density of the rivers network is 1.33 km/km². Nevėžis receives part of the water from Lėven and Šventoji [9].

Rivers lengths and basin areas [9]

Table 1

Rivers	Length overall, km	Length in Lithuania, km	Total basin area, km ²	Basin area in Lithuania, km ²
Merkys	203	185.2	4415.7	3798.73
Neris	509.5	228	24942.3	4266.79
Dubysa	139	139	1965.9	1965.9
Šešupė	276.6	157.5	6104.8	4769.75

Rivers	Length overall, km	Length in Lithuania, km	Total basin area, km ²	Basin area in Lithuania, km ²
Jūra	171.8	171.8	4005.06	4005.06
Nevėžis	208.6	208.6	6140.5	6140.5
Minija	201.8	201.8	2939.97	2939.97
Šventoji	246	246	6789.18	6789.18
Žeimena	79.6	79.6	2775.25	2775.25

The fertile soils of Central Lithuania are favourable for the development of agriculture. The significant impact of dispersed pollution here is determined both by intensive agricultural activity and by the hydrological and physical – geographical conditions of the sub-basin. For this reason, the Nevėžis sub-basin rivers are the most affected by agricultural pollution. Studies have shown that nitrate and/or total nitrogen concentrations do not meet the requirements for good ecological status/potential in 58 of the 70 river sub-basins of identified Nevėžis water bodies (83%). Nevėžis river is affected by nitrogen compounds. Nitrogen concentrations increased on average by 46,6 % between 1991 and 2010 [16,17]. Due to drainage systems, nitrate transport time to water bodies is shortened and the potential for containment/degradation is greatly increased. Soluble nitrates entering drainage systems do not decompose and are rapidly transferred to water bodies. Carried out assessments show that in 2015, due to the impact of agricultural activities, about 1655 km of water bodies belonging to the Nemunas RBD river category (19% of the total length of the identified water bodies) were not in compliance with the requirements for good ecological status [7]. The upward trend in nitrate concentrations is observed in Nevėžis river basins. Agricultural activity therefore remains one of the most significant factors affecting the quality of water bodies [9]. Mineral phosphorus compounds are formed by biological treatment of domestic and some industrial wastewater [3].

Assessment of the ecological status of rivers. Water quality can be analysed according to various characteristics: physical properties of water, quantity of present substances, content of organic, mineral, toxic substances, etc. The general physicochemical water quality elements that have the greatest impact on the status of biological elements in rivers are BOC₇, total phosphorus, P-PO₄, total nitrogen, N-NH₄, N-NO₃ and O₂ [9, 15].

The ecological status of rivers is assessed on the basis of physicochemical quality elements – common data (nutrients, organic substances, oxygen saturation): nitric nitrogen (NO₃-N), ammonium nitrogen (NH₄-N), total nitrogen (N_b), total phosphorus (P_b), biochemical oxygen usage over 7 days (BOC₇) and dissolved oxygen quantity in water (O₂), the values of which are specified in the methodology for determining the status of surface water bodies. For each indicator, the water body is classified in one of five ecological status classes on an annual average basis [14]. The chemical status of the surface water of rivers, canals, lakes and ponds are assessed in accordance with the maximum permissible concentrations in the water body in the receiver according to the Order No. D1-236 of the Minister for the Environment of the Republic of Lithuania on 17 May 2006 “Regarding the Approval of the Wastewater Management Regulation”. See Table 2 for maximum permissible concentrations (MPC) and limit values for priority hazardous substances and hazardous and other controlled substances in natural surface water bodies.

Table 2

Maximum levels (MPC) for other controlled substances in Lithuania [14]

Name of the substance	MPC to waste water collection system, mg/l	MPC to natural environment mg/l	MPC in water body - the receiver, mg/l	Limit concentration in the waste water collection system, mg/l	Limit concentration in the natural environment, mg/l
Total nitrogen	100	30	*	50	12
Nitrites (NO ₂ -N)/NO ₂	-	0.45/1.5	*	-	0.09/0.3
Nitrites (NO ₃ -N)/NO ₃	-	23/100	*	-	9/39
Ammonium ions (NH ₄ -N)/NH ₄	-	5/6.43	*	-	2/2.57
Total phosphorus	20	4	*	10	1.6
Phosphates (PO ₄ -P)/PO ₄	-	-	*	-	-

* The average annual values of these substances in the surface water body (broken down by ecological status classes) are specified in the Methodology for the Determination of the Status of Surface Water Bodies approved by the Minister of the Environment of the Republic of Lithuania on 4 March 2010 by Order No. D1-178 (Official Gazette 2010, No. 29-1363). “Limit concentration” is the maximum concentration of a substance calculated, measured or planned to be exceeded up to which it is not yet required for it to be normalised/controlled. Maximum permissible concentration (MPC) is the maximum concentration allowed by legislation for a given pollutant or group of pollutants in waste water, water body, sediment or biota. MPC are general minimum requirements for the contamination of waste water or the aquatic environment and may only be applied on a case-by-case basis (MPC equal to the permitted concentration) if legislation on environmental sensitivity, the nature of the activity or other specific circumstances does not impose more stringent or additional requirements.

RESEARCH METHODOLOGY

Water quality monitoring was carried out on 3 March 2021 and 10 March 2021. Nevėžis river water samples for analysis were taken from 3 river sites (above and below) at Panevėžys, see Table 3.

Table 3

Coordinates of surface water monitoring sites, water sample, test site and test collection site address

Water sample No.	Test collection site	Test collection site address	Coordinates in the LKS 94 coordinate system	
			X	Y
1 and 4	V ₁	Nevėžis river (by Nemuno str.)	55.7410443	24.3402908
2 and 5	V ₂	Nevėžis river (by Parko str.)	55.7378705	24.3268821
3 and 6	V ₃	Nevėžis river (by Vakarinė str.)	55.7383568	24.3131093

For methods, procedures and parameters used to determine the chemical parameters nitric nitrogen (NO₂-N), nitrite nitrogen (NO₂-N) total nitrogen (Nb), total phosphorus (P_b), biochemical oxygen usage over 7 days (BOC₇) and dissolved oxygen quantity in water (O₂) see Table 4.

Table 4

Measurements of parameters, measurement methods and procedures of surface water bodies

Measured parameters	Measurement method	Reference to documents
Organic content BOC ₇ (mg/l O ₂)	Electrochemical	LAND 47-1:2007 Biochemical oxygen usage over 7 days (BOC7) determined by electrometric method
Dissolved oxygen (O ₂ mg/l)	Electrochemical	LST EN Standard 25814:2012 Water quality. Determining dissolved oxygen. Electrochemical probe method
Phosphates (mg/l)	Spectrometric, using ammonium molybdenum	LAND Standard 58-2003 Water quality. Determining phosphorus. Spectrometric method using ammonium molybdate /Chapter 3/Determination of orthophosphorus
Nitrites (mg/l N)	Spectrometric	LAND Standard 39-2000 Water quality. Determination of nitrite quantity Molecular absorption spectrometric method
Nitrites (mg/l N)	Spectrometric	LAND Standard 65-2005 Water quality. Determination of nitrite quantity. Spectrometric method using sulphosalicylic acid
Ammonium nitrogen (mg/l N)	Spectrometric	LAND Standard 38-2000 Water quality. Determination of ammonium quantity. Manual spectrometry method.
Total phosphorus (mg/l)	Spectrometric, using ammonium molybdenum	LAND Standard 58-2003 Water quality. Determining phosphorus. Spectrometric method using ammonium molybdate/Chapter 6/Determination of total phosphorus by peroxodisulphate oxidation
Total nitrogen (mg/l)	Spectrometric, mineralization using peroxodisulphate	LAND Standard 59-2003 Water quality. Determination of nitrogen. Part 1. Oxidative mineralisation with peroxodisulphate method.

For chemical analysis, a sample of water was collected in clean containers of 1 litre capacity with sealed stoppers. The container must be filled fully to avoid exposure to atmospheric air. The sample is delivered to the laboratory stored at +4°C within 24 hours.

The water quality of Nevėžis river was assessed in accordance with the methodology for determining the status of surface water bodies. According to the average annual values of the indicators, a body of water is classified in one of five ecological status classes: very good, good, average, bad, very bad, see Table 5.

Table 5

Ecological status classes of rivers in terms of physico-chemical quality elements [14]

No.	Quality element	Parameter	River type	Criteria for river ecological status classes according to the values of physico-chemical quality elements				
				Very good	Good	Average	Bad	Very bad
1.	General characteristics Nutrient substances	NO ₃ -N, mg/l N	1-5	<1.30	1.30-2.30	2.31-4.50	4.51-10.00	>10.00
2.		NH ₄ -N, mg/l N	1-5	<0,10	0.10-0.20	0.21-0.60	0.61-1.50	>1.50
3.		N _b , mg/l	1-5	<2,00	2.00-3.00	3.01-6.00	6.01-12.00	>12.00
4.		PO ₄ -P, mg/l P	1-5	<0,050	0.050-0.090	0.091-0.180	0.181-0.400	>0.400

No.	Quality element	Parameter	River type	Criteria for river ecological status classes according to the values of physico-chemical quality elements				
				Very good	Good	Average	Bad	Very bad
5.		P _b , mg/l	1-5	<0.100	0.100-0.140	0.141-0.230	0.231-0.470	>0.470
6.	Organic substances	BOC ₇ , mg/l O ₂	1-5	<2,30	2.30-3.30	3.31-5.00	5.01-7.00	>7.00
7.	Saturated with oxygen	O ₂ , mg/l	1, 3, 4, 5	>8.50	8.50-7.50	7.49-6.00	5.99-3.00	<3,00
8.		O ₂ , mg/l	2	>7.50	7.50-6.50	6.49-5.00	4.99-2.00	<2,00

Test sites are marked in Figure 1.



Fig. 1. Sampling sites

RESULTS AND ITS ANALYSIS

Change of Biochemical Oxygen Consumption (BOC₇) concentration

BOC₇ (biochemical oxygen consumption over seven days) is the main indicator of organic substances quantity in water bodies. It indicates the amount of dissolved oxygen required for biochemical oxidation of organic substances in water. One of the reasons for the appearance of organic substances into the water body is industrial and domestic wastewater. The results of BOC₇ are presented in Table 6.

Table 6

Results of the Biochemical Oxygen Consumption (BOC₇) Test

Date of testing	Sample No.	Sampling site	Indicator	Test results	Ecological status of rivers in terms of physico-chemical quality elements indicators
30/03/2021	1.	V ₁	BOC ₇	2,24 mg/l O ₂	Very good
	2.	V ₂		2,31 mg/l O ₂	Good
	3.	V ₃		2,33 mg/l O ₂	Good
10/03/2021	4.	V ₁		2,32 mg/l O ₂	Good
	5.	V ₂		2,33 mg/l O ₂	Good
	6.	V ₃		2,44 mg/l O ₂	Good

During the test period (3 March 2021 and 10 March 2021), the concentration of BOC₇ varied from 2,24 mgO₂/l to 2,44 mgO₂/l. The maximum concentration was recorded at 2,44 mgO₂/l on 10 March 2021 and the minimum concentration at 2,24 mgO₂/l on 3 March 2021. The maximum variation in BOC₇ concentration is observed V₃ at test site at 0,11 mgO₂/l and the minimum at 0,02 mgO₂/l - V₂. According to the BOC₇, the ecological status of the river water V₁ at test site is very good and V₂ and V₃ - good.

Change in dissolved oxygen (O₂) concentration

Oxygen is essential for many aquatic plants and animals. The main sources of oxygen are atmosphere and aquatic plants and photosynthesis in green organisms. The oxygen quantity of water is an indicator of its contamination (the less oxygen it contains, the more organic substances in water for which oxidise oxygen is consumed). The results of the dissolved O₂ concentration variation tests in the Nevėžis river are presented in Table 7.

Table 7

Results of dissolved oxygen quantity (O₂) test analysis

Test date	Sample No.	Sampling site	Indicator	Test results	Ecological status of rivers in terms of physico-chemical quality elements indicators
30/03/2021	1.	V ₁	O ₂	9.34 mg/l.	Very good
	2.	V ₂		8.92 mg/l.	Very good
	3.	V ₃		8.50 mg/l.	Good
10/03/2021	4.	V ₁		9.58 mg/l.	Very good
	5.	V ₂		9.70 mg/l.	Very good
	6.	V ₃		8.60 mg/l.	Good

During the test period (3 March 2021 and 10 March 2021), the O₂ concentration varied from 8,50 mg/l to 9,70 mg/l. The maximum concentration was recorded at 9.70 mg/l on 10 March 2021 and the minimum concentration at 8.50 mg/l on 30 March 2021. The maximum variation in O₂ concentration is seen V₂ at test site at 078 mg/L, and the minimum variation - 0,1 mg/l - V₃ According to O₂, the ecological status of the river water V₁ and V₂ at test site is very good, and V₃ - good.

Nitric nitrogen (NO₃-N) concentration variation

Human activity significantly increases the nitrogen input of nitrates into rivers. Inorganic nitrogen compounds are released into natural waters by leaching inorganic fertilisers and mineralisation products from soils, with dry and wet fallout, and with sewage (domestic, industrial, agricultural). The results of Nevėžis river nitrate (NO₃-N) concentration variation tests are presented in Table 8.

Table 8

Test results for nitric nitrogen (NO₃-N)

Test date	Sample No.	Sampling site	Indicator	Test results	Ecological status of rivers in terms of physico-chemical quality elements indicators
30/03/2021	1.	V ₁	NO ₃ -N, mg/l N	1,21 mg/l N	Very good
	2.	V ₂		1,25 mg/l N	Very good
	3.	V ₃		1,52 mg/l N	Good
10/03/2021	4.	V ₁		1,60 mg/l N	Good
	5.	V ₂		1,47 mg/l N	Good
	6.	V ₃		1,78mg/l N	Good

During the test period (30 March 2021 and 10 March 2021) NO₃-N concentration varied from 1,21 mg/l N to 1,78 mg/l N. The maximum concentration was recorded at 1.78 mg/L N on 10 March 2021 and the minimum concentration on 30 March 2021 - 1.21 mg/l N. The maximum variation in NO₃-N concentration is observed at the V₁ test site at 0,39 mg/l N, and the minimum - 0,22 mg/l N at the V₂ test site. According to NO₃-N ecological status of river water is good at all test sites.

Ammonium nitrogen (NH₄-N) concentration variation

Ammonium is present in water in ionized (NH₄⁺) and non-ionized (NH₃) forms. Ammonium is not very toxic to aquatic animals in the ionised form (NH₄⁺). The concentration of ammonium nitrogen depends on the intensity of biochemical processes occurring in soil and water. The results of Nevėžis river phosphates (NH₄-N) concentration variation tests are presented in Table 9.

Table 9

Ammonium nitrogen (NH₄-N) test results

Test date	Sample No.	Sampling site	Indicator	Test results	Ecological status of rivers in terms of physico-chemical quality elements indicators
30/03/2021	1.	V ₁	NH ₄ -N	0,30 mg/l N	Average
	2.	V ₂		0,08 mg/l N	Very good
	3.	V ₃		0,13 mg/l N	Good
10/03/2021	4.	V ₁		0,28 mg/l N	Average
	5.	V ₂		0,05 mg/l N	Very good
	6.	V ₃		0,20 mg/l N	Good

During the test period (3 March 2021 and 10 March 2021), the $\text{NH}_4\text{-N}$ concentration varies from 0,05 mg/l N to 0,30 mg/l N. The maximum concentration was recorded at 0.30 mg/l N on 30 March 2021 and the minimum concentration at 0,05 mg/lN on 10 March 2021. The change in $\text{NH}_4\text{-N}$ concentration at all test sites is insignificant. According to $\text{NH}_4\text{-N}$, the ecological status of the river water V_1 at test site is average, V_2 - very good and V_3 – good.

Change in total phosphorus (P_b) concentration

Phosphorus compounds naturally enter naturally formed circulation circles, but due to anthropogenic activity the increased load of these substances has long before become a contamination. Intensive agricultural production and the use of mineral fertilisers contribute to exceeding the limit values for certain quantities of biogenic substances in rivers water. The results of the total phosphorus (P_b) concentration variation tests of the Nevėžis river are presented in Table 10.

Table 10

 Results of total phosphorus (P_b) test

Test date	Sample No.	Sampling site	Indicator	Test results	Ecological status of rivers in terms of physico-chemical quality elements indicators
30/03/2021	1.	V_1	P_b	0.120 mg/l	Good
	2.	V_2		0.142 mg/l	Average
	3.	V_3		0.143 mg/l	Average
10/03/2021	4.	V_1		0.122 mg/l	Good
	5.	V_2		0.141 mg/l	Average
	6.	V_3		0.144 mg/l	Average

During the test period (3 March 2021 and 10 March 2021) the concentration of P_b varies from 0,120 mg/l to 0,144 mg/l. The maximum concentration was recorded at 0.144 mg/l on 10 March 2021 and the minimum concentration at 0.121 mg/l on 30 March 2021. P_b concentration change is insignificant. V_1 at test site - 0.002 mg/l, V_1 and V_2 at test sites - 0.001 mg/L. Based on P_b , the ecological status of the river water V_1 at test site is good, V_2 and V_3 – average. ..

Change of total nitrogen (N_b) concentration

Nitrogen compounds, like phosphorus, naturally enter into naturally formed circulation circles, but the anthropogenic activity has resulted in increased loads of these substances becoming a contamination. Intensive agricultural production contributes to exceeding the limit values for certain quantities of biogenic substances in river water. The results of the total nitrogen (P_b) concentration variation tests in Nevėžis river are presented in Table 11.

Table 11

 Results of Total Nitrogen (N_b) Test

Test date	Sample No.	Sampling site	Indicator	Test results	Ecological status of rivers in terms of physico-chemical quality elements indicators
30/03/2021	1.	V_1	N_b	1.98 mg/l	Very good
	2.	V_2		2.22 mg/l	Good
	3.	V_3		2.14 mg/l	Good
10/03/2021	4.	V_1		1.96 mg/l	Very good
	5.	V_2		2.25 mg/l	Good
	6.	V_3		2.18 mg/l	Good

During the test period (3 March 2021 and 10 March 2021), the concentration of N_b varies from 1,96 mg/l to 2,25 mg/l. The maximum concentration was recorded at 2.25 mg/l on 10 March 2021 and the minimum concentration at 1.98 mg/l on 30 March 2021. The change in concentration of N_b is insignificant. V_1 at test site - 0.02 mg/l, V_2 - 0.03 mg/l. and V_3 at 0,04 mg/l. Based on N_b , the ecological status of the river water V_1 at test site is very good and V_2 ir V_3 - good.

Change of pH concentration

During the test period (3 March 2021 and 10 March 2021), the hydrogen ion concentration in the Nevėžis river water varied from 6,6 to 8,3. The average hydrogen ion concentration in river water is 7.45. According to the limit values for the water quality indicators specified in the description of the protection requirements for surface water bodies in which freshwater fish can live and breed, the water pH of the Nevėžis river complies with the requirements. The pH concentrations of most water sampling sites were similar to each other

during the test period. This suggests that the acidity – alkalinity - of Nevėžis river water is relatively constant and varies slightly.

Conclusions

1. In order to determine the water quality of the Nevėžis river, a physico-chemical water test was carried out and the following indicators were assessed: BOC₇, NO₃-N, Pb, Nb, O₂, NH₄-N ir Ph. Summary of the results of the study showed that none of the indicators exceeded the allowed maximum concentrations.

2. In order to assess the ecological status of Nevėžis river, the water for the tests was taken from 3 river sites near Panevėžys. Having assessed the water quality of Nevėžis river, it was found that according to:

- biochemical oxygen consumption during seven days the ecological status of the river water at Nemunas street is very good, at Parkas street and at Vakarinė street - good.
- the dissolved oxygen quantity river's water ecological status is very good at Nemunas street and Parkas street, and good at Vakarinė street .
- nitric nitrogen, ecological status of the river water is good at all test sites.
- ammonium nitrogen, the ecological status of the river water is average at Nemunas street, very good at Parko street and good at Vakarinė street.
- the total phosphorus in the river water is in good ecological condition at Nemunas street, at Parkas and Vakarinė street – average. It is believed that more intensive fertilisation of soils with phosphorus fertilisers may have contributed to this.
- total nitrogen ecological status of the river water at Nemunas street is very good, at Parko and Vakarinė street – good.

Summarising all the parameters assessed (BOC₇, NO₃-N, Pb, Nb, O₂, NH₄-N bei pH) and assessing the water quality of Nevėžis river according to its ecological classes, it is from average to very good condition.

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Received: 30 March 2021

Accepted: 31 May 2021

COWORKING SPACES AND SKILLS FOR CONSTRUCTIVE WORK IN THEM

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Annotation

Constant change in all spheres of life, new challenges for humanity, and at the same time new opportunities to overcome them, rapidly evolving ICT, the increasing use of artificial intelligence, even in areas traditionally associated only with direct human participation and action. Naturally, all this is changing, and will change even more in the future, not only the nature of work and activities, but also the environments and spaces in which those activities take place. One such environment / space is the coworking space. Coworking is the new path of melding life and work in a sustainable fashion. It is the global linchpin at the intersection of real estate, technology and community, which will shape the way we work in the future. Although the advantages of coworking spaces have been repeatedly mentioned in both practical and theoretical discourse, there is still little in-depth research on this phenomenon, especially on what skills are needed for constructive and successful work in them and what role higher education institutions should play in this context in educating a new generation of managers and entrepreneurs.

Keywords: coworking, coworking space, business administration, self-directed learning and working competencies, communication, collaboration.

Introduction

Constant change in all spheres of life, new challenges for humanity, and at the same time new opportunities to overcome them, rapidly evolving ICT, the increasing use of artificial intelligence, even in areas traditionally associated only with direct human participation and action. Naturally, all this is changing, and will change even more in the future, not only the nature of work and activities, but also the environments and spaces in which those activities take place. One such environment / space is the coworking space. The first space of this type was founded in San Francisco in 2005 by entrepreneur Brad Neuberg and called "The San Francisco Coworking Space". Despite the fact that in the beginning it was open only 2 days a week, it was a major innovation that fundamentally changed the approach to business organization and administration, specifically to the places and environments where that business could be conducted. Occurring just over 15 years ago in one particular location, in one particular city, now coworking spaces are popping up in most major cities with an annual growth rate of 24.2%. It is predicted that there will be more than 30,432 coworking spaces and over 5.1 million coworking members by the year 2022. (What is coworking, 2018).

Although the advantages of coworking spaces have been repeatedly mentioned in both practical and theoretical discourses (Everything you need to know about coworking spaces, 2020; The 7 most underrated benefits of coworking spaces, 2019; What Is Coworking, 2018, etc.), the deeper research is still limited, so this article aims to at least partially fill this gap.

Research problem

The object of the research - the coworking spaces and the skills are needed for constructive and successful work in them .

The aim of the research is to analyze the coworking spaces and to clear up what skills are needed for constructive and successful work in them .

Research tasks:

1. Define the concept of the coworking spaces;
2. Identify the main features of coworking spaces and their advantages in comparing with traditional working spaces in companies and organizations;
3. To determine the main skills needed for constructive and successful work in them.

Research methodology

Justification of the investigation and enforcement procedures. The analysis of collaborative environments and the analysis of the skills required to work in them is based on the analysis of theoretical and practical discourse. The areas of cooperation and their creation are a relatively new phenomenon in the world, especially in Lithuania; therefore the analysis of theoretical discourse was chosen to substantiate the idea, the concept of cooperation, its advantages and limitations, and the challenges arising from their work. The analysis of practical discourse and empirical data provided opportunities to take a deeper and more detailed look at the competencies necessary for successful work in such spaces, which in a sense can be identified as general competencies of self-employment and learning. It is the possession of these competencies that was one of the essential preconditions for successful learning due to the sudden transition from the pandemic situation and the transition to universal distance learning and work. The analysis of the latter was based on the operationalization of self-directed learning competencies previously prepared and published by one of the authors of the article, R. Pocevičienė.

Investigation period. The analysis of theoretical discourse took place in 2020 and 2021 at the beginning. An empirical study was conducted in 2020 on June, immediately after the relaxation of quarantine conditions, so that the acquired academic, organizational, emotional experience of working (studying) at a distance would be as vivid as possible. Later, an analysis of practical discourse was also performed.

Research methods. The general research methods were used to substantiate the research - analysis and synthesis of scientific literature; questionnaire. Data analysis was performed by selecting content analysis criteria and quantitative and qualitative analysis of empirical data.

The survey sample. 82 students of social and business and public management studies of Šiauliai State College participated in the empirical research. In the absence of significant differences across different demographic criteria, their responses to the questionnaire were analyzed in a pooled sample.

The concept of coworking space

The idea of coworking spaces is based on the essential functions of any business, and in a broader context and of any activity in general: communication and especially collaboration or coworking, which many theorists and practitioners perceive as a special, crucial activity as a guarantor of constructive action and success in almost all activities. According to N. Večkienė and I. Dirgėlienė (2010), collaboration is described as an activity when specialists from different or the same fields find a common, most acceptable way to solve a problem for a client. M. Teresevičienė and G. Gedvilienė (2000) name collaboration as an integral part of human existence, which is inseparable from human activity and ability to learn by applying one's experience, and believes that collaboration must take place constantly and with everyone. Equally important in this context is communication. According to M. Teresevičienė and G. Gedvilienė (2000), every human activity is like constant communication: we all know how to speak one language, we have laws that guide us, we live between people or we spend time in different communities linked by common goals. Because all social systems are based on the coordination of the actions of individuals, the pursuit of common goals, we also live in this world, to connect with each other. According to scientists (Teresevičienė, Gedvilienė, 2000), each individual must be able to communicate with each other and share their experiences with others, therefore communication and collaboration are integral parts of human existence. Proponents of collaborative management theory also emphasize the importance of collaboration, arguing that the best results can only be achieved through collaboration, and collaborative work or according to new concept coworking not only promotes people-to-people relationships but also improves company performance (Tariq, Aslam, Habib, Siddique & Khan, 2012). Perhaps because companies, businesses sometimes invest quite a lot of financial, material, or even human resources in buildings, in the design and equipment of various spaces, as well as in ICT in order to create the most effective conditions for constructive communication and collaboration, although, in fact, they are not always fully utilized afterwards.

On the other hand, business today is conducted quite differently than it was in previous decades. The Internet and other information and communication technologies have significantly changed its nature, organization and management, but jobs, work places are still very traditional, which in part slows down the pace of work and hampers business development, also due to the investments already made in creating and maintaining a suitable business environment. Which in turn, especially for small businesses, not to mention start-ups, freelancers or self-employed people who usually set up and run a business in their home environment. Meanwhile, new requirements also require new organizational and managerial

solutions. One such solution would be areas of cooperation, collaboration and coworking. The very word "space for coworking" says that it is a kind of common space for working together. In a sense, this is the case in the increasingly collaborative world of business, where many different and self-employed entrepreneurs and business people can come together to pursue their own goals. In other words, different employees work in a common space - in coworking space. Works as a community connected by labor relations and as is constantly changing and flexible, but in any case the community. (Everything you need to know about coworking spaces, 2020; The 7 most underrated benefits of coworking spaces, 2019, etc.)

Coworking is the new path of melding life and work in a sustainable fashion. It is the global linchpin at the intersection of real estate, technology and community, which will shape the way we work in the future. (What is coworking, 2018). On the other hand, coworking is not just about the sharing of infrastructure and cost, it is about belonging to a community, accessibility and sustainability. Coworking is the new way of working and sharing. Coworking spaces are designed to provide a productive and collaborative environment for their dynamic inhabitants, and created without corporate constraints on what is perceived to be an "office" environment offering flexible memberships to suit most needs. (What is coworking, 2018). According to the entrepreneurs themselves, there is a space for coworking - "a social gathering of a group of people who are still working independently, but who share values and who are interested in the synergy that can happen from working with people who value working in the same place alongside each other.". In Google's dictionary (2021) terms coworking is a type of work that includes "the use of an office or other working environment by people who are self-employed or working for different employers, typically so as to share equipment, ideas, and knowledge".

As we can see from the above concepts, coworking spaces are primarily for those who, for one reason or another, are unable or unwilling to have large offices, e.g. start-uppers for whom setting up any office is already a cost, while starting your own business requires investing first in the service, product, or what will help build it, rather than in the business administration itself. They are also suitable for freelancers, homemakers and so on. Not only that, for all of them, coworking spaces not only alleviate the financial burden, but these spaces are great opportunities for exchanging ideas, discussing, collaborating and coworking at different stages of business, which is important not only in realizing the right area, but maybe even and an impetus to develop new ideas, products, services.

Unlike traditional office environments, where many people work in the same company, and even if they belong to different parts or departments of organization, they are all brought together by an umbrella company, and people working in coworking spaces not only work on different projects and tasks, but also belong to different companies. Just at that point, they are working in one physical space. Only differently than in traditional offices or businesses, there is no form of direct competition, local policy or caring image here. Another distinctive feature of those to types of working spaces is that the employees of these spaces have stronger a working sense of identity. There is no fear or threat here that someone may be laid off, and freelancers or entrepreneurs have the opportunity to participate and share the information, what they do, what plans they have, what the results might be, as such sharing can become new business projects, partners or even young - niche - a branch of business. In addition, those who work here are characterized by a high sense of self-confidence, self-esteem and respect for their work, which also has a positive impact on business success. (Why people succeed in coworking space environments, 2019)

Main features of coworking space

Thus, the main features of coworking spaces, as well as the advantages identified by both entrepreneurs themselves (especially small ones working in their own households and individually) and researchers exploring these spaces (Everything you need to know about coworking spaces, 2020; The 7 most underrated benefits of coworking spaces, 2019, What Is Coworking, 2018, etc.). True, there are very few such studies so far, so this article seeks to fill this gap at least in part.

Thus, one of the essential features of coworking spaces is the **ability to separate work from personal life**. Entrepreneurs face many situations that require intense mental work, thinking, concentration, and retention. When working on your own, at home, it's not always easy to do that. This can easily be seen in the quarantines announced during the COVID-19 pandemic, when working from home and working in a distance became an form rather than an exception. Not one has had to make sure that working in such conditions and keeping workability and responsibilities, especially for extended periods of time, is not always easy. Not only personality traits but also relevant abilities such as e.g. the ability to manage time, set priorities, distance oneself from the external, sometimes distracting, environment, motivate oneself for work and manage it in any other way. (Pocevičienė, 2019, Kazlauskienė, Gaučaitė, Pocevičienė, 2015, 2016).

Meanwhile, the coworking spaces, which contain all the necessary tools for work and business administration, at the same time discipline and motivate those who work there in their own way. Thus, a work space separate from home, in this case a coworking space and such a coworking environment as is typical of such spaces, as other working people are visible nearby, not only helps to separate personal life from work, but also enables to work more constructively and productive.

Another important feature of coworking spaces is the **ability to reduce costs and increase flexibility**. It is obvious that office equipment (tables, chairs, especially high-speed Internet connection, communication office equipment, printer ink, etc.) is costly, so the costs of maintaining it and renting it can also be a brake on faster business development. (What is coworking, 2018). On the other hand, not all of these measures are needed by every business on an ongoing basis, so the investment in them does not pay off immediately, if at all, or in a sense those costs are passed on to the customer, e.g. through a higher price of the good or service. Meanwhile, such coworking spaces have all the necessary (in addition, sufficiently new and high-quality, because with a larger number of users, they pay off faster) physical, informational, communication, etc. tools and equipment. In addition, the entrepreneur himself does not need to take care of their maintenance, renovation, even repair, so it is possible to focus on the business itself, rather than on the management of the office building. In addition, there is a greater chance of taking business to the next level in less tangible ways. And while working in such coworking spaces requires a certain membership or one-time fee, it is certainly not high and, as the entrepreneurs themselves claim, performs a more motivating function. In addition, you only pay for the hours you actually worked and the tools you used at the time. So, coworking spaces are great for those people who need to think about one problem or task to solve a problem and don't want to think about all the insignificant details of renting or buying an office. They are also great for short-term, sole proprietorships or those who are just tired of working from home.

In addition to the advantages already mentioned, coworking spaces also meet the social needs of each person - **the need to be in the community**. As we have already mentioned, communication, cooperation, social interaction are necessary for everyone, especially for entrepreneurs. After all, in order to build a successful business, it is necessary to know what is going on around you, what people are living in, what they like, what is missing, and so on. After all, the needs and desires are the basis of any business. In this respect, coworking spaces are a great place for social interaction, where there is a high probability of meeting other entrepreneurs and other people with similar interests and ideas, and not only in their professional activities, but also in their personal lives. In this way, a community of coworking space is created - although very flexible and constantly changing, it is still a community. (Dunedin, Brown, 2012)

Coworking spaces provide excellent opportunities not only for establishing business relations, but also for developing them. Great networking opportunities are created here. Working in one coworking space, people get to know each other at different stages of business development, see how others are working, keep commitments, and behave when problems or challenges arise. In other words, you can get the best, proven, evidence-based information about your potential business partners here. On the other hand, it is a great place for self-knowledge and even self-promotion. And getting to know others and especially in self-activity, reflection not only on the results of work, but also on the process of achieving them are among the essentials in creating and developing a business. In addition, it is one of the essential skills of self-directed entrepreneur. On the other hand, a person with these abilities is much better and easier to work in coworking spaces. This was confirmed by the analysis of the experience of working remotely. After the first quarantine in Lithuania (in June, 2020), a survey of students of management, business and social sciences at Šiauliai State College (82 respondents participated in the study) showed how important the above-mentioned competencies are in working independently. (see Table 1).

Table 1

Skills and Experience that helped to be successful in distance learning during the quarantine:
students opinion

Skills and Experience	Percentage of Choices
Perfect organization of the whole process by the academics	58
I have skills of independent work	46,4
I often had consultations with the teachers	31,9
I have skills of time management	30,4
I have distance learning experience	14,5

We can see that, in the students' own opinion, their ability to manage time and work independently, to be precise, even self-directed, was a guarantee of their successful and constructive learning during quarantine.

The same is confirmed by the results of the survey of academics (see Table 2)

Table 2

Skills and Experience that enabled to achieve success in organization of distance teaching/learning processes during the quarantine: academics opinion

Skills and Experience	Percentage of Choices
I have skills how quickly adopt to new and changing working conditions	66,7
I have skills of time management	60
I have experience in distance teaching/learning	60
I have skills of independent work	53,3
I am open to changes and innovations	46,7

Here, too, we see how important it is to be able to manage your own activities and their processes in order to work constructively, adapt quickly to change and experience success. On the other hand, Table 1 shows how important communication and collaboration, and help and support from other participants in the process are, especially for a beginner.

Another feature of coworking spaces that makes them attractive and functional is **the professional environment for meetings with clients or business partners**. This is especially useful if the client is a proponent of tradition who may not want to hire, buy a product or service from an entrepreneur who does not have their own professional environment, in other words, their own workplace or office. And a business meeting in a cafe may be unacceptable not only because of such a traditional approach to business, but also in general due to the nature of the environment itself (noise, a completely different purpose of the place) and the equipment and tools needed for the meeting or transaction. Meanwhile, coworking spaces provide any business not only with an environment, and an office address that you can provide to your client, but all the tools you need to work.

In addition, they **ensure quality and mobility**, as each time you can choose between geographical, supply, working environment, microclimate, and so on, in terms of the most suitable space for coworking or at any time - according to the need (eg., close to your or your client's place of residence, price, communication, supply, etc.) or the desire to change them.

Another advantage of coworking spaces is that there will be more and more people here, which means new ideas, experiences, acquaintances, and maybe **new business perspectives**. This can be a good way to try everything before settling in permanently in your office. As we have already mentioned, there are many specialists from different businesses, industries and fields, with whom even great business niches can be found in communication and collaboration. Traditional office buildings are usually very isolated, while the doors of coworking spaces are wide open for meetings, communication, collaboration, coworking with many different people. As already mentioned, working here is useful not only for the reasons already mentioned, but also because it is possible to create social networks, look at the same phenomenon or thing from different angles, see things from a different, sometimes very unexpected, perspective. As you know, many businesses and big startups were born to solve a problem, so it goes without saying that being closer to different industries and seeing what their struggles are and which problems are more universal in business can help find a new solutions to these problems.

It has been observed that people working in these spaces are more likely than their non-working colleagues to succeed. This could perhaps also be explained by the fact that, as various studies show (Ockels, King, 2021; Dunedin, Brown, 2012, Cantor, 2010, etc.), there is a direct relationship between job satisfaction and job success. That such coworking spaces have a future can be judged from a study conducted in the USA (Ockels, King, 2021), which showed that working in coworking spaces **changes employees' thinking, self-esteem, attitudes towards work, motivation**, etc.

There is also a **high sense of social value**. The culture created in these workplaces acquires social value. Professionals working here can help each other when needed, as there is no or minimal minimization of competition, and helping each other becomes the cultural norm. Employees met in these spaces have unique skills that they are able to share with each other. A high sense of social mission is also ensured by the Coworking Manifesto, signed in more than 1,700 such coworking spaces. (Coworking Manifesto (global - for the world), 2021). The manifesto states that these areas of coworking are designed to develop and ensure learning, cooperation, collaboration and coworking, community and sustainability. This means that people here not only work or report for work, but also feel part of the community and social movement.

It is important to note that the concept of socialization is not coercive here. Employees working in coworking spaces are free to decide when and how they want to communicate and collaborate, so it is only natural that there are those who prefer meaningful discussions over coffee while others are serious. Understandably, there are still those who choose to work alone, but it is interesting to note that even for those who foster such a strong sense of identity, a sense of community was important (as shown by the analysis of the results of the above study). The fact that employees know they can communicate freely, and do it when they want, helps foster **a sense of community and freedom**.

On the other hand, no matter how strange, the sense of **control of work is strengthened** in the coworking space. These spaces are available 24 hours a day and employees can choose the right and convenient working hours for them. People decide whether they want to work day or night. They also have a space where they can work very intensively, especially when it comes to meeting certain deadlines. These coworking spaces also have places where you can relax. In other words, there are so-called quiet spaces where people can relax, reflect and so on. A sense of control over work, especially self-employment, is also encouraged by the fact that people can simply choose to work from home without any information, apology or request (eg., your child's nanny has not come, a master has to come home - you don't have to ask or apologize. You just stay at home to handle those things).

The research revealed that those working in coworking spaces especially value independence, which is not only the basis for self-study or work, but to a large extent also the basis for successful business. However, on the other hand, they also mentioned that in their life and work they need a certain structure, a system. In their opinion, too much independence can hinder their productivity, therefore it is necessary to maintain a balance in the coworking spaces. Being close to people who are very focused and motivated about their projects and work also enables them to be disciplined and to follow order. It even motivates you to work harder and meet deadlines.

The way forward for traditional businesses

The usefulness of coworking spaces is also evidenced by the fact that even more companies and organizations (eg., Uber, Instagram, Indiegogo, Wonderfly, ect) are beginning to apply the coworking spaces model and its core principles as part of their corporate strategy, while maintaining traditional workspaces and developing their strengths. (What Is Coworking, 2018) This is usually to help employees become more productive. It has been observed that in companies that have already applied such a model, there has been a marked increase not only in the willingness of employees to use such spaces, but also in their productivity. It has become even easier to attract employees who want flexible working hours and jobs. Due to these factors, the need for such coworking spaces is increasing. Naturally, for the reasons mentioned above, such a work model is also welcomed by employers. They say working away from an established office helps employees spread new ideas. When working in coworking spaces, employees show more effort to work as a team, greater listening and interest in the work.

On the other hand, in the absence of opportunities to go to work in such spaces, it is possible to try to adapt traditional offices, traditional spaces for coworking. People can adjust the circumstances of their work according to what they think gives a sense of purpose and meaning. For example, to change the layout of office furniture, to supplement their purpose, to create quiet areas for reflection. The same can be said for communication and interaction, which should go beyond business meetings. This can be promoted through the creation of online spaces, social events, summer camps and more. All of this fosters a sense of unity that can drive innovation. These changes also allow people to relax and freely share their ideas and thoughts about the projects they are working on.

In summary, these studies show that a well-organized workplace and environment are important for labor productivity. (Ockels, King, 2021) This is why independent professions and collaborative people show a greater sense of job satisfaction (compared to traditional office conditions).

Studies show that there is a strong link between productivity and autonomy. Companies must therefore strive to strike a balance between structure and independence. While employees want to be free, they also need a structure to keep them focused. Coworking spaces are a great opportunity for such a combination. The coworking space not only provides an excellent basis for developing ideas and innovations, but also leads to less staff turnover.

However, to work in such spaces, we need to develop the necessary skills (such as the ability to work and learn self-directedly, the ability to manage time and priorities, the ability to motivate oneself, communicate and collaborate constructively with professionals in one's own and other fields, etc.) and this development should begin even at school. (Pocevičienė, 2019, Pocevičienė, Stasenaite, Jakutiene, 2018, Kazlauskienė, Gaučaitė, Pocevičienė, 2015, 2016).

As stated by N. Cantor (2010), times demand that higher education play a transformative role. The future of democracy itself, as Martha Nussbaum wrote (2010), will depend on our ability to educate “complete citizens who can think for themselves, criticize tradition, and understand the significance of another person’s sufferings and achievements.” It’s true that we must have technology, science, commerce, and innovation, but they are not sufficient, in and of themselves. They must be embedded in a humanistic landscape that fully accounts for culture, history, and difference, and that strives to reduce inequality, spread opportunity, and strengthen community. And the coworking spaces are important for higher education institutions educating of future generations of managers and entrepreneurs, not only because future professionals are properly prepared to work in such spaces, where to have appropriate skills, such ability to work and learn self-directedly, ability to manage time and priorities, ability to motivate oneself, communicate and collaborate constructively with one’s own and other specialists, etc., but also because educational environments organized according to such principles would also provide better learning and study outcomes and ensure quality of studies.

Conclusions

- Coworking is the new path of melding life and work in a sustainable fashion with high intersection of real estate, technology and community, which will shape the way we work in the future. Coworking is not just about the sharing of infrastructure and cost, it is about belonging to a community, accessibility and sustainability. Coworking is the new way of working and sharing.
- Coworking spaces are designed to provide a productive and collaborative environment for their dynamic inhabitants, and created without corporate constraints on what is perceived to be an “office” environment offering flexible memberships to suit most needs. According to the entrepreneurs themselves, the coworking space is „a social gathering of a group of people who are still working independently, but who share values and who are interested in the synergy that can happen from working with people who value working in the same place alongside each other“.
- The main features of coworking spaces, as well as the advantages identified by entrepreneurs themselves (especially small ones working in their own households and individually) and by researchers exploring these spaces, are the following: the ability to separate work from private life; reduce costs and increase flexibility, ensure the need to be in the community, establish and develop business relationships, meet clients or business partners in a professional environment, ensure quality and mobility, and even anticipate new business prospects. In addition, it has been observed that people working in these spaces are more likely than their non-working colleagues to succeed, have positive changes in employee thinking, self-esteem, attitudes towards work, motivation, a high sense of social value and even a stronger sense of control.
- However, successful work in such spaces requires certain skills, such as the ability to work and learn self-directedly, the ability to manage time and priorities, the ability to motivate oneself, communicate and collaborate constructively with professionals in one’s own and other fields, etc., which need to be developed while already studying or even studying at school.
- Coworking spaces are important for higher education institutions educating future generations of managers and entrepreneurs not only because future professionals are properly prepared to work in such spaces, so they will need to have appropriate skills, such as ability to work and learn for self-directedly, ability to manage time and priorities, ability to motivate oneself, communicate and cooperate, collaborate and cowork constructively with specialists in one’s own and other fields, etc., but also because educational environments organized according to such principles would also provide better learning and study outcomes and ensure quality of studies.

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Received: 7 March 2021

Accepted: 31 May 2021

WORKFORCE MARKET RESEARCH: THE CASE OF ŠIAULIAI REGION

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Annotation

The workforce market is rapidly changing technologically, complex today's economics restructuring and requirements to the labor market are transforming. The issue of matching workforce market supply and demand from a requirements occupational perspective is becoming more important than ever. Workforce is a core value of a company. It is very important to analyze and predict what qualifications will need professionals to have in order to successfully participation in the labor market. This area of research is one of the components that ensure the quality of educational teaching. Quality is ensured by developing appropriate study programs that are in line with current / future labor market challenges. Depending on the projected demand of the labor market, study programs can be oriented towards specialization. The article presents the workforce market research on the example of Siauliai region.

Keywords: workforce, labor market, demand, supply, human resources.

Introduction

Workforce market forecasting and the goals to it have been transformed along with social and economic challenges. Workforce market analysis performs the functions of assessing the current situation and predicting a possible future scenario. This strengthens the planning of workforce resources policy and creates preconditions for a better match between labor market demand and supply. The results of the specialist needs analysis also serve to reduce information asymmetries in education and the labor market. The spontaneous distribution of the workforce market in the labor market has many shortcomings. Due to the diverse nature of the labor market and pre-determined rigidities, there may be large-scale long-term mismatches in the labor market on both the supply and demand sides (i.e. mismatch between what employers need and what the labor market offers). This situation is characterized by a high level of unemployment among people with a certain level of education and, on the other hand, by the difficulty for companies to find the necessary skilled workers.

Research problem. In order to maintain constant success and achieve the set goals in the company, great attention must be paid to the proper attraction of the workforce. Attracting the right workforce to the market helps to respond in a targeted way to economic change. The aim is to attract as many skilled workers as possible to the labor market. It is also important to increase the demand for workforce. There is a rapid development of international economic cooperation, rapid growth of technological progress and, at the same time, growth of workforce needs. Companies that aim to remain competitive are undergoing rapid change. There is also an increasing need for workforce. At the same time, it should be noted that there is a lack of research on the need for different types of specialists and the specifics of their identification. For this reason, the problem analyzed in the article is related to the insufficient analysis of the workforce market in Siauliai region.

The object of the research - the workforce market.

The aim of the research is to analyze the workforce market in Siauliai region.

Research tasks:

1. Define the concept of the workforce market;
2. Identify workforce market sources;
3. To determine the workforce market in Siauliai region.

Research methodology

Justification of the research and enforcement procedures. The need of the workforce market in Šiauliai region is based on the analysis of theoretical (changes in the concept of workforce) and practical discourse: Lithuanian labor market supply and demand forecasts and trends, strategic documents of the Republic of Lithuania, Šiauliai region, During the process of

selection of human resources or identification of the demand for labor, the most popular CV databases were used: www.cvbankas.lt, www.cv.lt, www.pvsistemas.lt, <https://exemigrantai.lt/> and others. The analysis of the main agencies providing human resources search services in Lithuania and Šiauliai region was used: UAB Personalo valdymo sistemas, UAB Nermeka (Hirelabas), UAB Guarana, Headex Group and others. According to the results of the research of the most necessary professions in Šiauliai and Telšiai companies conducted by Šiauliai Chamber of Commerce, Industry and Crafts (2021).

Research period. In order for the study education system to meet the needs of the market and future forecasts, various documents and statistical and research data were analyzed in 2021, in January-March.

Research methods. General research methods were used to substantiate the research - analysis and synthesis of scientific literature; document analysis. Data analysis was based on the methodology of V. Žydžiūnaitė (2017). Data analysis was performed by selecting content analysis criteria (structural units). The data of the content analysis are recorded in the tables, the frequency of recurrence of the structural units and their compliance with the selected criteria are highlighted.

The concept of workforce

In the scientific literature and various sources, the workforce can be named in two ways - as a statistical indicator describing the number of active population and as the ability of people to work (see Table 1).

Table 1
Definitions of workforce

Year	Author (source)	Definition
2009	J. Bagdanavičius	The workforce is a group of people who have the opportunity to be employed.
2014	Glossary: Labour force	The workforce or the economically active population is employed (employed and self-employed) and unemployed
2019	Organization for Economic Co-operation and Development (OECD)	The workforce or currently active population consists of all persons who meet the requirements of the employed or unemployed.
2021	Lithuanian Department of Statistics	The workforce is all employed and unemployed
2021	Universal Lithuanian encyclopedia	Workforce is a statistical indicator describing employed or actively looking for a job in the country. According to international standards, the terms workforce and economically active population are synonymous. In this sense, they are used in sample workforce surveys (in Lithuania since 1994).
2021	Glossary of Economic Terms	Workforce is the physical and mental abilities of people that can be used for economic or other socially useful activities.

Source: compiled by the authors of the article according to the sources presented in the table

In many sources, workforce is described as labor supply, and this term includes all employed or willing / able to work (looking for work) residents, regardless of their age. According to J. Bagdanavičius (2009), the workforce consists of people of working age from 14 years of age to retirement, who are considered active employees (working or in search of work). A young person of working age is also included in the workforce. In the Law on the Framework of Youth Policy of the Republic of Lithuania, a young person is a person from 14 years of age. In the context of modern society, young people enter the labor market at an increasingly later age as more emphasis is placed on obtaining higher education. According to R. Brazienė and I. Mikutavičienė (2013), young people are studying longer and longer, therefore the labor market situation is changing, more and more young people tend to live as if in an “extended present”. The workforce does not include children under the age of 14, students, pensioners, workers on parental leave, prisoners and those who do not want to work. However, according to the Law on Employment of the Republic of Lithuania (2021), the list of persons additionally supported in the labor market has been supplemented with three groups of persons. The first group consists of pregnant women, the child's mother (mother-in-law) or father (adoptive parent), the child's guardian, career and persons actually raising a child (adopted) under 8 or a disabled child (adopted) under 18 and persons caring for disabled family members, who are in constant care or supervision. The second group - returning from places of imprisonment, when the period of imprisonment was at least 6 months. The third is addicted to narcotic, psychotropic and other psychoactive substances after completing psychological social and / or vocational rehabilitation programs, if they apply to the Employment Service no later than within 6 months of completing the psychological social and / or vocational rehabilitation program.

The OECD documents (2019) state that the workforce or the currently active population consists of all persons who meet the requirements of the employed or unemployed. In the Law

on Employment of the Republic of Lithuania (2021), the employed are defined as those who work at least one hour a week and receive a certain salary / profit or have a permanent job, but are temporarily not working due to illness, leave or work activities. Unemployed are defined as people who are unemployed but actively looking for work and able to start work at any time. For a person to be considered part of the workforce, he or she must be able to work, want to work, and be in the job search.

In business enterprises, the workforce is recognized as employees / human resources / human capital as a commodity that stands out in the labor market due to certain specific features: the workforce is characterized by deliberate activities, continuous improvement and can improve itself organization, as well as this product itself chooses its buyer t. y. the workplace, taking into account the proposed salary, the microclimate and values of the organization, future career opportunities or professional development, job satisfaction and taking into account the motivational measures available in the organization (see Table 2).

Table 2

Definitions of employee, staff, human resources, human capital

Year	Author	Definition
2010	L. Labanova	Human resources are all the people working in an organization, their skills, abilities, competencies, knowledge and experience, creativity and methods that enable them to do the work required by the organization and which the organization uses and improves.
2010	O M. K. Kagochi, C. M. Jolly	Human capital is a set of specialized skills that is acquired through human learning. A special form of human capital is knowledge.
2012	A. Jakutis, V. Petraškevičius, A. Stepanovas, D. Andriušaitienė	An employee is a person who performs physical and mental work.
2014	I. Lapinskaitė, M. Krikščiūnaitė	Human resources are the physical and mental strength of all people.
2016	A. Kalvionytė, R. Karsokienė	Human resources are not material resources, but human capital.
2017	A. Bortnikas	Human resources are a key asset in a modern and ever-changing world.
2021	Universal Lithuanian encyclopedia	Personnel - employees, members or employees of an institution, company, organization, all of them

When analyzing the concept of workforce, it is important to discuss the factors of workability. The Glossary of Economic Terms (2021) states that the workforce consists of the following factors of workability: the state of human health and available knowledge and skills.

The Glossary of Economic Terms (2021) describes the workforce market as a market whose object is workforce. The workforce market consists of the main actors - the buyer and the seller. Employers provide employees in the product and service sector, motivate them to work by providing opportunities to improve qualifications, develop competencies, improve as an individual, as well as pay salaries in exchange for quality work that brings profit to the organization. The role of the human factor plays an important role in the labor market. Important human social and psychological characteristics. Employees sell their work to meet their physiological and mental needs.

In the Universal Lithuanian Encyclopedia (2021), the concept of the labor market is described as a system of economic relations of purchase and sale of workforce. The labor market is a kind of system based on economic relations between employees and employers with appropriate mechanisms and norms that ensure the proper use of workforce. According to R. Adamonienė (2004), the labor market is a system of public relations related to labor demand and labor supply, economic (employment) space and a mechanism that ensures compatibility of prices and working conditions between the employer and the employee. Summarizing the author's opinion, the labor market consists of the purchase and sale of labor, as well as the workforce - buyers and sellers, the employment process and the provision of favorable prices and working conditions for both employees and employers. Workforce supply - persons who can and want to work. Labor supply is defined by the ability and willingness of the workforce to work for specific reasons: to meet physiological and psychological needs. Working conditions, wages, working hours and the possibility to work from home are important for employees, as are the microclimate of the organization and the values it cherishes. Competitiveness also varies depending on workforce supply. When workers enter the labor market, they often face competition between employees at their level. Competing for a job / retention, better pay. Thus, the pursuit of a stable income by entering the labor market, regardless of the level of wages and the supply of workforce. Workforce demand is a societal need for labor force. Labor demand is

the most important indicator of workforce capacity and willingness to work. According to researchers, the demand for workforce is the amount of work that employers want and can hire - the state, companies, private individuals. Employers employ workforce taking into account the following factors: wages, prevailing market prices of goods / services, trade union activities. The demand for workforce depends on the growing consumer consumption of society, the scale of production of goods, the innovativeness of production technologies, as well as wages.

Summarizing the results of the study, it can be stated that the workforce is all employed and actively looking for a job in the country. The workforce is closely related to the concepts of human resources and human capital. The workforce market is defined as a market whose object is labor force. The workforce market is a system based on economic relations between employees and employers. The workforce market is further recognized as labor market supply and demand, which can be identified and predicted from a variety of sources.

Sources of labor force market identification

According to E. Jančiauskas (2006), changes are constantly taking place in the labor market: some workers become unemployed, voluntarily stop working (i.e. become a passive part of the workforce), others - return to active work, third - graduates, mothers who have raised children until a certain age, - enter the labor market (for the first time or return to it) and, in the fourth, cease to work for the various reasons mentioned. The labor market is dominated by constant changes in the workforce, and the demand and supply of workforce is changing rapidly.

Economists note that the workforce decreases during economic downturns, in emergencies, as people tend to have a negative view of their employability during such periods. Redundancies or low pay can completely deter people from looking for work. So, even if people want to work, some stop looking for work and deliberately leave the workforce. Given the aging population and the rapid gap with the younger generations, with declining workforce participation and declining population growth rates, the workforce is expected to grow more slowly in the future than in recent decades.

The Lithuanian Classification of Occupations LPK 2012 (prepared according to the International Standard Classification of Occupations ISCO-08) is used to collect workforce market research and collect various data on occupations. It reflects changes in the structure of the labor market. The classification contains codes, names and descriptions of occupations and their groups using a certain unified structure. The classifier is used to assess the employment of the Lithuanian workforce by occupation. According to the Lithuanian Classification of Occupations LPK 2012, the workforce consists of the following professions: managers, specialists, technicians and junior specialists, civil servants, service sector employees and salesmen, skilled agricultural, forestry and fisheries workers, skilled workers and craftsmen, plant and machine operators and assemblers, unskilled workers, armed forces professions. These occupations are classified by code, title, main subgroups, groups, subgroups and occupations.

Existing competencies and skills are used to perform qualified work, as well as higher / higher education and participation in trainings. There are no special requirements for qualification skills or professional abilities for unskilled work. According to the classification of occupations, unskilled workers perform simple and repetitive tasks, which usually require manual tools and physical strength. The main requirements for unskilled workers are often primary education or training in a certain field.

According to L. Šalkauskienė, R. Pocevičienė and Radzevičienė (2017), the demand for workforce can also be confirmed by the strategic documents of the Republic of Lithuania (data of the Lithuanian Department of Statistics, the Government of the Republic of Lithuania "Lithuania 2030", Strategic Action Plan of the Ministry of Agriculture of the Republic of Lithuania for 2021-2023, Siauliai City Municipality Employment Increase Program for 2021–2023, Siauliai Region Development Plan for 2014–2020, Siauliai City Strategic Development Plan for 2015–2024, Council of the European Union Recommendation on the establishment of the Youth Guarantee Initiative 2013, Youth Employment Centers Employment Programs, etc.) which clearly identify the need for professional development, the aim to develop deeper entrepreneurial skills by developing business in the national and international market.

There are youth work centers in the customer service departments of the Employment Service, located in the largest cities of Lithuania (Vilnius, Kaunas, Klaipėda, Siauliai, Panevėžys). Youth Work Centers (JDCs) are a place where young people can get advice from professionals who know their job, as well as training, creative workshops and meetings with potential employers. It takes into account the needs of the young person, provides youth-oriented services, counseling and training that help to make informed decisions about future careers.

In Lithuania, the demand for workforce is also based on the data of the Employment Service (former Lithuanian Labor Exchange). The Employment Service conducts annual activity reports on employment mediation services provided to natural persons. The Employment Service monitors the labor market on a monthly and quarterly basis, forecasting possible changes in the labor market on an annual basis. Information on changes in the labor market situation is published at the beginning of the month, an overview of trends at the end of the quarter, and a forecast for the coming year in December. According to the reports of the Employment Service, it can be noticed which workforce demand is the highest in Lithuania. The annual reports reveal key information: the age of the workforce, according to which persons are divided into certain age groups (<29, 30-49, 50>), as well as gender, position held and the country to which the person was employed. From 2020 In January, another column was added - the nationality of the employed person. Reports published by the Employment Service regularly update information on labor shortages, as well as reveal workforce trends for the coming years. It becomes clear which specialties are in most demand.

The Employment Service has prepared a "Map of Professions". It is a career guidance tool. The Map of Professions presents the situation of supply and demand of the most relevant professions for the Lithuanian labor market in Lithuanian municipalities.

Proper job search requires a lot of effort. High-quality recruitment often involves employment agencies that know their job and focus on the human resources selection process. By working with employment service agencies, employers save a lot of time and can focus more on their company's operations, leaving the process of finding the missing workforce in the hands of their qualified professionals. There are two types of employment agencies: private and public. Private employment agencies are for-profit organizations. They provide recruitment services through an intermediary between the employer and the jobseeker. Private and public employment service organizations differ in that private ones work for employers (clients) and public ones for jobseekers. The main agencies providing human resources search services in Siauliai region are JSC Personalo valdymo sistemos, JSC Nermeka (Hirelabas), JSC Guarana, JSC Darbinteria, JSC Jurgvita, Headex Group, Viatera.

When performing the human resources selection process or identifying the demand for workforce, the most popular CV databases are used: www.cvbankas.lt, www.cv.lt, www.cvonline.lt, www.uzt.lt, www.cvmarket.lt, [www.pvsistemos .lt](http://www.pvsistemos.lt), www.dirbu.laikas.lt, www.dirba.lt, <https://exemigrantai.lt/> and others. These portals host job advertisements for companies that reflect the need for workforce shortages. These portals are used both by staff responsible for human resources search in companies and by employment services agencies. This facilitates the recruitment process by reducing the time and effort resources involved in selecting staff.

Research results

Analyzing the workforce market in 2021 forecasts in Lithuania, according to the data of the Employment Service under the Ministry of Social Security and Labor of the Republic of Lithuania (Employment Service), 2021, 16.4% was registered on 1 February. It means there were 282 thousands unemployed. 20.7 thousands job offers were registered in the information system of the Employment Service. During the COVID-19 pandemic wave, the situation in the Lithuanian workforce market remains uneven. The emergency situation and quarantine valid throughout the country resulted in the loss of jobs to the Employment Service in 2020. 1.3 times more people of working age applied than in 2019.

Data on the structure of the employed by occupation show that in 2020, in comparing to 2019, the number of specialists (3.4%), technicians and junior specialists (2.2%) and employees of institutions (0.6%) increased. The number of skilled agricultural, forestry and fisheries workers decreased by one sixth (16.6%).

At the end of 2020 the registered unemployment rate for men (50.1%) was 0.1% point lower than women. Registered female unemployment accounted for 49.9% during the analyzed period, 40.6 thousands of 16-29 years old young people were unemployed. This is 9.1% of population of the same age group in the country. Registered youth unemployment, compared to 2019, grew by 4.1%. The growing registered unemployment of women and young people is mainly due to the fact that the majority of these groups usually work in the most affected trade, services and services sectors of COVID-19, which were partially or completely closed during the quarantine period.

According to the data of the Ministry of Social Security and Labor of the Republic of Lithuania (2021), it is important to mention the main causes of youth unemployment in Lithuania: not acquired or acquired insufficient professional qualification; mismatch of acquired qualifications with the needs of the labor market; lack of practical experience; lack of job search

skills for young people; lack of motivation and social competences of young people; the quality of jobs and the high expectations of young people.

In order to promote youth employment, in 2013 The Council of the European Union has issued a recommendation on the establishment of a Youth Guarantee initiative. The main aim of this initiative is to mobilize young people in the shortest possible time: by staying in touch with the labor market or by providing access to further education. The aim is to reduce youth unemployment and improve the situation of young people who are not in employment or education. It aims to ensure that all young people aged 15-29, whether registered with the Employment Service or not, receive a specific offer of employment or further training, including an apprenticeship, traineeship or internship, within 4 months of leaving school or losing their job.

With the increase in the number of unemployed and the maintenance of a similar number of new job vacancies, it is becoming more and more difficult for young people to find employment, not only for the long-term unemployed. Almost every fifth (19.5%) unemployed person registered with the Employment Service is a long-term unemployed person. It is noted that two out of five registered unemployed are between the age of 30 and 49 years old, a slightly smaller proportion are over 50 years of age, almost one in five people under the age of 30. The majority of the unemployed have a secondary education. Every third has no professional training.

Compared to previous periods, the demand for administrative and executive secretaries, postmen, builders-installers, drivers of heavy trucks and lorries grew the most. There was a decrease in job offers for primary and secondary education teachers, salesmen, unskilled workers (shelf loaders, unskilled civil engineering workers, kitchen helpers). Compared to 2019, workforce supply increased by 27.1%. Every third (33.1%) registered unemployed person is younger than 30 years of age. Older than 50 years of age persons make up 28.8%. One in three (33%) registered unemployed people live in rural areas.

Due to the situation in the country after the declaration of an emergency situation and quarantine, when many businesses were forced to partially or completely suspend their activities, the registered unemployment rates also increased in the regions of Lithuania. The highest - 6.1% - growth was recorded in Panevėžys and Ukmergė. Registered unemployment also grew rapidly in Vilkaviškis (5.9%), Druskininkai (5.8%), Lazdijai (5.6%) municipalities. The declaration of quarantine and emergency had the least impact in Neringa (0.8%), Raseiniai (1.7%), Molėtai (1.9%) municipalities. Areas of highest unemployment remain the same as in previous years. These are mostly border areas, far from the country's major cities, where economic development is faster and the need for workforce and employment opportunities are higher. Meanwhile, in the areas of the highest unemployment, the economic development is slow, the number of operating economic entities is small, there are no larger employers creating more jobs. The lowest unemployment remains: in Neringa (3.5%), Klaipėda district (6.7%) and Kretinga (7.7%). Of the five largest cities in the country, the lowest number of unemployed was in Šiauliai (9.6%). Assessing the labor market indicators by regions, it was noticed that 57088 thousand people were registered in Šiauliai region as the jobseekers of working age. Unemployment of 15.9% was registered in Šiauliai region.

According to the Employment Service, in 2020 employers registered 12.8% fewer job vacancies than in 2019. The largest share (59.4%) of registered vacancies was in the service sector. More than a fifth (20.8%) is in industry. According to qualifications, fewer vacancies were registered for skilled workers and workers in the service sector. The largest number of vacancies by occupational group is registered for drivers of heavy trucks and lorries, loaders, cleaners of offices, hotels and other establishments, maids and helpers, drivers of cars, taxis and vans, shop assistants, chefs, advertising and marketing specialists, forestry workers, plumbers and plumbers, builders, painters, carpenters and joiners. The number of registered jobs decreased the most for office, hotel and other office cleaners, maids and helpers, stevedores, shop assistants and chefs.

According to the Employment Service, in 2020 there is a mismatch between workforce supply and demand in the labor market: a surplus of unskilled workforce and a shortage of skilled workforce. The supply of specialists and skilled workers was more than 16% lower than demand, while those wishing to work unskilled work - 16% more than the need for such workforce.

Examining the compatibility of workforce supply and demand by Lithuanian counties, it is observed that the distribution of professions with labor shortages by regions is uneven.

The validity and necessity of the need for specialists in the labor market of Šiauliai region is revealed by the search for employees (www.uzt.lt, www.cv.lt, www.cvmarket.lt, www.cvonline.lt, www.cvbankas.lt, www.pvsistemas.lt, www.dirba.lt, www.ldb.lt/TDB/Siauliai, etc.) And data on the workforce employed by the Šiauliai Region Employment Agency in 2015-

2020. According to the employment agency, it has employed the following professions over the last five years: managers, specialists, technicians and junior professionals, civil servants, service sector workers and salesmen, skilled workers and craftsmen, plant and machine operators and assemblers, and unskilled workers. During the analyzed period, the company never employed qualified agricultural, forestry and fisheries workers and persons belonging to the professions of the armed forces.

According to the survey data of Šiauliai Chamber of Industry and Crafts (2021), sales and marketing and production managers will be mostly sought in the next three years. According to the results of the survey, specialties in the field of engineering were singled out, such as production engineers, technologists, designers, mechanical engineers, etc. Developers of online and social networking services will be in high demand in the region. Other high-class specialists included production masters, warehousekeepers, export managers, transport logistics, economists, financial analysts, and others. Also unskilled workers in various fields.

The highest demand for workforce in 2015-2020 emerged in the category of technicians and young professionals. Summarizing the results of the survey, the employment agency in 2020, in comparing to 2015, 37.5% more managers were employed in Siauliai region, as well as 6.3% more specialists, 43.3% more technicians and junior professionals, as well as twice as many 50% employees, 66.7% more skilled workers and craftsmen, plant and machine operators and assemblers were employed 100%, and unskilled workers were employed as much as 71.4% more. The total number of employed workforce in Siauliai region increased by 39%.

The forecast of employment opportunities in Siauliai region for 2021 (see Table 1) shows the possible need for specialists by professions in Siauliai County and the Republic of Lithuania.

Table 3

Forecasts of employment opportunities by professions in Lithuania and Siauliai region for 2021

Region	Professions
Siauliai region	<p><i>Specialists and managers:</i> sales and production managers, production foremen, production engineers, technologists, designers, mechanical engineers, advertising and marketing specialists (marketing managers), administrators, economists, financial analysts accountants, accountants, warehousekeepers, export managers, transport logisticians, social workers.</p> <p><i>Employees and skilled workers in the service sector:</i> developers of online and social network services, drivers, salespeople, builders, cooks, welders, mechanics, electromechanics, electricians, painters.</p> <p><i>Unskilled workers in various fields:</i> cleaners, packers, kitchen workers.</p>
Lithuania	<p>Specialists and management staff: advertising and marketing specialists, warehousing staff, administration, personnel, accounting, nursing specialists, construction managers, mechanical engineers, etc.</p> <p>Service sector workers and skilled workers: industrial mechanics, production workers in various fields, welders, painters, drivers, etc.</p> <p>Unskilled workers in various fields.</p>

The need for the analyzed specialists (see Table 1) is also confirmed by the analysis of the strategic documents of the Republic of Lithuania, which clearly identify the need to develop deeper entrepreneurial and information management skills in developing business in the domestic and international market. E.g. Priority VI "Smart Economy" of the State Development defined in the State Progress Strategy "Lithuania 2030" emphasizes "a flexible and competitive world [openness], a high value-added economy based on knowledge, innovation, entrepreneurship [creativity] and social responsibility; Green growth [responsibility] ". Lithuania's Progress Strategy "Lithuania 2030" is a public agreement aimed at creating a modern, vigorous, open state that fosters its national identity. According to this strategy, the aim is to become an integral, successful, politically and economically strengthened part of the Nordic-Baltic region, which would include five Nordic and three Baltic States. The aim is also to change the Lithuanian economy. Lithuania is expected to be a flexible and competitive world, a high value-added economy based on knowledge, innovation, entrepreneurship and social responsibility.

In the programme of Government of the Republic of Lithuania "Employment Increase 2014–2020" in 3 chapter 3 the reasons for drawing up the program are presented: the aim of reducing unemployment caused by the economic downturn, structural and long-term unemployment, youth unemployment and regulating the impact of emigration processes on the labor market.

In Ministry of Agriculture of the Republic of Lithuania 2021-2023 The strategic goal set in the strategic action plan is to ensure long-term competitive and sustainable development of agriculture, food and rural areas by promoting employment in regions and rural areas.

In strategic development plans of Siauliai county district municipalities in 2014-2020 and Siauliai region in 2015-2024, in Youth employment center employment programs there are indicated the developmental directions related to the development of economic activities or business. E.g. Priority 2 "Business Environment and Entrepreneurship Development" of Siauliai District Strategic Development Plan, Activity Priority 1 "Competitive Business Environment" of Siauliai City Strategic Development Plan emphasizes the importance of innovative engineering industry and logistics services that create high added value and attract local and foreign investments. Also, the creation of new jobs in Siauliai region and the development of industrial activities are envisaged from the indicated goals.

Akmenė and Siauliai Free Economic Zones have been established in Siauliai region, the aim of which is to increase the industrial attractiveness of Akmenė and Siauliai and to create more favorable conditions for attracting investments, development of high technologies and creation of new jobs. The region has also intensified the activities of industrial, transport, trade and service companies, which generate the highest gross value, added. These factors will make it possible to set up new businesses and create jobs for professionals in various fields.

The goal of Siauliai City Municipality's employment increase program for 2021-2023 is to increase employment and integration into the labor market. It has the following tasks: to develop the social and work skills of the unemployed.

Thus, the compatibility of workforce market supply and demand is confirmed by the strategic documents of the Republic of Lithuania, which show the need to increase overall workforce employment, encourage young people to enter the Lithuanian labor market faster and easier, increase economic growth and develop an innovative society capable of adapting to employers labor market conditions.

Conclusions

The results of the empirical research allowed to achieve the goal of the research and to formulate the following main aspects of the need for specialists in Siauliai region:

- The workforce is all employed and actively looking for a job in the country. The workforce is closely related to the concepts of employee, personnel, human resources and human capital. The workforce market is defined as a market whose object is workforce. The labor market is a system based on economic relations between employees and employers. The workforce market is otherwise recognized as labor market supply and demand.

- The main sources of workforce market identification are the strategic documents of the Republic of Lithuania - the Government of the Republic of Lithuania „Employment Growth Program 2014-2020“ (current wording), Lithuania Progress Strategy „Lithuania 2030“, the Ministry of Agriculture of the Republic of Lithuania Strategic Action Plan 2021-2023, Siauliai City Municipality Employment Increase Program for 2021-2023, Siauliai Region Development Plan for 2014-2020 (current wording), Siauliai City Strategic Development Plan for 2015-2024, Recommendation for the Establishment of the Youth Guarantee Initiative of the Council of the European Union 2013. Also sources of workforce identification are data of the Lithuanian Department of Statistics, Youth Work Centers, the Employment Service and employment agencies are stored.

- The following professions are forecasted in Siauliai region: Specialists and managers: sales and production managers, production foremen, production engineers, technologists, designers, mechanical engineers, advertising and marketing specialists (marketing managers), administrators, economists, financial analysts, accountants, warehousekeepers, export managers, transport logistics, social workers. *Employees and skilled workers in the service sector*: developers of online and social network services, drivers, salespeople, builders, cooks, welders, mechanics, electromechanics, electricians, painters. *Unskilled workers in various fields*: cleaners, packers, kitchen workers.

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Received: 4 March 2021

Accepted: 31 May 2021

SYNERGISTIC EFFECTS OF COMBINED THERAPY: ELECTROSTIMULATION WITH INFRARED LIGHT AND ULTRASOUND FOR CELLULITE

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Annotation

Cellulite, the problem of dimpled appearance of the skin that is present in 80-90 % of post-pubertal women and considerably affects quality of life. A wide range of products and treatments for cellulite reduction is available, however, there is a lack of research what is effect of electrostimulation with infrared and ultrasound on cellulite effected skin.

Key words: elektrostimulation, infrared, ultrasound, stage III cellulite.

Introduction

Cellulite is a descriptive term used to characterize the cosmetically distressing, altered (eg, dimpled, padded, peau d'orange) topography of skin. Cellulite is multifactorial, with sexual dimorphism of subcutaneous connective tissue, the effects of localized increases in tissue tension, and local circulatory and inflammatory abnormalities all thought to play an important role (Canela et al., 2018). Cellulite as skin condition is most commonly found on the posterolateral thighs, buttocks, and abdomen. It is often identified by a dimpled or orange-peel appearance of the skin's surface. Cellulite is a multifactorial condition that is present in 80–90 % of post-pubertal women (Luebberding et al., 2015). Cellulite may worsen during high estrogen states, including pregnancy, nursing, and chronic use of oral contraceptives. Although diet, exercise, and lifestyle, however, do not appear to be associated with its development, weight gain and obesity can worsen the appearance of existing cellulite (Friedmann et al., 2017). Even though it is not a life-threatening clinical condition, cellulite affects most women's psychosocial sphere because it is directly and inexorably related to the physical appearance, self-esteem, and, consequently to the well-being perception and social acceptance. Thus, the main reason to look for a treatment for cellulite is its esthetic appearance (Pérez Atamoros et al., 2018). There are four stages of cellulite:

- Stage I - the changes are caused by venous and lymphatic stasis only visible in bruising; this phase begins with the accumulation of fat in the adipocyte, and they are still prominent.
- Stage II - adipocytes compressing blood vessels, which blood flows through are reduced; at this stage a swelling can be a symptom occurring as the irregular protuberant surface of the skin, there is also the characteristic drop in the flexibility changes that can be obtained by compression of a skin fold.
- Stage III - at this stage circulatory disorders get worse around accumulated adipocytes they begin to accumulate deposits of collagen and ground substance of connective tissue, which results in fibrosis of certain parts of the subcutaneous tissue, the skin has an uneven corrugated surface, there are lumps and swelling, the changes are already visible without skin compression.
- Stage IV - collagen deposits begin to transform into hard nodules that compressing blood vessels and nerves, they cause pain, skin is wrinkled with visible and palpable hardenings; changes can rest, and the visibility is increased muscle tension at (Baryluk et al., 2017).

Based on the consistency of skin, cellulite is usually classified into four general types: hard, soft, edematous and mixed (Bauer et al., 2018).

Nowadays, there are several noninvasive and minimally invasive technologies to improve the appearance of skin and subcutaneous fat, such as radiofrequency, cryolipolysis, manual massage, carboxytherapy and high-intensity focused ultrasound, among others (Canela et al., 2018). Nonfocused ultrasound and electrical stimulation are therapeutic modalities commonly used in physiotherapy practice and, when used simultaneously, they are called Combined Therapy. The combination of electrical stimulation and ultrasound can be more effective than each of them used separately. Therapeutic ultrasound is characterized by mechanical vibrations of high frequency – above 20 kHz – and it can be a potent modality to promote biological effects (Canela et al., 2018). Electrostimulation current is characterized by an alternating medium frequency wave modulated in low frequency, and it can be indicated for various purposes, including muscle strengthening, pain control, circulation promotion and edema control (Choi, Lee, 2016). Heat generated by infrared light on the skin implies an increase in microcirculation, lymphatic drainage, and collagen synthesis. The process of collagen denaturalization induces its contraction, thickening, and later skin tightening (Pérez Atamoros et al., 2018).

Only a limited number of studies on synergistic effects of combined therapy of electrostimulation with infrared light and ultrasound on cellulite affected skin have been published in the international literature.

The research aim: to determine the efficacy of electrostimulation with infrared light and ultrasound in treatment of cellulite on the thighs, circumference reduction and the safety profiles.

Research Methodology

Subjects

The study involved four healthy women, aged 25 to 35 years. The subjects were enrolled in the study on acceptance to participate. The inclusion criterion was the presence of the stage III solid cellulite. The exclusion criteria were pregnancy, a history of edema, obesity, only mild cellulite, concomitant cellulite treatments; inflammatory or infectious skin diseases, in the treatment areas, neoplasm; significant varicose veins on the lower extremities, history of deep venous thromboses, having an artificial cardiac pacemaker, or any other disease diagnosed at the time of the initial interview. All patients gave a written informed consent prior to study participation.

Treatment protocol

It was used for the study *BODY SHAPE UP SYSTEM* (Technology SRL, Milano, Italy), whose mechanism of action is based on electrostimulation, ultrasound and infrared light.

Treatments were performed every other day, three times a week for a total of 10 sessions. Each woman was treated with a combined electrostimulation infrared and ultrasound apparatus by the same well-trained technician for 40 min. No specific diet or exercise plans were given to the patients, but they were advised to drink 1.5–2 l of water per day.

Cellulite stage was assessed in the subjects with a “Callegari soft plus” instrument using a cellulite measurement program that measures moisture level, cellulite stage, and water retention level in relation to changes in body temperature. The initial measurement was performed prior to the course of procedures to assess the client’s suitability for the study. Other measurements were performed after 5 and 10 procedures using a centimeter strip. Measured: widest point of thighs (under buttocks fold), middle of thighs, lower thighs (above knee joint), before every treatment visit. Each measurement point was recorded at baseline to ensure that subsequent measurements were obtained at the same location. All subjects completed the treatment protocol and attended every follow-up visits.

Questionnaires

The results of the study were also subjectively evaluated by the subjects by completing a questionnaire in which the tolerance of the procedures and the satisfaction with the treatment were assessed. The level of tolerance was marked from 1 to 4 (1 - intolerable, 2 - tolerable, 3 - comfortable, 4 - very comfortable), the level of satisfaction procedure was also marked from 1 to 4 (1 - dissatisfied, 2 - indifferent, 3 - satisfied and 4- very satisfied).

Research Results

Before the course of procedures, the water retention level of three subjects (A1, A2, B2) was 3, one (B1) – 2 (Table 1). After 5 procedures, the water retention level of three women (A1, A2, B1) did not change, one (B2) - decreased by one scale unit. After the entire course of procedures, the water retention stage of study A1 decreased to 2, A2 remained unchanged, B1 did not change, and B2 decreased to 2.

Table 1

Level of water retention in the skin before the course of procedures, after 5 and after 10 procedures

	Before	After 5	After 10
A1	3	3	2
A2	3	3	3
B1	2	2	2
B2	3	2	2

Assessing the changes in circumference before, after 5, and after 10 procedures, changes are observed in all cases (Table 2, Table 3).

Table 2

Changes in right thigh circumference before the course of procedures, after 5 and after 10 procedures

	The widest place			Middle			The narrowest place		
	Before	After 5	After 10	Before	After 5	After 10	Before	After 5	After 10
A1	59,20	59,20	58,90	51,90	51,90	51,50	42,80	42,80	42,40
A2	68,30	68,30	67,90	60,80	61,00	60,50	53,20	53,10	52,80
B1	56,30	56,30	55,10	48,30	48,30	47,00	37,60	37,50	36,40
B2	66,80	66,40	65,30	60,00	59,90	58,80	58,50	58,00	57,00

Assessing the changes in the widest part of the left thigh, it can be seen that the decrease decreased by 0.3 cm for study A1, by 0.4 cm for study A2, by 1.2 cm for study B1, and decreased by 1.5 cm for study B2. Assessing the changes in the mid-thigh circumference, it can be seen that for study A1 the circumference decreased by 0.4 cm, A2 - by 0.3 cm, for study B1 - by 1.3 cm, and B2 decreased by 1.2 cm. Assessing the changes in the narrowest right thigh, it was found that the circumference decreased by 0.4 cm for subjects A1, A2, for B1 decreased by 1.3 cm, for study B2 – by 1.5 cm. Thus, the largest positive changes were observed for the B2 study.

Table 3

Changes in left thigh circumference before the course of procedures, after 5 and after 10 procedures

	The widest place			Middle			The narrowest place		
	Before	After 5	After 10	Before	After 5	After 10	Before	After 5	After 10
A1	59,20	59,20	58,80	52,40	52,40	52,00	43,00	43,00	42,70
A2	68,20	68,20	67,80	61,10	61,10	60,90	53,20	53,20	53,00
B1	56,90	57,00	55,60	48,60	48,50	45,50	37,50	37,40	36,30
B2	66,80	66,60	66,00	60,20	60,00	59,40	58,60	58,30	58,00

Assessing the circumference of the left leg, it can be seen that after the course of procedures, the widest point for A1 and A2 subjects decreased by 0.4 cm, B1 - decreased by 1.3 cm, and B2 - decreased by 0.7 cm. Assessing the left middle part of the leg, it was observed that the circumference of A1 decreased by 0.4, A2 - by 0.2 cm, and B1 studies decreased by 1.1 cm, B2 - by 0.8 cm. The narrowest part of the left thigh decreased by 0.3 cm for A1 subjects, by 0.2 cm for A2 and by 1.2 for B1, and by 0.6 cm for B2 subjects. Thus, the largest positive changes in left leg circumference were observed in B2 study.

Before the course of procedures, all subjects had cellulite stage III, after 5 procedures stage did not change. After 10 procedures, the cellulite stage of three subjects did not change, one - changed to II (Table 4).

Table 4

Changes in cellulite stage before procedures, after 5 and after 10 procedures

	Before	After 5	After 10
A1	3	3	2
A2	3	3	3
B1	3	3	3
B2	3	3	3

After evaluating the level of tolerance of the performed procedure (Table 5), subjects A1 and B1 indicated that the procedure was comfortable, and A2 and B2 rated it as very comfortable. Assessing the level of satisfaction with the procedure (Table 5), subjects A1 and A2 indicated that the procedure was satisfied, while B1 and B2 rated it as very satisfied. Such results showed that the procedure is tolerable, does not cause unpleasant sensations and gives quite good results.

Table 5

Subjects' tolerance and satisfaction with treatment

	Tolerance level	Satisfaction level
A1	3	3
A2	4	3
B1	3	4
B2	4	4

Discussion

Cellulite is related to collagen and elastic tissue degeneration in dermis and hypodermis associated with fat deposition (Canela et al., 2018). This disorder, which bothers women to such a high extent, however, is not easy to be treated (Hexsel et al., 2017; Modena, 2019; Bauer et al., 2020). Although there are many methods of treatment, there is still no perfect way to eliminate the cellulite (Wanitphakdeedecha et al., 2015; Alomairi et al., 2018). Despite multiple therapeutic approaches that attempt to treat cellulite, no procedures have been proven successful long term. Topical agents, injectable treatments, and energy-based devices can ameliorate the appearance of cellulite, sometimes to a satisfactory degree, but never eradicate cellulite because this involves extensive tissue remodeling (Sadic, 2019). Consequently, until the present moment there is no revolutionary therapy that will bring the cure for cellulite (Modena, 2019; Writers, 2015).

Noninvasive and nonpharmacological body countering techniques are effective in the management of cellulite (Atamoros et al., 2018; Alomairi et al., 2018). There are a number of effective non-invasive anti-cellulite therapies in the scientific literature where combination therapy is more effective than each of them used separately (Wanitphakdeedecha et al., 2017; Canela et al., 2018; Atamoros et al., 2018). In our study case the synergistic effects of the combined therapy electrostimulation with infrared light and ultrasound methods are more effective than each of them used separately also.

Ultrasound can induce biological effects through heating that results from the absorption of ultrasonic energy and through nonthermal mechanisms that include ultrasonic cavitation, mechanical stress and other nonthermal processes. In cosmetic application, both thermal and nonthermal mechanisms within an ultrasonic field are used for the destruction of adipose tissue and contraction of collagen-based tissue – dermis (Mlosek et al., 2011; Miller et al., 2012). Experimental studies suggest that the absorption of ultrasonic energy can lead to changes in the cellular activity and in the structure of adipocytes, and it releases lipids in the blood circulation and extracellular space immediately after the treatment (Garcia, Schafer, 2013).

Phototherapy improves cellular activation which is an important factor for the treatment of cellulite. These positive effects can result in a further improvement of body aesthetics using infrared-LED (Paolillo et al, 2011). Infrared light penetrates deeper into the skin than other non-invasive treatments. When it penetrates at a deeper level, it jump-starts the production of collagen and circulation which improves the skin quality. Infrared light has shown positive results for body contouring and fat loss across several clinical studies. It is non-invasive and safe treatment to improve the looks and overall health (Bauer et al., 2018; Bauer et al., 2020).

The *BODY SHAPE SYSTEM* used in our study included ultrasound, electrostimulation, electrolysis, drainage, infrared light processes. The use of the equipment leads to visible results in reducing adipose tissue and cellulite and improves muscle and skin toning performance. Whereas cellulite is usually related to alterations of the microcirculation (Nkengne et al., 2013; Freire et al., 2019).

When evaluating anthropometric measurementst the current study showed a slight decrease of the circumference of treated areas, but it should be kept in mind that this was the case for solid cellulite. In cases of edematous cellulite when slimming due to reducing the circumference of edema would decrease more (Godoy et al., 2012).

Another aspect of this study was the evaluation of the levels of tolerance and satisfaction with the treatment through self-questionnaires. The procedure was considered well tolerated. All participates were satisfied with the treatment outcome, the percentage of satisfaction level was high (50% satisfied, 50% very satisfied) after the treatment. No adverse reactions were observed. All the subjects would undergo the treatment again, they resumed normal activities immediately after each session of the treatment, without downtime, pain or discomfort.

However, some other authors conclude that anti-cellulite procedures may have side effects - pain, ecchymosis, or swelling (Alomairi, 2018; Canela et al., 2018).

According to many authors, in order to assess the effectiveness of anti cellulite treatment should be studies carried out on a large number of patients (Canela et al., 2018; Baryluk et al., 2017; Modena, 2019).

The current study has some limitations that must be considered when interpreting the results. The sample size is small, further studies using larger sample size should be performed to confirm these results. Another limitation is lack of follow-up to determine how long the beneficial effects of combined therapy electrostimulation with infrared light and ultrasound lasted.

Consequently combined therapy electrostimulation with infrared and ultrasound is efficient and safe treatment to improve cellulite appearance and reduce body circumferences.

Conclusions

1. We conclude that the synergistic effects of the combined therapy electrostimulation with infrared and ultrasound might be a good option for cellulite treatment.
2. The therapy is good for cellulite affected thigh skin condition and circumference, but it is less effective in reducing the cellulite grade.
3. This combined noninvasive and nonpharmacological therapy is well-tolerated and safe.
4. Further studies with larger sample size should be performed to confirm these results.

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Received: 30 November 2020

Accepted: 31 May 2021

ISSN 2424-5321

PROFESSIONAL STUDIES:
Theory and Practice

2021 / 8 (23)

Proofreading is the sole responsibility of the author.

Issued by Šiauliai State College
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