CER Comparative European Research 2016

Proceedings | Research Track

of the 6th Biannual
CER Comparative European Research
Conference

International Scientific Conference for Ph.D. students of EU countries

October 24-27, 2016 | London

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Introduction

The conference Proceedings you are holding is a collection of selected peer-reviewed texts presented at the international scientific conference Comparative European Research - CER 2016 (October 24-27).

The biannual international scientific conference is organized under the auspices of the SCIEMCEE scientific platform every March and October and follows up on activities aimed at providing greater support for the scientific activities of Ph.D. students and beginning researchers. The various biannual CER conferences represent a space for the international assessment of the qualitative standard of scientists and the results achieved by the various academic institutes. The CER conference is an ideal place for comparing the standard of scientific work, particularly on a European scale.

The Proceedings from the 2016 CER conference contains several dozen academic texts whose main purpose is the presentation and sharing of knowledge always in one of nine conference sections. The conference Proceedings prioritize only those articles which are good enough to offer readers new insights into the issues analyzed, or which extend the known boundaries of science. The guarantor of the CER 2016 conference is a signatory of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, and therefore all papers are made available to professionals and the general public via OpenAccess.

The conference committee, comprising experts from several university departments, believes that the CER international scientific conference will attract an ever wider base of participants to join in the discussions and will stimulate further scientific work and interdisciplinary development.

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THE GROWING IMPORTANCE OF SYNERGY EFFECT IN BUSINESS ENVIRONMNET

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Abstract: *The synergy effect create a new direction for change in current strategy management of companies. They are characterized by mutual interaction which run in various form of cooperation, partnership, competitive struggle. The external environment constantly affecting internal environment of company and creates special conditions, in which companies need to build, organize and combine exceptional skills of managers and employees. These capabilities represent new value that is unique for implementation and better understanding of strategic management in today´s globalized market conditions. The purpose of article is to point out creating synergy effect through suitable chosen strategy management of company. For company´s success in current globalized environment with increasing need to maintain long-term competitiveness – it is necessary to define and appropriate way how can be company manage in order to achieve synergy effect.*

Keywords: *synergy, synergy effect, cooperation, methods and approaches to strategy management*

1. Introduction

The importance of exploring new approaches in management of existing companies supports idea of synergy and synergy effects as an object of study and consideration. Synergy is a connection, or engage in cooperation within a specific environment, and this environment influenced by synergy is changing, developing and reacting. Synergy effect is directly related to environment in which arise value (expected, unexpected) and status changes. Goold and Campbell [3] consider synergy as effect of interaction and cooperation act between sub-business units that resulted in creating additional value.

Synergy is not seen only in context of biology, physics, chemistry, but also in business environment, even in strategy management methods such as Balanced Scorecard. Therefore is need to state a following argument: The synergy effect is a result of mutual interaction of individual company´s bonds in which is applied a strategy management. Synergy is defined as a change in behaviour and properties of system due to creating interaction [17].

Comprehensive theoretical and practical in this article is related to article: Cooperation as base for synergies [4]. This analysed also status of growing synergy but in cooperation, especially to refer on creating expected and unexpected values in cooperative organizational forms through cooperation management.

The current cooperative organizational forms need to create value – synergy effect, that company create in team-work with own internal and external environment of companies. On the other hand, result of team-work may be different. Synergy effect can be positive, negative, or null – but it is important to correctly understand their origin, measurement and valuation.

For proper functioning of cooperative organizational forms (companies and their environment) it should by based on case studies, observation and theoretical studies in field of cooperation and strategy management defining appropriate strategy management of cooperative organizational forms. In these findings is important for forming new approach to manage company identify, classified, uncover synergy effect and how can be achieved in front of business environment.

2. Selected methods of strategy management

The success of any company within cooperative organizational forms depend on efficient and effective chosen strategy and strategy management, which may help achieve defined objectives. In strategy it is important to see changes in environment as an active factor of influencing strategy management of companies. Orthodox setting of strategy management could have adverse effects on area of company performance. Management of company within context of responding to environmental changes should assess correction, which are needed in strategic plans in front of company´s goals and available resources. In addition to general approaches of strategy management, it is necessary to know the tools of strategy management as BSC, EFQM model, PRISM and others. Following text contains theoretical processing and selection of main elements of these chosen methods. It is important to focus on methods which can contribute to create synergy effect through strategy management of companies. Whereas these system tools are suitable not only for collecting information in enterprises, but also for comprehensive assessment of business and its performance. This is suitable for defining tools and key elements for identify, classified, uncover synergy effect.

BSC method gives a comprehensive tool for managing company [1] (internal environment), and group of companies (individual branches of companies). Kaplan and Norton extending view of Balanced Scorecard. It is known as performance measurement framework for

strategic planning and management system. [7] If company achieve synergy through its business and support units, then critical is system alignment. Measurement and management systems allows accurate determine advantages of system alignment of company [13], which are based on strategy maps and BSC systems. BSC consist of four perspectives: financial, customer, internal processes, learning and growth. This method had more well-made case studies and information, but most important is presented by authors Kaplan and Norton, its founders.

It turn out that BSC can be extended for company as a whole in terms of synergic effect. Headquarters (high level of management) provide alignment of activities that create value undertaken by individual business unit – to achieve results beyond (greater value to customers, reducing operating costs, etc.). Synergy in this BSC method by Kaplan and Norton [7] is identified on basis of: Financial synergy: How can we increase shareholder value by bringing our portfolio of strategic business units (SBU)? Synergy of customer relations: How can companies share their interface with customers so that we can increase overall value to customers? Synergy of internal processes: How can we manage processes of SBU to achieve savings arising from whole range of activities or from integration of value chain? Synergy of learning and growth: How can we develop and share our intangible assets? The main assumptions of the Balanced Scorecard for use in strategic management are:

- Constantly shifting strategy within top-down management approach with feedback: company goals, coordination, measurement, employees. Cascade connection between strategic objectives.
- Assessment of company performance in individual areas and processes to ensure identification of what had been done and measured.
- Identification of cause and implications of various processes. Determine responsibility for individual processes.
- Continuous communication in all direction of company, also in mission and strategy of company.
- View and clarify position in overall strategy and how it can create value in their own units, but also to cooperate with other units.

PRISM identifying key business issues, asking critical questions for decision making through thinking about connection between used measurements. The principle of this method is to have a limited number of measurement, which clarifies what business is trying to achieve. The problem of current measurement in companies is that it focuses on internal management and so lose an overview about strategic management. A significant attention is focus on costs to provide and receive information. Another problem is number and variety of reports, but retreats into background what really matters and that is monitoring and measurement of operational activities that support strategic management. Measurement should be a process of collecting information for management, not just measure everything [9].

PRISM is a method in which base is collection of correct measurements from different perspectives [8]. It look at what stakeholders want, and also analyses the best strategies for meet their needs. PRISM consist of five interrelated sides: Who are our stakeholders and what they want? (Stakeholder satisfaction) What we want and what we need from our stakeholders? (Stakeholder contribution) What strategies we need to adjust meet desires and needs of stakeholders, while we satisfy our own requirements? (Strategy) What processes we needed to set up for implementation our strategies? (Processes) What skills we need to introduce and prepare so we can operate processes? (Capabilities) Based on theoretical and practical findings about The Performance PRISM is possible to point out these important elements for strategy management:

- Identification of key stakeholders and their prioritization.
- Management, measurement and involving all stakeholders. Implementation of top-down management approach.
- Monitoring performance of stakeholders, as well as meet their own needs.
- Implementation of strategy should by supported by corresponding processes and necessary skills (all of this is need to measure).

EFQM model provides an overview of company. In essence, is a perfect framework for development of sustainability. Exceptional companies achieve and maintain excellent level of performance that meet or exceed expectations of all its stakeholders [2]. They achieve sustainability baseline levels of performance that meet or exceed expectation of all stakeholders. Therefore, assumptions of model are formulated to recognize and promote sustainable success and provide advice to achieve success [6]. Model enables to companies: assess current state of excellence, integrate common vocabulary and way of thinking, connect planned and existed initiatives, identify gaps and duplication, provide structure for management, use self-assessment, benchmarking, identify areas for improvement. EFQM model has three main components [10, 11]: basic concepts of excellence, model criteria, Radar logic. The main assumption of the EFQM Excellence Model for use in strategy management are these key elements:

- Optimization impact of all resources to company-wide strategy management and policy.
- Measurement is starting process for functioning of company and its effectiveness.
- Draw attention to: What business doing? – actual situation (leadership, strategy, processes, resources) Which will reach? – results (customers, employees, business) What is need for excellence?
- Maintaining excellence in areas: shaping future, providing values, development of skills, creativity and innovation, leadership, flexibility in management.
- Using radar logic: setting goals of strategy, planning achieve strategy, ensure implementation strategy, monitoring and analysing improvement of strategy.

- Knowing activators of results and their effective management to ensure future performance.
- Draw attention to human potential by means of strategy management provides results, performance and ensure future performance.

3. Case study – Sipe, Ltd.

Following findings represent environment observation company Sipe in from of origin synergy effect. Sipe. Ltd. is constructing company at Slovak republic, where it operates since 1997. It deals with production exterior and interior floors and paving. Be common categories about company it belongs to category of small enterprises with 10-49 employees. The organizational structure consist of three levels: leading a sales department, which assign tasks to an executive department. This cooperative organizational group, including company Sipe can be generally characterized by criteria: frequent interaction, long-term cooperation, a medium-high performance, reciprocity, reliability, availability, competitiveness and trust.

Previous criteria is confirmed coherence of companies in this environment for which are proposed recommendations by meaning of appropriate strategic management of cooperative organizational forms in front of origin of synergy effects. The Slovak construction environment, surrounding company Sipe, it is necessary to define five typically basic relations with customers, partners, suppliers, competition and regulations. The importance of individual relations depend on strength of connection between two companies in mentioned area. It should be assumed, what expected and unexpected effects were achieved in these relations and then determine what goals, measurement, and control should be selected on implementation appropriate strategic management for origin synergy effects. Partnerships with individual members of environment establish a certain structure to provide value not only for goal of partnership, but also for future action in this internal cooperative environment. The following observation represent main aspect of synergy effect within specified relations of cooperative environment of Sipe:

a) Number of competitors and elements of environment encourage companies to think ahead. The synergy effect is competitiveness and sustainability on market that emerge with continuous development of market. The reason for thinking ahead is just a limited number of customers. The intention of company is remain on market, cut demand generated from customers (attract new customers), while maintain regular customers.
b) Suppliers guarding intensive relationship with all its customers, which lead to indirect influencing of capabilities in stock, time pressure and unexpected challenges. Synergy effect of this intensive relationship is built on a reliable suppliers, which can be characterized as: respect deadlines, reduce price in high drain, provide certified quality of resources (materials, machinery, equipment, etc.), solve problem in time. Slovak construction market has a sufficient number of geographically distributed suppliers with supplier-customer relations, which are contractually define by parameters: price, quality and deadlines.
c) Creating an appropriate strategy on market is based on gathering right information, strengths, know weaknesses and strengths on market and responses from actors of this environment. Expand cooperation with different market players and implement larger projects (use advantage for development and growth) is synergy effect. These cooperative relation resulted in frequent interaction, high trust and reliability.
d) For certain customers are reflected higher degree of loyalty to company and its services. Synergy effect is create by competitive barrier that is effective relationships marketing. From these relationships are generated important customer references, which affects actual market position with respect to customer. Marketing communication build long-term and loyal relationships with customer and also obtain new one.

6. Conclusions

Strategic management mean knowing the right decision and put on a path that will lead to success. Therefore, if you get to know the condition and relations between strategy management of companies within origin synergy effect – you achieve one of the successful strategies on how to be competitive and be able to use the key competence (key success factors). The success of such efforts represent encouraging the emergence of synergy effects within cooperative environment. This implies had a clearly defined strategy, objectives, and particularly appropriate strategic management of cooperative organizational forms.

The Slovak construction market contains high competitiveness in area: pricing, quality manufacturing, customer relationship management, trust and confidence, marketing communication, customer satisfaction, defences strategies: formed couplings and strategic alliances.

Synergy effect is important for increasing, improvement and development of companies in current dynamic environment, but to by effectively directed, it is necessary to identify strategic steps for successful management of resulting cooperation. From this resulted following question: How properly refer conditions and relations to strategic management of companies in global environment for achieve synergy effects?

Current knowledge of authors, realized observation within an environment Sipe, as well as comprehensive content analysis of theoretical and practical knowledge of secondary data it should be noted a following proposed starting point:

- Updating knowledge and skills of managers and employees who create a main active control element of appropriate functioning strategic management. The current dynamic business environment require a change of perspective on strategic management in terms of updating methods, approaches and way how to manage company.
- Management oriented to create value through cooperation – Cooperation management [15]. This

value is created in internal relations – cooperation between managers and employees, and in external relations – stakeholders of company.
- Mutual trust in strategy management of cooperative organization forms is based on sustainability of way how to achieve goals. This means that if it is properly configured internal strategy management between actors, then is achieved: higher level of trust, stronger reference intensity, unique negotiating power, etc.

In case of application suggested starting points of strategic management it is higher chance to achieve synergy effect within limits of competitiveness and recombination of tangible and intangible resources, what can ensure flexibility and efficiency of business operations. This article refers to starting position of thinking and research in the context of synergy and synergy effects in business environment.

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MANAGERIAL DECISION MAKING IN MOTIVATION PROCESS

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Abstract: *This paper talks about the importance of managerial decision making in motivation process. This one shows a points where there are a managerial decisions in the motivation process. It is therefore possible to say that this paper shows a potential hazards which may fail during motivating employees. This fact is supported by the model of motivation process which are indicated exactly these critical points in.*

Keywords: *motivation, motivation process, decision making, employees*

1. Introduction

„Everything we can do can't change the past, but everything we do will affect and change the future, although the future has particular element of uncertainty. Managers are much more interested in shaping the future than past history, "[1].

Just as every employee is unique with his or her needs and requirements so is unique every manager. This fact is also reflected in the decision-making. Divergences significantly differ managers' decisions, and their personal characteristics such as a value system, personality, courage and so on, are main parts of them. Therefore during examining managers' decisions in motivating it is important to take into account the individuality of managers in decision-making process and to take care that managers are motivated to take right and responsible decisions, sometimes even if they are contrary to their personal characteristics.

2. Motivation and decision-making

In this connection several important authors state that permanent enhancement of the organization itself is the basement not only for measuring and improving but also the key to motivate the employees. In this way organizations tend to accept and subsequently implement a number of important managerial decisions and stemming strategies, tactics, and immediate actions. To these are often assigned for example following: continuous alignment of individual and personal objects; linking elements of measurement and motivation; plans as motives for employees; clarity and delivery strategy to employees; employees' involvement and other tactics [2, 3, 4]. This means that into decision-making process in motivating enters many elements and facts which need to be taken into account in decisions. Deciding, concerning the people and their motivation, is very sensitive because each one of accepted decision may affect their entire future.

3. Motivation process

Each 'motivator', i.e. motivating person – most frequently manager – has to decide carefully in every single step of motivational process. Before the needs analysis (first step of motivational process) it is needed to decide how to collect the data and information (quantitative and qualitative) in the most suitable and most effective way for the organization and its employees in order to obtain necessary documents for creation motivational program, or in order to choose the right strategy which will the motivational process follow. Fig. 1 simply illustrates motivational process and by the red dashed line is marked where in this process occurs the situation when manager has to make a decision and this decision influences next direction of whole motivational process. This means that in each indicated step takes place the decision-making process [5].

Next step of motivational process is analysis of possible options of satisfying the employees' and managers' needs. In this step, person who motivates, decides about motivational program itself based on available resources of the internal organization's background and on available resources from external background while it is appropriate to consider all the risks and benefits of these options. Before selection of suitable alternatives of meeting the employees' and managers' needs it is important to establish motivational program where this selection is included. When creating motivational program it is necessary to determine status of currently used motivational resources in organization. This analysis requires to decide what methods and techniques will be used (interview technique, questionnaire survey, observation, analysis of internal documents, etc.), what will be the budget, schedule and so on. Consequently it is important to set the objective/objectives of new motivational program and this choice has to take into account all interested groups that motivational program affects and will affect in future, and also to align the objectives of motivational program with the mission and aims of organization.

The motivator makes another important decision during the selection of motivational activities and events which are the part of motivational program. When choosing suitable alternatives, motivator should decide on the base of evaluation criteria the most appropriate and effective for the organization and its employees (e.g. time demand, the amount of the spent money, the willingness of employees and managers, the effectiveness of individual alternatives,

etc.). S/he also has to consider which actual motivational events and activities to keep, which to support and which to remove.

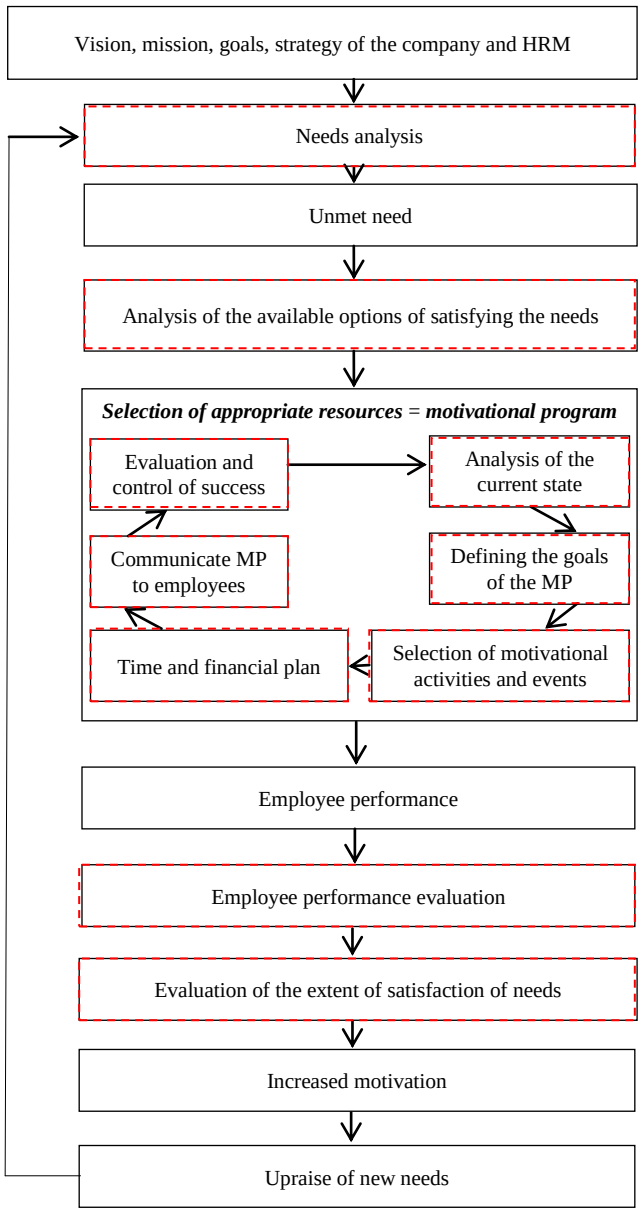

Figure 1: Motivational process model with an emphasis on decision-making in motivation

The penultimate step of implementation of motivational program is to familiarize employees with the motivational program where manager has to choose appropriate method of this familiarity so each employee properly understands it and there will be no confusion in its subsequent implementation.

The last step of creation and implementation of motivational program is the control and evaluation the implementation success. In this point the manager has to decide about the method of evaluation and about the timeframe when it will be implemented. It is also necessary to establish evaluation criteria that is very important to monitor in order to evaluate the implementation of the motivational program.

After implementation of the motivational program is evaluated the employees' performance in motivational process where the person who motivates decides how to evaluate it and compares previous and present performance [5]. During these activities the manager should take into account fulfilment of the objectives, personal development of each individual and his acquired skills and knowledge.

Subsequent evaluation which the manager should realize, is assessing the level of satisfying employees' and other managers' needs. In this step the decision appears in selection of appropriate criteria, based on which there will be assessed the extent to which were the needs unmet a how much was the employees motivation level increased, what is visible on their enhanced performance, achieved qualifications, and career growth. After satisfying the existing needs there is a creation of new needs, or possibly extending the existing needs, there occurs feedback and whole motivational process repeats cyclically.

In any point of deciding in motivational process it is required for person who motivates to take into account and consider about the elements of internal and external environment which may sometimes unexpectedly interfere into the motivational process.

In the motivational process the decision-maker must use the amount of quantitative information that s/he acquires by the exploration, observation, analysis and so on. And also a number of qualitative information that make the decisions themselves in motivation much more difficult. It is therefore necessary for decisions to be made precisely, based on all the facts but also on personal experience, intuition and skills of decision-maker, as all the decisions in motivational process are related to employees because they are the essence of each organization. When making a decision it is very important an effectiveness which includes three basic parameters, which are an efficiency, expediency, and economy of every decision.

The decision-maker decides also about how to motivate himself in intention of successful motivation of others. S/he also decides about the scope of participating others on his or her own motivation. Motivation of decision-maker is vital precisely because the decisions cannot fall into the stereotype. On the contrary they have to be constantly reviewed and implemented on the base of consideration of all information. Only the one who is motivated and has certain abilities and characteristics may effectively motivate others.

4. Conclusions

Decision-making and/versus motivating and motivation are mutually interdependent, interacted and interconnected (Fig. 2). Entire motivational process and decision-making in motivation affects a number of factors and influences arising either in external background of the organization or inside it itself.

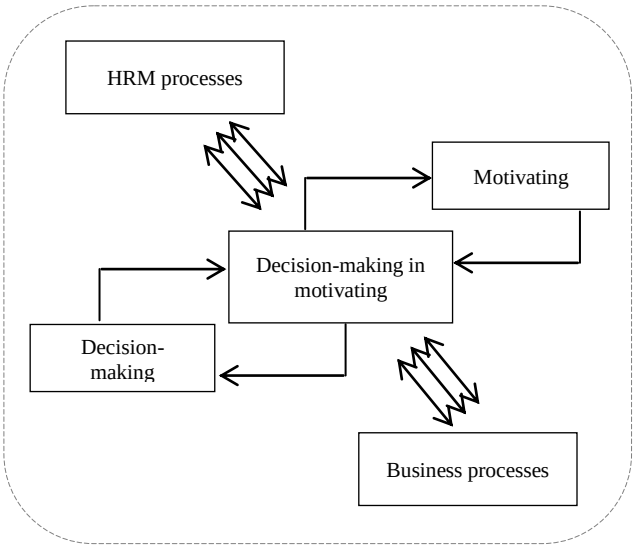

Figure 2: Mutual influence of decision-making, motivation and decision-making in motivation

Just like decision-making, also motivating is closely linked and influenced by other processes of management and development of human resources and other organizational processes. According to many authors it is essential for managers to learn to understand and effectively guide employees' motivation because for the future success is very important for organization to have its employees motivated [6, 7, 8, 9, 10]. Each manager, who wants to lead his or her employees successfully, has to see and recognize these interconnections and mutual affects during motivating and decision-making, so the decisions that may have positive impact on one process will not endanger another process and thus whole organization.

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DECISION SUPPORT SYSTEMS

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Abstract: *Correct and relevant information has always been, are and will be very important for business. Decision-making would be very difficult for managers without high-quality and timely information. Use of Decision Support Systems (DSS) makes decision-making easier, more efficient and faster. This paper shown Decision Support Systems and also contains model solution. A model presents a description of the process of transformation of various data to relevant information.*

Keywords: *decision support systems, computer information system*

1. Introduction

A decision making in the management is one of the key activities, which is very often subjective, because the decision making is performed by a manager with own opinions, an intuition, a creativity and so on. A quality of the decision making is effected not just by a subjectivity of a manager, but also by availability to good, actual and specific information, which are necessary form a solving of problem. For an access of the manager to this good and especially actual information is appropriate to use modern information and communication systems in the company. These systems are used for a support of the decision making.

2. Characteristics and importance of Decision Support Systems

According to Janakiraman and Saruku is the system for supporting of the decision making "interactive, flexible, and adaptable computer-based information system that utilises decision rules, models, and model base coupled with a comprehensive database and the decision maker´s own insights, leading to specific, implementable decisions in solving problems that would not be amenable to management science models per se. Thus, a DSS supports complex decision making and increases its effectiveness." [3]

DSS are supporting decisions of managers in companies and that why they had to be connected with all databases. In case, that DSS had no access to financial records of organisations, manager would be not able to receive necessary information, for instance and analysis of the financial flows, which is important for decision in area of fundraising.

Decision Support Systems are related to Business Intelligence, because Decision Support Systems are components of an architecture of Business Intelligence. Novotný, Pour a Slánský defined Decision Support Systems as systems designed for managers in lower levels of the management, which are helping them in solving of recognised problems with usage of various model, while users are able to create their own decision making models. [4]

However, systems for supporting of decisions are not designated just for the specific managing level in a firm, as well as they are not clearly intended for which size of companies are suitable. More likely it is recommended to us DSS in bigger firms with a bigger amount of data.

As it was stated previously, according to the other author, Tripathi, DSS are computer information systems, which are helping for choosing the solution from one of the offered alternatives, which are solving the problem quickly by analysis of the big amount of information. The author also states that DSS is interactive information system, which is combining models, people, processes, software, databases, same as telecommunication devices and it is solving unstructured and semi-structured problems. According to Tripathi is DSS interactive and flexible computer system, which is not just using models and large databases, but also decision rules.[6]

It is important for the system to take into account some rules during creating of alternatives. These rules are keeping alternatives in reality.

It is possible to define DSS as well as computer system, which is solving non-structured and semi-structured complex problems.[5]

As it is stated on the website of Inc., DSS are helping manager in various areas from financial flows, to improving the performance of products, multilevel prediction and to analysis of allocation of resources. DSS is suitable for big companies and it is for them a competitive advantage. [1]

The similar view to DSS is stated on the web site of MSG Management Study Guide - DSS are computer systems for helping in planning, production, operation and in decisions of managers by available information. These systems are according to MSG based on knowledge and they are supporting decisions in the company. DSS are not creating decisions. DSS are just providing insights, calculations and possibilities of solution, which are helping to manager to make the decision. DSS are used in various field – in the military, health care, security, engineering, business. [2]

Managers ought to take into consideration the fact, that DSS are not creating decisions. DSS are providing information, which can help manager to make the decision by his own. While working with the system it is important

to evaluate which kind of information manager needs. Based on these, he can task the DSS to process.

3. Model of Decision Support Systems

It is possible to say, that systems for supporting the DSS are used in companies for conducting various analysis solving the problem in that way that the information provided to manager are helping him and improving the process of decision making by usage of modern solutions.
Model in the Figure 1. I was based on definitions of various authors. Model is describing the way of usage the DSS by manager in the company. Various data are coming into the computer information system. That is, by help of the process which includes system for managing databases, models, rules for decisions and reports, processing various data to alternatives for solving the problem. System for supporting the decisions (DSS) provides the manager by relevant information based on specified requirement. Manager might support his decision in the tackling based on relevant information provided by the DSS.

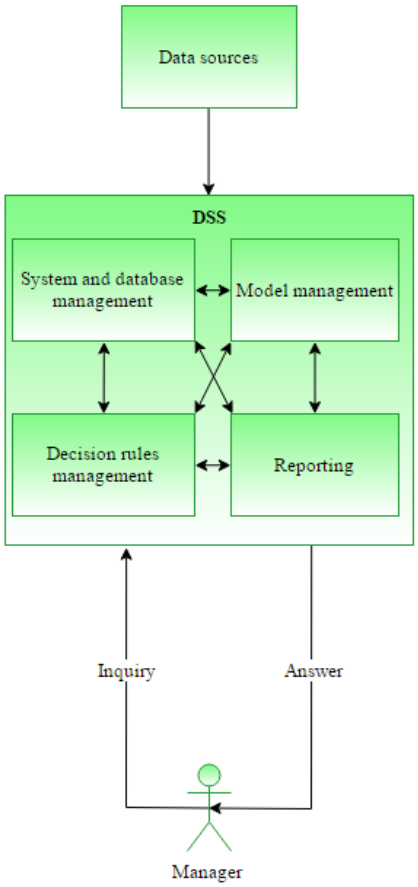

Figure 1: Transformation of various data to relevant information through by DSS

The trigger for a process of transformation of various data into relevant information is a request made by a manager. The request is information, which the manager needs for the decision. DSS brings variants of solutions in a form of a model, charts, tables, reports, etc., based on the request. In this process, is DSS using systems for administration of databases, models, reports and system for administration of rules for decisions. These components of DSS communicate with each other and entry requirements evaluated. Also these components of DSS are trying to find the best response by combining all the knowledge, models, reports and data. Each component manages the different area. Database management system maintains and save information like management system models, but in different forms. System for management decision rules, set the rules with conditions (eg.: the terms of "if-then") for selection to the requirement. The system itself contains DSS database, which maintains and stores information which are export to manager in the form of finished Variants - models, charts, tables, numbers reports, other reports, etc. The model of Figure 1 also contains a data sources. This means that in DSS coming a information recorded from across the enterprise. This information are treated by DSS components on the based instructions of the manager. The input for this process are various data from a data source. These data might be structured or non-structured. When is an inquiry processed by DSS, it exports the answer for manager in the form of tables, charts, models, reports and so on. Manager might support his decision by these results. If he is not satisfied by the output from DSS, he changes the inquiry and the process is repeated.

4. Conclusions

Decision Support Systems is the flexible computer information system and for companies is considered as the competitive advantage. This information system helps managers to make decisions during solving the problems.
The proposed model of DSS describes the transformation of various data into relevant information. In this case is DSS triggers it action by request of manager. The proposed model takes into the consideration not just administration of models and databases or reporting but also the system for administration of rules for decisions. This system sets rules of “game".
DSS is possible to use in all areas of business. Whether it is finance, business, marketing, human resources, planning of production or warehousing and logistics as well as non-production area as health care.

Acknowledgements

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LIFE CYCLE OF INFORMATION SYSTEM

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Abstract: *This article looks at the importance of an information and an information systems for company. The information and the information systems represent an important role in management of the company. Correct definition of information system life cycle is a competitive advantage. Correctly defined links, relationships and practices are essential to prosperity and for maintaining the company on the market.*

Keywords: *information, system, information system, life cycle of information system*

1. Introduction

Every company needs information to its existence (eg. in receiving orders from customers, payment of wages, product information and so on.) Company needs to share, communicate, save and search this information. The company needs the correct technology and information systems in order to handle the information properly. This article aims to approach the importance of IS and fundamental stages in its creation.

2. Information in company

Data are certain traits, characteristics, attributes that may not be linked together. They describe environment and they are only a pure and real facts that does not have a deeper meaning. Information is formed from the data if it reduces ignorance, insecurity in the recipient.

The information is statistical probability of signal or character occurrence, which removes the ignorance of recipient. The less probable the occurrence of given character is, the more value for recipient the information has. [4]

The information represent a very important resource for the company. Information including their collection, processing and storage are associated with costs. In the past, information was used just to record and capture the current situation and effects of company's behavior. They were focused on the inside of the company and ignored external environment of the company. Information also served to reduce costs. Currently the information is used to decide on the future development of the company. [1;2]

According to Smetáček the company in dealing with some issue should first think through all the possible options and then concentrate, accumulate and buy sufficient information for it to be resolved. This should become sort of a rule which companies should follow. [5]

Information is needed at every level of management in the company. But their nature may be different. Different information will be taken to the top level management and other on lower level of management. It is necessary to extract and collect only the information required by the said control level.

The key success of the company is flexible response to external influences. Processes in the company have to be optimally adjusted and the flow of information have to be properly set up. This means that the information is in the right place at the right time – this exactly is the purpose of information systems.

3. System

Systems generally contains a number of elements, among them are individually defined relationships.

Information technology can be described as a set of processes and tools used to work with information. Information system, cannot effectively operate without the high-end technology. Information Technology include collecting, processing, storing and providing information. By using information system company communicates with the outside, with their customers, suppliers and so they can compete in the market. [6]

Information systems in an enterprise significantly contribute to accelerating and improving the processes. Information system can be defined as a set of programs, methods, techniques and procedures for collecting, storing, processing, validation and distribution of information in the company. The main task of the information system is to provide quality information for individual employees at different levels in company. [3]

3.1 Life Cycle of Information System

The life cycle of an information system is constantly evolving and consists of several phase. The phases are not always strictly separated, sometimes there is an overlap of some parts of activities. Each phase is characterized by assumptions for launch of the phase, features, attributes, inputs, outputs, documents and assumptions for finish of the phase. Basic models of the information system life cycle are waterfall model, spiral model, V-model and evolutionary model.

All models are based on the waterfall model. They differ only by their phases that depend on the environment in which the system is used.

3.2 Design of Information System Life Cycle

Following section consists of description and diagram of information system life cycle. This life cycle, like all other life cycles, is also based on the waterfall model. The cycle

is divided into three main phases, namely:

- Planning phase;
- Implementation phase;
- Final phase.

Each and every phase has its own sub-phase, which follow each other and complement each other (Fig. 1).

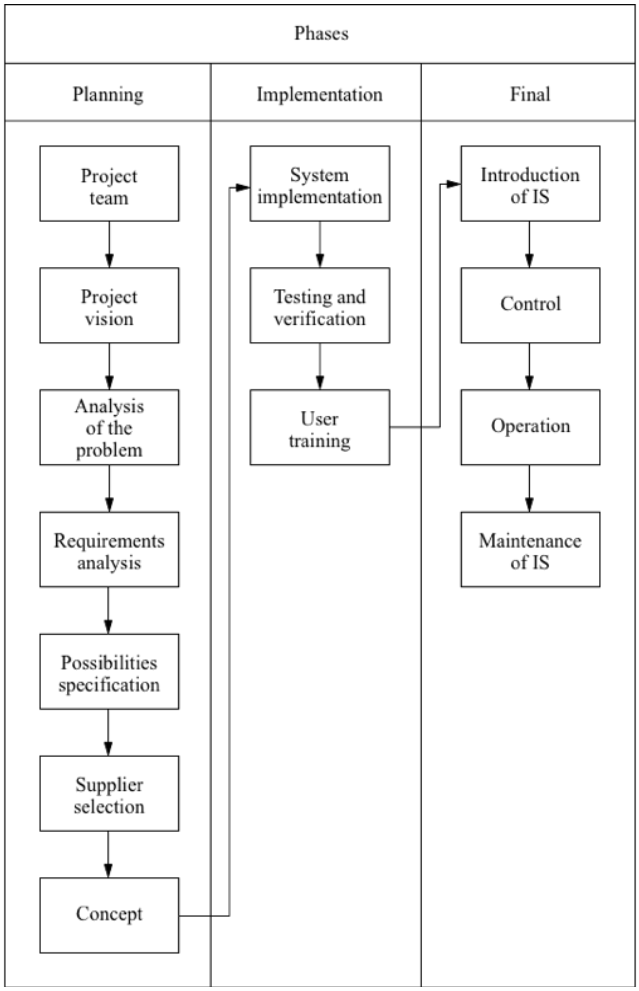

Figure 1: Design of Information System Life cycle

3.2.1 Planning phase

The planning phase is the first phase in the entire life cycle of information systems. This phase includes most of the sub-phases and is considered the most important because it lays down the theoretical foundations for this solution. It contains seven sub-phases: the project team, the project vision, analysis of the problem, requirements analysis, possibilities specification, supplier selection and concept i.e. the particular choice of options.

The first sub-phase is to create a project team, which may or may not be composed of internal employees. The prerequisite for creating this team is the initiative of the company, which plans to establish an information system. The team members should have experience with information system selection. Launch of the project takes place at the initial meeting with the company, which is interested in the introduction of the information system.

When choosing information system, we should take into account not only the vision of the company but also the vision of the project, that is what the company wants to achieve with given project. It is therefore necessary to set it in the beginning. Input to this sub-phase is strategy and vision of the company and the output it is the definition of the project vision, which should be recorded in the documents. When the vision of the project is established, we can continue to the next step.

The next step is the analysis and understanding of the problem. Input to this sub-phase are documents, internal processes, number of employees, etc. The output is a list of critical points in the company in which it is necessary to introduce the information system.

Subsequently, after the vision of the project is established, the problem and critical points in the company are analyzed, there is analysis the and requirements specification for information system. At this point, the input data is a list of critical points and output is requirements specification for information system.

Next step is possibilities specification. Inputs to this sub-phase are taken from the previous step. Possibilities are specified in this section based on the requirements.

Next phase consists of looking for a suitable supplier for each type of information system. Followed by a choice of one that meets all the requirements. Contract with the supplier is signed in this part. Communication with suppliers and cost estimation is very important in concept sub-phase. The supplier must thoroughly know the processes in the company and the requirements for the information system in the company.

3.2.2 Implementation phase

The implementation phase follows after the planning phase. The launch of this phase is conditioned by completing the whole planning phase. Implementation phase contains three sub-phases, which are the system implementation, testing, verification and user training.

Implementation of the system implies creation of favorable conditions for the actual implementation of information system. This means that it is needed to develop technical and system environment for selected information system (properly selecting and configuring hardware and software). It also involves the implementation of data migration. The data shouldn't be migrated until the so-called purification of database. Tab. 1 captures bottlenecks in data migration.

Table 1: Bottlenecks in data migration

Where	*Critical points*	*Result*
Supplier	ignorance of the relationship between the original data structures	serious faults in the system
IT department	lack of capacity due to an administration in existing information system	risks of slowdown
Database of the new information system	data structures differences	abstract text
Users	lack of time for inspection	additional programming

After the implementation of information system in the company follows testing and verification of the system. The main mission of this sub-phase is to inspect the functionality of each module, followed by the integrated function modules and their relationship to other applications. Verification of migrated data is also necessary. The output of this sub-phase is proposal to begin operations and report of each tests.
User training is another important aspect in the implementation of information system. It is necessary that users and employees were informed how the new information system is used so they know how to search information necessary for performing their duties. The output of this phase is the guide how to work with the new information system.

3.2.3 Final phase

The final phase is the last phase and is carried out after the implementation phase and all of its sub-phases was completed. It consists of four sub-phases, namely the introduction of information system, control, operation and maintenance of information system. In this phase the system can be introduced in all the necessary parts.
Inspection is used to compare the real state of the project with plan, if the deadlines have been complied, costs, and so on. It is essential that inspections are carried out on an ongoing basis throughout the project. If there were deviations from the plan, there may be remedies actions. Operation and maintenance is a service and development of Information system in the form updating information systems in accordance with the new legislation, trends and business needs.

4. Conclusions

Design of information system life cycle and its subsequent creation is a complex process. For businesses, it is essential to have the process from its inception to the implementation and operation (ie. life cycle of information system). This process should be divided into three main parts: planning, implementing and finalizing. From that each part is composed of sub-phases.
It is not sufficient to resolve the creative process of information system only by selecting the contractor, as it is a complex and difficult process that contains creating and building IT infrastructure, enterprise processes. It is therefore necessary to devote sufficient time and attention to the life cycle of the information system.

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ENGAGING STAKEHOLDERS IN SLOVAK NON-MANUFACTURING ORGANIZATIONS

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Abstract: *The business activities of organizations are influenced by their stakeholders. This fact is same for manufacturing and, also non-manufacturing organizations. There are different models of managing relationships with stakeholders. This paper shows the possibilities of managing relationships with stakeholders in the Slovak non-manufacturing organizations by shown model.*

Keywords: *stakeholders, engaging stakeholders, relationships, slovak non-manufacturing organizations, model*

1. Introduction

Although the industry is very important for a national economy, we should not forget the non-manufacturing organizations. They have an important proportion of aggregate GDP of individual national economies. Therefore, the non-manufacturing organizations as well as the manufacturing organization needs to be realized stakeholders engagement.

What are the stakeholders?

David Miller and Mike Oliver in their publication *Engaging Stakeholders for Project Success*, report that stakeholders are individuals groups of people or organizations that may influence or affect the business, or they are affected by the activities of the company. [13]

2. The situation in Slovakia

How can be specify non-manufacturing organizations in Slovakia?

"Sectoral structure of the national economy is division of the economy by kind of the final results of the activities of individual organizations and businesses." [1]

On this basis, the sectors of Economy of the Slovak Republic are divided into two groups: manufacturing and non-manufacturing.

"The structure of the non-manufacturing sector is as follows: education, health and social security, culture, science and research, justice, security, transport, housing management, insurance and finance, community organizations and other non-manufacturing services." [1]

Therefore non-manufacturing organizations are organizations working in one of the non-manufacturing sector. Due to kind of the final result of a business activity can be generalized to these companies as service companies. "Service organizations are organizations of services, trade, transport, banking, insurance and other companies that provide services." [2]

What is the position of non-manufacturing organizations in the Slovak economy?

According to the Statistical Office of Slovak Republic, the Slovak companies operating in the non-manufacturing industry in 2015 employed around 1.5 million people. [3] At the same time these companies produced about 60% of the total GDP of Slovak economy. [4] Consequently organization of non-manufacturing sector is a significant contribution to the GDP.

What types of non-manufacturing organizations have the most problems?

Within the non-manufacturing sector in Slovakia is the long-standing problem in the healthcare and education. These problems was indicated by striking doctors in 2011, nurses at the end of 2015 and striking teachers in early 2016. [5,6,7]

These experiencing problems we can also find in service companies in the field of tourism, which is important for the Slovak economy, because tourism can be a "medicine" for the Slovak economy. [8] I think, tourism can be an important part of the Slovak economy, because improving visit of Slovakia can improve incomes in other non-manufacturing sectors such as public transport.

Which stakeholders influence the most non-manufacturing organizations?

There are many stakeholders influence non-manufacturing organizations. However stakeholders, with a most influence to non-manufacturing organizations can be regarded as local authorities, local council, NGOs, government, schools, residents of the region, contractors and various competing organizations.

Which of the above stakeholders most directly affect tourism in Slovakia?

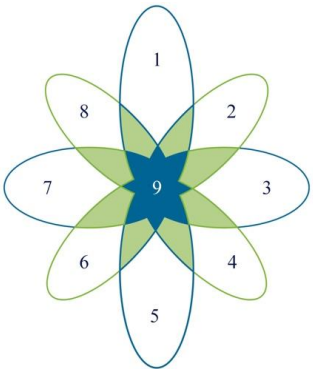
It is individual, such as development of tourism in Slovakia is influenced mainly by the state and the various legislative measures. For example, "payment of taxes, levies and charges to Slovakia requires up to twice the number of payments in comparison with the normal state of the European Union". [14]

On the contrary, the organization of the World Cup in alpine skiing in Jasna (the Ministry of Education has participated financially in the organization of this event [15]), had a positive impact on tourism in the area. This weekend the Jasna was visited by 20,000 people. [9,10,11]

It means, that the various external stakeholders have a various influence on the development of tourism in Slovakia.
Lots of stakeholders directly and indirectly influence Slovak companies. It is necessary to deal with these issues. This also requires that companies identify the various stakeholders and to manage relationships with them. However, this does not apply only in Slovak companies, but for all companies globally.

3. Why is it important, that the companies managed relations with stakeholders?
Amy Baugh says that to succeed, it is important not only to identify the stakeholders, but also choose the key stakeholders, that can be used to achieve business success. [13] It can be said, that the stakeholders engagement (management of relationships with stakeholders) for the company represents one of the key activities, because identifying the right stakeholders and next managing of relations with them, the company may achieve success.

4. What does the stakeholder engagement for the companies mean?
Stakeholder engagement for companies mean, carrying out activities that not only establish relations with stakeholders, but activities, that will be develop existing relationships with stakeholders. Sequerira and Warner defined eight major components that influence stakeholder's engagement in the company. Coherence and impact of these components on the proper management of relationships with stakeholders is shown in the figure below.

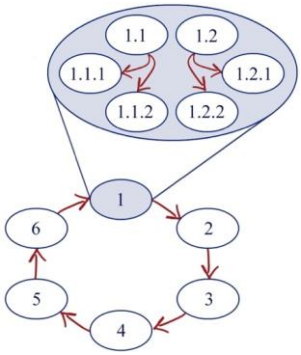


1 – Information Disclosure
2 – Stakeholder Consultation
3 – Negotiation and Partnerships
4 – Grievance Management
5 – Stakeholder Involvement in Project Monitoring
6 – Reporting to Stakeholders
7 – Management Functions
8 – Stakeholder Identification and Analysis
9 – Good Stakeholder Engagement

Figure 1: Key components of stakeholder engagement Source: [12]

These components consist of activities that must be carried out in the company if the relationship between companies and stakeholders be managed properly. [12]
However, these components are applicable to all types of organizations, including non-manufacturing. Because, the situation in the Slovakia is specific, companies need these situation solve individually.

5. How engage stakeholders in the non-manufacturing organizations in Slovakia?
In view of the facts relating to the Slovak non-manufacturing organizations and eight major components that define Sequerira and Warner, was created following model of good stakeholder's engagement in Slovak non-manufacturing organizations.



1 Identification of stakeholders
2 Selection of key stakeholders
3 Planning engagement with stakeholders
4 Communication with stakeholders
5 Stakeholder engagement
6 Reporting collaboration with stakeholders

1.1 Identification of external stakeholders
1.1.1 Identification of external stakeholders that directly or indirectly affect company
1.1.2 Identification of external stakeholders that are or may be affected by the company
1.2 Identification of internal stakeholders
1.2.1 Identification of internal stakeholders that directly or indirectly affect company
1.2.2 Identification of internal stakeholders that are or may be affected by the company

Figure 2: Model of stakeholder engagement of Slovak non-manufacturing organizations

The new model shows six main areas that make up the proper stakeholders engagement.
At the beginning of this model of stakeholder engagement is needs to be correctly identified as internal as well as external stakeholders. The identification of both internal and external stakeholders need to be consist of:
a) stakeholders that directly or indirectly affect company,
b) stakeholders that are affected or may be affected by company.

After identifying the various stakeholders is needed of all identified stakeholders choose the main stakeholders that will help the company achieve success.
Next the organization must plan the activity of engaging key stakeholders. Another important step is to maintain active communication with stakeholders.
The main point of this model is the point number 5. At this point the organization by effective implementation of planned activities effectively engaging stakeholders.
At the end of cycle (before the resumption of cycle) is necessary to involve stakeholders to analyse and evaluate. In point 6 company finds errors and places to improve before re-starting the process. The process is cyclical and repeated throughout the period covered by the company.

6. Conclusion

Stakeholder engagement is specific for each industry or company. However, it is good if the management of company during planning of stakeholder engagement performs activities by logic manner. The aim of this paper was to provide a simplified uniform procedure for stakeholder's engagement for non-manufacturing organizations in Slovakia. The main benefit of this model is improving efficiency of stakeholder engagement in non-manufacturing companies in Slovakia. This model will help to choose the main stakeholders of company, which ones will help the company achieve success.

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DUTY OF LOYALTY AND DUTY OF CARE AND THE CLAIMS OF THE COMPANY TOWARDS THE STATUTORY BODY OF THE COMPANY

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Abstract: *The authors deal with the duty of care and the duty of loyalty of the statutory body of the company. The authors focus primarily on the limited liability of the company. The emphasis of the research is on the duty of care of the limited liability company director. Moreover the authors analyze the duty of care of the company bring also the foreign German and Anglo-American approach. The authors slightly lay out the potential claims of the company towards the executive director of the company that violate the duty of care or the duty of loyalty.*

Keywords: *statutory body, executive director, duty of care, duty of loyalty, claims of the company, liability of the executive director.*

1. Introduction

Limited Liability Company became the mostly used corporate vehicle in Slovak legal environment for realizing the entrepreneurial plans of many Slovak businessmen. Limited liability of the company and relatively low amount of the initial capital needed by the members (shareholders) to establish the company plays very important role for the Slovak businessmen when it comes to starting the business. That means that more than 90% of the business companies within Slovak Republic are represented by limited liability companies. [1].

In every fictitious legal person there are natural persons standing behind the legal person that "vitalize" the company itself. In case of the limited liability company, these natural persons are the company members (shareholders), who contribute to the entrepreneurial activity with their initial monetary or non-monetary contribution and the executive directors who represent the "brain" of the company. The executive director acts within the law and its legal boundaries including the boundaries set in the Articles of Association of the company. Executive directors make fundamental decisions connected with the day-to-day business linked with the entrepreneurial activities of respective companies.

2. Slovak view on the duties

Executive directors are considered to be a neuralgic part of the limited liability company and are the subject of many academic debates initiated by legal scholars including attorneys practicing law. The person of the executive director is subject to severe and tight legal regulation as for his performance as the executive director and for the liability connected therewith. Slovak legislator is aware of executive directors´ importance and therefore limits them with the duty of care and the duty of loyalty. Executive directors are obliged to exercise their powers with the professional care, in accordance with the interests of the company and the interests of all of its shareholders while having sufficient information basis so that the decisions adopted were in the best interest of the company.

Executive directors do not enjoy an advantage of the limited liability as the shareholders in Slovak republic what causes that they might be held liable for the harm caused to the company and to be obliged to compensate the company also by using their personal assets.

From the general point of view we can say that the term professional care of the company´s executive director is not defined by law. The same applies to the terms "honest business relations" or "good manners". We share the same opinion as Vítek [2] who says that such rules, which lawmaker intentionally does not define, lay down advanced demands on judges. On the other hand, such rules offer bigger discretion for the judges to make a decision pursuant to specific circumstances of the case and also to take into account the current situation of both parties to the case. The basic element of the professional care in the sphere of the Slovak legal system is that the law prescribes solely the indefinite legal provisions relating to the executive director´s duty of professional care while performing on behalf of the company. It means that law prescribes main standard of care which statutory body or its member is obliged to adhere to when fulfilling duties given by law or the company´s Articles of Association.

3. Czech view on the duty of the professional care as the duty of prudent treasurer

The duty of the executive director to perform with care of the prudent treasurer is stipulated by Czech law that does not use the term professional care. Czech law itself stipulates minimal standards of care for the executive director to comply with. This legal duty may not be limited or excluded in the written agreement on performance of an office or by subsidiary application of mandate agreement. Such rule is valid also in the terms of Slovak legal regulation. Article 135a, section 4 stipulates that the agreements between the company and its executive officer that exclude or limit the executive officer's liability are prohibited; neither the agreement of association nor articles of association may limit or exclude an executive

officer's liability. It is therefore unambiguous that the standards of executive director´s performance and duties are imposed directly by cogent provisions of law and the parties to the contract (the company and the executive director) might not deviate from these standards and stipulate other provisions in their mutual contracts or agreements. These rules stipulating that the parties are not eligible to agree otherwise are applicable also in Slovak republic.

4. Subjective and objective approach

In relation to the enforcement of executive director´s liability, legal scientists developed two approaches when reviewing the acts of the executive director of the company. These two approaches are represented by the subjective and objective approach. Early from the beginning, we disclose professor Eliáš´s [3] idea who states that subjective conditions and circumstances of the executive directors shall not be overlooked even though according to the Commercial Code the liability of the executive director is seen as the objective liability.

The executive director is held liable unless they prove that the breach of the duty was due to the circumstances excluding the liability according to an Article 374 of the Commercial Code. The circumstance excluding the liability shall be deemed as an obstacle that occurred independently of the intent of the obliged party and that prevents them from fulfilling their obligation, if it may not be reasonably assumed that the obliged party could have averted or overcome this obstacle or its consequences, or that they could have foreseen this obstacle at the time when the obligation was established. Professor Eliáš supports his statement with the implication that natural persons shall be seen differently than the legal persons in connection with culpableness of the natural persons when reviewing the damages caused by natural persons. If the legal person shall be held liable, natural person acting on behalf of the legal person shall be found and held liable.

The nature of the objective approach of the executive director´s review and imposing of his liability lies in the comparison of the care provided by the executive director and the standards stipulated by law which are represented by the standards of professional care (care of the prudent treasurer in Czech Republic). Subjective approach reviews the culpableness of the executive director and is therefore more advantageous for the executive directors as such approach allows reviewing their legal acts by taking the circumstances of the case and the fault of the director into account. Čech, another legal scholar from Czech Republic, argues that every member of the statutory body is obliged to provide the company with all the knowledge and experiences he disposes with. [4]

5. German and Austrian regulation

Čech argues that purely objective approach of executive director´s liability based upon the standards of care of prudent treasurer standards raises the standards of the executive directors who are not performing in accordance with the care imposed by law. On the other hand, objective legal standards may lower the standards in those cases where the executive directors are well-educated and experienced. Under these circumstances, subjective approach of the executive director´s acts would be more advantageous for the company as the standards of care of well- educated and experienced executive director shall be higher according to the subjective approach. Legal scholar Čech strongly supports the abovementioned subjective approach of the executive director´s liability according to his academic research of foreign legal regulation. Subjective approach is present in Austrian and German legal regulation stipulating that the statutory bodies of the company are liable for violation of the care that is represented by the standards of care while conducting their own affairs. From our point of view, such objective approach brings risk in some cases. Huge risk arises in the situations when the person not skilled or less-educated is appointed as the executive director of the company. It is then legitimate to say that he conducts his own affairs with lower standards as well.

Therefore, under the Austrian or German legal regulation adhering to the subjective review of executive director´s acts, he would not be held liable for violating his duties as the executive director of the company due to the fact that he conducts and handles his own affairs in the same manners. In this particular case, the executive director shall be held liable according to the standards of care which are not based on the "care of the prudent treasurer" but rather on his own subjective standards of care. Subjective standards of care are routine standards of care that are represented by care of executive director when handling his own affairs. Such subjective approach might endanger the enforcement of company´s claims against the executive director as the statutory body of the company. On the other hand, highly professional and educated executive director with many experiences in the company´s business activities shall be held liable according to even higher standards of care than the care of the prudent treasurer (professional care).

5. The shareholders and the duty of care

Professor Čech [5] implies that subjective approach supports the autonomy and the intensions of the shareholders more than the objective approach. The shareholders have the most fundamental impact on choosing the executive director of the company and therefore factually predetermine the standards of care of the company´s executive director as the statutory body. Effectively, they predetermine the standards of care in which the affairs of the company will be conducted.

Czech judge Štenglová [6] points out that the requirement to perform with professional care (care of the prudent treasurer) does not include the necessity to be equipped with all of the professional knowledge or experiences for all the actions to be performed by the executive director. On the other hand, it does not mean that if the executive director has this knowledge ad experiences, he is not obliged to adhere to them when acting on behalf of the company. Her opinion is supported by the judgment of the Supreme Court of Czech Republic [7]. The court ruled

that the executive director of the company does not have to be "equipped with" all the professional knowledge and experiences needed for the performance as the statutory body of the company due to the fact that he might provide them by contracting the third persons while seeking professional help. On the other hand, it is not acceptable that the executive director concludes the contract with another executive director of the same company (other than the agreement on performance of an office) upon which the executive directors oblige to provide such professional help to the company. In connection with the liability of the executive director of the company to assure the professional opinion of the third persons, there is an issue related to the liability of the executive director for incorrect professional advice provided by the third person. How shall we judge the executive director who caused damage to the company based on the professional opinion of the third person?

6. Duty of loyalty

Executive director performs his function also with another element of professional care, i.e. duty of loyalty. [8]. Another component of the professional care is the fact that the member of the statutory body of the joint stock company, when deciding in the board of directors, gives the priority to interests of the company instead of shareholder´s interests which appointed him as the member of the board of directors. That means he is not affected by any shareholder when acting on behalf of the company. The abovementioned rule shall also be applied in case of the executive director of the limited liability company. [9].

In terms of the legal regulation [10], the executive director of the limited liability company is obliged to perform his scope of powers in accordance with the interests of the company and its shareholders. He is not allowed to prefer his own interests, interests of specific shareholders or third persons´ interests instead of the interests of the company while acting on behalf of the company.

By stipulating the abovementioned duty to prefer the interests of the company itself, the Commercial Code indirectly prescribes executive director´s duty of loyalty towards the company. Eliáš [11] claims that the loyalty is one of the aspects that shall always be taken into account by the executive director. Furthermore, Eliáš adds that the executive director shall be able to "hold his tongue behind his teeth" when he is expected to do so. Eliáš implies that the duty of loyalty also contains the duty of confidentiality. Confidentiality is prescribed for the executive directors by the Commercial Code, which sets forth the duty of executive director to keep in confidence confidential information and facts whose disclosure to third parties could cause harm to the company or endanger its interests or the interests of the company's shareholders. The loyalty of the statutory body members demands an executive director´s dedication for the sole interests of the company.

7. Comparison between Slovak and Czech limits for loyalty in relation with the shareholders opinion

As for the review of the executive director´s duty of loyalty and the company´s interests it is interesting to compare the legal regulation of company´s business management in Czech Republic and Slovak Republic. The term company´s business management is not defined by Slovak law and the answer to that question is provided by the literature. The term company´s business management is defined as the decisive power related to organisational issues, technical issues, day-to-day business and the business intent of the company. [12]

Slovak legal regulation is rather brief and stipulates that decisions falling within the powers of executive officers on the company's business management require the consent of a majority of executive officers, unless the agreement of association stipulates the higher number of votes. Executive officers shall not bear the liability for any damage caused to the company by their conduct in executing a decision of the general meeting; this shall not apply if the general meeting's decision is contrary to legal regulations, the agreement of association or articles of association. If the company has established a supervisory board, approval of the executive officers' conduct by the supervisory board shall not relieve them of liability. [13]

Slovak Commercial Code does not further stipulate the connection between the general meetings´ instructions related to the company´s business management and the business management conducted by the executive director himself. Article 125 of the Slovak Commercial Code stipulates that the general meeting is entitled to usurp the company´s business management competence. If the company´s business management falls under the competence of the executive director, the Slovak legal regulation does not entail any limitation of the company´s general meeting related to the instructions of the general meeting addressed to the executive director. By doing this, the position and the performance of the executive director might be weakened and the professional skills and knowledge might not be taken into account. Such situation arises mostly in the cases when the shareholders lack the necessary knowledge related to the particular business decision. In these cases arising out in Slovak legal environment, the autonomy of the executive director is violated. The executive directors are bound also by the interests of the business company that might not be expressed in writing by the company but these interests shall be known by the executive director. The executive director of the company shall not only wait for the instructions resulting from the sessions of the company´s general meeting. The executive director shall be aware of the company´s interests and to identify them even though the instructions from the general meeting are ambiguous and vague. Executive director acting with professional care and loyalty shall not claim that the interests of the company were unknown for him and. [14].

8. Anglo-American view

We would like to address the view represented by the Anglo-American law related to the executive director´s duty of loyalty. Anglo-American legal science. Common law system works with the doctrine that the members of statutory body shall act in good faith and with their own opinion (deliberation), in accordance with the company´s interest and without any personal "side interests". [15].

When reviewing the loyalty of actions taken by the executive directors, subjective test is applied. This test has been investigated by the legal scholar Jonathan Parker. [16]. "The issue in these cases is not the fact whether the decision of the company´s statutory body was made in accordance with the interest of the company or whether the court itself would adopt the same decision as the executive director. The court examines whether the statutory body acted in good faith and whether he faithfully trusted that the decision is in accordance with the interests of the company. In connection with its other decisions [17] the court stipulated that the executive director is obliged to act faithfully and to perform every action in good faith.

Executive director shall honestly believe that his actions are in full accordance with the interests of the company. If the court finds out that the executive director truly believed that he acts in accordance with the interests of the company, the violation of the duty of loyalty or duty of professional care shall not be adjudicated. Such decision is regardless of the fact that the court might see such decision unreasonable or that the act of the executive director caused harm to the company. [18]

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THE SPORTS MARKETING AND SPONSORSHIP – EXAMPLE OF GYŐRI AUDI ETO KC

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Abstract: *The main goal of the scientific paper is the analysis of sports, specifically of the ever-evolving activities in the field of marketing, as well as sponsorship and strategies regarding them. The scientific paper contains results of research, in which both qualitative and quantitative research methods were applied. For the purposes of qualitative research we had an interview with the club's head of communications. For the purposes of quantitative research, we chose a questionnaire survey, which was presented to the fans.*

Keywords: *sports marketing, sponsorship, marketing communication*

1. Introduction

We list sports marketing into an extensive database of marketing science. Today in sport, with a growing tendency a developing business life takes place, and millions of funds are rotating in the sports business. [5]

1.1 The sports marketing

The sports marketing is a sales promotion of products with the use of products from the sport or sports results, marketing of sports products, as a marketing of product. The main aim of sports marketing is to try to sell products and services related to the topic of sport with the image of sport. If someone wants to be a successful sports marketing expert, it must be extremely knowledgeable about the sports industry, must also understand it depending on this he/she must be able to apply marketing elements and processes in the context of sport [10]. In this economy, the number of goals, the gains and losses in proportion to the number of kilometers may determine the demand. From another point of view not the proportions are important in a case when a member of a club is a world-famous athlete, we can dispense with the arithmetic values and goodwill will take over this position [2]. We distinguish two trends within the sports marketing. One is the sports marketing and the other is marketing through sport. Under sports marketing we mean the sale of sport and its propagation, we also list here the game marketing of sport events, clubs and athletes. Under sport's marketing we mean a variety of marketing activities of companies that are carried out by different sport events. An excellent way for this can be a sponsorship or a contract made with a star athlete [6]. Nufer and Buehler as a subfields of sports marketing identified the following: ambush marketing, business to business marketing, ethics, event marketing, hospitality marketing, brand management, market research, market segmentation, merchandising, neuro marketing, rights and commercialization, relationship marketing, social marketing, social media, sponsorship, testimonial and celebrity advertising, ticketing, virtual advertising [8].

The sports marketing also applies the elements of marketing mix, but the most important factor is the communication mix especially the PR and advertising. The vast majority of public relations in organizational branding is corporate identity. This includes organizational design, communication, organizational culture and organization "products, respectively services". Organizational identity of the sports organizations include the organization's philosophy, organizational design to the brand, organizational communication, organizational culture and product/service [12]. Thanks to advances in today's market promotional activities not only rely on the direct sale, but beside that tries to win latent and potential customers to develop the artificial of human needs and motivate, promote them. In contrast, PR activity is inconceivable without feedback, because it is an interactive relationship between the communicator and the addressee [11].

1.2 The sponsorship

The next major income source is also image enhancing in sponsorship process. The sponsorship forms the basis of sports marketing; in fact it means the fusion of marketing, advertising and PR. Its great advantage is that the target audience is targeted by their emotions and habits during their free time activities. Its aim is create a direct association between the sports events/sports organizations and providing support to companies [13]. According to the European Sponsorship Association (ESA), the ICC defines sponsorship as follows: the sponsorship is mutual commercial agreement made between the sponsor and the sponsored person, contractually provides financial and other support from sponsors to be able to connect itself with the sponsored image of its brands or products or to realize indirect benefits for cooperation [1]. It's worth to deal with sponsorship in sports, it brings a huge audience. This is an outstanding opportunity that can help an organization or individual person to become known by their sponsored club, event or with the name of an athlete. The sponsorship is a kind of expression of marketing through sport. One way can be called a kind of image transfers [4]. The sponsorship offers further sale and advertising opportunities for the company through sport and the corporate life interconnection [3]. The sponsorship can be called as communication technology that allows a specific event, televised relations, publications and other purchase or support of other things, so that the

organization has the opportunity to advertise its brand sign, name and description of it [7]. The sponsorship is a great way for the company's corporate social responsibility (CSR) and is a tool for corporate image development of the positive benefits [9].

2. The results of empirical research

The Győri Audi ETO KC counts today as one of the most prestigious handball club, it has a long history. To carry out primary research we used qualitative and quantitative research. The research carried out in early spring 2016. For qualitative research we have chosen the interview which we made with the clubs communication manager. From the basic quantitative research methods we have chosen the questionnaire survey, which was made among the fans. With the questionnaire survey we informed about marketing communication used by the club, furthermore about the quality of information transfer, sponsorship activities and other activities of the club affecting fans. Before the applying a real questionnaire we used test questionnaire to eliminate possible mistakes. The survey was made online and implemented according to the club's fans association database.

2.1Results of interview research

The interview revealed that the club takes the greatest emphasis on youth education and outstanding sports achievements retention and repetition. Hungary wants to remain Europe's outstanding sports center in the future. With education of players the club serves the teams on the entire territory of Hungary, those players who do not get into the first team of ETO, or into other teams of country's cutting-edge teams might compete for European club teams. The development of growing economic life also had an impact on the club's daily activities, so the emergence and integration of marketing activities into the life of the club was essential. To keep up with society and the business and non-profit sector alike, the following steps were indispensable: media lists, photo documentation, organizing press events, press monitoring, image-enhancing activities, inviting sponsors. These activities will help the club to get on the art of high-level marketing, which can be inferred to achieve modern standards. The club's major supporters are obtained by request; the sponsorship with Audi was such, which is the result of many years hard work of the club. It can be concluded that the company's reputation will be enhanced by supporting a club that achieves success in sports, because their names are identified with each other. Audi Hungaria has also become supporters of ETO at the time when it proved advantageous for cooperation. It's economically advantageous to be a title sponsor of sports clubs, because the club's success in Europe and worldwide can advertise the reputation of companies for consumers. Consequently, consumers purchase intention changes into deed that will affect the company because they merge their name with the popular name of the club and the company from this generates economic revenue. Collecting sponsors is also present among the future goals of the club, which can gain further valuable cooperation for both parties. According to the club's president the club's revenues are provided by the main sponsor Audi (17 %) beside that TAO support is significant (24 %) and government engagement (23 %), while most of the expenditures are for personal payments (64 %).

2.2 Results of questionnaire survey

In the research we investigated the sponsorship and corporate relations of recognition. It may be noted that the sponsorship also has its own marketing, where the clubs are encouraging companies to support marketing related activities.

In case of Audi we can talk about *acquaintance arising from sponsorship*. It is clear from the research that now fans identify Audi with the club. The interviewed persons firstly connect the name Audi Hungaria Motor Llc. with the club. The naming sponsorship significance is clearly visible from results; their reputation to consumers gets first by club's name. According to the survey, at almost all options Audi featured first. From the subjective sponsor knowledge 98.75 % of respondents have taken Audi first place.

In another case, the club organizes events with his support. Thus, this event will remain in the media; its news reaches a wide range of consumers. The story of "Hajdú sajt" is an example for this on the basis of our survey, which supports the club not so long time ago, by jointly organized competitions they left a mark in fans consciousness and because of this they are on the second place on awareness scale. According to survey fans do not know smaller sponsors, - which are not involved with various publicity with the club - they do not know them as good as companies linked with events. Based on all these research results and the following results we can state that sponsorship affects organizational life. This is illustrated in part below.

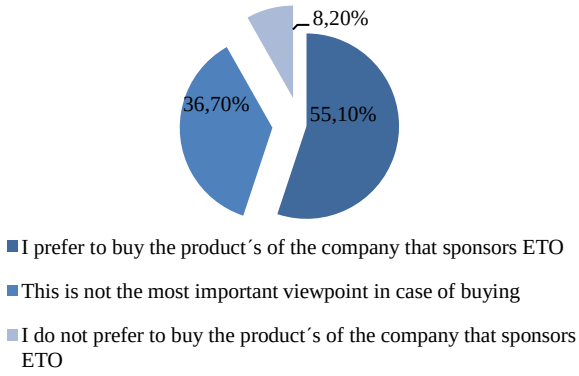

Figure 1: Consumer behavior in the case of two identical products (supporting company's product and t and neutral company's product)

If a fan needs to choose from two same products (supporting company's product and t and neutral company's product), then they will choose a product from the company supporting their club, 55.10 % in all cases and 36.7 % partially. This shows that the connection

between the sponsorship and corporate reputation is visible.

The club's marketing activities creates a kind of opinion in fans about the quality of activities. The figure below shows the opinion of the fans before the stage, during and subsequent promotions, i.e. the clubs complex communication conveyed toward fans.

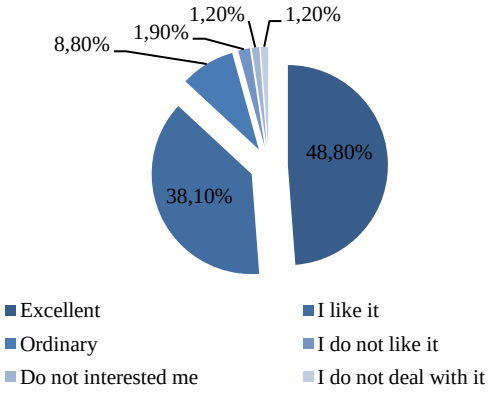

Figure 2: Assessment of the club, the fans point of view of marketing activities

The majority of fans think positively of transmitted communication. According to 48.8 % of the respondents marketing activity is outstanding. According to 38.1 % of the respondents, marketing communications is eye-catching, but should be improved. Only 13.1 % of the respondents had negative experiences related to marketing efforts. The club should seek to reach them as well. For this purpose Győr Audi ETO KC keeps in touch with fans, weekly discussions are made with the head of fans association. Since the club cares for PR at a high level, they consider it crucial to maintain friendly relations with fans.
Further, respondents evaluated the club's activities on a Likert scale (1 - "bad", 5 - "excellent"). In case of Likert scale we used average and standard deviation.

Table 1 The average and standard deviation of the answers

Answer	*Average*	*Standard deviation*
Contact with fans	4.04	0.8936
Involvement of fans into the game	3.98	0.8837
Mood creating at matches	4.18	1.1229
Prize games	3.61	1.0006
Information service	3.83	0.9909
Event promotions	3.98	0.9871
Printed information on matches	3.63	1.1812
Activities of sponsoring companies during matches	3.48	1.0664
ETO shop offer	3.68	1.1322

The highest value can be associated with the creation of mood on the match, here is the fans satisfaction the highest (4.18). The fans positively appreciated the contact keeping (4.04), their involvement into the game (3.98), and event advertising (3.98). What they mentioned as shortcomings is a presence of prize games (3.61), the presence of the printed information matches (3.63) and the ETO shop offers (3.68). The club should to take extra care for all components except complex marketing communication and need to raise even the lowest level of satisfaction as high as it is possible. The standard deviation of sample points to the factor of how the pattern data situated around the average. It is characterized by swings at higher value. The higher the value of standard deviation is, the less are answers considered homogeneous. From the standard deviation of answers we can see that respondents not all the time give the same answers.

2.3 Analysis of hypothesis

Hypothesis: There is a relationship between the club's marketing activity and fan's satisfaction.

To confirm the hypothesis we used cross table, also known as contingency table analysis that indicates relationship between two variables. In this hypothesis, we examined whether there is a link between the marketing activities of the club and supporters' satisfaction. From the possible statistical analysis we choose Person's Chi-square and Cramer's V.

Table 2 Chi-Square test

Answer	*Pearson Chi-Square Value*	*df*	*Asymptotic Significance (2-sided)*	*Cramer´s V*
Contact with fans	427.701	20	.000	.817
Involvement of fans into the game	392.813	20	.000	.783
Mood creating at matches	353.674	20	.000	.743
Prize games	385.797	20	.000	.776
Information service	354.549	20	.000	.744
Event promotions	3747.173	20	.000	.765
Printed information on matches	330.191	20	.000	.718
Activities of sponsoring companies during matches	407.786	20	.000	.798
ETO shop offer	363.329	20	.000	.753

The investigation revealed that there is a relationship between the two variables. Investigated correlations show strong significant relationship in all cases. So the better the club's marketing activities are, the fans are more satisfied and more loyal. It can be noticed that they participate more and more in activities organized by the club, also plays a great role in their daily lives "to belong" to ETO. According to this we accepted the hypothesis.

4. Conclusions

The study presented the sports marketing, marketing communications and sponsorship through the literature research and process, as well as the example of chosen sports club through an empirical research. The sport has a

huge influence on the world of marketing by its popularity. The relationships between sport and business have bigger significance; millions of funds are carried out by rotating money in each business area of sports activities, so the economic effect is not in question. Within the framework of our research a quantitative survey was carried out between the club's fans, which results were compared by the club's communication manager's interview results. Overall, the aim of the research was to present a well-known sports club's rudimentary and current marketing activities in practice. The Győr Audi ETO KC was not so marketing-oriented before like nowadays. Development progress can be connected to the advancing age. The club's management was forced to use a wide range of marketing tools and involve the business community into operation if they want to contain their success. They nurture their sponsor relationships at a high level, ongoing communications, events, services are associated with sponsors, and in addition they regularly look for new sponsors. From the part of the fans it can be said that they are satisfied with club's activities and with public relations. According to their opinion at some areas they have some gaps. We would propose to examine the reasons for the shortcomings by: market research methods, surveys, invitations for the fans, forums and seek development opportunities. Overall it can be said that for today marketing business has become an integral part of the sport. It is essential to maintain a successful sports organization.

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CAPACITY OF INNOVATION – BASED ON INNOVATION CULTURE AND INNOVATIVE CLIMATE

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Abstract: *There is little agreement about which, and how, organizational capabilities influence firm success. In this article, the construct innovational power is conceptualized based on the concept of organizational culture and innovational climate. Furthermore it is assumed that innovational power is the product of the dimensions organizational culture and innovational climate. Against this background, the aim of this paper is to make a theory-based contribution to a better understanding of the innovative capability of firms or organizations, the development of a model for conceptualization and operationalization of innovation capability, as the foundation for the development of a measuring tool of the innovational power of the organisation. Thus, two research questions arise: 1. Is it possible to develop a model for innovation capability based on the dimensions innovation culture and innovational climate? 2. Is it possible to measure innovational power, based on the assumption that it is a product of innovation culture and innovational climate?*

Keywords: *innovation capability, innovation culture, innovative climate*

1. Introduction

The semantics for innovation research and consulting is known. Companies are now faced with an increasingly dynamic and complex environment. The economy in transition, globalization, pressure on prices, location competition and increasingly more individual and demanding customer requirements are just a few key words that characterize the daily lives of companies. The engine of any company is innovation and in practice, shows a close correlation between successful innovation and business success. Therefore, it is important to grow with its own innovative strength and maintaining its market position successfully [10] [2]. The traditional understanding of innovation is product-, technology- and market-oriented, established a holistic understanding of innovation only in the current transformation of the economic system from an industrial to a knowledge and service economy. In addition to technical aspects, the human, social and organizational features enhance an organization's ability to innovate [1] [10]. Against this background, with the exploration of innovative capacity develops an interdisciplinary field of science. Basis of investigation is man as a crucial enabler of innovation [11]. With the emphasis on innovation capability obtain the so-called soft factors in value-added processes greater attention and increased quality [8]. The economic activity no longer relates only to short-term monetary gains, but is tied to sustainability and are thus extended by human and social aspects. The innovation studies are still in the development phase. In addition to working and learning research other areas of sociology, psychology and education and, increasingly, operational and economists, staff developers and engineers are involved in the formation of a research community. The interdisciplinarity is of fundamental importance for the innovation studies and helps to generate new ideas [11] [6].

Innovation capability needs competent people and adaptable companies. Growth and jobs only created when the development of human resources and the company matched(Bundesministerium für Bildung und Forschung 2006, p. 3). In the center of innovation capability stands the human being and the development of competences. Organisation and technique are seen as the social environment where knowledge can be transformed into competence [13].

2. Aspects of innovation capability

The term innovation capability is composed of the terms innovation and ability. A lot if definitions that represent extended understanding of innovation. Following table provides a selection of definitions and the related knowledge contribution.

Table 1: Development of definitions of innovativeness

Author	*Key definition*	*Knowledge contribution*
Jeschke (2011)	Innovative capability is the ability of individuals, groups, institutions or networks, continuously to innovate. It results from the complex interplay of human dimensions, organization and technology. Many companies to perform by innovation and knowledge management as well as personnel and organisational development to increase its capability for innovation, as this has a strong influence on international competitiveness.	Innovation and knowledge management same weight as personnel and organizational for increasing its capability for innovation
Reif and Buck (2003)	Innovativeness referred parlance especially the active participation and the assumption of a role initiators [by staff]. The employee as initiator recognizes its own problems and solve them in cooperation with others.	The role of the employee and his abilities to recognize and solve problems, form an integral part.
Schreyögg (2008)	Innovative behavior must grow out of the need to solve problems out. Furthermore, it says, by the release of motivation and creativity [should] be given a substantial impetus for innovation in business.	The ability to solve problems will be brought into focus. The man and his abilities, which are based on problem solving, are central.

At the conclusion it is to be noted that no definition of innovation capability is present, which can provide an adequate description of the purposes of this work. In this respect, a general definition will represent the different aspects of existing definitions and is already integrated with respect to the subject matter of this work: innovativeness includes specific staffing and organisational characteristics of a company, their interaction supports the continuous development of innovations.

The influencing factors of innovation capability are extremely complex. So far there is no generally accepted empirical basis for the operationalization of innovativeness. It is generally accepted that innovation is the key factor to ensure international competitiveness and prosperity [4] [15] [8]. In many parts there is only limited generalizable and sometimes conflicting research results. This shows again the need for a profound conceptualization (detailed specification) and operationalization (development of a measuring instrument for the empirical record of the construct) of the latent construct of innovativeness [15]. Basically, only a few works can be identified, explicitly and mainly deal with the innovative capacity of businesses. In particular, no work could be identified, which undertakes an empirically validated conceptualization of innovation capacity in the form that is not the innovative ability queried directly or through output variables (eg number of product innovations, innovation) is measured, but recognized their contents, elements and structural characteristics [4]. However, for a better understanding of the innovative capacity issues and to generate implications for the management just knowledge of the elements and the structure of the capacity for innovation centrally, because only then can be gained about understanding how to improve the innovative capacity of a company. Empirically good quality evidence to the innovative capacity of enterprises, there are therefore currently insufficient [8]. It lacks not at least on operationalizable overview potentially conducive to innovation characteristics of companies that can be used by managers to deliberate design innovation favorable conditions. The present work contributes to filling this gap in research. Features the innovative capacity therefore represent the central subject of investigation work.

3. Aspects for the research model

In the research field of innovation studies organizational innovations are less researched than technical innovations. One reason is that the relationship between innovation and organization is quite complex and stringent theoretical concepts and standardized definitions for a long time not available [2]. If it is want to represent the quality of the innovation capacity precisely, can the degree of severity of the number of innovations in a defined period, the success of innovation (sales and profit share, cost reduction, quality improvements), the type of innovation (improving innovations and radical innovations, process innovations or product innovations). To distinguish innovation capability of not capable of innovation or non-innovative companies is one thing. Crucial is the question of what makes innovative companies innovate. These features are the conditions and critical factors of innovation capability. The innovation research has produced a number of findings about the success factors of innovative companies. They relate to external environmental conditions and internal factors. The organizational differentiators between innovative and non-innovative enterprises reflect, summarized in the following areas [1] [12] [16].

- target and value system – culture (Market strategy, regional and global orientation, employment development as part of the mission statement, vision, business strategy, customer focus
- acting management system - culture carriers

The starting point of further consideration, the organizational culture, transmitter of organizational culture in the form of management and the organizational climate. From a strong organizational culture and a favorable organizational climate is mentioned, when it comes to successful businesses [12]. As part of the literature review, it always comes back to overlap the topics organisational culture and organisational climate. Often the two terms are also used interchangeably but in this cases the terms didn´t get their real importance. Different research perspectives. Both concepts come from different scientific developments. The climate concept is based on the psychological field theory of Lewin (1939). Aspects of culture traditionally addressed by the scientific discipline of anthropology. It can be deduced also that these studies were carried out using different methods. In his comparison of the two literature of culture and climate Denison (1996) stated, that traditional methods of studying culture relates to qualitative perspectives and studies of organisational climate are based on quantitative research designs (Denison, 1996). The term climate consciously perceived processes and factors of the environment are described that can be controlled by the organisation. The focus of climate is on the situation and its link to perceptions, feelings, and behaviour of employees. It can be viewed as relatively temporary and as subject to direct control, that means also as subject to manipulation by authority figures. The term organisational culture, however, deeply rooted values and assumptions are addressed, which are often not aware of meaning is established through socialisation to a variety of identity groups that converge in the workplace. Interaction reproduces a symbolic world that gives culture both a great stability and a certain precarious and fragile nature rooted in the dependence of the system on individual cognition and action [12]. Organizational climate means the relatively enduring quality of the internal environment of the organization that is experienced by the members, may be affected and their behavior described by the values of a particular set of characteristics of the organization. The organizational climate refers to the perception of the current situation by employees. It is time-less stable than the organizational culture and can be changed and influenced more quickly. For innovation-related aspects of the organizational culture and organizational climate are a

strong focus on innovation, a commitment to quality, a process-related efficiency focus, support for experiments, a high fault tolerance, and clear standards of risk taking. It is not enough to verbalize the norms and values of innovation. Rather, it is important for an externally visible and credible inward culture that the norms and values are consistently practiced and lived. The work of Cooper and Kleinschmidt (Cooper, 1995) show that the influence of the culture of innovation or of items that are considered by the authors as part of the culture of innovation that has scarcely been examined for the success of new products. So in the literature also a corresponding need for research is attested [9] [5].

The construction of innovation-promoting values and a strong culture is not possible at short notice. A culture can only be established in the long term. Willingness to communicate and mutual trust must grow slowly and cooperative. The norms and values of creativity should also be team and leadership development play a more prominent role [12]. Many small and medium enterprises have a number of characteristics that favor innovation. Flat hierarchies, short communication lines, fast and unbureaucratic decisions, small division of labor, motivation of management and employees as well as a high proportion of informal communication are all properties that - as a recommendation for large enterprises - be mentioned when speaking of a positive climate for innovation [4]. The positive effect of an innovation-friendly and entrepreneurial working atmosphere on innovation success is considered indisputable. As part of innovation success factors studies no latent construct is in this context, mostly Climate of Innovation measured, but rather a question about what measures are being taken to promote entrepreneurial (or innovative) activities of employees [9]. These include the existence of an incentive or idea management system, the ability of employees, especially those from research and development to be able to use a certain part of their time on the (further) development of own ideas, support for employees to work at unofficial development projects, the provision of internal venture capital for employees' ideas the promotion of training activities of employees [4]. An innovation-friendly climate in the company with an appropriate risk adjustment is also isolated as relevant for success identified. In the latest work of Cooper and Kleinschmidt (1995a) is the construct entrepreneurial climate operationalized by those variables. Besides the aforementioned idea suggestion system the following aspects are considered: possibility for employees, preferably use of R & D, a fixed proportion of their independently working for work on their own ideas to be able to; support for work on unofficial projects that have been already stopped by management and the provision of internal venture capital to facilitate the implementation of creative ideas. Another undoubtedly significant factor that affects both the innovation cultures in teams as well as directly on the innovative capacity of teams, represents the leadership. Not only for the social relations within the team, but also for the ratio of supervisors to employees membership relation found significant correlations [6]. But innovation does not fall from the sky, but are made by people. Experience shows that there are no more than 10-15% of managers and professionals, drive innovation beyond the mainstream even against resistance. Many managers but find it difficult to help to develop the innovative potential of the workforce. Accustomed to optimize the status quo, they seem to have forgotten how to promote creative engagement and makes available for the company's development. Programmatically adapt companies although often new models and management concepts to promote innovation; currently next to the unbroken economic learning organization is observed an increase in projects to synthesize innovation culture; but rationalize the company and continue to shrink - the contribution to improving the innovation capacity is limited [12].

The definition of the culture of innovation is made uneven. The question of configurability is closely related to the question along to the measurability. A positive correlation between the dimensions innovation culture and innovational climate has been found in numerous studies. A central question of this work is now to develop a model that determines the innovative ability of a company or organization using the dimensions innovation culture and innovative climate and can measure.

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RISK-TOLERANCE IN CONTEXT WITH FAMILY BUSINESSES

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Abstract: *Risk tolerance is one of the major concepts in economics and finance. It is usually measured by the attitude toward risk or risk taking behavior. Earlier research has searched for factors associated with and individual's risk tolerance. However no study has addressed the risk tolerance in family businesses. Furthermore no study has directly compared entrepreneurs and managers of family businesses as risk takers. Finally this paper focuses on risk-tolerance attitudes and behavior. Therefore the paper has the objective to connect the literature and compare family business owners and nonowners in terms of risk attitudes and behavior, to explore family and business characteristics associated with risk-taking attitudes and behavior as well as to examine the consistency between risk-taking attitudes and behavior among family business owners. First the concept of decision making is shortly illustrated. Second studies of risk attitudes and risk behavior as well as the variables used in studies are examined. Then the family businesses are defined. Finally the link should be made between risk and family business.*

Keywords: *family business, risk tolerance, attitude toward risk, risk-taking behavior, financial and nonfinancial goals*

1. Introduction

The task of the General Business Administration is, in particular, to support decisions in companies. The concept of decision is defined as the choice of one of several alternatives available to the decision-maker to achieve a goal. Such a decision-making situation can be present in both a conscious and unconscious choice of one of the alternatives. The alternatives may consist of one or more measures or parts.

When making decisions, different situations with regard to the extent of the available information (ie the individual manifestations of the action or decision-making space) must be taken into account. Either these are unambiguously determined - which is very rare in reality - or there is a lower or higher uncertainty about the data situation. In this case, a distinction can be made between whether the decision-maker is able to assign probabilities for their occurrence to the individual possible data expressions. In this case, this means the decision is taken under risk. On the other hand, a decision is uncertain if the decision-maker has no evidence as to whether one of the different possible forms of expression is more likely to be expected. In such a case, there is no way to determine probabilities for the occurrence of the different facts constellations. The concept of probability in this context is used in the sense of a "subjective expectation frequency".

On the other hand, probabilities in the sense of a statistical use of this concept would presuppose that there is a sufficiently large number of identical repetitions of the decision-making problem. This is not regularly the case with the questions discussed here. It is true that certain questions can be answered more frequently (for example, the question of the advantage of an investment), but the conditions for making these decisions will be very different, so that they will not be sufficiently comparable Conditions [1].

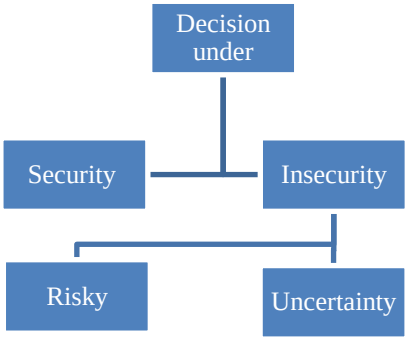

Figure 1: Possible characteristic features of environment conditions in connection with entrepreneurial decisions [2]

2. Risk tolerance and risk taking

Risk tolerance is one of the major concepts in economics and finance. It is usually measured by the attitude toward risk or risk taking behaviour. Previous research almost twenty years ago [3] reexamined factors associated with an individual's risk tolerance.

Risk tolerance is one of the essential parts of the effective management of investment both in corporate and private settings. Another part is the investment horizon, financial stability, and clear and specific goals [4]. Friend and Blume (1975) [5] have developed a framework to measure risk tolerance which has been used in many empirical studies. This framework focuses on the relationship between risk tolerance and wealth.

Hanna and Chen (1997) studied the relationship between risk tolerance, planning horizon, and wealth by using the expected utility model and historical investment return data. They concluded that even investors with very low subjective risk tolerance levels should have aggressive

portfolios if their planning horizons is twenty years or longer [6].
Other empirical studies showed a positive relationship between risk tolerance and variables including non-investment income, years to retirement, education, and self-employment status.
Risk taking is considered an essential characteristic of entrepreneurs [7]. Brockhaus (1980) defines risk taking propensity as the perceived probability of receiving the rewards associated with the success of a proposed situation [8].
The underlying mechanism of risk is the probability distribution associated with the outcomes that result from taking different actions. Then, risk refers to the "unpredictability or possible downside variability of performance" (Miller 2007, p. 67). The risk taking propensity of an entrepreneur is high if he or she is willing to knowingly take risks [9].
Therefore it can be stated that risk is part of business and each business owner has a separate risk-taking attitude. Nevertheless it might be that entrepreneurs have a risk taking attitude with regard to their entrepreneurial decisions but are rather risk averse when it comes to their private lives (e.g., in terms of car driving behavior or risk attitude with regard to sports). That is why the entrepreneurs' risk attitude in the specific business and entrepreneurship context should be assessed [10].

2.1 Studies on risk-tolerance attitudes and behaviour
In recent years there have been studies on the risk attitudes with most of them comparing entrepreneurs with nonentrepreneurs. Entrepreneurs were treated as homogenous group. Their risk attitude was compared to the ones of managers [6], bankers [11], or employees [12]. Our particular focus is on motivation, which is found to differ widely among entrepreneurs
Recently also some research has been published on the risk attitudes of the different types of entrepreneurs. One distinguishes betwee entrepreneurs who pursue a new business because of opportunity and others who do so through necessity. Benz and Stutzer (2004) explained their findings by using the concept of procedural utility. According to this concept, individuals not only obtain utility from the outcome but also from the process of how this outcome has been achieved. They argue that entrepreneurs' utility is a multidimensional construct that goes beyond solely monetary measures and includes several aspects of nonmonetary entrepreneurship [13].
The departing point for procedural utility is that individuals have a sense of self. More precisely, they are striving for a positive sense of self, and their fulfillment affects their general well-being; they care about how they perceive themselves as human beings and also how others perceive them. This is in line with psychology, as control and esteem are considered to be among the most important motivations of the self, and both are associated with happiness [14].
It is argued that entrepreneurs who place a higher value on nonmonetary aspects of their work are also more risk tolerant when it comes to investing money in an activity related to their venture.
Despite the great public attention that the Global Entrepreneurship Monitor (GEM) has created by introducing the distinction of opportunity and necessity entrepreneur in 2001 (Reynolds et al. 2002), little is known about those two groups from a microperspective. Opportunity entrepreneurs start their ventures to take advantage of identified business opportunities. Necessity entrepreneurs, on the other hand, start their ventures because they have no other choices with respect to earning a living. Therefore, the GEM has introduced a third group of entrepreneurs who started their venture out of a combination of both necessity- and opportunity-based motives, which is refered as mixed-motivated entrepreneurs [15].

2.2 Variables to measure attitudes and behavior
In the financial sector for example the risk-taking attitude can be measured by a categorical variables with four levels. The respondents of a survey can be asked which of the following statements comes closest to the amount of financial risk that they or their partner is willing to take when they save or make an investement.

- Take substantial financial risks expecting to earn substantial returns
- Take above average financial risks expecting to earn above average returns
- Take average financial risks expecting to earn average returns
- Not willing to take any financial risk.

The risk taking behavior than could be measured by the share of risky assets in total assets [16].
In different studies the independent variable was grouped into family and business characteristics. The family ones were such as home ownership satus, household size, family income and net worth. The characteristics of family business owners included age, education, race, and age. Business characteristisc included the number of employees, number of years in business, gross sales, number of businesses owned, having started the business and sole proprietorship status.

Nonpecuniary benefits
Besides the variables above entrepreneurs often enjoy substantial nonpecuniary benefits as the autonomy and freedom associated with self-employments. An Indication here may be the entrepreneur's beliefs about retirement plans (SFC). In each stage of age entrepreneurs are much more likely than other to think they will never retire.

Attitudes toward risk
The attitude toward risk can be measured for example by asking how much risk a person is willing to take given a planning hoirzon from a few months to five years ore more.

Mearuring Optimism
In surveys participants were asked about how old they think they will get. Furthermore questions about education,

race, gender and age were asked. Using the detailed demographic information a statistical life expetancy was computed and compared to the answers. This formed the basis of the optimism measure. Entrepreneurs expect to live about 2 years longer than those who are not entrepreneurs [17].

To classify opportunity and necessity entrepreneurs, the participants can be asked to indicate whether they took advantage of a new business opportunity, whether they had no better alternatives for employment, or whether a combination of both applied [10].

Entrepreneurs are more optimistic, more willing to bear risk and more motivated by the nonpecuniary enjoyment of work than wage-earners. However there are important differences within different types of entrepreneurs. Those who inherit businesses rather than start or buy businesses are less willing to embrace risk than the average nonentrepreneur. Entrepreneurs who work with their spouse or grown child appear to be more optimistic. However theye do not share the same tolerance for risk that other entrepreneurs exhibit. Individuals who possess the traits of an entrepreneurs work more, even when these individuals do not own private businesses [17].

2.3 Results

The research of literature showed that opportunity entrepreneurs are willing to take more risks than necessity entrepreneurs. Furthermore entrepreneurs who are motivated by creativity are more risk tolerant than other entrepreneurs.

The relationship between the entrepreneur's motivation and risk attitude helps us to understand the large differences that exist within the group of entrepreneurs, for example, with regard to entrepreneurial success [24], innovativeness [25], or the effects of entrepreneurship on economic development [19].

Past research has shown that opportunity entrepreneurs differ from necessity entrepreneurs in a number of aspects, such as income from entrepreneurship, duration in self-employment, job satisfaction, regional context, and socioeconomic characteristics [18]. On a macro level, it has also been shown that necessity entrepreneurship has a lower impact on economic growth than opportunity entrepreneurship [19].

3. Family businesses

The family business literature can be organized according to the individual, the interpersonal/group level, the organisational level and the societal/environmental level [2].

On the individual level reasearch has been done concerning the founders, the next generation, women and nonfamily employees. One theory in use is the social network theory which argues that the founder has a significant influence on the culture, values and performance. Different adaptive leadership styles are used by the next generation. The principal agent theory and the stewardship theory may be of use when looking at the relationship with nonfamily employees.

On the interpersonal or group level contractual agreements, sources of conflicts and management and intergenerational transitions have been analysed. The theories used in this circumstances are variants of agency theory as well the resourc-based view of the firm. The latter states the importance of transferring tacit knowledge, networks and social capital as well as passion, which then should lead to a competitive advantage.

On an organizational level the resource based theory is used as well. Types of sources identified on this level are human, social survivability, patience and governance structures. It is important to understand the beliefs and culture.

On an organizational level the impact of the fiscal system has been analysed and the institutional theory, contingency theory at the the structural level and the transaction cost theory of Williamson at the ecological level have been used.

Even though it is possible to theorize across multiple levels, most of the literature has focused on one level rather than the complex domain of multiple-level theorizing [2].

In the following two strategic management oriented explanations which are the agency and resource based view will be used.

Researchers proposed that altruism and the tendency for entrenchment are the fundamental differences in terms of agency costs between family and nonfamily firms [20]. Both theories may help to connect risk and family businesses.

Altruism can lead to the result that family members are willing to suffer from short-term deprivation for a long-term firm survival, to reach low overheads, be flexible in decision making and to reduce bureaucratic processes to a minimum. These can lead to a competitive advantage. [21]. Furthermore it may alter the way of risk attitude and behavior.

The entrepreneurial attitude, as a resource, and abilities in a successor may be the key to success in family firm succession. There is evidence that integrity and commitment are more important to the selection and success of a successor than technical skills [20].

It is important to define the family business exactly when comparing data. The involvement of the family or the so called level of familiness measures how much or how strong the family is involved in the business. Herby the level of family influence ranges from no influence to a maximum influence.

Depending on where the business is in its life cycle different criteria which can distinguish between these businesses are percentage of ownership, strategic control, involvement of multiple generations and the intention to keep the business in the family.

One way herby is to separate the level of influence in three circles. The outer circle requires only some family participation in the business and involvement in business's strategic direction. The middle circle requires that the business owner intends to pass on the business to another member of family and that the founder or descendant runs the company. In the narrowest definition multiple

generations have a significant influence on the business [22].

3.1 Combination of financial and non-Financial goals

Goals and priorities of the family and business systems may not be complementary. Family goals are created and supported by family members. Business goals are for example to make profit, increase the market share be more efficient or other economic goals. Therefore family firms may be characterized as having both financial and non-financial goals. The emotional attachment to family issues may distract from a firm's focus on purely financial goals. In such situations, non-financial goals often become equally or more important than financial goals. Non-financial goals in family firms include family harmony, family employment opportunities, corporate independence and privacy, cross-generational sustainability and management succession. High levels of family ownership empower the family as the ultimate authority and allow the family to reflect its vision on the business. The family firm's tendency to hold non-financial goals increase when family ownership increases. Studies show that with higher family ownership, goals change towards greater independence and private wealth. As a result family firms are expected to take both economic and (family-centered) non-financial goals into account while making business decisions. It seems that strategic and structuring decisions are made in order to achieve these combined financial and non-financial goals. Therefore it can be assumed that the family is expected to influence strategic and structuring decisions indirectly through their idiosyncratic goal setting [23].

3.2 Risky decisions in family businesses

For family business additional considerations concerning risk-tolerance patterns owners have to made. Some of the many risky decisions might be if the family should provide loans to their business, if the business should grow vertically or horizontally, if the business should be managed by nonfamily members or not. The level of risk tolerance along with financial capacities and long-term goals of family business owners directly influence decisions made on these issues [16].

The findings of a study of Haynes and Avery (1997) in Xiao [16] suggests that households engaging in small business ownership have substantially higher debts and a higher probability of borrowing form commercial banks and family members than those households not engaged in small business ownership. Finances of the business and family may be intertwined with family members making direct loans or grants to the business, borrowing money form the business, pledging personal assets as collateral for business loans and in numerous other ways. Another study [24] suggests that female business owners are more likely to intermingle financial resources than their male counterparts. These risky decisions are affected by the level of risk tolerance, among other factors.

The above mentioned theories can be used to analyze the influence of risk-tolerance attitudes and behavior in family businesses. What interests me is the question how the risk-tolerance affects management decisions in family businesses in a narrower sense, as for example the choice and change of legal form – which can lead to a strategic renewal - the effect of taxes and other financial factors.

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THE PROBLEM OF THE ECONOMIC DOWNTURN AND MUNICIPAL REVENUES IN POLAND IN THE YEARS 2006-2015

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Abstract: *In 2008 Poland was forced to face economic collapse. Because of the recession particularly affected public finances. The aim of this publication is to show the negative consequences of the economic crisis on the budgetary revenues of municipalities.*

Keywords: *business cycle, economic crisis, finance municipalities*

1. Introduction

In the last quarter of 2008 we saw the release of many important indications talking about the coming economic slowdown in Poland, which were a result of the global financial crisis, which is then transformed into a global economic crisis. Because of the recession particularly affected public finances. Due to the deteriorating economic situation and the economic state, the basic unit of local government which is the municipality was obliged to take appropriate action in order to improve the financial income. The essential problem was to change. In its financial policy, as well as the budget, because municipal revenues are dependent on the business cycle, over and above the grants and subsidies from the state budget. The economic slowdown influence these have in subsequent years changed dramatically.

2. Today's economic crisis

The economic crisis is defined as an economic phenomenon taking place in the economy, which is based on the collapse of the present system due to many external factors. The economic crisis is also known as a recession, economic collapse and economic depression. The reason of his birth is not limited to defective conducted financial policy of the country or economic, which in turn translates into the state budget. The essence of the economic crisis lies in the fact that it always causes negative effects on the functioning of the state, which in turn the quality of life of society. Very often, their range covers many countries, even those highly developed. Generally, the most important is that the State has taken the appropriate measures in order to combat and economic recovery [1].

In the last quarter of 2008 we saw the release of many important indications talking about the coming economic slowdown in Poland, which were a result of the global financial crisis, which is then transformed into a global economic crisis. Economy many countries, including Polish included then very difficult to transition period. The crisis of 2008 is different from the crises in the past, mainly due to the reason for their creation as well as the reaction of states to the situation. In Poland, as a result of the occurrence of significant foreign capital in the Polish banking institutions, with the effect of the so-called "contagion of credit drought" there was stagnation in bank lending business entities as well as individuals. Due to the high interest rates on individuals and legal persons were forced to give up borrowing due to inability to pay. In practice, this means limiting, and even the lack of exploitation activities and taking any investment projects from both individuals and businesses[2].

The basic causes of the economic crisis include the activities of the federal government, the US monetary policy and the development of credit markets and subprime modern financial instruments[3].

The outbreak of the economic crisis took its reach not only the US but also other highly developed countries, including Poland. The consequences of the crisis have left their mark not only on the financial market, but also contributed to the disruption of stable functioning of the entire economy. The fundamental impact of the global crisis should include [4]:

a) losses recorded in the banking sector noticeable in early 2007. No gains occurred in various areas of banking activity. Financial institutions have been forced to create reserves, writing off the liabilities, which could not be download, increasing the cost of funding on the interbank market. All actions inevitably led to billions in financial losses, as a consequence of their bankruptcy;
b) financial losses in the insurance sector, which is a result of engaging in innovative insurance transactions in the securities market, including those aimed at the then risky in the US segment of the mortgage;
c) the need to strengthen the capital base of banks, which was affected by the deterioration of liquidity, increase investment risk;
d) loss of confidence in the interbank market, which meant that the banks were in relation to each other wary. As a result, the so-called lending on the interbank market almost disappeared. Banks ceased to lend money to other banks, fearing that the loans will not be repaid. This situation developed over several months, where after this uncertainty thanks to the intervention of central banks of the United States and the European Union acted return to stability;
e) the collapse of the stock exchange, where the result of the relationship that market banking market and the

real estate market has caused sharp declines in stock prices and high volatility of the market;

f) stagnation in the segment of debt securities that may be issued by the State as well as enterprises;
g) stagnation in the segment of innovative instruments and, therefore, suspend the issue of new innovative instruments, no purchase transaction - the sale of instruments of this market;
h) the destabilization of investment funds and pension funds, which decreased the value of their investment portfolios, which in turn translates into a valuation of mutual fund units. Following the crisis, the return on investment remained at a very low level, more than it has increased investment risk which contributed to the outflow of a large part of the capital of mutual funds;
i) the negative impact on households, which in the face of the crisis had to deal with the high prices of loans, a decrease of income as a consequence of their limited opportunities for both investment and consumption;
j) disturbances in the activity of companies that have difficulties in obtaining external sources of financing their activities, and thus inhibiting their growth and activity;
k) the deteriorating situation on the labor market, where the society had to face mass redundancies, the lack of new jobs;
l) increased government spending, which deepened the budget deficit;
m) the weakening of the international trade activity, which automatically translates into a decline in foreign trade.

One of the essential features of the world economy is moving to fluctuations in macroeconomic as well as internationally. In recent years, the Polish state was obliged to face the changes that have occurred in its environment. The macroeconomic data indicate that the slowdown in economic growth in Poland has become a reality. The state of the Polish economy in the years 2005-2015 presented in the following statistics.

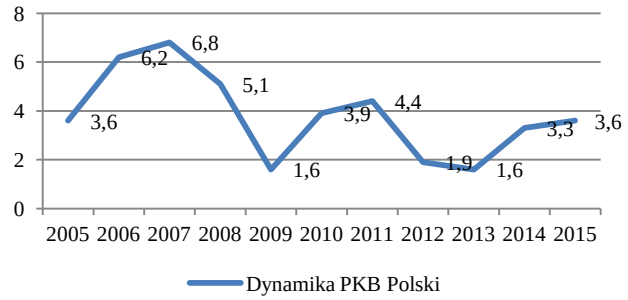

Figure 1. Dynamics of the Polish GDP in the years 2005-2015

Source: Own study based on: Annual macroeconomic indicators, the Central Statistical Office, http://stat.gov.pl/wskazniki-makroekonomiczne/ [accessed 15.09.2016 r.].

Since 2005, it showed an increase in Polish GDP, which remained until 2007. In 2008, Poland suffered the impact of the global economic crisis. Already in 2009, there was a weak GDP growth, while the growth rate in the previous year dropped by 3.5 percentage points. It was a significant decline in GDP growth, but in Poland continued GDP growth was visible, with this, it was a slow growth. In 2010-2011, there was a renewed increase in GDP growth, although already in 2012 Poland felt again the strong economic slowdown. The dynamics of Polish GDP in the years 2014-215 increased, reflecting the progressive growth.

3. The commune system of public authorities

In accordance with art. 164 paragraph. 1 of the Polish Constitution of 1997, the municipality is the basic unit of local government. Residents of municipalities formed under the law self-governing community, where organized as a corporate entity local government should jointly make decisions regarding their cases. As part of the community can be created so-called auxiliary units, which include village councils, districts and settlements [5].

The municipality has a legal personality, which means that as a consequence is not only a public body, but also to private law. It may therefore be a member of business transactions as well as other legal entities. More than they can hold its own assets, manage it yourself and draw different types of commitments. The municipality as the basic unit of local government shall perform public tasks on its own behalf and on their own responsibility [6].

The foundation of an independent economy of the municipality is the budget. The budget of the local government and a resolution is planned as the budget resolution and implemented according provided legislation. It is made for the calendar year. Above it is a detailed financial plan of the municipality, including both its income and expenditure, as well as its revenues with the planned intended to cover the shortage of legally defined revenues and outflows on the basis of which it carries out in a transparent manner, and its own independent financial management [7].

The budget as revenue and expenses complies with certain rules, which are aimed at ensuring the proper functioning of the economy budget. The budget must be mandatory open, containing all the expenditure incurred and revenue received, thus providing a whole [8].

Municipality wanting to carry out public tasks must have certain revenues that are derived from different sources. Their classification is based primarily on account of their origin. There are: own revenues, general subsidy and specific grants transferred from the state budget. Due to their specific local needs they require that they be financed in a continuous manner, and it is desirable that the sources of income of municipalities to be effective, creative, and at the same time stable. With the result that the municipality has the relative financial independence from the state and gives it the ability to make rational financial management in the longer term [9].

4. Revenue municipalities in Poland in the years 2006-2015

Extremely important in the process of implementation of public tasks by local municipalities have an adequate system of financial power. Budget revenues of municipalities in the following diagram.

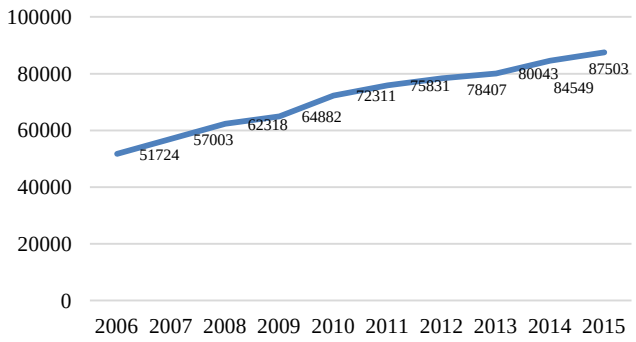

Figure 2. Total revenues of the municipalities in the years 2006-2015 (million PLN)

Source: Own study based on: Annual macroeconomic indicators, the Central Statistical Office, http://stat.gov.pl/wskazniki-makroekonomiczne/ [accessed 08.09.2016 r.].

Municipal revenues are primarily taxes and fees, which for the most part belong to the traditional set of sources of income of local government. The revenue of the municipality include[8]:

a) tax revenues from real estate, agricultural, forestry, transport vehicle, personal income paid in the form of taxation, inheritance and donations, civil transactions;
b) receipts from fees such as stamp duty, fair, local, spa, Dog license, exploitation, other than income municipalities;
c) proceeds obtained by the municipal budget units municipality;
d) income from the property of the municipality;
e) inheritances, bequests and donations to the municipality;
f) income from fines, as well as a fine to the municipality;
g) 5% of the proceeds raised to the state budget in connection with the execution of tasks government administration and other tasks assigned by laws, unless otherwise provided;
h) interest on funds held in bank accounts municipality, unless separate regulations provide otherwise;
i) interest on loans granted by the municipality;
j) interest on late paid taxes which are revenues of municipalities;
k) donations from the budgets of other local government units;
l) general subsidy;
m) share in taxes constituting the revenue of the state budget;
n) other income payable to the municipality on the basis of separate regulations.

Budget revenues of municipalities characterized by an upward trend, although their dynamic growth was seen in the years 2006 - 2011. In subsequent years, the growth of income of municipalities was visible, with that was characterized by a lower growth rate.

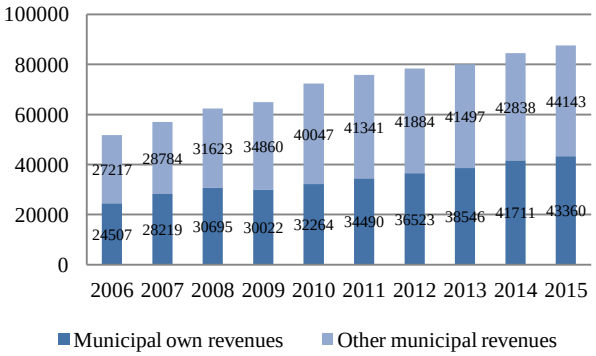

Figure 3. Share of communes in the revenue total in the years 2006-2015 (in mill. PLN)

Source: Own study based on: Annual macroeconomic indicators, the Central Statistical Office, http://stat.gov.pl/wskazniki-makroekonomiczne/ [accessed 08.15.2016 r.].

An important part of the budget of municipalities are the own revenues, which account for nearly half of budget revenues. Other income is subsidy and subsidies. Own revenues in the period were characterized by an upward trend with the exception of 2009. There was then a slight decrease as a consequence of the economic slowdown that took place in Poland. However, in the case of other income municipalities it saw a drop in their revenues only in 2013, which also had a relationship with the global economic crisis.

5. Conclusions

The analysis should be noted that municipal revenues as a result of the economic downturn have changed. Especially own revenues decreased in the initial phase of the emergence of the economic crisis, namely in 2009. The experience of recent years has shown that municipalities should strictly develop its financial policy. The economic slowdown municipalities should manage reasonably obtained funds. The business cycle has a significant impact on the budgets of local government units. It should be noted that in the case of municipalities collected local taxes, such as the forest or the means of transport are relatively stable, which means that they are resistant to the economic crisis, while their share in total income is small, and consequently, income from the investments are small in comparison to others.

To sum up, on the basis of the analysis must be said that the economic crisis is having an impact on budget revenues of municipalities, however, it applies to certain of their sources. More than in a situation of economic downturn, it is necessary to have obtained a reasonable income as well as the implementation of the necessary

public tasks. Only such policy financial municipalities will allow them to function properly and survive the difficult period which is the economic crisis, the consequences of which can be seen in all areas of finance and economy.

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OPERATIONS OF SELF-GOVERNMENT UNITS IN POLAND FOR ENTREPRENEURS AND THEIR ECONOMIC ACTIVITY

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Abstract: *In the following article are discussed topics related to the role local government units play in the development of entrepreneurship and innovation. There were talked over the actions that government can take on this issue with the division on regulatory- legal, information and promotion, investment and organization, financial and redistribution, coordination and arbitration.*

Keywords: *entrepreneurship, self-government, Poland, development*

1. Introduction

The development of entrepreneurial activity of citizens is a very important lever for socioeconomic development in a market economy. That is why supporting this activity is the main focus of economic policy-makers. Various policy instruments to promote entrepreneurship are at the first stage of implementation nationwide. Over time, it became clear that there is a need to support entrepreneurship at a regional level, primarily to stimulate innovation processes. As it turns out, even in the era of the Internet and facilitated flow of information, the concentration of business entities in a particular area is of great significance. If additional conditions are met, the cooperation between these entities can have positive effects for them and at the same time contribute to the development of the region to a much greater extent than if they were to act completely independently. Only in the last decade or so the focus has shifted to the local dimension of entrepreneurship, particularly in large urban areas.[9]

Poland is a country with great potential in terms of entrepreneurship. More than 300 thousand Poles annually decide to start their own business. It is natural that not all are successful, because the economic activity is associated with some risk of failure. Therefore, it is important to prepare to such activity as much as possible. The support, in this matter, can be found among the various types of institutions that deal with the promotion of entrepreneurship. Local government units (LGUs) have a wide range of instruments to support the development of entrepreneurship. Due to the nature of the interaction they can be divided into: financial, infrastructural, legal, administrative, planning, marketing and institutional information. [10]

The purpose of this article is to indicate what role in supporting entrepreneurship play LGUs. What is the scope of action they take both in terms of theoretical support, financial and developmental for entrepreneurs who start their business. [5]

2. The potential of Polish entrepreneurship

Nowadays, when we talk about development whether economic or social, immediately come to mind phrases such as entrepreneurship, innovation and competitiveness. In order to develop these skills among their citizens states organize various kinds of programs and activities aimed at supporting entrepreneurs especially when just starting independent running their own businesses. This is to improve the quality of life both locally and globally. Poland is in so much favorable position, it has the opportunity to use the experience of other countries, mainly highly developed. It may even be that the fact that there are significant developmental delays compared with the more developed countries can bring certain advantages. This was the case when the under-investment in agriculture has resulted in interest in Polish, healthy, unpolluted by artificial fertilizers and non-GM food. We need also pay attention to the fact that Poles enjoy a relatively high level of creativity. The example in this regard may be, among others, a large number of talented creators of computer programs while there is underinvestment in Polish scientific institutions and enterprises. However, in the long term, intellectual potentially gives the multiplied effects when it is supported by financial investment, expertise in the field of market and management, culture of entrepreneurship and innovation. [12]

Entrepreneurship and innovative potential are fields very difficult to measure but also to support. The main reason for this is the complexity and multi-stage processes, which they result and are implemented innovative - creative solutions. Therefore, in order to assess the level of entrepreneurship and innovation of individual economies on an international scale or individual regions on a national scale, we use a series of indicators included in the aggregate indices.[4] The Innovation Union Scoreboard Ranking is one of the most frequently quoted studies of this type in European and Polish strategic documents. This is a new version of the European Innovation Scoreboard, created to better monitor the progress of implementation of the objectives of the Europe 2020 strategy (smart growth). Most of the indicators has been preserved, sometimes with a change in their scope. Among the indicators worth mentioning a whole new category devoted to the research networks. [4] IUS first appeared in 2011 –it includes indicators for 2006-2010 recalculated according to the new

methodology.[9] On the overall index consists of 8 groups of indicators divided into three broad categories:

- Levers (enablers) - human capital, ability to obtain financing from the market or state support for innovators, but also the quality, openness and attractiveness of the national research system;
- Companies' Activities – firms' investment in innovation, cooperation with other entities and the creation of intellectual property;
- Results - innovators' population, economic effects of innovation. [4]

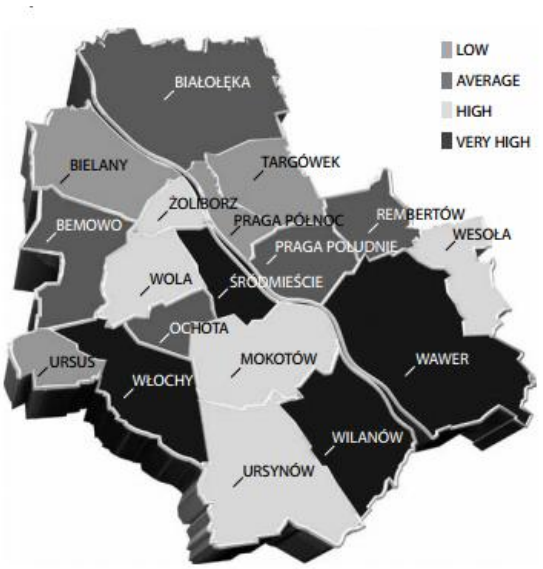

Figure 1: Indicator of the number of active business entities per 1000 inhabitants – Warsaw[9]

It should be noted that the infrastructure support of entrepreneurship and innovation has been working in Poland only since 1990, but significant acceleration and financial support dates back only a few years later. Significant importance had the immediate prospect of European Union membership, and subsequently the programs and funds, to which gained access support institutions - Technology Transfer Centres, Academic Business Incubators, Science and Technology Parks, Technological Incubators and financial support institutions. Along with this wide-opened opportunities to participate in networks supporting innovative entrepreneurship in the European Union. [12]

3. Supporting entrepreneurship by LGU

Business development policy at the local level is a process that involves measures and decisions that are important for entities of the national economy operating on its territory. From a business perspective, it is important that this policy is a sustainable and planned process of initiating changes in the business environment, which will allow entrepreneurs to understand the actions of the local administration in the long term and use them in their own development activities. This policy should therefore have the form of a strategic document, which, on the one hand, will describe the established processes of supporting entrepreneurship and, on the other hand, will stimulate the local administration to optimize the verification of the quality of the initiated changes.[9]

Local government due to their statutory tasks and the ability to carry out additional tasks, among others with financial support from EU funds, currently serves a key role in the regional economy. It administers public funds, it is an investor and an employer. Its abilitiesto act are limited only by the shortage of funds and the prerogatives of the central authorities in the creation and enforcement of law, including commercial. [5] LGUs can both directly and indirectly impact on the social, economic and territorial cohesion of individual areas using the available legal instruments, administrative procedures and financial resources. By supporting the development of entrepreneurial activities by local governments should be understood - support actions to take and expand economic activity in a given municipality.[5] Such actions can be taken using various instruments to that end. They can be divided into four basic groups: [6]

1. Measures which are aimed at the creation and development of technical infrastructure, facilitating the making, keeping and expansion of economic activity;
2. Promotion and organization actions whose purpose is:
   - to provide entrepreneurs potentially interested in taking up or expansion of the business in the LGU's area full information on the conditions of such undertaking,
   - facilitation (within the competence of local government units) formalities connected with it,
   - promotion of enterprises operating in a given municipality.
3. Guide to specific entrepreneurs activities that are aimed at creating favorable financial conditions for the creation and expansion of economic activities;
4. The actions of a state aid, which rely on the direct or indirect financing, so to increment specific financial benefits to entrepreneurs, which favors them in comparison to competitors. [7]

The potential of small and medium-sized enterprises varies regionally, due to the different operating conditions in different regions: the economic structure, population's income, availability of transport but also the activities of local governments. LGUs have the opportunity to take action in the field of technical infrastructure and building of generally favorable financial solutions. In the case of technical infrastructure they work on the basis of the following provisions:

- in relation to themunicipalities the provision of Art. 7 sec. 1 Act on Commune Self- government, including the commune's own tasks, among others, case management areas, municipal roads, streets and bridges, waterworks and water supply, sewerage, electricity supply, heat and gas, local public transport;[1]
- in relation to counties the provision of Art. 4 sec.1,including the responsibility of the county public tasks a trans-communal tasks regarding transport and

public roads, property management, land development and water management;[2]

- in relation to the provinces provision Art. 11 sec. 2 of the Act on Regional Government, according to which the provincial government has a policy of development of the region, which consists of, among others, maintenance and development of social and technical infrastructure of regional significance.[3]

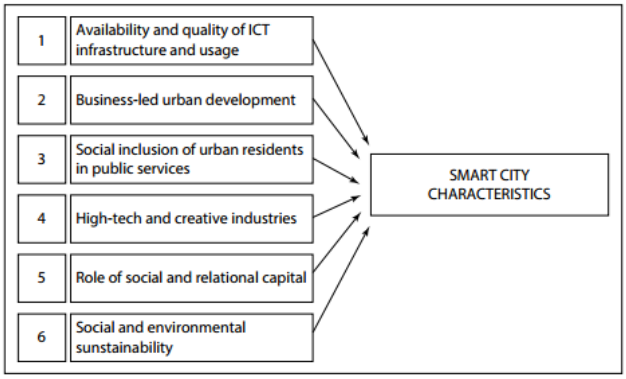

Figure 2: The key characteristics of Smart Cities [9]

Large metropolitan areas create particularly favorable conditions for the formation of clusters of entrepreneurs operating in the field of culture, art and advanced technologies, i.e. the creative industries. The concentration of a large number of educated, artistically talented and also widely understood knowledge workers triggers creativity and stimulates the implementation of interdisciplinary projects.[9]

For entrepreneurs, including foreign investors, are important competencies of local government in the promotion of employment and prevention of unemployment. That is why it is so important to assist employers in attracting employees through job placement, career counseling, initiating, organizing and financing training, vocational training of adults and realization of projects for the promotion of employment. Local governments should cooperate in this matter with county labor offices, which are part of the national system of public employment services.[8] In carrying out this type of aid activities should be used in services and labor market instruments. The most important instruments of the labor market include, among others, subsidy of work place equipment, refunding the costs incurred for paid social security contributions in connection with the employment of the unemployed and funding activating allowance. Tasks related to professional activation are carried out in part by the local government system of social assistance, including social welfare centers and district family assistance centers. In addition, they can be carried out in cooperation with entrepreneurs.[6]

The basic form of entrepreneurship support of local government is the development of technical infrastructure. Good infrastructure is one of the main aspects of encouraging entrepreneurs to take up economic activities in the region. It also encourages the expansion of already formed business.[8] LGUs have the possibility of carrying out a kind of territorial marketing through the introduction of modern management. The investment activities of local governments plays in supporting their business a central role, because it directly affects the development of the unit. Any such activity should be carried out in accordance with the development strategy and long-term investment plan. An essential element thereof should be an issue of supporting entrepreneurship, for example through incentives and tax exemptions, guarantees and loan guarantees, lending municipal property.[6]

One cannot ignore the issues related to the legal regulations in a given municipality. An important aspect for potential entrepreneurs or investors are administrative decisions and resolutions of the decision-making bodies, eg. with regard to the amount of local taxes, fees, rents, concessions and permits. But the most important are strategic documents and spatial development plans. It also involves the local government interventionism and the threat of over-regulation of the economic system. In this matter important will be also the creation and implementation of the budget of the local government. This is because an increasing role in local government finance plays external sources of project financing, for example. EU funds. Local administration can shape the local and regional financial policy, use a variety of market financial instruments, eg. loans and bonds, to decide on the scale of public and private investment and ways of financing them. In addition, note the fact that the local government can act as a conciliator (arbitrator) in the event of a dispute or conflict of interest, eg. between entrepreneurs and residents of the community. The development of this sphere of activity of local governments fosters prestige and public confidence in the representatives of the local and regional power.[6]

Local government units may play an important role in attracting and retaining foreign investors in the region. Some of them performs the tasks in this area and creates special organizational units, serving investors.[7]

4. Conclusions

The above presented lines of action to improve the relationship between local government units and entrepreneurs at the local level: better information, effective coordination of local government activities aimed at entrepreneurs and the integration of the business community through local networks, do not require significant material or financial expenditures. Also the shortcomings in terms of specialized knowledge and qualifications can be supplemented relatively quickly. What we do need, however, is a change in the philosophy of socioeconomic development at the local level, keeping in mind that especially in metropolitan areas, in line with the idea of a Smart City), entrepreneurs can constitute an important driving force of development. [5]

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MULTINATIONAL ENTERPRISES – AN INCREASING IMPORTANCE OF STATE OWNED MULTINATIONAL ENTERPRISES IN THE WORLD ECONOMY

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Abstract: *Our paper focuses on the description of both multinational enterprises (MNE) and the state owned multinational enterprises (SO-MNE) rates of importance within the world economy. The impact of the public administration is felt in both counts. Along Europe it is more intensive in the post-communist countries like in Czech Republic and Slovak Republic and the same in some Arab countries where the SO-MNE are intensive even dominantly operating mostly within the energy industry segments.*

Keywords: *multinational enterprises (MNE), state-owned multinational enterprises (SO-MNE), foreign direct investments (FDI), internationalization*

1. Multinational enterprises (MNE)

Mudambi (2008) defines MNE as the net of the activities connected through the knowledge and the flow of the products. By Dunning and Lundan (2008) MNE is defined as an international or a transnational enterprise engaging in FDI and owning or controlling the added value activities in several countries. The MNE is characterized by two features: 1. it enters, organizes and coordinates multiple added value activities within the home market; 2. it internalizes at least some cross border markets regarding the intermediate products resulting from these activities. According to Kusluvan (2013) MNE is defined as the company owning more than 10% of the assets and operating in the contracting relations like the managerial contracts, franchising and leasing agreements within more than one country. As per Zvirgzde (2013) the selection of the location is of a strategic importance for MNE due to the factors attracting the foreign companies to specific locations and determining the MNE competitiveness from the long-term aspect. According to Baziki and Norbäck (2016) in principle the MNE are the firms characterized by the international advantages like the patents, know-how and the brand name image. These firms are often very big, organizationally established like the companies with limited liability and operating on the stock market. An UNCTAD (2015) paper points out the plan of the MNE to expand their activities in particular through the foreign trade and export within the mid-term horizon. Among the preferred entering of the foreign markets the importance of the cross border fusions and acquisitions is in increase. According to UNCTAD (2016) the larger is the MNE the higher is the complexity of its internal ownership relations. The literature shows various criteria regarding the evaluation of the level or multinational intensity or transnationality of the firm; i.) Number and extent of the foreign subsidiaries or affiliated firms owned or controlled by it; ii.) Number of countries where it owns or by some way controls the value added activities like: the mines, plantations, factories, premises, banks, offices and hotels, iii.) Their global assets rate, income, sales, number of the foreign subsidiaries employees iv.) International level of management and ownership, v.) Scope of the internationalization of the higher added value activities like the research and the development. Inter alia – the criteria of measurement intends to cover the quality or the scope of the foreign production and the foreign subsidiaries contribution to the approach or the direct creation of new knowledge, vi.) Scope and the scheme of the systematic advantages resulting from its processing and its impact on the economic activities network within various countries, vii.) Scope where the responsibility for establishment and operation of the company as well as the decision process considering the financial and marketing matters are transferring to the foreign subsidiaries (Dunning, Lundan, 2008, p.3). In general we may say that the professionals tried either to quantify the value of the foreign firm production (eventually its foreign representation) or to identify the rate of the management relationships, organizational processes, operational strategies and the calculation of the production in the manner showing their international or domestic orientations. (Dunning, Lundan, 2008, p.765, 766). The UNCTAD (2016) statistics acknowledge a MNEs enormous force within the country economy and its positions and importance within the world economy and its constant expansion. The most of the MNE companies are coming from the countries of mature markets while the most MNE affiliations are located in the developing countries.

Table 1 The world's top 100 non-financial MNEs, ranked by foreign assets, 2015

rank	*TNI*	*Corporation*	*Home economy*	*Industry*
1	37	Royal Dutch Shell plc	United Kingdom	Mining, quarrying and petroleum
2	64	Toyota Motor Corporation	Japan	Motor Vehicles
3	67	General Electric Co	United States	Industrial and Commercial Machinery

4	19	Total SA	France	Petroleum Refining and Related Industries
5	40	BP plc	United Kingdom	Petroleum Refining and Related Industries
6	59	Exxon Mobil Corporation	United States	Petroleum Refining and Related Industries
7	75	Chevron Corporation	United States	Petroleum Refining and Related Industries
8	61	Volkswagen Group	Germany	Motor Vehicles
9	18	Vodafone Group Plc	United Kingdom	Telecommunications
10	65	Apple Computer Inc.	United States	Computer Equipment

Source: UNCTAD (2016) World invest report 2015, Annex table 24. The world's top 100 non-financial MNEs, ranked by foreign assets, 2015. Preliminary results based on data from the companies' financial reporting; corresponds to the financial year from 1 April 2015 to 31 March 2016, TNI, the Transnationality Index, is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment, c Industry classification for companies follows the United States Standard Industrial Classification as used by the United States Securities and Exchange Commission (SEC), Data refers to 2014, Data in the table are in millions of USD and the number of the employees.

2. State owned multinational enterprises (SO-MNE)

Jaworek and Kuzel (2015) say that inspite of the fact that the SO-MNE represent the minor part of the total number of MNEs in the world and they have an important portion of foreign subsidiaries and assets regarding their number. According to Kowalsky, Buge, Sztajerowska and Egeland (2013) the fact is that the public sector is long term key economic player within almost all world economies regardless the rate of their development. According to Capobianco and Christiansen *(2011)* the SO-MNE are achieving a critical position and play an important role as the direct external foreign investors in the time period of two previous decades. UNCTAD *(2011)* defines the SO-MNE as the enterprises including the parent business firms and its foreign subsidiaries, with the government control interests (full, majority or major minority) if they are not active in the stock market. As the SO-MNE is regarded in particular the state enterprise, public enterprise, public company, governmental business, governmental-trade business or the government owned company. UNCTAD *(2014)* identified 550 of SO-MNE with foreign assets more than 2 trillions of USD. Sauvant & Strauss *(2012)* found that the most of the SO-MNE are originally from the country classified within the developing markets. OECD *(2009)* defines the SO-MNE as the commercial entity established through either central or local government and under official inspection realized by the government. An OECD *(2005)* definition of the SO-MNE is regarding it as the government owned or the government controlled entities with a corporate form of the assets generating the volume of their income from the goods and service distributions. A SO-MNE is responsible for cca.5% of the economy of average OECD member country. Predominantly within the countries with ranking on the developing markets this share varies from 10% to 40%. The exact characteristics of the SO-MNE legal statuses are different within the respective countries. Shapiro and Globerman *(2009)* emphasize the probability of the state ownership on federal government, state government, government departments or the state retirement funds levels. In spite of 20th century 80th and 90th extensive privatization the state remains a considerable owner of the commercial companies within OECD member and non-member countries. In some OECD countries the SO-MNE share up to 20% of GDP, approximately 10% of employment and more than 40% of market capitalization. As to the ownership of the SO-MNE within OECD countries the Czech and Slovak Republics are of a high ranking. The state ownership is concentrated within the strategic sectors like the public services, infrastructure, energetics, traffic and telecommunication. Recently and particularly in USA and UK the state ownership within the bank segment undoubtedly increased as the governments of these countries took over the capital shares of the banks and other financial institutions being in crisis. (Shapiro, Globerman, 2009 p.5). Shapiro and Globerman´s study demonstrated a probability to make a dividing line between the SO-MNE in mature markets and the SO-MNE in developing and transforming markets. Particularly it is relating to the fact that only a few SO-MNE within mature countries are capable to compete in the global market. Within the mature markets the problems of administration related to the SO-TNC were solved through the combination of the privatization and establishing the corporations. In spite of existing state ownership there is an increased enforce regarding the effective administration. Additionally the remaining commercial SO-TNC within majority of countries are concentrating in several segments being the subject of some form of FDI regulation. On the other hand the SO-TNC in developing and transition markets offer a more complicated reflection. Often the SO-TNC are the part of specific state strategy connected with the national interests and national competitiveness and mostly within the technology and energy segments. Under such conditions a possible failure of the government related to non-commercial purposes, limited transparency and diminished managerial responsibility represent the relevant risks resulting in specific investments of the firms with the consequence of net costs increase to the host economy (Shapiro, Globerman, 2009 p.28). It is highly presumable that the international operations made by the SO-TNC are increasing however it is less presumable that their motivation changes. Henceforth their motivation includes their technology and source accessibility. (Shapiro, Globerman, 2009 p.29). According to Bremmer (2009; Hong et al., 2014) in new era of so called – guarded globalization – the effect of FDI state ownership will always be predominant within the segments representing the strategic priorities of participating governments.

Table 2: The top 100 non-financial SO-MNEs from developing and transition economies, ranked by foreign assets, 2014

rank	*TNI*	*SO-MNE*	*Home economy*	*Industry*
1	50	Volkswagen	Germany	Motor vehicles
2	70	Eni	Italy	Petroleum
3	67	Enel	Italy	Utilities (electricity, gas, water)
4	49	EDF	France	Utilities (electricity, gas, water)
5	40	GDF	France	Utilities (electricity, gas, water)
6	62	Deutsche Telekom	Germany	Telecommunications
7	17	CITIC Group	China	Diversified
8	30	Statoil ASA	Norway	Petroleum
9	72	Airbus Group	France	Aircraft
10	42	General Motors	USA	Motor vehicles

Source: UNCTAD (2015) World invest report 2015, Annex table 24. The world's top 100 non-financial SO-MNEs, ranked by foreign assets, 2015. Preliminary results based on data from the companies' financial reporting; corresponds to the financial year from 1 April 2012 to 31 March 2013, TNI, the Transnationality Index, is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment. The state is the owner of minimum 10% share or it is the majority owner in the firms.

3. Conclusions

Based on current available literature we prepared a finding describing the relationships respectively the interactions among MNE, SO-MNE and the public administration. The MNE are the bearers of FDI and of the globalization (UNCTAD, 2007), MNE are involved in FDI and the problematic of MNE is related to the problematic of FDI (Dunning, Lundan, 2007). The selection of the locality is of strategic importance to MNE as the factors attracting the foreign firms to specific locations are determining the competitiveness of MNE in long term aspect (Zwirgzde, 2013). MNE play a key role not only within economy and also in formation of the company like the entity as they have an access respectively they may select the material sources like the capital, the taxes and the labour positions (Beck, 2015). Through important way MNE share the world trade whereby some selected MNE are at the level of the state economics and it refers that the greater is the MNE the greater is the complexity of its internal relations of ownership (UNCTAD, 2016). SO-MNE represents cca 5% of average OECD member country economy (OECD, 2009). Within some OECD countries the state owned MNE share up to 20% of GDP, approximately 10% of employment and more than 40% of the market capitalization. The Slovak Republic and Czech Republic have a high share of state owned MNE (Shapiro, Globerman, 2009). SO-MNE are reaching the critical position and play important role as the direct external foreign investors (Capobianco, Christiansen, 2011). The majority of SO-MNE is from the countries specified as the developing markets (Sauvant, Strauss, 2012). The number of 550 SO-MNE dispose of the foreign assets in the amount of more than 2 trillions of USD (UNCTAD, 2014). The globalization is based on political principle and it does not represent any spontaneous process (Oatley, 2015). The public segment is long term key economic player within almost all world economies regardless the rate of their development (Kowalsky, Buge, Sztajerowska, Egeland, 2013). The term of „guarded globalization"– the effect of the state ownership will always be predominant within the segments representing the strategic priorities of the government.

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ANALYSIS OF THE INNOVATION-SUPPORTING INSTITIUTIONS OF POLISH ENTERPRISES

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Abstract: *Development of enterprises has indisputably a great impact on the economy. On the other hand, more and more often it depends on effective innovation activity. The innovation plays a role of a proverbial key for solution of the problem which is a constant battle that results in an emphasis of a certain subject against the background of competition. Nevertheless, the solution does not belong to the easiest ones, because many barriers come in the way, which make it difficult/impossible to run an innovative activity. Then, entrepreneur can use a wide palette of services offered by the innovation-supporting institution. Undoubtedly, having knowledge in this respect has crucial meaning for both scientific and practical purposes. This is the reason for this article proposed. The aim of the article is, then, the analysis of the institutions supporting the innovation of Polish enterprises. Considerations aim to order the knowledge of readers from the scope proposed through presentation of information condensed related to the matter discussed herein.*

Keywords: *innovation, enterprises, supportive institutions*

1. Introduction

Enterprises must know and comply with many rules thanks to which they can prosper on the market. One of them is the innovative activity. Innovation is a way to stand out among the competitors [1].

It is important from the economic operator point of view, but also influences the economy. Without innovation the development of enterprise cannot exist and so also the development of the economy as a whole [2].

Innovative activity is hard by nature and very complicated, thus, one of the effects of increasing economic education of society is using the form of consultancy and the marketing, financial, legal and technological information which, undoubtedly, make it easier for entrepreneurs to carry out any kind of innovative processes. Therefore, it is so important that the state be favourable for shaping entrepreneur and innovative attitudes so that the citizens can succeed in business. Enterprise success depends on many factors [3].

One of the main premises is certainly a choice of an appropriate source of funding of the innovative activity and also the innovative processes. There are often barriers for funding innovation and, also in this case, the innovation-supporting institutions of many kinds are helpful.

2. Innovation-supporting institutions

In the economic reality, the innovation-supporting institutions constitute the fundamental part in the system of the state economic development support. They include the institutions of public administration, networks of business environment and a group of non-profit institutions. The operations of the above mentioned institutions contribute to the support of enterprises, scientific researches and the business environment, cooperation of scientific units and enterprises as well as the development of modern staffs for education sector [4].

It is worth to say that the characteristic of supportive institutions is that they are profit-oriented [5]. Contrary, in the market they play the role of service making a peculiar network institutional network infrastructure that enables entrepreneurs boosting developmental processes and realization of the strategies intended [6].

According to the subject literature, the institutions include [7]:

a) Academic Enterprise incubators;
b) Technology parks;
c) Technology incubators;
d) Technology transfer centres;
e) Education and consulting centres;
f) Credit guarantee funds;
g) Local and regional loan funds;
h) Networks of business angels;
i) Venture Capital funds.

2.1 Academic Enterprise incubators - preincubators

Preincubators are usually initiated by academic environment. First of all, they help to prepare for setting up enterprise and for preliminary assessment of the chances for market success.

The idea of support of the academic entrepreneurship assumes an active participation in the educational processes e.g. through promotional actions, university competitions, training organizations, creation of academic creativity centres, cooperation with the institutions of business support [8].

The main functions of incubators are [9]:

a) helping in submitting applications and in receiving financial sources;
b) providing premises for business activity;
c) offering business-supporting services (financial, legal, patent, organizational, economic consulting etc.);
d) making favourable climate for running business activity as well as for implementing innovative projects.

2.2 Technology parks

Technology parks are organized subjects to support the development of enterprises operating, especially, in the innovative industries and the industries offering products / services technologically advanced. In the operation between business and scientific centres, technology parks are the tools of transfer and application of the modern technology [10].

They contribute to development of SME this way.

The fundamental tasks of technology parks one can name are:

a) making available a range of services supporting the activity of enterprises (accountancy, marketing);
b) providing enterprises with places to run business activity (office, factory floor, warehouse);
c) providing consultancy services related to transfer and commercialization of knowledge;
d) intermediary in the cooperation between academic environment and business [11].

2.3 Technology incubators

The priority objective of technology incubators is to help start-up innovative enterprise in reaching maturity and the capabilities to function on the market itself.

On the contrary, the main task of those institutions is assistance and a help in the first period of activity of small technology enterprise. The offer of entrepreneurship incubators is expanded, but it can also be encapsulated as:

a) an assistance in gathering financial sources (including risk funds);
b) making the office, laboratory premises for business activity available;
c) providing business-supporting services (all kinds of consultancy);
d) „soft" services (trainings, cooperation with scientific institutions, access to common technical infrastructure as well as local and global networks of business, support in entering the foreign markets, assistance in the transfer of technology [6].

2.4 Technology transfer centres

The other institutions that in a full certainty are worth discussing are technology transfer Centres. It is an organizationally-varied group, non-profit-oriented units of consulting, training and informative units active in the field of transfer and commercialization of technology, and all those which accompany the processes of tasks.

Their activity is to bear fruits by adaptation of modern technologies through SME or by setting up new-technologies-oriented enterprises. The objectives of those institutions are [6]:

a) commercialisation;
b) technology transfer;
c) intellectual property management;
d) supporting the enterprises;
e) promoting the results of scientific researches;
f) building the cooperation with business.

2.5 Training and consulting centres

The largest group of innovative and entrepreneurship centres are the training and consulting centres. They provide an access to knowledge and abilities through consultancy, trainings and information transfer. Fundamental aim of those centres is the development of entrepreneurship and of self-employment as well as improvement in SME competitiveness and increase in the economic potential and improvement in the quality of life of local society.

It is worth discussing the tasks of the training and consultancy centres tasks in a lapidary way at least.

They include [6]:

a) an active support of the initiatives of local societies in making SME;
b) an active cooperation with local (self-governmental and governmental ones) administration and other organizations (private, non-governmental ones) in order to create common ground for the development of economy and social region;
c) a support and popularization of the idea of entrepreneurship and self-employment;
d) an active participation in interim actions in the situations resulting from the economic or social needs in region.

2.6 Credit guarantee funds

Simply put, the credit guarantee funds are non-profit-oriented financial units supporting local social and economic development.

The aim of those funds discussed herein is supporting economic operators through the support in gathering funds for business activity.

It should be emphasised that the units referred provide a financial support in the forms of guarantees, mostly for small developing companies without the necessary credit history or enough financial securities.

2.7 Local and regional loan funds

One may emphasize that local and regional loan funds are para-bank subjects that support the local social and economic development through creating new economic operators and work places.

They help financially in the forms of preferential loans for start-ups and small (developing) enterprises without enough credit history or the financial securities required. The funds are significantly more available for SEM than bank credit at least by simplified procedures that occur in the case of loan funds [4].

Main tasks of the loan funds include:

a) decrease in the costs of loan management by elimination of bank intermediaries;
b) providing a person who starts or runs business with the necessary capital, knowledge and information;
c) enabling representatives of local societies participation in the procedures of granting and monitoring loans for minimization of the risk related to their granting.

2.8 Networks of business angels

Relatively new (still little popular) instrument of funding companies in the early phase of development are Networks of business angels.

One may assume very simply that they are experienced private investors, businessmen and entrepreneurs who possess a large capital [12].

The people are ready to invest their own financial sources for project that very often is in its initial phase of idea but has much potential of value increase. Additionally, they prefer risky projects. Habitually, they invest in shares or interests of SME for the period of 3-6 years.

The table below presents the motives that business Angels use with regard to both economic and non-economic ones.

Table 1 Motives used by business Angels

Economic	*Non-economic*
high rate of return on the capital employed	improvement of self-image
tax credits	satisfaction and pleasure of participation in the process of setting up new enterprise
	sense of social responsibility
	need of self-realisation
	pursuit of cooperation in the technology progress
	regional development support
	self-creation of work place
	potential to earn more popularity and approval

Source: own development based on subject literature: [10]; [13]

2.9 Venture Capital Funds

The last one discussed herein are Venture Capital Funds, thus, specialized companies, very often related to banks which deal with investment in the projects of high risk [14] of which development enables to reach a great return on the funds invested [15].

In other words, it is a model of long-term funding business activity on expenses for innovation and implementation purposes. It is worth mentioning that Venture Capital is a part of Private Equity investment – capital investment in the businesses that are not listed on Warsaw Stock Exchange (WSE). The core of Venture Capital Funds can be presented in five points, namely [16]:

a) Venture Capital company equip enterprise with own capital in the form of stocks that do not require commonly used forms of securities and percentage;
b) VC company is obliged to help in the enterprise management;
c) The company is responsible for activity only to the amount equal to the contributions made;
d) Shareholders aim to reach high profits in the case of taking risk projects;
e) Aiming at maximization of long-term profits (increase in the market value of an enterprise)

Here, it is much worth presenting the advantages and disadvantages of Venture Capital – Table no. 2 presents them.

Table 2. Advantages and disadvantages Venture Capital

Advantages	*Disadvantages*
enables the realization of very risky projects	Limits in the freedom of action of enterprise
flexible attitude to risk	Interference with ownership structure
improvement of debt in relations to own capitals	Capital investment of a temporary nature
considerable improvement in enterprise accounting liquidity	Concern about excessive control by investor
better access to business trade partners	Lower price of shares in comparison to the public offer
know-how transfer	
gain value added in the form of business knowledge	
monitoring of the enterprise especially in the financial regard	
improvement in credibility of enterprise toward creditors and image	

Source: [10]

It is worth mentioning that financing from VC funds can be sought by private enterprises being at different steps of development, unlisted on the exchange stock, operating in different regions and industries.

Nevertheless, VC customers undoubtedly must:

a) have a better offer of services / products and comparison to their competitors;
b) develop faster than the industry;
c) be resistant to the changes undergoing around;
d) operate on the market with potential to achieve considerable progress;
e) have qualified staff of employees [17];
f) have significant share on the market.

3. Conclusions

All the institutions discussed relates to a variety of activities that serve to boost people's creativity, entrepreneurship and finally innovation [18].

It is very important both from the point of view of particular economic subjects and, first of all, the economy as a whole. Enterprise support institutions play a great part both in the development of enterprises and the innovation of Polish business operators. A variety of activity forms of the supporting institutions facilitate the development of innovation and stimulate business operators to continue to develop. Entrepreneurs are non-stop explorers of market opportunities, but innovation centres skillfully provide with them through expanding their range of services to provide.

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ALTERNATIVE DISPUTE RESOLUTION

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Abstract: *The author of this article devoted to alternative dispute resolution before the Slovak Trade Inspection in the Slovak Republic. Author in the introduction of article evaluates the rules of alternative dispute resolution in the Slovak Republic and compares this with the neighboring countries of the European Union, in particular with the law of alternative dispute resolution in the Czech Republic. Subsequently, the author discusses the current legislation of alternative dispute resolution in the Slovak Republic expresses its position on legislation on alternative dispute resolution in Slovakia, emphasizing the possibility of adopting legislative changes. In another aspect of application problems associated with the current legislation in this area.*

Keywords: *alternative dispute resolution in Slovak Republic, problems in application practice*

1. Introduction

The reason for writing this article and selecting this topic for the author of this article is the adoption of new legislation in Slovak Republic in the field of alternative dispute resolution for consumer disputes.

An important fact is that in Slovak Republic not only a new legislation in the field of alternative dispute resolution for consumer disputes has been adopted, but also thanks to the adoption of this new legislation a new legal institution was created in Slovak Republic, namely the Alternative Dispute Resolution Institute.

Alternative dispute resolution for consumer disputes as a new legal institution in Slovak Republic was created by adoption of Act No. 391/2015 Coll. on alternative dispute resolution for consumer disputes, as subsequently amended (hereinafter as „Act on consumer ADR“). The Act on consumer ADR in Slovak Republic was adopted by the National Council of Slovak Republic on 12th November 2015 and came into effect on 1st February 2016. A precondition for adoption of this legislation was the amendment of Act No. 250/2007 Coll. on consumer protection as subsequently amended (hereinafter as „Consumer Protection Act“), namely in provisions § 3 sec. 6 and § 10a sec. 1 letter k).

The legal institute of alternative dispute resolution in Slovak Republic was not created on the initiative of National Council of Slovak Republic, but because the Slovak Republic adopted the law on alternative dispute resolution on consumer disputes it transposed into Slovak law the Directive of European Parliament and of the Council of the European Union. The legal institute of alternative dispute resolution was created throughout whole European Union, based on the Directive of European Parliament and Council 2013/11/EU of 21st May 2013 on alternative dispute resolution on consumer disputes amending the Regulation (EC) No. 2006/2004 and Directive2009/22/EC (hereinafter as „Directive on consumer ADR“).

Based on the Directive on consumer ADR the legal institution of consumer ADR was created throughout whole EU and individual EU Member States have transposed the Directive on consumer ADR in its national legislations.

The difference is in the approach of individual EU Member States on how the transition of the Directive on consumer ADR into their national legislations will be done. For comparison I present an example that in Slovak Republic as noted above has adopted separate lex specialis, namely the law on consumer ADR. In contrast, in Czech Republic there has not been adopted a new separate law on consumer ADR, but rather a new legislation on consumer ADR in Czech Republic was created by amending Act No. 634/1992Coll. on consumer protection as subsequently amended (hereinafter as „Consumer Protection Act CZ“).

Given the above, the author of this article will focus in the next part on law of consumer ADR in Slovak Republic, the usefulness and efficiency of consumer ADR, comparison of legislation of consumer ADR with the legislation of Czech Republic.

2. Alternative dispute resolution in Slovak Republic

If we sum up the fundamentals of consumer ADR in Slovak Republic, we can easily say that it is a decision making legally designated entity for consumer disputes between the consumer and the seller, which originated from signed consumer contract.

On proceedings on consumer ADR refers a law on consumer ADR as a lex specialis, while for this procedure the Act No. 71/1967 Coll. on administrative proceedings (Administrative Code) does not apply, or alternatively, with the exception of proceedings on administrative offenses for violation of the law on consumer ADR, when the Administrative Code applies in alternative[1].

The subjects of consumer ADR are: the authority for consumer ADR, the consumer and the seller. The authority for consumer ADR may be the Office for Regulation of Network Industries, Office for Regulation of Electronic Communication and Postal Services and the Slovak Trade Inspection[2]. The authorities of consumer ADR will

conduct its activities in the field of consumer ADR through professionally qualified persons, while the performance requirements for the professionally qualified person for dealing with consumer ADR are also provided by the law on consumer ADR. Given the fact that the widest range of consumer disputes will be resolved by the Slovak Trade Inspection, the author will focus on consumer ADR of Slovak Trade Inspection.

The consumer ADR is initiated at the request of the consumer. The condition for such application by consumer is the dissatisfaction with the way the seller responded to the complaint or if the consumer believes that their rights have been violated. The consumer has the right to initiate the request on consumer ADR to consumer ADR entity, if the seller responded negatively on the complaint or did not respond within 30 days period from the date of dispatch. From the stated above, it is obvious that the prerequisite for applying for consumer ADR is a previous complaint and its backlog. Here I just point out that the legislation of Czech Republic adjusts the period to which you can apply for consumer ADR differently. In Slovak Republic the consumer can apply within one year from the date of receiving a negative response from the seller on consumer's request to redress or from fruitless expiration of 30 day period from the day on which the consumer dispatched the request to the seller, to which the seller did not respond[3]. In contrast, in Czech Republic the consumer may apply for complaint no later than one year from the date on which the consumer has exercised his right to the seller, where the right is the subject of dispute for the first time[4].

The request for consumer ADR must contain specific requirements by law, whereas if it does not contain the authority of consumer ADR is obliged to ask the consumer to correct these deficiencies. If the consumer does not correct these deficiencies of the complaint within specified period the authority of consumer ADR shall reject the request.

The law on consumer ADR appoints also other reasons for the rejection of consumer's request, of which I will not focus in this article, because I consider this to be the standard, but I would like to mention one reason for rejection of the consumer's request and that is if the quantifiable value of the complaint does not exceed 20,- Euros[5]. The legislation of consumer ADR of Czech Republic does not provide any quantifiable value of the dispute as a reason for the rejection of the consumer's request.

The consumer ADR is considered commenced the moment of receiving of a complete application from the consumer to the competent authority of consumer ADR. The authority of consumer ADR will notify the parties of consumer ADR (the seller and also the consumer who made the request) that a consumer ADR was initiated. Then the authority of consumer ADR will ask the seller in the given period of time to comment on the request of consumer ADR and provide explanation on the matter. In the event of not doing so on the side of the seller, the authority of consumer ADR is obliged to impose a penalty of 500,- Euros to 10.000,- Euros on the seller, while the upper limit of this penalty may be doubled[6]. In the absence of cooperation of the consumer or failing to fulfill the obligations of the consumer, the authority of consumer ADR is not entitled to impose a fine on the consumer, but in violation of this obligation the consumer ADR may be deferred.

The ADR entity proceeds in the resolution so that the dispute is resolved as quickly as possible, to avoid unnecessary delays, acts efficiently and without unnecessary and disproportionate burden on the parties and other persons; if possible, for communication it uses telephone contact and electronic means. The ADR entity evaluates the facts individually and in mutual relations impartially at its discretion, while making efforts to achieve an amicable solution, mainly by actively addressing the parties of the dispute. The ADR entity terminates alternative dispute resolution within 90 days of its initiation. In particularly complex cases, the ADR entity can extend the period according to the first sentence by 30 days and repeatedly. The ADR entity is obliged to immediately inform the parties of any extension of the period according to the second sentence and also stating the reason for this extension.

The result of consumer ADR is:

- agreement on the settlement of the dispute,
- reasoned opinion,
- deferred proposal.

The law on consumer ADR provides conditions under which the authority of consumer ADR can defer the consumer's request, such as the case when the court had decided, an agreement on mediation was signed, the consumer declared that is has decided to terminate its participation in consumer ADR, etc.

Another outcome of consumer ADR is an agreement to resolve the dispute. If after a careful evaluation of all the findings and observations of the parties it is obvious that the parties are interested in an amicable settlement, the ADR entity shall prepare a draft agreement to resolve this dispute. This agreement of the settlement will either be sealed or not. The agreement, which comes as a result of ADR, is binding to the parties, but the possibility of the parties of the dispute to move the case to the court is not excluded.

If between the parties the agreement of settlement has not been concluded and the ADR entity, based on the facts it has revealed in the ADR, comes to a reasoned conclusion that the seller violated the rights of the consumer under the regulations for the protection of consumer rights, it will terminate the ADR by issuing a non-binding reasoned opinion, which is delivered to both parties. Let me point out that if ADR entity, based on the facts it has revealed in the ADR, comes to a reasoned conclusion that the seller did not violate the rights of the consumer, it shall not issue a non-binding reasoned opinion.

The consumer ADR using the authorities of consumer ADR is free of charge. Competent legal entity can state in its regulations of ADR, that it is entitled to demand a fee from the consumer for initiation of ADR in an amount, which will be made public on its website. However, this fee must not exceed the sum of 5,- Euros (Tax incl.).

Competent legal entity can demand to pay the fee earliest simultaneously with sending the notice of initiation of ADR. Here I note, that the legislation of Czech Republic does not collect any fee for this procedure.
The possibility to go to the court before the commencement of consumer ADR, during the consumer ADR or after the consumer ADR is not excluded.

3. Problems in application practice

First, it is necessary to comment on justification and effectiveness of consumer ADR.
For the evaluation of justification and effectiveness of consumer ADR, it is necessary to evaluate this legal institution from three standpoints:

- whether the dispute has been resolved by means of consumer ADR?
- whether the result of consumer ADR is binding to the parties?
- how quickly and using what means has the dispute been resolved?

The answer to the first question is not possible to say, as the law on consumer ADR is effective only six months. However, I believe that after a period of 2-3 years, we can evaluate that question. Information about whether the dispute has been resolved by means of a consumer ADR will be available, as the authorities of consumer ADR will have to keep records and produce an annual report, where this data can be found. I dare to have a skeptical view on the number of disputes that will be resolved through consumer ADR, mainly because of reasons below.
The first reason is that the ADR is initiated only after the consumer has filed a legal complaint and the seller rejected the claim or has not dealt with it within 30 days. I believe that if the seller rejects a complaint because of its insubstantiality, then based on the recommendation of Slovak Trade Inspection the seller will not change its opinion and will I give you an example. The consumer complained about a flaw on bought shoes. Every seller will verify the complaint, in this case with a qualified person (shoemaker), who will find the cause of the flaw on the shoes. In our particular case, it appears that the flaw was not caused by defective shoes, but with inappropriate treatment of the shoes and the complaint is rejected. Then the dissatisfied consumer will contact the Slovak Trade Inspection and requests for a consumer ADR. The Slovak Trade Inspection within the area of consumer ADR finds no new facts and does not present any new relevant grounds on which the seller would change his mind. Assuming that no expert´s report is done on the subject of these shoes, which I believe the Slovak Trade Inspection should not do, since it is wasteful. Quoting § 16 sec. 7 of Act on consumer ADR: *„The ADR entity proceeds in the resolution so that the dispute is resolved as quickly as possible, to avoid unnecessary delays, acts efficiently and without unnecessary and disproportionate burden on the parties and other persons; if possible, for communication it uses telephone contact and electronic means.“*
The second question is whether the result of consumer ADR is binding for the parties. For this question there is an exact answer – the outcome of the ADR is not binding for the parties, with the exception of the settlement agreement, but even in this case it is possible for the parties of the ADR to move the case to the court.
The third question is how quickly and using what means was the dispute resolved. The law on consumer ADR sets the period to end the consumer ADR for 90 days. From a personal point of view I do not consider 90 days for a quick resolution of the dispute, because the dispute is already preceded by the complaint and may, after finishing consumer ADR, proceed to the court. Personally, I would consider a quick end to the consumer ADR to 30 days. The administrative authority in administrative proceedings is even required to decide in administrative proceedings, what precedes taking of evidence and also issue a binding legal action – a decision without any delay and at latest within 30 days and in more complex cases within 60 days[7] and the consumer ADR should take up to 90 days and we are trying to talk about quick and effective resolution of the dispute? In this regard I evaluate the consumer ADR also negatively.
Given by the above facts I therefore evaluate the justification and effectiveness of the legal institution of consumer ADR negatively. I will be more than glad if in the future after the results of future research of next 2-3 years of consumer ADR put in practice I could say that I was wrong.
As problems and shortcomings of consumer ADR I consider the extra costs for the seller. I dare to say that entrepreneurs in Slovak Republic have already high costs associated doing business (starting business, establishment of the company, tax burden, cost of operating permits,..), and the institute for consumer ADR will even further financially burden entrepreneurs, because firstly the complaint of the consumer must be dealt with, then the entrepreneur has to be collaborative in consumer ADR and, ultimately, unless the consumer is still not satisfied with the result, the entrepreneur will have to defend in a lawsuit.
Another problem, and a lack in consumer ADR, I consider the sellers obligation to be involved and collaborative in the consumer ADR, despite the fact that the seller whishes not to be involved, even under the pretext of imposing a penalty of at least 500,-Euros up to 20.000,- Euros on the seller. This I consider as an unfortunate solution. I would rather be inclined to a solution, where the Slovak Trade Inspection, after the request of the consumer, contacts the seller if he/she wants to resolve the dispute through the consumer ADR and if yes, the result of consumer ADR would be binding for the parties. If the seller would not be willing to this, the proposal of the consumer would be rejected. Such legislation would be economical and efficient.
Once again pointing out, that in case when the seller does not cooperate in consumer ADR the seller will be imposed a penalty of at least 500,- Euros to 20.000,- Euros and when the consumer does not cooperate the only consequence will be deferring the consumer's application for ADR. Such legislation I deem illegitimate as it establishes an unequal legal status of the parties in consumer ADR. I would opt-in for a legislation, where

both parties would have same procedural legal status. This is also in relation to my next lower remark.

In recent years, the adoption of legislation on consumer protection, whether at national level or at the level of European Union, gives me more and more feeling that we make the consumers as a protected species, i.e. we make consumers irresponsible for their actions. Such approach I personally do not acknowledge – consumer is a natural person who has the same legal capacity as an entrepreneur has, and therefore we must also assume its responsible actions and behavior, not to defend its irresponsible behavior.

I also do not agree that the procedure should be free for the consumer, as it only encourages the consumer to do further irresponsible conduct, where the consumer will submit proposals no matter if he/she critically assessed if he/she is entitled to get legal protection or not. I would suggest a legislation for sharing the costs according to the result of consumer ADR, which would lead to greater accountability on both sides of consumer ADR, such as the consumer (would decide whether to submit a proposal or not) and the seller (would seek to properly defend their rights in a dispute). The current law can be in simplicity explained on the side of consumer like "So what, I will submit a proposal, its free and we will see how the seller defends" and on the side of seller like "I'm not even going to deal with this, it will unnecessarily generate costs, I will just do enough so I don't get a fine."

As another drawback in the legislation of consumer ADR I consider the value of the dispute as a reason for rejecting the proposal for consumer ADR. Such legislation is discriminating. If the competent legal institution was created to protect consumer's rights, one consumer may be granted legal protection and the other may not only because of the value of the rights which they seek. Should I go to the extreme, it is like saying that a dispute within 20,- Euros does not have any legal judicial protection.

The aim of this article was not to critically condemn the law on consumer ADR as whole and the ADR entity, but the aim was to draw attention to the law on consumer ADR and evaluate this regulation during the beginning of its effectiveness. However, I will continue to monitor this legal institution and after reasonable time I shall reanalyze it.

4. Conclusion

The point of this article was not to propose solutions to all problems in the field of consumer ADR in Slovak Republic, but to draw attention to the complex law of consumer ADR in Slovak Republic.

For this purpose were selected several major problems, which we often face in this area, specifically the increased cost for the seller, legitimacy and effectiveness of consumer ADR, unequal procedural positions of both the consumer and the seller and lastly the non-binding character of consumer ADR.

Individual selected legal institutions of consumer ADR in Slovak Republic were compared with foreign legislation and subject to critique.

Given the facts mentioned in the article, I express criticism of the law on consumer ADR and encourage possible future legislative changes in this area.

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DISCRETION OF THE STATUTORY BODY ´S DECISIVE POWERS AND ITS RISK CAPACITY

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Abstract: *The authors deal with the topics related to issues concerning the discretion of the statutory body when acting on behalf of the company. The authors are trying to find the thresholds of the risk capacity of the statutory body, mostly in the difficult business decisions relating to the company. When analyzing this topic, the authors analyze the business judgment rule doctrine and its applicability in the legal order of United States of America, Slovak republic and the Czech republic. The authors try to reach the conclusion connected with the limits of the statutory body members relating to the limits of the statutory body of the company (mostly limited liability company).*

Keywords: *statutory body, risk capacity, performance of an office, business judgment rule, discretionary power of the statutory body.*

1. Introduction

The statutory body of the company is empowered to set the actual conception of the company´s business activities; he is the main judge and reviewer of the amount of risk in the company´s business activities. [1]. From our point of view, it is incredibly difficult to evaluate the statutory body´s conducts with reference to riskiness on the one hand and the standards of professional care on the other hand. Evaluation of these conducts is based mainly on the review of circumstances and information that are playing the decisive role for the statutory body when deciding about the conduct of the acts on behalf of the company. The rules related to the evaluation of the statutory body´s acts are altogether summarized in the doctrine of the statutory body´s business judgment rule.

2. Doctrine of business judgment rule

A doctrine of business judgment rule is stipulated in many foreign legal regulations and serves as the doctrine for the evaluation of the statutory body´s conduct. Business judgment rule gives an opportunity for the executive director to prove in court that he acted "lege artis" while acting on behalf of the company and making the decisions. Business judgment rule is sometimes seen as the right of the statutory body "to make a mistake" while acting on behalf of the company. Such explanation might presume incorrect and defective conducts of the executive director. Therefore, scholar Broulík [2] comes with the term "the right for the unsuccessful (unlucky) results".

Every important decision of the statutory body of the company is related to certain level of risk. Therefore it is really important to evaluate the situation when the decision has been adopted and thereafter to review whether the actions have been taken with the professional care. So that such evaluation was more fair to the members of the company´s statutory body, foreign judiciary and legal scholars have adopted the business judgment rule doctrine. This doctrine specifies the "breathing space" for the statutory body and lowers the tension and pressure faced by the members of the company´s statutory body that have to comply with the duty of care and duty of loyalty.[3] According to the scholar Lasák, the basic idea of this doctrine is the reservation (abstention) of the courts when reviewing the decisions of the company´s statutory body members when acting on behalf of the company. Business judgment rule has its roots in the legal system of United States of America. The judiciary of the state of Delaware plays the most important role in this case. [4] On the one hand, American legal regulation and the precedents stipulate that statutory bodies are bound by the duty of care and loyalty towards their company. According to American law, the members of the statutory body have to apply such degree of professionalism and care that would be applied in the similar circumstances by reasonably prudent person. In United States of America the violation of the standards of care is seen as negligence and therefore gives rise to the liability of the statutory body of the company. On the other hand, the doctrine of business judgment rule stipulates that the statutory body of the company shall not be liable for the consequences of its decisions provided that the statutory body adopted these business decisions based upon the trustworthy information and these business decisions were adopted in good and honest faith in accordance with the highest interest of the company. The situations that do not fall into scope of the business judgment rule and therefore are not protected by the business judgment rule are indicated as the fraud, conflict of interest between the statutory body and the company or other injustice performed by the statutory body. [5]

3. Application of business judgment rule doctrine

Even though the fundamentals of the business judgment rule doctrine seem to be punctual, there are two lines of opinions when it comes to application of the business judgment rule. First line sees the business judgment rule as certain liability standard upon which the courts evaluate the decisions of the statutory body members. This shall be understood as the further definition of the professional care standards and the so-called model of interpretation of the

professional care. [6] Second line of these opinions sees the business judgment rule as the waiver of the judicial review. According to the latter way of business judgment rule understanding, if the statutory body member complies with the standards of the business judgment rule, his decisions on behalf of the company will not be reviewed by court at all. [7]
Legal scholar Broulík [8] argues that even the fundamental stipulation of the business judgment rule standards are not standardized and there still are the disputes regarding the conditions to be met in order to be protected by the business judgment rule doctrine. Referring to the American legal scholar Allen, Broulík states that the fundaments of the business judgment rule doctrine have its roots in American law, which is disunited and disharmonized within the respective American states. Even the courts themselves cannot reach an argument when it comes to the basic definition characteristics that shall be met so that the business decision was covered by the business judgment rule. The courts agree that the statutory body members shall not be held liable for the honest mistakes in business decisions. Though, most of the judges claim that the negligence of these persons is inadmissible. [9] When evaluating the statutory body liability and applying the business judgment rule doctrine, it is important to note that until the general meeting does not approve the agreement on performance of an office, the relationship between the statutory body and the company is governed by the respective provisions of the mandate agreement under Slovak law. [10]

4. Elements of business judgment rule

Business judgment rule has been the subject matter of the research by American scholar Hinsey [11]. He tried to define the basic elements of the business judgment rule doctrine in his report inscribed in the Washington Law Review that are as follows [12]:
a) the absence of personal interest or self-dealing ;
b) an informed decision, which reflects a reasonable effort (subject to permitted reliance upon the advice and efforts of others) to become familiar with the relevant and available facts as well as an actual decision;
c) reasonable belief that the decision serves the best interests of the company;
d) good faith.
Subject matter of the review according to the business judgment rule is the procedure that precedes the decision adopted by the statutory body. In respect of the fact that the entrepreneurial risk always lies on the entrepreneur´s side, the liability of the statutory body is not the liability for unsuccessful results but it shall rather be seen as the liability for the proper and professional performance as the statutory body of the company acting on its behalf. To be more specific and factual, we would like to point out that has been very interesting case from Anglo-American legal environment. The case deals with the liability of the statutory body of the company regardless of economic outcome of the statutory body´s business decision. The case "Smith vs. Van Gorkom" has been resolved before the Supreme Court of Delaware. [13]
Abovementioned case deals with the sale of company´s shares. The members of the statutory body of the company have been held liable due to the fact that they did not require more information about the intended sale of shares from their chairman, Mr. Jeronym van Gorkom. Mr van Gorkom (chairman of the Board of Directors) proposed the sale of the company´s shares. He has had his speech about the profitability and expediency of such sale for only 20 minutes. The members of the statutory body approved the sale of the company´s shares based only upon the speech of their chairman, Mr. Jeronym van Gorkom. It has been proved by court that they have not been informed about the further conditions of the contract and moreover have not asked for the copies of the share purchase agreements, nor have they asked questions regarding the price of the company´s shares. Based on the aforementioned circumstances, business judgment rule doctrine could not have been applied as for the lack of informational basis of the statutory body members. The mistake of the statutory body members did not lie in a decision itself, but in the informational basis adequacy. Simply, the information provided to the members of statutory body has not been sufficient in order to comply with the business judgment rule doctrine and professional care standards. The Supreme Court of Delaware stipulated that the members of the statutory body members represent the interests of the company´s shareholders and as the statutory body they are obliged to protect their interests. The members of the statutory body of the company have been considered as "inexcusably negligent" by court due to the fact that the meeting of the board of directors approving the sale of the shares took less than 2 hours.
Even though the members of the statutory body have been held liable for their failure to act with professional care, there has been a dissenting opinion of some judges of the Delaware court. These judges claimed that the statutory body members have been informed sufficiently and adequately and therefore the statutory body members should be protected by business judgment rule doctrine. Business judgment rule doctrine protects those members of the company´s statutory body that act in good faith, are properly informed and do not have any other personal interest when conducting the transaction. When meeting these criteria, the member of the statutory body shall not be held liable for the consequences of his decision provided that his decision does not lack the informational basis. Business judgment rule represents "safe harbour" for the statutory body members as for the fact that it provides certain level of liberty when acting on behalf of the company and making decisions related thereto.

5. Discretionary powers of the statutory body

The judges have expressed that it is important to stress the specialties of the "businessmen world" (mostly in the United States of America). It has been argued that the statutory body members shall act as the professionals, not as the silly figures. Moreover, the judges argues that at the end of the day such decision might have been seen as justified, right and advantageous as for the fact that shares have been sold with 37 % profits compared to the situation

if the shares would have been sold on stock exchange. In general, the judges reviewing the corporate business transaction face the problems with the evaluation of the situations. On the one hand, there is a business perception of reality and on the other hand, we have the judges with their own sight and their perception of reality. Businessmen are facing the risky area of business with limited amount of time during which the important business decisions shall be adopted. Businessmen have to decide based on the thoughts that are not always adequately forethought and are not supported by necessary informational ratio. The judges perceive the reality based on the evidence submitted by the by the plaintiff and the defendant. When reviewing the former decisions of the statutory body of the company that happened further in the past, it is extremely difficult to prove the facts of the case, mostly in cases where written evidence is missing.

Members of the statutory body shall be provided with complex information about the relevant aspects of the business decisions to be adopted. If such complex information is not provided to them before the statutory body session, they are obliged to ask for the supportive information according to the professional care standards. For the review of the information and respective materials, sufficient amount of time shall be provided to them. The members of statutory body of the company might be held liable for the violation of their duty to act with professional care even though their business decision was right and the decision earned money for the company. The basic subject of review in these cases is the procedure of the statutory body members when adopting the business decisions even in those cases where the decisions led to a success for the company. The members of the statutory body are responsible for the proper performance of their function, not for the results of their business decisions.

Even though the Smith vs. Van Gorkom decision is labelled as controversial by Anglo-American legal theoretics, we personally can see some rationale there. In relation to business judgment rule, the court stipulated that the nature of business judgment rule doctrine is the sufficient informational basis for the decision to be adopted. Duty to be properly informed is one of the aspects of professional care and therefore the court stipulated that "unexcused and harsh negligence" is the right criterion for the determination whether the business decision of the statutory body member has not been provided with sufficient informational basis.

Business judgment rule doctrine is applied also in Great Britain where, similarly like in the United States. The courts play vital and the most important role when interpreting the doctrine. [14] As we conducted our own research, the business judgment rule does not have to be based only upon the judicial precedents interpreting the doctrine. Germany [15], Australia [16] and last but not least the Czech Republic have adopted the business judgment rule into their codified statutory law. We will address most recent legal regulation of business judgment rule enacted in Czech Republic in the following lines.

6. Czech view on the doctrine and statutory body´s powers

As of 2014, Business Companies Act was adopted in the Czech Republic. Articles 51-53 of the aforementioned Act represent the basis for the consideration of the business judgment rule in Czech legal framework. One of the problems to be solved by the Czech legislator was the issue of the business riskiness when acting on behalf of the business company. Nowadays, calculated, rational and informed risk is common in the business practice. Business Companies Act [17] stipulates the basic standards of the business judgment rule.

"Member of the statutory body acts with professional care and informational basis provided that he could rationally and faithfully assume that he acted with sufficient informational basis and in the best and sustainable interest of the company. Former sentence shall not be applied if proved that the executive director did not make a decision with loyalty desired by the company." Legislative intent of Business Companies Act stipulates that the business judgment rule has been adopted in Czech law in relation to the inspirations from the foreign jurisdictions. Business judgment rule in Czech Republic gives an opportunity for the executive director to prove that he acted "lege artis" and therefore he does not bear any responsibility for any economic losses incurred by the company. In the end of the legislative intent, Czech legislator argues that the whole conception of business is based on the contracts which have uncertain economic results for the company. Therefore it is not justified to require the management of the company (statutory body of the company) to bear all the risks incurred on behalf of the company, mostly those risks that cannot be influenced by the executive directors at any means. Moreover, the standards of business judgment rule in Czech law are strictly connected with the executive director´s duty of loyalty. When reviewing the decisions of the statutory body of the company by Czech court, three elements of the business judgment rule shall be addressed. Firstly, the court has to consider whether the statutory body acted in good faith. After that the court shall examine whether the informational basis of the statutory body was sufficient. Lastly, the court has to review whether the statutory body acted in rational and sustainable interest of the company. Absence of the executive director´s loyalty shall prevent the abuse of the business judgment rule. Therefore, the loyalty is seen as the control element of the business judgment rule. Violation of the duty of loyalty may not be "healed" by the fact that the executive director complied with all of the features of business judgment rule. [18]

7. Risk capacity of the statutory body

In relation to business judgment rule doctrine, the members of the statutory body shall not undergo the risk that would be excessively enormous as for the company´s capacities. The theorists use the term "risk capacity" for these situations. [19] Risk capacity shall be understood as the biggest financial loss that could theoretically be incurred by company and the company would still be able to survive such lost and avoid bankruptcy. [20] Acceptable

risk is defined as the amount of loss that the company is willing to accept in the frame of its risk capacity. The decision about the company´s risk capacity is one of the most fundamental decisions of the company and shall be dependent on the requirements of the shareholders of the company.

The sole negative economic result of the executive director´s actions might not be the reason to stipulate that the executive director failed to comply with the standards of the professional care. Every "manager" in the corporate world is obliged to act professionally in all matters. If the executive director proves that he ensured sufficient volume of information, weighed the information responsibly and acted rationally with regard to the interests of the company (without self-dealing), the company shall not be entitled to blame the statutory body of the company due to the fact that the company incurred losses resulting from wrong business decision of the statutory body. [21]

Eliáš [22] claimed that the business judgment rule has been existent in the Czech legal "awareness", even though it has not been stipulated by law or by sufficient judicial decisions. There are only a few of judicial decisions of the Supreme Court of Czech Republic. One of the decisions dealing with the aspects of the business judgment rule is the decision of the Supreme Court of Czech Republic marked 29 Cdo 4276/2009. The reasoning (rationale) of the decisions is as follows: "Failure to enforce debt in a legally stipulated way shall not be seen as the violation of the executive director´s duty to act with professional care. For the speculations related to the director´s duty it is important to evaluate whether the debt enforcement would be real and successful as for the economic situation of the debtor. In case of the debtor that is obviously not capable to settle the claims of the company (not even partially) or the company (the creditor) fails to provide the debtor with the legal title of the claim, the statutory body shall not be seen liable for not enforcing such debt. In this case, the debt enforcement could possibly bring even more costs related to debt enforcement without any revenue for the company (creditor). In other words, the statutory body shall consider whether the debt should be enforced as for all of the circumstances of the case." Supreme Court provided the arguments based on the provisions of the Commercial Code, but his reasoning entails the arguments related to the business judgment rule doctrine even though the business judgment rule has not been stipulated in the Commercial Code (Business Company Act) when deciding the case. There are also other decisions of the Czech Supreme Court dealing the business judgment rule in the criminal proceedings. [23]

I do have to agree with Bělohlávek [24] who says that the courts will have the fundamental role in reviewing the business judgment rule. The courts will have to interpret many terms of the Czech Business Companies Act that are used for business judgment rule establishment. Rational interest of the company, necessary information, acting and assuming in good faith, required loyalty are the examples of the terms that shall be interpreted by the court due to the fact that the Act does not define them. Bělohlávek argues that the legislator´s effort to establish the business judgment rule while being inspired by foreign legal regulation is welcomed and needed. On the other hand he criticises the legislator that the business judgment rule is stipulated only in "sharp lines" and not-defined terms. Therefore the application of the doctrine will be dependent on the courts´ activity and decisions process. Therefore, the business judgment rule stipulated in Business Companies Act is not the matter of statutory law but rather the matter of doctrine and judicial decisions.

In practice, it is extremely difficult to review "ex post" the acts of the statutory body members and to decide whether the standards of professional care have been violated. As we have mentioned before, there is no simple objective criterion to evaluate and review the acts of the executive director in relation to the professional care standards. Acting within the businessmen relationships is always risky and members of the statutory body undergo the risky business transactions as everyday reality. [25] Every business contract bears certain level of risk and the sole non-success shall not be seen as the violation of the duty of care. In other areas of law, such behavior of the executive director consisting in risky business might be seen as the negligence. In the area of corporate law, it is crucial to evaluate whether the risk exceeds the reasonable amount of risk. [26] In these cases, the members of the statutory body have to decide within short time horizon and based on the limited amount of information. On the other hand, if the member of the statutory body is extremely studious and afraid to "take an action" some of the business contracts might not be concluded between the parties due to his hesitation. As a result, the company loses a part of the estimated income and due to the executive director´s punctuality and preciseness. Another problem in the countries like Slovak or Czech Republic is inefficient knowledge of the judges when it comes for the corporate lawsuits and corporate matters. In Slovak Republic, there are no specialized courts for the business matters and therefore these lawsuits are handled by the general courts with mostly civil jurisdiction. As we mentioned before, it is extremely difficult for the judges to review the specific actions of the limited liability company executive director. These issues can be handled by appointing an expert witness in the current field of corporate law. Ex adverso, appointment of the expert witness is costly for both parties and sometimes does not bring the estimated advantages as for the evidence at the trial.

8. Conclusions for Slovak republic

In the end of this article we will lay out the Slovak legal regulation of the executive director´s liability in relation to the business judgment rule doctrine. Slovak Commercial Code stipulates that the statutory bodies (executive officers) are obliged to exercise their powers with professional care and in accordance with the interests of the company and all of its shareholders. In particular, they are obliged to obtain and take into account in their decision-making all available information relating to the subject of their decision, to keep in confidence confidential information and facts whose disclosure to third parties could cause harm to the company or endanger its interests

or the interests of the company's shareholders, and while exercising their powers, must not give priority to their own interests, the interests of only certain shareholders or the interests of third parties over the company's interests.

Slovak legal regulation does not expressly stipulate the standards of business judgment rule doctrine as the Czech legal regulation. I can say that Slovak legal regulation entails tiny "fragments" of business judgment rule doctrine. Slovak legal regulation does not exactly stipulate that if the statutory body acts with professional care and informational basis, in good faith with regard to all of the information provided and with necessary loyalty, such acts shall be deemed as the acts carried out with professional care and with necessary knowledge. On the other hand, there is a question whether such legislation shall always be strict and precise as the terms used by Czech legislator (sustainable interest of the company, rationally assume etc.) are very difficult to be defined in statutory law. Therefore, many scholars claim that these terms shall remain "legislatively ambiguous and vague" so that they have been interpreted by judiciary and the judges when reviewing particular cases. From my point of view, there are some advantages of having those terms legislatively defined. It is sometimes helpful for the judges when they have to interpret the terms that are absolutely vague to have at least minimal standards to comply with.

Legal scholar Kožiak [27] adds that the business judgment rule doctrine brings advantages in cases executive director acts review. These advantages shall be seen in making the job of the judges easier, enhancement of statutory body´s position in the company that brings him the higher scope of sovereignty and brings economic advantages for the company. Business judgment rule doctrine shall help the judges to decide the cases related to professional care of the business company statutory body members. Business judgment rule doctrine strengthens the position of the statutory body if the statutory body performs in a correct and proper managerial way. Such situation shall be deemed as a big advantage for the entrepreneurial environment in the country as for the fact that the executive directors are motivated to comply with the required standards of care. Executive director therefore has a bigger discretion while acting on behalf of the company. Furthermore he is free to exercise the activities leading to the economic profit of the company rather than to think about the ways how to protect himself from occurrence of possible liability.

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ZERO BOUND INTEREST RATE POLICY AND THE DYNAMICS OF ECONOMIC GROWTH

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Abstract: *The article aims to identify dependencies between the central bank's interest rate and GDP dynamics in selected economies and to highlight the risks of a zero bound interest rate policy for an economy. The hypothesis that the main interest rates and GDP dynamics in the euro area, USA and Poland are statistically significantly related to each other was confirmed. The purpose of the article was accomplished using the following methods: a review of the scientific literature, the presentation of pertinent statistical data and statistical analysis. Its findings imply that although a low cost of money can stimulate a country's economy, prolonged periods of zero bound interest rates can be a threat to economic expansion.*

Keywords: *monetary policy, zero bound interest rates, deflation, economic growth*

1. Introduction

The years of the Great Depression in the 1930s were a period of severe deflation. In many countries where deflation has occurred despite the nominal interest rate having been reduced to almost zero economic activity slackened [1]. At the same time, though, in many countries deflation has not been accompanied by a lower rate of GDP growth. For instance, in 2002, deflation did not prevent the Chinese rate of GDP growth from reaching 8% [2]. This said, it must be noticed that the literature provides more evidence that low interest rates have a negative effect on national economies. It is also noteworthy that interest rates have a major influence on the rate of economic growth and that the influence is negative when they are either too high or too low.

2. Deflation, zero bound interest rates and an economy

Economies in deflation have to pay many costs, one of which arises from the "explosion" of bad debts that takes place when some debtors have to spend a higher percentage of their income to service debt liabilities when the amount of loan instalments does not change while their income (in monetary terms) decreases as prices fall [3]. A major threat related to a zero bound interest rate is the risk of collapse of the financial sector, because easily available loans are frequently spent on assets, which consequently drives their prices upward and thereby the value of collaterals [4], [5]. A prolonged period of low interest rates can lead to the emergence of a speculative bubble in the assets market, the bursting of which can destabilize the financial sector [6]. Economists hold different views on how a central bank should respond to the emergence or bursting of such bubbles. Some argue that because central banks cannot recognize that a market bubble is being formed, they should focus on offsetting their impacts. A relevant example is the situation from before the most recent financial crisis, when the major central banks believed that pursuing a zero bound interest rate policy was right even at the risk of deflation [7], [8], [9]. From 2002 to 2006, the US interest rate was some 2.5% lower than that recommended by the Taylor rule [6] (in Taylor's opinion, the US monetary policy in the pre-crisis years was either not restrictive enough or too loose). This departure from the Taylor rule lasted longer than in the 1970s. The Fed explained this extraordinary reduction of interest rates as an intended abandonment of conventional monetary policy rules in order to enable a discretionary intervention against deflation (such as that observed in Japan in the 1990s) [10]. The formulas below represent the original Taylor rule and its version with parameters calibrated for the USA. The first of the formulas is the following:

$$i_t = \pi_t + \emptyset_\pi(\pi_t - \pi^*) + \emptyset_x x_t + r^*$$

where, i_t = the nominal federal funds rate in period t, π_t = the annual rate of inflation in period t (%), π^* = inflation target in period t (%), x_t = GDP gap (demand) in period t (GDP deviation from its potential level, %), r^* = the real interest rate corresponding to full employment (natural interest rate), $\emptyset_x$, $\emptyset_\pi$ = structural parameters.
The calibrated formula reads as follows [11]:

$$i_t = \pi_t + 0.5(\pi_t - 2) + 0{,}5x_t + 2$$

Baranowski noted that the Taylor rule offered a guideline for monetary policy. As well as facilitating the forecasting of interest rates, the rate is also an important element of theoretical and empirical models of the national economy [12].
Another threat arising from a zero bound interest rate policy is that low interest rates can make risky projects appealing to banks. For instance, interest rate reductions in the US increased the risk of loans, because banks started to lend at lower prices and to borrowers of questionable creditworthiness [13]. Researchers studying Spanish loan records spanning a period of 23 years made a similar observation. They noted that interest rate reductions were followed by an increasing amount of loans granted to borrowers that either had a bad borrowing history or did not have such history at all. Their conclusion was that the

credit risk increases with an extending period of low interest rates [14]. Having analysed the impacts of interest rates staying low for a long time after the financial crisis, Rzonca concluded that the maintenance of zero bound interest rates was harmful to economic growth [6]. Nevertheless, some economists believe that the quantitative easing policy should be continued, because the world economy may plunge into another crisis unless banks continue to support economic growth with low interest rates.

3. Analysis of dependencies between central banks' interest rates and the rate of economic growth in USA, the euro area and Poland

This section presents statistical data on the main interest rates, inflation and GDP dynamics in the USA, the euro zone and Poland, as well as the results of regression analysis of the rates' influence on GDP dynamics in these economies.

Table 1 shows the levels of the main interest rates set by the central banks in the euro area (the main refinancing operation rate), the USA (the federal funds rate) and Poland (the reference rate) between 1999 and 2016. Because the rates were frequently changed over a year, the table presents their annual arithmetic means, excluding the US interest rates in the period 2009-2016 that are shown as bands.

Table 1 Main interest rates of central banks in euro area, USA and in Poland

Year	*Main refinancing operation rate ECB*	*Federal funds rate USA*	*Reference rate NBP*
1999	2,90	5,25	14,50
2000	4,04	6,08	18,25
2001	3,94	3,73	14,43
2002	2,75	1,25	8,28
2003	2,25	1,00	5,88
2004	2,00	1,75	6,08
2005	2,25	3,38	5,15
2006	3,00	4,88	4,13
2007	3,88	4,50	4,63
2008	3,44	1,93	5,54
2009	1,44	0-0,25	3,88
2010	1,00	0-0,25	3,50
2011	1,25	0-0,25	4,13
2012	0,75	0-0,25	4,50
2013	0,38	0-0,25	3,21
2014	0,10	0-0,25	2,00
2015	0,05	0,25-0,50	1,50
2016	0,00	0,25-0,50	1,5

The long-term interest rates were low over the analysed years, especially in the euro area and the USA. The Polish interest rates are now at their historic low level, but at the end of the 20th c. and in the early 21st c., they were much higher than in the euro area and the USA.

Table 2 shows the 1999-2015 economic growth rates for the euro area, USA and Poland. The growth dynamics of GDP was the lowest in the euro area, somewhat higher in the USA, and the highest in Poland. It needs to be noted, however, that Poland is counted among the "catching-up" countries (emerging markets) where GDP growth is typically higher than in developed economies.

Table 2 GDP growth in Euro Area, USA and in Poland

Year	*GDP growth rate in Eurozone*	*GDP growth rate in USA*	*GDP growth rate in Poland*
1999	3	4,69	4,6
2000	3,8	4,09	4,3
2001	2,1	0,98	1,2
2002	0,9	1,79	1,4
2003	0,6	2,81	3,9
2004	2,3	3,79	5,3
2005	1,6	3,35	3,6
2006	3,2	2,67	6,2
2007	2,9	1,78	6,8
2008	0,4	-0,29	5,1
2009	-4,4	-2,78	1,6
2010	2,1	2,53	3,9
2011	1,5	1,60	4,5
2012	-0,9	2,22	2
2013	-0,3	1,49	1,6
2014	1,1	2,43	3,3
2015	2	2,43	3,6

Table 3 contains annual inflation rates for the euro area, USA and Poland in the same period. The rates were low in both the euro area and the USA. The Polish inflation rate was high in the years 1999-2001 but in 2002, it abruptly dropped below 2% to rise above 4% in 2004. An inflation rate of 2.4% or less was not noted in Poland until 2012. The years 2014-2015 were a period of deflation.

Table 3 Inflation in Euro Area, USA and in Poland

Year	*Inflation in Eurozone*	*Inflation in USA*	*Inflation in Poland*
1999	2,2	1,1	7,30
2000	3,4	2,1	8,50
2001	2,8	2,3	3,60
2002	1,6	2,2	0,80
2003	2,3	2,1	1,70
2004	2,7	2,1	4,40
2005	3,4	2,2	0,70
2006	3,2	2,2	1,40
2007	2,9	2,1	4,00
2008	3,8	3,3	3,30
2009	-0,4	0,3	3,50
2010	1,6	1,6	3,10
2011	3,2	2,7	4,60
2012	2,1	2,5	2,40
2013	1,5	1,4	0,70
2014	1,6	0,4	-1,00
2015	0,1	0,0	-0,50

Below, a regression analysis of the selected variables is presented. It aimed to find out which dependencies between central banks' main interest rates and GDP dynamics in the three selected areas were statistically significant in the years 1999-2015 and to test a null hypothesis H_0 (the variables' parameters are not significant) and an alternative hypothesis H_1 (the parameters are significant). The variables were checked for

stationarity with the use of the ADF test (the Dickey–Fuller test). The necessary data were obtained from the Eurostat, World Bank and Polish Statistical Office websites [15], [16], [17].

Table 4 contains the regression results for the USA. The independent variables were the nominal federal funds rate [FEDF_USA] and the nominal federal funds rate lagged by one year [FEDF_USA_1]; the dependent variable was GDP dynamics in the USA [GDP_USA].

Table 4 The dependent variable (Y): GDP_USA; independent variables (X) – FEDF_USA and FEDF_USA_1

Variable name	*Coefficient*	*Standard error*	*t-Student*	*p-value*
Const	1,88835	0,458773	4,116	0,0012***
FEDF_USA	0,968802	0,263448	3,677	0,0028***
FEDF_USA_1	−0,819561	0,247387	−3,313	0,0056***
Selected regression statistics and analysis of variance: 2000-2015 observations (N = 16))				
R-square 0,517774				
F(2, 13) 6,979167 p-value for F test 0,008732				

The data in the table point out that the nominal federal funds rate and the federal funds rate lagged by one year had a significant effect on GDP dynamics in the sampled years. This conclusion is based on Student's t- statistics of 3.677 and -3.313, respectively, and on the probabilities of obtaining them (0.0028 < p=0.05 and 0.0056 < p=0.05) that allow rejecting the null hypothesis H_0 in favour of the alternative hypothesis H_1. There is a 95% probability that between 1999 and 2015 both these rates and GDP dynamics in the USA were statistically significantly related to each other. The value of the coefficient in table 4 is negative (−0.819561) only for the second rate, meaning that the influence of interest rates on GDP dynamics in the USA is consistent with economic theory. Further, the coefficient for the nominal federal funds rate is positive (0.968802), indicating that the GDP growth rate in the USA increases as the Fed raises the federal funds rate.

Table 5 shows the regression results for the euro area. In this case, the independent variables were the ECB's main refinancing operation rate [REF_ECB] and the ECB's main refinancing operation rate lagged by one year [REF_ECB_1]; the dependent variable was GDP dynamics in the euro area [GDP_ECB].

Table 5 The dependent variable (Y): GDP_ECB; independent variables (X) – REF_ECB and REF_ECB_1

Variable name	*Coefficient*	*Standard error*	*t- Student*	*p-value*
Const	1,30129	0,540457	2,408	0,0316**
REF_ECB	2,20292	0,363609	6,058	4,04e-05***
REF_ECB_1	−2,07964	0,389467	−5,340	0,0001***
Selected regression statistics and analysis of variance: 2000-2015 observations (N = 16)				
R-square 0,739698				
F(2, 13) 18,47099 p-value for F test 0,000159				

An analysis of the data in table 5 leads to a conclusion that the ECB's nominal interest rate and the nominal interest rate lagged by one year rate had a statistically significant influence on GDP dynamics in the euro area. A proof of this is Student's t-statistics of 6.058 and -5.340, respectively, and the probabilities of obtaining them (4.04e-05 < p=0.05 and 0.0001 < p=0.05) that allow rejecting the null hypothesis H_0 in favour of the alternative hypothesis H_1. There is a 95% probability that in the period under consideration both these rates were statistically significantly related to GDP dynamics in the euro area. As in the previous case, the coefficient is negative (−2.07964) only for the ECB's main rate lagged by one year, implying, again, that the effect of interest rates on GDP dynamics in the euro area was consistent with economic theory. The positive value of the coefficient for the ECB's nominal interest rate (2.20292) indicates that the raising of interest rates by the ECB stimulates GDP growth.

Table 6 presents the regression results for Poland. The independent variables in the analysis were the NBP's reference rate [REF_NBP] and the NBP's reference rate lagged by one year [REF_NBP_1]; the dependent variable was the dynamics of Polish GDP [GDP_POL].

Table 6 The dependent variable (Y): GDP_POL; independent variables (X) – REF_NBP and REF_NBP_1

Variable name	*Coefficient*	*Standard error*	*t-Student*	*p-value*
Const	4,46671	0,667096	6,696	1,48e-05 ***
REF_NBP	0,386282	0,189698	2,036	0,0626 *
REF_NBP_1	−0,461657	0,177164	−2,606	0,0218 **
Selected regression statistics and analysis of variance: 2000-2015 observations (N = 16)				
R-square 0,355107				
F(2, 13) 3,579188 p-value for F test 0,057766				

The above data indicate that both independent variables significantly influenced the dynamics of the country's GDP in the analysed period. This conclusion can be drawn from Student t-statistics of 2.036 and −2.606, respectively, and from the probabilities of obtaining them (0.0626 < p=0.1 and 0.0218 < p=0.05) that allow rejecting the null hypothesis H_0 in favour of the alternative hypothesis H_1. There is a 95% probability that in the analysed years the relationship between NBP's reference rate and the reference rate lagged by one year, on the one hand, and the dynamics of Poland's GDP, on the other, was statistically significant. The negative value of the coefficient (−0.461657) for the first rate indicates that the relationship was consistent with economic theory again. The coefficient for the second rate is positive (0.386282), meaning that the Polish GDP increased following rises in the NBP's reference rate.

The results of the analysis indicate that in the sampled years the dependencies between central banks' main interest rates and GDP dynamics were statistically significant in the USA, the euro area and Poland. As monetary policy plays a significant role in economies, central banks need to be watched carefully for changes in their interest rates.

4. Conclusions

Economic policy makers take interest in deflation only when inflation rates fall substantially and the short-term interest rates are reduced. The maintenance of near-zero nominal interest rates frequently prevents the use of measures counteracting deflationary shocks that affect price levels and production. The purpose of this article has been to highlight that there are significant relationships between central banks` main interest rate in the USA, the euro area and Poland and the rate of economic growth in these regions. As regards the consequences of these relationships, both interest rates that are too low or too high can have a negative effect on an economy.

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SEARCHING FOR THE NEW CULINARY EXPERIENCES AS A NEW TREND IN NUTRITIONAL BEHAVIOUR OF CONSUMERS

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Abstract: *The nutritional needs are the basic and the most important needs of people. However, nowadays, fastidious and bored consumers are searching for new experiences and sensations also in food area. They want to involve all senses in discovering the world, try new flavours, take part in interesting events or simply escape from mundane life and make new acquaintances. They also look for the possibilities to express feelings and experiences related to cooking skills and have some impact on other humans' lives. The aim of this article is to identify the new culinary experiences, which are new trends in consumer nutritional behaviour based on secondary sources of information published over the period of 2009-2016. Across the studies covered by this paper it was found that the combination of consumers' needs and social, demographic and economic determinants had led to create some new food trends, such as food tourism, street food, food-trucks and food blogging.*

Keywords: *food-trucks, food blogging, street food, food tourism, consumer behaviour*

Introduction

Consumption of food is necessary for proper functioning of human body. Therefore, the nutritional needs, according to the key concepts and theories of human needs prioritized by famous scientists such as Maslow, McCeland and Alderfer, are considered as physiological needs and the most important needs of every human being. The fulfilment of these needs has significant impact on the development of further needs [1].

Nutrition, besides satisfying hunger, satisfies much more various needs, such as respect, sense of security and belonging. Furthermore, the social and cultural environment, which human exists in, extends human nutritional needs by the elements of prestige or imitation [2]. The nutritional behaviour of consumers is one of the forms of consumption and is associated with consumers' attitudes and ways of dealing with satisfying nutritional needs. They include the choice of food, the way of buying and preparing it for consumption, the time, place and people with whom food or dishes are usually consumed [3].

Nowadays, consumers get bored very fast with taste and way of eating, so they look for new experiences in this area. They also search for the possibility to express feelings and experiences related to cooking skills and have some impact on other humans' lives. For these reasons, the popularity of food tourism, ethnic street food or food-trucks and food blogging increases rapidly.

The aim of this article is to identify the new culinary experiences, which are new trends in consumer nutritional behaviour based on secondary sources of information published over the period of 2009-2016. Article shows the specification of food tourism, street food, food-trucks, food blogging and consumer behaviour in these areas.

1. The food tourism

Nowadays, the tourism has evaluated. One of the reasons of that is the fact that people in move look for new and various destinations, which offer unique experiences. This creates new trends in tourism associated with increasing popularity of destinations, which are non-traditional and less-crowded. Modern tourists have different needs, they look for new sensations and experiences. In traditional meaning travelling (especially cultural travelling) was associated with observing architecture, countryside or visiting museums, what engaged only one of the five senses – sight. It means, that other senses were not used enough by tourists, and their experiencing was limited. Therefore, contemporary consumers, who are more aware of their own needs, demand voyages where the other senses are also involved. Tourists wish to take part in some events, feel the atmosphere of the place and enjoy the local food [4].

Food and tourism have strong connections. It has been estimated by various authorities which food is main tourism resource for. It is necessary for physical sustenance that all travelling people have to eat during journey, however, the searching for new taste experiences could become the major aim of their trip. With regard to advantages, food is associated with pleasure and entertainment, moreover, it has a social purpose. The eating habits can make a clear image of way of life and make it possible to understand cultural differences between countries.

Food tourism, which can be called culinary tourism, gastronomy tourism or tasting tourism [5], is kind of response for increasing consumer interest in local food. Local products can be bought at local supermarkets or retailers as well as in farm shops and farmers' markets. Also restaurants serve food, which is prepared from local ingredients in order to add value to eating experiences and be updated with customers' preferences associated with local food [6]. The present interest in local food is related to the ethics, sustainability, environment and health awareness. More and more consumers feel obliged to

support local economy and networks [7]. Furthermore, consumers prefer perceiving these products as fresher, tastier, of better quality, pure and traditional. There have been indications that phenomenon of interest in local food is observed not only among local consumers, but also among tourists. In each local food market people in move can find another experiences as every market is unique. The differences are caused by many determinants such as local culture, tradition, history, environment and socioeconomic situation, local consumers' nutritional preferences. Due to the food variation in every country the popularity of culinary-gastronomic food tourism is increasing [6].

It is observed that food, local gastronomy and meals are often used in the places branding. Food and gastronomy are used as a significant component in creating some destinations more attractive for consumers. There have been indications that food and meals may be used for creating some atmosphere at the places as well as protecting and strengthening the identity of the place. Distinctive local or even national cuisines, which are used to reinforce the identity of larger regions or nations such as Thai, Russian, Greek, Italian and French cuisines can be assumed as good examples. Gastronomic tradition can be also treated as an element of historical heritage, which has the significant impact on place identity. The interesting example is Bangkok, where food markets and canal markets presenting Thai cuisine are main tourists attractions.

Food can also be used for changing the old image of a city. One example is the famous path, called 'fun walk' created in between railway stations to the Cape Town Stadium during World Cup in South Africa. Although 'fun walk' was created to solve traffic problem during the 2010 FIFA World Cup, it was transformed into place with numerous restaurants, food-trucks and cafes very fast.

Summarizing, the traditional tourism changed. Tourists have new needs, they look for new experiences, so the old aims of tourism such as visiting famous places or observing architecture and conventional destinations are less popular. Consumers search for new sensations; they want to involve all senses in discovering world. The above mentioned trend is used by some authorities, to encourage tourists to visit their areas. Especially food, meals and gastronomy are used in many ways to promote the image of cities, affect their identities or make them more attractive for visitors and persons, who look for place to live and work [8].

2. Street food and food-trucks

Street food is very old custom, which is more and more popular in many developing countries. It is one of the most significant consumption patterns of urban life, mostly in developing world and very often it is one of the city attractions. The main factors of increasing popularity of this kind of gastronomy among consumers are busy lifestyle and long working hours [9]. Florida Department of Agriculture and Consumer Services (FDACS) defines the street food vendors as persons who sell food other than fresh vegetables or fruits from trucks or trailers [10].

Food-trucks are the large vehicles, which are equipped to prepare and sell food. This kind of mobile restaurants has become increasingly common recently, especially in Poland. The characteristic feature of it is serving various and international cuisine. The beginning of the popularity of food-trucks is noted for 1600s. In those times, it helped to deal with feeding of workers during long cross-country cattle drives. The stew, roast beef, boiled potatoes and beans were generally served then [11]. Over many years this way of serving dishes has become very popular and fashionable. The main determinants of development of food-trucks are popularity of sport, touristic and cultural events, outdoor music concerts and historical reconstructions, which are associated with numbers of people in one place, where permanent dining options are usually not provided.

Food-trucks are essential in promoting cuisines of various countries, which are very often exotic for the natives. The average consumer has opportunity to try new tastes. One example is food-truck named 'La Chica Sandwichera', which is specialized in cuisine of Cuban emigrates living in Florida, USA. Another example is 'Carnitas Food Truck' the gastronomy company serving simple Mexican dishes, such as tacos and burritos with chilli habanerom or guacamole [12].

There are some indications, that street food and food-trucks are good alternatives for consumers who look for fast eating, new taste and saving money.

3. Food blogging

Looking for new experiences in eating does not always have to be associated with satisfying hunger. The result of some studies indicates that nowadays consumers look for a way which allows them to escape from temporary life, gain knowledge and socialize. For this kind of individuals, eating and drinking is a wonderful opportunity to meet friends and enjoy their life [13]. That is the reason of growing popularity of food and wine festivals, cooking classes, culinary TV programs and writing and reading food blogs.

There have been few studies on food blogging as a serious leisure. Consumers are willing to share their culinary knowledge, skills and discoveries by writing about them. Blogs are kind of personal diaries online, composed of personal thoughts, advises, experiences, photos, links and images, with comments left by readers, generally organized in chronological order. The same rules are referred to food blogs. Food blogs usually represent authors' recipes created by gourmet, some culinary advices and photos. Majority of food blogs authors use their own photos. Many of them write cook books' reviews. Food blogging can be something more than writing about some culinary recipes. It might focus on some personal, emotional or physical matters and have impact on heath, well-being and environmental human awareness [14]. Food bloggers can be treated as communities in local and global meaning. Foodie blogroll (www.foodie blogroll.com), one of the largest culinary portals, listed 16 938 blogs in October 2016 and more than 510 715 daily visits [15]. Whilst the majority of food blogs ought to

probably be treated as a hobby and pleasure activity, there are lots of examples that food blogs have been successful and have come into cooperation with food industry, however it is probably rare for people to make a living from food blogging [14].

Conclusions

Summarizing, nutritional needs are the basic and the most important needs of people. However, nowadays consumers are very changeable. Their needs and expectations are changing very fast, because of the fact that they are bored very fast. Consumers are searching for new experiences and sensations. Across the studies covered by this paper there have three areas been described: food tourism, street food and food- trucks and food blogging, which are examples of new trends created by consumers' behaviour on food market. Some conclusions has emerged across the studies. Firstly, the phenomenon of food tourism was created by consumers, who had deeper needs in discovering world than only visiting architecturally unique cities, who wanted to feel atmosphere, taste and smell of place. The consequence of this trend was using food, as one of the main attractions in some destinations. Secondly, the determinants such as busy lifestyles, long working hours and popularity of big cultural and touristic events led to an increase of consumers' interest in street food and food- trucks. Thirdly, searching for new experiences in eating can have different meaning than satisfying hunger. Sometimes consumers simply want to escape from mundane life, learn something new or make new acquaintances. They have also a need of expressing their feeling about cooking, boasting their cooking skills or having some impact on human awareness and healthy life, so they are writing a blog about food.

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ELECTRONIC IDENTIFICATION AND AUTHENTICATION IN THE CONTEXT OF ELECTRONIC PUBLIC ADMINISTRATION SERVICES

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Abstract: *The author deals with issues of electronic identification and authentication as fundamental preconditions for providing and using electronic public administration services. In particular, author is dealing with the concept of electronic identity and aspects of its identification and authentication within public administration from the perspective of Slovak legal order. Furthermore, author focuses on electronic ID as means of secure electronic identification and authentication. Electronic mailbox is considered important institute of analyzed issue. Moreover, author is dealing with new challenges in the field of electronic identification and authentication, in particular new legislation on electronic identification and trust services for electronic transactions in the internal market adopted by European Union.*

Keywords: *identification, authentication, electronic identity, public administration, electronic services*

1. Introduction

Public administration authorities enter into legal relations with various entities, in particular natural persons, entrepreneurs or legal entities. Such activities can occur not only in "real world" but also in "virtual world" through the internet, in particular by using electronic services provided by public administration authorities. [1] Increasing number of electronic public administration services and frequency of their use undoubtedly decrease administrative burden. However, it is necessary to bear in mind that public administration authorities as providers of various electronic services must more or less rely on who is the user they are communicating with. This implies electronic identification and authentication.

2. Electronic public administration services

Phenomenon of eGovernment is connected with electronic form of public administration that is exercised within application of information-communication technologies into the public administration processes. In that connection, it must be stated that eGovernment cannot be identified only with electronic services provided by public administration but also with creation of new process model when a considerable extent of administrative operations is directed outside the citizens.

Electronic public administration service (also known as eGovernment service) is very important category in the field of eGovernment. In particular, electronic services provided by public administration are considered electronic form of communication between public administration and the public within handling of administration matters and public participation in the field of public administration.

Based on the criteria of providing of electronic public administration services via internet, four levels were created: [2]

- Information services. Public administration authorities as providers of electronic public administration services make available via the webpage only basic information like contact, opening hours etc.;
- One way interactive services. User is allowed to download form an another documents from publicly available webpage. However, user is obliged after the filling in particular form send it to particular service provider;
- Two way interactive services. Mutual communication (interaction) between service provider on one side and service receiver on the other side is secured via publicly available webpage. Service receiver is allowed to fill in the form and send it in electronic form to service provider;
- Transaction services. Service receiver is allowed to completely electronically use particular service (including monitoring, decision receiving and carrying out financial transaction) via publicly available webpage. Such a service is provided without direct contact with user and substitutes personal or postal contact between service provider and service receiver.

In the light of aforementioned, it must be borne in mind that only in the case of two categories of electronic public administration services, in particular two way interactive services and transaction services, can be the issue of electronic identification and authentication relevant.

2.1 Electronic identity

Identity as a principal concept of analyzed issue has to be clarified. Transition from "paper world" to "virtual world" caused that various entities like natural persons are using their identities for the purpose of communication with public administration authorities. Natural person is characterized by various attributes. Set of these attributes that can easily differ one natural person from another consists identity of natural person in question. Natural person can be characterized by her age, height, weight, appearance, DNA, date of birth etc. It is useless to know all attributes and therefore we created identifiers (artificial identities) that are characterized by their uniqueness and

help us to distinguish one natural person from another. Such an identifier can be birth certificate number or identification cards like passport or identity card. [3]
With respect to meaning of electronic identity, Act No. 305/2013 Coll. on the Electronic Form of Governance Conducted by Public Authorities and on amendments and supplements to other acts (hereinafter as "eGovernment Act") provides its legal definition. Pursuant to Article 19, Section 1 of eGovernment Act, electronic identity consists of *"set of attributes that are recordable in electronic form and that clearly distinguish one person from another person in particular for access to information system or electronic communication."* Furthermore, electronic identity is declared by identification of the person and is verified by authentication of the person. [4]

2.2 Electronic identification and authentication

In general, identification means declaring of identity. Entity, such as natural person has to introduce herself. In "virtual world" it is analogous to entering username on a website. The aim of the identification is to persuade other side that I am who I am and therefore I have the privilege of to do something (depends on nature of electronic public administration service). In relation to identification, Article 3, Letter m of eGovernment Act states that identification is declaring of object including person for access to information system or communication. Persons use various types of identifiers for the purpose of identification. For example, natural person identifier is her birth certificate number in connection with name and surname. [5]
Identification itself is not enough because there are entities that try to act under a false identity. Such activities can lead to identity theft or fraudulent access to information system or electronic communication. Therefore, it is necessary to authenticate the identity. In broad sense, authentication means proofing of declared identity. Person proves that she is indeed who she claims to be. Authentication of persons can be based on what person knows (password, PIN etc.), what person has (ID card, certificate) or what person is (biometric characteristics like fingerprints, voice etc.). [6] With respect to authentication, Article 21 of eGovernment Act states that for authentication has to be used authenticators. In accordance with eGovernment Act such an authenticator is ID card with electronic chip and personal security code (hereinafter "eID"). Alternative authenticator is not available yet. [7]
Successful authentication does not guarantee possibility to access and use of particular electronic public administration service. Such a possibility depends on authorization which provides authenticated user with allowance to act in accordance with authorizations that pertains to him.

2.3 eID

On the one hand, eID presents physical means for citizens of the Slovak Republic, as well as foreigners with permitted residence in the Slovak Republic which means classical proof of identity. On the other hand, eID is considered means of identity proofing in electronic environment. Such a function is necessary for access and use of electronic public administration services. Issuing of eID in the Slovak Republic started in 2013. It is necessary to point out that eID became secure means of identification and authentication in "virtual world" via personal data that are stored in the electronic chip. It is also possible to store qualified certificate for qualified electronic signature and key pair (public key and private key). [8]
Precondition for using eID for access and using electronic public administration services is its activation. Determination of security personal code (hereinafter "SPC") is a part of activation process. SPC is a combination of six numbers chosen by the holder when submitting the application for eID issuance or later in person at the district headquarters of police force on specific request. Security of sensitive data that are stored in the chip is provided by security mechanisms, as well as SPC. Furthermore, eID is means of creating electronic signature, in particular qualified electronic signature. [9]

2.4 Electronic mailbox

The concept "one person, one identity" that is asserted by public administration within communication with citizens, entrepreneurs and legal entities is realized by establishing of electronic mailbox. It is necessary to point out that electronic mailbox is relatively new institute how much it was made available on the 1st January 2014. In accordance with Article 3, Letter l of eGovernment Act is electronic mailbox electronic storage where are stored electronic messages and notifications. With respect to obligation to establish electronic mailbox, according to Article 11, Section 1 of eGovernment Act, electronic mailboxes are established to public authority bodies, legal entities, major natural persons, entrepreneurs and subjects of international law. The main aim of the electronic mailbox is to provide electronic communication among citizens or entrepreneurs on the one side and public administration on the other side by sending and receiving of electronic messages. Establishment of electronic mailbox itself is not enough to reach such an aim. Therefore, it is necessary to activate it. Natural persons activate their electronic mailbox on the basis of mailbox owner application. Obligatory activation of legal entity electronic mailboxes is planned on the 1st January 2017. [10]
Identifier of the natural person for access into the electronic mailbox is her name and surname in connection with birth certificate number. eID in connection with SPC are means of authentication. In practice can occur situation when natural person can be an owner of more than one electronic mailbox. It is the case when natural person has a legal status of natural person, entrepreneur and public authority body (e.g. notary). Despite the fact that natural person owns more electronic mailboxes she registers via the same identifier and authenticates herself by one means. Consequently, in the light of the foregoing considerations, it can be said that natural person can have more electronic mailboxes, however there is still only one identity that is unique for her.

3. New challenges in the field of electronic identification and authentication

New regulatory framework regarding to electronic identification and authentication, in particular Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC [11] (hereinafter "Regulation eIDAS") applies from 1st July 2016. It must be observed that the regulation in issue is in the Slovak Republic, as well as in other European Union (hereinafter "EU") Member States binding and directly applicable and therefore there is no need to implement it into the Slovak legal order by further act. Regulation eIDAS does not aim to intervene with regard to electronic identity management systems and related infrastructures established in Member States. One of the objectives of this regulation is to remove existing barriers to the cross-border use of electronic identification means used in the Member States to authenticate, for at least services that are provided online by public sector body. In most cases, citizens are not allowed to use their electronic identification means to authenticate themselves in another Member State because the national electronic identification schemes in their country are not recognised in other Member States.

Regulation eIDAS is aimed at establishing legal framework for the use of trust services. [12] Regarding to provisions regulating mutual recognition of trust services within the EU, as well as their legal effect it should be borne in mind that qualified electronic signatures, qualified electronic seals and qualified electronic time stamps are recognized in all Member States. Furthermore, with their using are connected same legal effects in all Member States under the condition that they are based on qualified certificate issued by qualified trust service provider that is located in EU.

Besides aforementioned establishment of legal regulation framework regarding to trust services, Regulations eIDAS also aims at establishment of legal regulation framework regarding to obligation of Member States to mutually recognize electronic identification means. It is necessary to point out that the provisions regarding to mutual recognition will be applied in Member States from 2018. With respect to meaning of electronic identification means, Article 3, Section 2 of Regulation eIDAS states that it is considered *"material and/or immaterial unit containing person identification data and which is used for authentication for an online service."* Such an electronic identification means is eID in the Slovak Republic. In practical terms, mutual recognition of electronic means can be useful in situation when citizen of the Slovak Republic wants to use electronic public administration service of other Member State. In this case, citizen of the Slovak Republic is not obliged to apply for issuing of electronic identification means of other Member State. Of course, Member State providing such a service online has to fulfill some requirements stated in Regulation eIDAS. [13]

6. Conclusions

Various entities such as natural persons, legal entities, entrepreneurs or public administration authorities became parties of different legal relations not only in "real world" but also in "virtual world". In particular, in the case of electronic services provided by public administration authority, such a provider must more or less rely on who is the user he is communicating with. This implies electronic identification and authentication. Identification, in other words declaring of identity is not sufficient. Therefore, it is necessary to authenticate identity, in other words to proof declared identity. The most important electronic means for electronic identification and authentication is eID in the Slovak Republic. eID is considered means of identity proofing in electronic environment and is necessary for access and use of electronic public administration services. With respect to communication, in particular sending and receiving of electronic messages, among citizens or entrepreneurs on the one side and public administration on the other side, electronic mailbox was established. Electronic identification and authentication does not extend only to national level. New EU regulatory framework regarding electronic identification and trust services for electronic transactions in the internal market is aimed at removing of existing barriers to the cross-border use of electronic identification means used in the Member States to authenticate, for at least electronic services provided by public sector body.

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[13] Article 6 of Regulation eIDAS

TAX MORALE AND TAX PAYMENTS AMONG EURO AREA HOUSEHOLDS'

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Abstract: *This paper investigates theoretical and practical aspects of tax morale and tax payments in euro area countries. Taxes are the foremost important income source for modern governments however unwillingness to pay taxes is common phenomenon. This paper provides insights into the 'tax payment gap' – the difference between tax actually collected and the tax that should be collected – and argues that it is close to 840 billion euro annually across the euro area. In order to close the tax payment gap, conventional measures like changing the tax rate and taxation base are not very effective and demand for additional measures rises. Households' tax payment morale is assessed quantitatively by employing a dichotomous logit-probit regression analysis. The research is based on household level data for all euro area countries. The results suggest that the main issues behind weak tax morale are corruption and a lack of national pride. Additionally, tax morale is significantly affected by factors such as age, gender, religiousness, income and education. Given the sensitivity of tax income to changes in tax morale - an increase of the share of households willing to pay taxes by 1 percentage point results in tax income growth by 21 billion per year in all euro area countries - by influencing these attributes, one could anticipate changes in tax morale and tax income for the government.*

Keywords: *tax morale, tax gap, public goods, logit-probit analysis*

1. Introduction

Payment of taxes is an agreement among tax payers and the state. Tax payers commit to pay taxes and the state provides public goods and security that otherwise would not be available in the market economy. However, the 'universal aversion to tax' theory contradicts previous statement in a way that every rational economic agent will tend to increase its wellbeing by reducing tax payments and seeking public benefits. Practical outcomes support this statement as 90 % of public income is raised from tax contributions, but at the same time uncollected taxes constitute nearly one fifth.

The two main indicators – the tax base and tax ratio – are unable to fully and comprehensively explain changes in tax payments, which suggests the existence of other explanatory variables. This is the reason behind growing attention to alternative factors, which could disclose factors under unwillingness to pay taxes more accurate. Furthermore, the consequences to a general unwillingness to pay taxes and a rise in the unpaid tax gap is not always clear. The main drawback of such research approaches is a lack of suitable data sources because of the criminal nature of tax evasion activities.

The aim of this paper is twofold: to disclose factors affecting the unwillingness to pay taxes in the euro area and to make preliminary estimations of the cost to the economy in nominal terms of uncollected taxes. The analysis of tax morale is based on the data provided by World Values Survey (WVS) and European Values Study (EVS). Data received from these surveys are quantitatively assessed by employing dichotomous logit-probit regression models. Tax payment gap is assessed using a "top-down" approach that estimates the nominal amount of unpaid taxes in euro area.

The rest of this paper is structured as follows: the second section reveals importance of taxes in contemporary economy; the third section deals with magnitude of tax evasion; the fourth section explains factors behind tax collection; in the fifth section of this paper a quantitative assessment of tax morale in euro area countries has been revealed and results are presented; section 6 concludes.

2. Economic meaning of taxation

Taxes are affecting economy and behavior of tax payers in different ways. As Levine-Schayowitz presents, when governments raise taxes, people alter their behaviors and make decisions they would not make otherwise [1]. This suggests that when the behavior of private citizens is affected by a tax, the allocation of resources changes as well. Because taxes raise the prices buyers pay, providing incentives to consume less, and lower the prices sellers receive, providing incentives to produce less, the size of the market shrinks below its optimal level in the sense that revenues raised by government taxation may be less than the distorting market outcomes. Changes in tax policies also affect decisions to participate in the labor market, choice of occupation, tax avoidance schemes, and degree of tax evasion activities through participation in the formal or informal sector of the economy.

Usually changes in tax collection determine whether the government is running budget surplus or deficit. In case public sector has more income and savings rather than expenditures, public spending towards consumption and investment increases without building up debt. This makes positive contribution to general economy because public spending increases ceteris paribus aggregate demand. In case public expenditure remains higher for longer period the widening gap between income and expenditure need to be covered by borrowed funds or decrease in reserves (in

case particular country has reserves). Both outcomes are generally unwelcome, because growth of debt means increase in debt burden for future generations and usually it is a leading indicator for future tax increases.

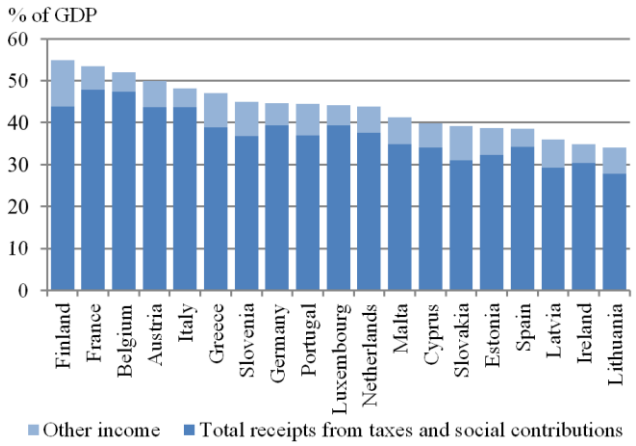

Figure 1: Structure of general government income (2014)

The main share of general government's income among euro area countries constitutes from taxes (see figure 1). Three taxation sources – value added tax, taxes on income and wealth and social contributions – are the main ones as they made 83-84 % of total income in period from 2002 till 2015 [2]. As this paper investigates issues behind tax morale only among household it is important to clarify households share in tax contributions. National accounts are not distinguishing final payers of value added tax and put it as payment made by total national economy. However, value added tax is recorded as being borne by purchasers, not sellers, and then only by those purchasers who are not able to deduct it. Thus the greater part of this tax is recorded as being paid on final uses, mainly on households for their consumption [3]. Based on this an assumption in this paper is made, that all value added tax has been paid solely by households. Detailed national accounts data reveal that in period from 2002 till 2015 in euro area nearly 77-78 % of general government total income has been received as taxes payed by households.

3. Tax payment gap

Estimating and dissecting the difference between tax due and collected is becoming more common, but remains the exception—even in advanced economies. Measurement of tax payment gap depends on the data and resources available. Generally, two main approaches have been used. "Bottom-up" approach is based on estimations made from audit results or other operational information. This way is rather costly, but provides direct intelligence on the nature of non-compliance. "Top-down" approach uses national accounts and other data to model the tax base and estimate revenue under perfect compliance, subtracting actual collections to arrive at the tax payment gap. This has the advantage of using fairly readily available data [4].

One of the ways to employ "top-down" approach by measuring tax payment gap has been described by Raczkowski [5]. Author argues that multiplication of three main components can reveal nominal amount of unpaid taxes, i.e. total tax rate, gross domestic product (in nominal terms) and size of shadow economy. Raczkowski takes total tax rate as paid by business that excludes taxes such as personal income tax or value added taxes, sales taxes, goods and service taxes. The purpose of this paper is to investigate tax morale and compliance of households, thus total tax rate of business has been interchanged with consumption and labor taxes. Calculation reveals that in period from 2003 till 2012 tax payment gap in euro area constituted 840 billion euros annually or nearly one fifth of all general government total income. Thus existence of tax payment gap and possible ways to increase tax morale remains foremost important objectives of contemporary governments as decrease of households share unwilling to pay taxes by 1 percentage point will result in closing of tax payment gap by 21 billion euros annually.

The factors affecting public sector's income gathering and budget balancing are important to securing fulfilment of contract among public and private sectors. Classical taxation model suggests looking at the tax payer as a decision maker with an aim to maximize benefit. However, number of unanswered questions remains. For instance, why economic agents tend to pay taxes and why not; what are the main factors behind their decisions; how these factors could be influenced; what role could be played by the government; in what extend government income is sensitive to tax morale?

4. Factors behind tax collection

Economic agents agree to pay taxes to the state, for public goods and security in return. At the same time economic agents are rational seekers for benefit compared to cost and will try to avoid or minimize tax payment and simultaneously will seek public goods and security. Samuelson argues that the private provision of public goods will be inefficiently low, because each individual will have an incentive to "free ride" on the private purchases of others [6]. The theory of general reluctance to pay taxes also brings arguments that are contrary to the concept of conscious taxpayers' agreement with the state. Fiscal illusion theory adds that rational economic agent realizes the need to have balanced public finance. Notwithstanding this, rational economic agent tends to seek financial benefits from the state and not pay for public goods and services via taxes. Thus this behavior is assessed as irrational.

There are three possible ways to deal with taxation: 1) agree to pay taxes; 2) evade taxes; 3) avoid taxes. Agreement to pay taxes is not under aim of this paper, thus will not be assessed further. Tax evasion and tax avoidance have at once similar and different meanings that must be clarified. According to Organization for Economic Cooperation and Development (OECD) tax evasion is linked to illegal agreements among parties in order to conceal on taxes or elude for fulfilment tax liabilities. Meanwhile tax avoidance is linked to searching for legal abilities enabling to diminish tax payments [7]. For the purpose of this paper differences between tax evasion and tax avoidance are not important, because the result of

general unwillingness to pay taxes is under concern. By taking this into account in scope of this paper tax evasion and tax avoidance have been taken as synonyms.

The most famous income tax avoidance model was presented by Allingham and Sandmo [8]. It has been proposed to look at the tax payment as an optimal portfolio formation exercise, where the tax payer chooses to take risky position and not to pay taxes, but faces probability to be audited by tax authority. Or tax payer can choose safe portfolio and pay taxes. Yitzhaki complemented the model with fine in case the fact of tax evasion is detected [9]. Such approach allows investigating sensitivity of tax payer behavior to factors like probability to be audited, fines and changes in tax rates. However, the weakest point of this model is an assumption, that tax payer receives benefit only by avoiding paying taxes, because classical model does not take into account the economic goods and services that are provided by the government. Thus the only rational outcome in this case would be to avoid paying taxes and free-ride. This drawback is well perceived by the authors, however because of simplicity it is commonly used to explain unwillingness to pay taxes.

Thus why are people are paying taxes? This question has been raised by Alm, McClelland and Schulze and results of their experiment suggest that compliance occurs, because some individuals overweight the low probability of audit, although such overweighting is not universal [10]. Moreover, there is evidence that individuals pay taxes because they value the public goods that their taxes finance. At this stage it should be noted that individuals exhibit a remarkable diversity in behavior. They sometimes appear to overweight low probabilities, they sometimes appear to be risk-seeking, they are on occasion cooperative, and at other times they are free-riders.

Recent research results in tax payment field recognize that models like Allingham and Sandmo lack explanatory power. Daude, Gutierrez and Melguizo explain that tax morale is based on aspiration to be honest with the state and other tax payers and trust of government [11]. Contrary, dishonesty and distrust towards government is directly linked to tax evasion. Factors behind willingness to pay taxes have been investigated differently by several authors (Slemrod and Yitzhaki [12]; Slemrod and Weber [13]). The main challenge investigating tax morale is criminal background of such activity (Weber, Fooken and Herrmann [14]). Models and field experiments confirm positive relation among quality of public goods and willingness to pay taxes. Also correlation is found among tax payment and social norms like belonging to social group, country, patriotism, justice. Field experiments confirm that relations between tax payers and tax collectors as robbers and police do not encourage paying taxes, thus should be avoided.

5. Quantitative assessment of tax payment

Among number of issues that are challenging assessment of tax avoidance is criminal background of such activity. As a result, a scarcity of data is common for researches in the field of tax morale. One of commonly used sources is WVS [15] and EVS [16] data. These globally performed regular surveys investigate respondents' opinion in fields like living conditions, family, religion, society, policy, economy. Martinez-Vazquez and Torgler [17], Alm and Torgler [18], Torgler and Schneider [19], Lago- Peñas and Lago- Peñas [20] have used WVS and EVS data for investigating tendencies among willingness to pay taxes and other independent variables.

As a dependent variable for analysis the individual answers to question "Cheating on taxes if you have a chance" are taken with possible answers varying from 1 ("never)" to 10 ("always"). Taking into account that answers data are categorical variables according to Gujarati simple linear regression is not suitable and instead logit-probit regression model should be used [21]. The summary of previously made researches in tax morale field (see Lago-Peñas and Lago-Peñas [20]) shows that main independent variables are age, gender, religiousness, employment, marital status, trust in public institutions, democracy.

For the researchers in tax morale field it is common to use dichotomous (binary) instead of multinomial logit-probit regressions. According to Torgler and Schneider (2006) the main reason behind this is lack of depended categorical indicators to perform reliable analysis [21]. In order to explain main factors behind tax payers' behavior for every combination of variables at least 20 % of opposite indicators should appear, otherwise the explanatory power of model decreases sharply. However, some categories are lacking data to ensure this rule, thus it is common to use dichotomous instead of multinomial logit-probit regressions. Moreover, independent variables of the model are assessed by odds ratio. Odds ratio is specific ratio for logit-probit models and shows how dependent variable (in this case cheating on taxes if you have a chance) could change in case one of independent variables will increase by 1 and all others will remain unchanged.

Table 1 Odds ratios for independent variables

Countries	*Gender*	*Age**	*Marital status*	*Education*	*Employment*	*Income*	*Religiosity*	*Confidence in Parliament*	*National proud*	*Acceptance of bribe*
Austria			1.1				1.2		1.4	2.2
Belgium	0.7							1.3	1.3	1.3
Cyprus					1.0		1.2		1.3	3.6
Estonia	0.7	1.0							1.3	4.3
Finland	0.6	1.0					1.4			2.1
France	0.6	1.0							1.4	1.4
Germany		1.0			1.0				1.4	2.2
Greece									1.2	1.8
Ireland	0.7	1.0							1.6	2.0
Italy		1.0							1.3	2.0
Latvia	0.7	1.0							1.2	1.8
Lithuania		1.0				1.0			1.4	2.1
Luxembourg				1.3						1.6
Malta							1.8			4.0
Netherlands	0.7	1.0								2.5
Portugal		1.0					1.2			2.3
Slovakia		1.0							1.3	1.8
Slovenia	0.7	1.0							1.4	6.0
Spain		1.0					1.3		1.4	2.5

* 0.94-0.99

86 WVS and EVS surveys on individual households for all 19 euro area countries were made starting from 1981 till 2013 with different coverage among countries. Data received for every single country have been assessed separately by applying dichotomous logit-probit regression analysis. 10 independent variables and one dependent variable have been taken to investigate importance of different factors to tax morale for every single euro area country and 3-6 are selected as significant. The suitability of whole model is assessed not by coefficient of determination, but by the share of classified cases. The case is assessed as classified, when the results received by the model are the same as actually collected during the survey. As Gujarati suggests more than 50 % of classified cases by the model allows to assess the model as suitable [21]. The results of logit-probit regression analysis for each euro area country are presented in table 1.

6. Conclusion

The main share of public sector income constitutes of tax contributions. Rational economic agents tend to avoid tax payments and consume public goods. Tax payment gap constitutes nearly one fifth in euro area. Classical models on unwillingness to pay taxes are not always able to explain factors behind the weak tax morale. Thus gap in this field is filled with alternative methods suggested by tax morale researches and is assessed quantitatively by employing dichotomous logit-probit regression analysis.

Results of tax morale analysis in all euro area countries suggest that main factors behind weak tax payment are corruption and weak national pride. More efforts of national authorities while investigating tax evasion should be given to men and tax payers of younger age. Additionally, more educated persons and those with higher income tend to evade taxes more; however, this has been evidenced only for some of countries under investigation. Also religiousness has direct strong positive link (especially in some countries) towards willingness to pay taxes.

What outcomes could be expected for the general economy in case tax morale will improve? Annual tax payment gap in euro area is almost equal to half yearly budget devoted to social protection; it exceeds budget for health or for general public services or almost two-year budget for education. To close tax payment gap completely is nearly impossible, however to decrease it by strengthening tax morale is feasible. Thus growth of households' share willing to pay taxes by 4 percentage points in euro area will benefit in funding annual environment protection budget; growth by 5 percentage points – budget of recreation, culture and religion; growth by 6 percentage points equals to funding of annual defense budget.

Systematic assessment of factors behind weak tax payment is guidelines for public authorities in field of greater tax morale in the country. Different measures like tax payer honour code, better quality of public goods, greater trust in state, patriotism and community should be employed in order to increase tax morale. By employing different measures public sector could expect closing tax payment gap ensuring better standing of public finance and abilities to provide goods and services for the same households.

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APPLYING THE FLOW-OF-FUNDS FRAMEWORK FOR THE ANALYSIS OF MACRO-FINANCIAL LINKAGES AND MONEY CREATION

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Abstract: *In this paper we apply the flow-of-funds framework for the analysis of macro-financial linkages. In particular, we look into a number of stylised cases of economic and financial transactions to analyse the macroeconomic mechanism of the creation of purchasing power through credit, the link between credit and money creation, the partial self-financing property of bank credit, as well as similarities and differences between bank credit and other sources of financing. Financing through money creation has huge macroeconomic implications: bank credit flows directly support domestic demand and can at times be the single most potent, yet typically grossly underrated, demand-side driver behind the dynamics of economic activity and prices. In this paper we show that bank credit directly adds to domestic demand, which translates into some combination of stronger domestic economic activity, stronger foreign economic activity and higher prices. Moreover, there are also macroprudential implications of credit-driven growth as it may result in a systemic over-reliance on continuous debt accumulation and poses the risk of balance sheet recessions or depressions.*

Keywords: *flow-of-funds, macro-financial linkages, national accounts, money creation*

1. Introduction

The recent global financial crisis caught mainstream economists by a surprise, exposing serious gaps in the collective understanding of crucial elements of the interaction between the real economy and the financial system. With only a handful of exceptions, the mainstream macroeconomic models regard bank credit as a means to redistribute existing real savings (or purchasing power), whereas in fact, by issuing loans, banks create new purchasing power. If investment spending is not actually predicated upon the consumption versus saving choice of an optimising agent but can instead be supported by bank credit and the cost of the dilution of the existing purchasing power may be borne by unsuspecting agents. There are signs of ongoing tectonic shifts with the world's most authoritative financial institutions voicing concerns about the current "debt-fuelled growth model" and effectively calling for a paradigm shift in economic thinking and policy making [1].

In this paper we get back to the basics in the pursuit to understand the fundamental linkages between financial and real sides of an economic system. Advances in national accounting frameworks and the associated analytical tools, compilation of more detailed financial accounts and constantly improving statistical compatibility between economic and financial accounts allows us to usefully apply the flow-of-funds (FOF) framework for the analysis of macro-financial linkages. We look into stylised cases of economic and financial transactions to analyse the macroeconomic mechanism of the creation of purchasing power through credit, the link between credit and money creation, the partial self-financing property of bank credit, as well as similarities and differences between bank credit and other sources of financing.

The remainder of this paper is structured as follows. In Section 2 we provide a short introduction to the analytical FOF framework and present economic and accounting principles behind it. In Section 3 we analyse macroeconomic identities and accounting constraints. Finally, in Section 4 we apply the FOF analysis tools to show bank credit as a mean to create purchasing power.

2. General principles of the macroeconomic accounting

The system of national accounts (SNA) is an internationally compatible accounting framework providing a detailed description of national economies, their real and financial components and the economic relationships between institutional sectors. One of the main sets of tables in the SNA framework is the institutional sector accounts. In this accounting representation, a national economy is comprised of institutional sectors, namely, nonfinancial corporations, financial corporations, general government, households and non-profit institutions serving households (NPISH). There is also "the rest of the world" (ROW) sector, which enables recording economic interactions between the national economy and non-residents.

The institutional sector accounts are organised around the sequence of accounts, which records each sector's economic and financial activities in a compatible way. More specifically, the sequence of accounts provides a comprehensive sequential description of the cycle of sector's economic activity by linking its resources (revenue), uses (expenditure), accumulation of financial and nonfinancial assets and the associated changes in the sectoral balance sheet positions. The use of similar classifications and accounting rules allows symmetrical reporting of transactions or changes in asset positions for interacting institutional sectors. The unified accounting framework also ensures the aggregation of sectoral accounts data into economy-wide aggregates, which are at the heart of the macroeconomic analysis.

Integrated economic accounts form the basis of the flow-of-funds tables and the associated sectoral balance sheet position tables. These analytical tools prove very useful for diagnosing the short-term state of an economy and are routinely applied by organisations like the International Monetary Fund in country assessment programs. They allow monitoring and assessment of economic imbalances (Be Duc and Le Breton [2]), facilitate the analysis of macro-financial linkages (Crowe, Johnson, Ostry and Zettelmeyer [3]), real and financial network formation (Castren and Kavonius [4]; Castren and Rancan [5]) and shadow-bank activity (OECD [6]), as well as help to better understand the role of money and credit in the economy.
An analytical FOF table offers a quick and straightforward way to portray an economy as a closed system consisting of interacting institutional sectors. A FOF shows revenue, expenditure and financing transactions of each sector and the national economy, as well as the interactions with the rest of the world. The economic variables typically are highly aggregated, there is no breakdown into uses and resources unlike in the "T-account" representation, and changes in assets and liabilities are often reported on the net change basis. Thus, to obtain more detailed information it might be necessary to refer to the tables of integrated economic accounts or other related sources of statistical information. The main advantage of the succinct FOF representation is that it makes immediately clear which sectors have deficits, why they have them, from which sectors they finance excess spending and by which financial instruments. The system is closed in the sense that in the absence of statistical errors there should be no unaccounted sources of financing, thus such accounting framework can be very helpful in ensuring internal consistency of the macroeconomic analysis.

3. Macroeconomic identities and accounting constraints

Constraints in the FOF stem from some principal macroeconomic accounting identities. First, private institutional sector's disposable income equals the primary income net of taxes plus net social benefits and other current transfers. In contrast to the private sector, the major part of general government's disposable income comes from taxes. In national disposable income calculations, the income that constitutes other domestic institutional sectors' expenditure (for example, taxes, rents, etc.) is netted out. Thus, gross national disposable income (GNDI) is the sum of gross domestic product (GDP), external primary income (PI) and external secondary income (SI).

$$GNDI=GDP+PI+SI \quad (1)$$

National saving is defined as the difference between GNDI and final consumption expenditure (C; and again, national saving is the sum of government and private sector saving (S)):

$$S=GNDI–C \quad (2)$$

By substituting equation (1) into (2), using the GDP decomposition by expenditure approach and applying the balance-of-payments (BOP) definition of the current account balance, one gets another well-known macroeconomic identity, which states that the saving-investment (I) balance of the national economy must equal the external current account (CA) balance:

$$S–I=CA \quad (3)$$

By adding capital transfers to both sides of equation (3) and abstracting from statistical errors, we can immediately see why net lending (NL) of the aggregate economy should equal net borrowing of the ROW sector in the FOF:

$$GNDI–C–I+KA=NL=FA=CA+KA \quad (4)$$

where, FA = financial account balance and KA = capital account balance.

The recent global financial crisis, which was characterised, among other things, by disrupted capital flows among key economic sectors, highlighted the need to understand the financial interconnectedness between sectors but such analysis was hampered by the lack of adequate data (Shrestha and Mink [7]; Shrestha, Mink, and Fassler [9]). Therefore, in recent years more and more countries are starting to compile and publish financial accounts data on the so-called who-to-whom basis. This representation contains large amounts of data and are difficult to compile for economies with advanced financial markets, thus the progress in this field is rather slow. However, the economic importance of such data is immense because it ensures internal consistency of integrated economic accounts framework.
When financial accounts data are available in both instrument and who-to-whom decomposition, the FOF can be easily tailored to specific analytical needs. We can combine elements of both decompositions and break sectoral net financing (NF) into two broad sources of funding, namely, foreign (FF) and domestic financing (DF). For example, in the case of the nonfinancial corporations sector (subscript C) this gives:

$$NF_C= –NL_C=FF_C+DF_C \quad (5)$$

In case nonfinancial corporations sector has a negative net lending ($NL_C<0$), this implies that the sector is a positive net financing need ($NF_C= –NL_C>0$) and it funds its excess spending by acquiring financing either from abroad or from other domestic sectors ($FF_C+DF_C>0$). It is also noteworthy that at the aggregate economy level the flows of financing among domestic sectors are netted out (DF=0) making net financing of the total economy equal net foreign financing:

$$NF= –NL=FF \quad (6)$$

Comparing equations (5) and (6) we see that while excess spending of an institutional sector can be funded by

attracting financial resources from other sectors or from abroad, a rise in the national excess spending can only be associated with financing from abroad. It is tempting to make the conclusion that domestic financing, for example in the form of bank credit, cannot stimulate spending. But it would be mistaken because, under certain circumstances domestic financing – and bank credit in particular – can stimulate both national spending and income resulting in a small or even no financing gap for the national economy.

4. Bank credit as a mean to create purchasing power

Bank credit is crucial in the process of creating money and new purchasing power. The view that bank credit technically creates deposits and not vice versa is also known in the financial literature as "financing through money creation" (FMC) and it strongly contrasts with the "old" and technically flawed "intermediation of loanable funds" (ILF) view (see Jakob and Kumhof [9], for a comparative analysis). Incidentally, the fact that bank credit technically creates deposits is indisputable and is widely acknowledged in the central banking and financial community (McLeay, Radia and Thomas [10]) and even in introductory textbooks on money and banking but the modern mainstream models almost universally embrace the old ILF view of banks.

Though the FMC view is undoubtedly correct from financial accounting standpoint, one cannot accept it unconditionally from the macroeconomic perspective. Even though banks can issue new credit at will, they still need to be sure that they will have enough liquidity (e.g. reserves with the central bank) in the case of withdrawals or transfers of newly created and old deposits. Thus banks' willingness to grant new loans depends not only on profitability considerations but also on their liquidity situation and, by extension, on their deposit base (because deposits create liquidity in the form of bank reserves at the central bank). Nowadays, ample and cheap liquidity available from central banks downplays the importance of liquidity considerations and diminishes the importance of deposits in determining banks' willingness to extend new credit.

The FMC paradigm has very important and nontrivial macroeconomic implications. It suggests that bank credit can provide a powerful boost to domestic purchasing power even in the absence of the access to foreign funding (see equation 6). Banks' inherent ability to create purchasing power at will, with only relatively mild limitations, implies that nominal levels of investment and consumption expenditure are much less dependent on individual saving decisions than is conventionally maintained in the standard macroeconomic theory. Simply put, saving may lead to investment in the absence of banks (e.g. through peer-to-peer lending) but credit-financed investment leads to rises in nonfinancial surpluses and deposits, which can even be loosely interpreted as newly created "savings".

Without a proper analysis of the financial side of the economic system, one would still observe the saving and spending processes that balance each other but nevertheless it is very likely that the drivers behind these decisions would be misinterpreted. Let take an example of household buying house with mortgage. The household sector is the net borrower and the nonfinancial corporate sector has a nonfinancial surplus of exactly the same magnitude that is needed to finance the housing acquisition. So looking at the snapshot of the economy after the transactions have taken place and concentrating on the nonfinancial part of the economy, one could conclude that strong income growth of the nonfinancial corporations sector and withheld corporate investments led to a rise in corporate savings which were channelled to the household sector and bolstered its housing acquisition. But in fact this would be a completely incorrect interpretation of what actually happened. We know that this simple case was devised in such a way that households were willing to acquire housing, while the bank took the decision to grant credit and was arguably the most important economic actor in this regard. Banks' ability to issue credit was not predicated upon any of the sectors' willingness to save.

This example clearly shows that the loanable funds paradigm portraying banks as functionally passive financial intermediaries between savers and borrowers is incorrect: banks have a much larger role than merely facilitating the process of reallocation of existing real resources. Also, the ILF view incorrectly regards depositors as savers and "attributes to them an influence on the "supply of credit" which they do not have" (Schumpeter [11]). The reallocation of resources eventually happens as a consequence of bank lending but by issuing loans the banking sector first and foremost enables systemic balance sheet expansion or, in other words, an increase in the financial leverage at the aggregate economy level. By issuing loans, banks create new nominal purchasing power, which leads to a demand-driven rise in economic activity (domestically or abroad) and changes in various price levels (in particular, consumer and producer prices, financial asset and property prices, wages, and exchange rates), which in turn dilute the real purchasing power to a certain degree.

To further clarify economic implications of credit creation and to distinguish it from other forms of expenditure financing, it is useful to reconsider the above-discussed financing case in terms of the equation of exchange.

$$M \cdot V = P \cdot Q \quad (7)$$

where, M = broad money; V = velocity of money; P = prices level; Q = real output.

In the case of sectoral spending funded by current savings there are no immediate changes in any of the components of the equation of exchange (7). When a sector draws down its financial assets or borrows from other domestic nonfinancial sectors, nominal output (P·Q) rises but M in the economy remains unchanged leading to an increase in V. Even though we do not explicitly examine the dynamic implications of the initial expenditure and financing transactions, it is reasonable to think that such an increase in V would quickly subside as, figuratively, economic

agents, or a sector as a whole, would quickly find limits to tapping into their bank accounts.

In contrast, bank credit helps to overcome these limitations because, as was mentioned above, it expands nominal purchasing power rather than redistributes it. Bank credit induces an increase in M and a commensurate rise in P·Q, leaving V roughly stable. After the initial increase in M it is likely to decline only gradually as bank loans are repaid, thus the demand-side stimulus related to bank credit (and, more generally, to money creation) is likely more persistent than a stimulus related to an increase in the V associated with drawing down sectoral assets. Notably, the impact of bank credit on the equation of exchange is not unique – borrowing from abroad creates qualitatively similar effects. Domestic bank credit differs from borrowing from abroad in that the latter leads to the accumulation of foreign debt and a flow of cross-border interest payments.

5. Conclusions

In this paper we applied the FOF framework for the analysis of macro-financial linkages. The FOF framework represents the economy as a closed system of economic and financial flows among institutional sectors, which is ideally suited for tracking the origination and macroeconomic impact of credit and money flows. The FOF framework helps identify bank credit as one of the means of expenditure financing, i.e. by running down net financial assets, as opposed to restraining other spending.

Money and purchasing power creation is an indispensable corollary of bank credit issuance, which implies that the "financing through money creation" paradigm does a much greater job in explaining the actual mechanics of bank credit creation than the "loanable funds" model. Credit is not predicated upon existing savings but rather creates new savings and is therefore to some extent self-financing. However, credit is not necessarily fully self-financing because, in simple terms, money can flow out of the banking system leaving banks exposed to financing gaps. Financing through money creation has huge macroeconomic implications: bank credit directly adds to domestic demand, which translates into some combination of stronger domestic economic activity, stronger foreign economic activity and higher prices – with particular configuration depending on the structural features of the economy.

Moreover there are macroprudential implications of credit-driven growth as it may result in a systemic over-reliance on continuous debt accumulation. Beside the partial self-financing feature of credit, one of the most remarkable aspects of credit expansion is the large capacity of economies to absorb new credit. The self-propelling and overextended credit booms may result in a situation where economic agents are unwilling or unable to take up additional credit and further expand their balance sheets, which naturally leads to a reversal of credit flows and invokes the "aggregate debt repayment phase" and the associated balance sheet recession. The policy makers' standard response seems to have been to resort to debt (or asset price) reflation strategies by trying to reignite private sector credit growth or replacing it with growing public debt. The long-term implications of these strategies applied in response to the recent global financial crisis are still largely unclear.

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PERMANENT ESTABLISHMENT STATUS IN THE LIGHT OF BEPS (COMMISSIONAIRE ARRANGEMENTS)

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Abstract: *In many countries, the interpretation of the treaty rules on agency-PE allows contracts for the sale of goods belonging to a foreign enterprise to be negotiated and concluded in a country by the sales force of a local subsidiary of that foreign enterprise without the profits from these sales being taxable to the same extent as they would be if the sales were made by a distributor. In many cases, this has led enterprises to replace arrangements under which the local subsidiary traditionally acted as a distributor by "commissionaire arrangements" with a resulting shift of profits out of the country where the sales take place without a substantive change in the functions performed in that country.*

Keywords: *permanent establishment, BEPS, commissionaire arrangement*

1. Introduction

International tax issues have never been as high on the political agenda as they are today. The integration of national economies and markets has increased substantially in recent years, putting a strain on the international tax rules, which were designed more than a century ago.

Weaknesses in the current rules create opportunities for base erosion and profit shifting (BEPS), requiring bold moves by policy makers to restore confidence in the system and ensure that profits are taxed where economic activities take place and value is created [1].

Following the release of the report Addressing Base Erosion and Profit Shifting in February 2013, OECD and G20 countries adopted a 15-point Action Plan to address BEPS in September 2013. The Action Plan identified 15 actions along three key pillars:

- introducing coherence in the domestic rules that affect cross-border activities,
- reinforcing substance requirements in the existing international standards, and,
- improving transparency as well as certainty. [1]

Since then, all G20 and OECD countries have worked on an equal footing and the European Commission also provided its views throughout the BEPS project. [4] Implementation therefore becomes key at this stage. The BEPS package is designed to be implemented via changes in domestic law and practices, and via treaty provisions, with negotiations for a multilateral instrument under way and expected to be finalized in the near future [1].

1.1 Definition of Permanent Establishment

According to Article 5 (1) OECD Model Tax Convention: For the purposes of this Convention, the term "permanent establishment" (hereinafter also "PE") means a fixed place of business through which the business of an enterprise is wholly or partly carried on."

Article 5 (Permanent Establishment) of the OECD Model Tax Convention includes the definition of the treaty concept of permanent establishment, which is primarily used for the purpose of the allocation of taxing rights when an enterprise of one State derives business profits from another State [2]. The main use of the concept of a permanent establishment is to determine the right of a Contracting State to tax the profits of an enterprise of the other Contracting State. Under Article 7 a Contracting State cannot tax the profits of an enterprise of the other Contracting State unless it carries on its business through a permanent establishment situated therein. [3]

Before 2000, income from professional services and other activities of an independent character was dealt under a separate Article, i.e. Article 14. The provisions of that Article were similar to those applicable to business profits but it used the concept of fixed base rather than that of permanent establishment since it had originally been thought that the latter concept should be reserved to commercial and industrial activities.

The elimination of Article 14 in 2000 reflected the fact that there were no intended differences between the concepts of permanent establishment, as used in Article 7, and fixed base, as used in Article 14, or between how profits were computed and tax was calculated according to which of Article 7 or 14 applied. The elimination of Article 14 therefore meant that the definition of permanent establishment became applicable to what previously constituted a fixed base. [3]

2. Permanent Establishment in the light of BEPS

Tax treaties generally provide that the business profits of a foreign enterprise are taxable in a State only to the extent that the enterprise has in that State a permanent establishment to which the profits are attributable. The definition of PE included in tax treaties is therefore crucial in determining whether a non-resident enterprise must pay income tax in another State.

The Action Plan on Base Erosion and Profit Shifting (BEPS Action Plan) called for a review of that definition to prevent the use of certain common tax avoidance strategies that are currently used to circumvent the existing PE definition, such as arrangements through which taxpayers replace subsidiaries that traditionally acted as distributors by *commissionaire arrangements*, with a resulting shift of profits out of the country where the sales

took place without a substantive change in the functions performed in that country. [1]
Changes to the PE definition are also necessary to prevent the exploitation of the specific exceptions to the PE definition currently provided for by Article 5(4) of the OECD Model Tax Convention, an issue which is particularly relevant in the digital economy. [1]

3. Artificial avoidance of PE through commissionaire arrangements

According to the Article 5(5) OECD Model Tax Convention: "where a person — other than an agent of an independent status — is acting on behalf of an enterprise and has, and habitually exercises, in a Contracting State an authority to conclude contracts in the name of the enterprise, that enterprise shall be deemed to have a permanent establishment in that State in respect of any activities which that person undertakes for the enterprise, unless the activities of such person are limited to those mentioned in paragraph 4 which, if exercised through a fixed place of business, would not make this fixed place of business a permanent establishment under the provisions of that paragraph.
Article 5 (6) OECD Model Tax Convention continues that An enterprise shall not be deemed to have a permanent establishment in a Contracting State merely because it carries on business in that State through a broker, general commission agent or any other agent of an independent status, provided that such persons are acting in the ordinary course of their business.
It is a generally accepted principle that an enterprise should be treated as having a permanent establishment in a State if there is under certain conditions a person acting for it, even though the enterprise may not have a fixed place of business in that State. [3]
Persons whose activities may create a permanent establishment for the enterprise are so-called dependent agents i.e. persons, whether or not employees of the enterprise, who are not independent agents falling under paragraph 6. Such persons may be either individuals or companies and need not be residents of, nor have a place of business in, the State in which they act for the enterprise.
It would not have been in the interest of international economic relations to provide that the maintenance of any dependent person would lead to a permanent establishment for the enterprise. Such treatment is to be limited to persons who in view of the scope of their authority or the nature of their activity involve the enterprise to a particular extent in business activities in the State concerned. [3]
Therefore, paragraph 5 proceeds on the basis that only persons having the authority to conclude contracts can lead to a permanent establishment for the enterprise maintaining them. In such a case the person has sufficient authority to bind the enterprise's participation in the business activity in the State concerned. [3]
Also, the phrase "authority to conclude contracts in the name of the enterprise" does not confine the application of the paragraph to an agent who enters into contracts literally in the name of the enterprise; the paragraph applies equally to an agent who concludes contracts which are binding on the enterprise even if those contracts are not actually in the name of the enterprise. [3]
The requirement that an agent must "habitually" exercise an authority to conclude contracts reflects the underlying principle in Article 5 that the presence which an enterprise maintains in a Contracting State should be more than merely transitory if the enterprise is to be regarded as maintaining a permanent establishment, and thus a taxable presence, in that State. The extent and frequency of activity necessary to conclude that the agent is "habitually exercising" contracting authority will depend on the nature of the contracts and the business of the principal. It is not possible to lay down a precise frequency test. [3]

3.1 Commissionaire arrangements

A commissionaire arrangement may be loosely defined as an arrangement through which a person sells products in a State in its own name but on behalf of a foreign enterprise that is the owner of these products.
Through such an arrangement, a foreign enterprise is able to sell its products in a State without technically having a permanent establishment to which such sales may be attributed for tax purposes and without, therefore, being taxable in that State on the profits derived from such sales. [1]
Since the person that concludes the sales does not own the products that it sells, that person cannot be taxed on the profits derived from such sales and may only be taxed on the remuneration that it receives for its services (usually a commission). [1]
BEPS concerns arising from commissionaire arrangements may be illustrated by the following example, which is based on a court decision that dealt with such an arrangement and found that the foreign enterprise did not have a permanent establishment:

- ABC is a company resident of State A. It specialises in the sale of pharmaceutical products.
- Until 2000, these products are sold to clinics and hospitals in State D by DEF, a company resident of State D. ABC and DEF are members of the same multinational group.
- In 2000, the status of DEF is changed to that of commissionaire following the conclusion of a commissionaire contract between the two companies. Pursuant to the contract, DEF transfers to ABC its fixed assets, its stock and its customer base and agrees to sell in State D the products of ABC in its own name, but for the account of and at the risk of ABC.
- As a consequence, the taxable profits of DEF in State D are substantially reduced. [1]

It is clear that in many cases commissionaire arrangements and similar strategies were put in place primarily in order to erode the taxable base of the State where sales took place. A foreign enterprise that uses a commissionaire arrangement does not have a permanent establishment because it is able to avoid the application of Article 5(5) OECD Model Tax Convention, to the extent that the contracts concluded by the person acting as a commissionaire are not binding on the foreign enterprise.

[2] Since Article 5(5) OECD Model Tax Convention relies on the formal conclusion of contracts in the name of the foreign enterprise, it is possible to avoid the application of that rule by changing the terms of contracts without material changes in the functions performed in a State. [1]
Commissionaire arrangements have been a major preoccupation of tax administrations in many countries, as shown by a number of cases dealing with such arrangements that were litigated in OECD countries. In most of the cases that went to court, the tax administration's arguments were rejected. [1]

6. Conclusions

Similar strategies that seek to avoid the application of Article 5(5) OECD Model Tax Convention involve situations where contracts which are substantially negotiated in a State are not formally concluded in that State because they are finalised or authorised abroad, or where the person that habitually exercises an authority to conclude contracts constitutes an "independent agent" to which the exception of Article 5(6) OECD Model Tax Convention applies even though it is closely related to the foreign enterprise on behalf of which it is acting. [1]
As a matter of policy, where the activities that an intermediary exercises in a country are intended to result in the regular conclusion of contracts to be performed by a foreign enterprise, that enterprise should be considered to have a taxable presence in that country unless the intermediary is performing these activities in the course of an independent business. The BEPS Report and the BEPS Action Plan recognize that the current definition of permanent establishment must be changed in order to address BEPS strategies. [1]

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ELECTRONIC FORM OF JUDICIAL DECISION IN THE SLOVAK REPUBLIC – NEAR FUTURE?

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Abstract: *The article deals with the electronic form of judicial decision in the Slovak Republic in the field of administrative justice. In the introductory part of the article the author focuses on clarifying of the process of informatization of society with attention to the area of informatization of judiciary, so called e-Justice. After a brief analysis of the current Slovak legislation of the form of a judicial decision, which is the paper form, are clarified fundamental issues related to the electronic form of the judicial decision with reference to the advantages and disadvantages of this institute. At the conclusion of the article the author summarizes the discussed issue and analyses the opportunity of drafting of judicial decisions in electronic form.*

Keywords: *electronic form of judicial decision, electronic decision, e-justice*

1. Introduction

In 1973 American professor of sociology Daniel Bell has used in his book "The arrival of post-industrial society" a new term "post-industrial society", which he defined as the enormous growth of the third sector - non-profit sector, functioning out of business and government including schools, hospitals, research centers, volunteer and civic associations and so on [1]. Based on Bell's theory the term began to refer to Society, which represents a new era following the industrialization when the economic system is more based on the production and distribution of information than on the production of goods. Creating and communicating of new information is done through massive use of information and communication technologies that characterize the ongoing 21st century. Use of information and communication technologies and the related modernization of services covers various areas of life, such as public administration (e-Government), justice (e-Justice), healthcare (e-Health), commerce (e-Commerce) or education (e-Learning). The presented paper deals with the issue of informatization of the judiciary, namely the issue of judicial decisions in electronic form and their possible publishing in the Slovak Republic, referring to the field of administrative justice. E-Justice comprises several important issues, such as electronic court file, electronic collection of laws, electronic registry, electronic delivery or mutual electronic communication with the courts. The judicial authorities in the Slovak Republic are working at the moment largely on paper principle, however under the current legislation, there is a possibility of electronic delivery of documents, which is limited and does not apply to judicial decisions.

2. The physical form of the judicial decision

The courts declare judgments and resolutions directly at the judicial hearing. After oral statements are completed, the court creates the decision in written form for the purpose of delivering of the written copy to the participants of judicial hearing. In the case of a judgment the delivery is always necessary, in case of a resolution the delivery is made only when it is required by the law. On the basis of the sec. 105, par. 1 of Law no. 160/2015 Coll. Spore Civil Procedure (hereinafter referred to as "Spore Civil Procedure"), the Court deliveres the document during judicial hearing or during other actions. In following sections are given more delivery options: through a judical carrier, competent department of the police and in cases stated by special legislation it is possible through the Ministry of Foreign and European Affairs of the Slovak Republic [2]. In addition to the above classical methods of delivery, the legislature has stated also the electronic form of delivery through electronic means [2] in order to adapt legislation to the ongoing process of informatization of the society, but with certain restrictions. These restrictions concern the decisions, because under sec. § 111, par. 1-3 of Spore Civil Procedure some documents specified by the law (e.g. judicial decisions) are delivered so that the addressee has to confirm receiving of document on confirmation of delivery of the document. [2] Based on the above it is possible to summarize that the courts as well as the participants now have the opportunity to send different documents and carry out communication by using modern information technologies, but electronic delivery of judicial decisions, whatever the form of a judgment or resolution, is not yet possible.

3. Electronic form of a judicial decision

Electronic form of a court decision means that the particular court decision will be after the oral statement delivered to the participants by electronic means. In accordance with Law no. 215/2002 Coll. on electronic signature and on amendment of certain acts (hereinafter referred to as "Law on electronic signature"), an electronic document is a numerically coded document stored on physical media, transmitted or processed by technical means of electrical, magnetic, optical or other form [3]. An electronic document differs from a classic paper in various specifics. The most striking difference between the two forms of documents is access to the original document. In a case of an electronic document its originality and authenticity in the classical sense is meaningless. Since the

electronic document, unlike paper documents, it is not associated with a physical medium, in its case, there is no unique original. However, this does not mean that an electronic document could not be trusted, or that it can not be used as an information carrier of evidence, same as a paper document. The second significant difference is the perception of discussed forms of documents. While paper documents can be seen directly, electronic documents are recorded on technical means, while the content can not be read without the use of a technical device, usually a PC equipped with the necessary software and hardware [4]. Based on this fact the opinions about the untrustworthiness of virtual environments and electronic documents are formed, as the technology needed to detect the contents of an electronic document may fail or be misused. Also, questions arise about the possible alteration of the electronic document. Where there is an electronic form of a judicial decision, it is absolutely necessary to regulate, in addition to delivery process, a number of basic questions, such as the particulars of the decision, the issue of converting the decision from the electronic form to paper form and vice versa, application of specific decisions on follow-up actions and the need for its submission to other bodies, which also relates to the conversion. For the need of the presented paper, these issues were modified as follows:

a) electronic delivery of a judgment,
b) the essentials of an electronic judicial decision,
c) the electronic conversion of a judicial decision.

Ad a) In the Slovak Republic, the Law no. 305/2013 Coll. by electronic means of exercising the powers of public authorities and on amendments to some laws (hereinafter referred to as the "Act on e-Government") was adopted in 2013. This law reffers to two major institutes that relate to the electronic form of a decision: the electronic mailbox and electronic delivery. The electronic box is an electronic repository where electronic messages and notifications are stored. [5]. This will be set up free of charge to public authorities, individuals, legal persons, entrepreneurs and also to the subjects of international law. Conditions for setting up of an electronic mailbox, the activation, access, deactivation and also the cancelation are adjusted in detail in the Law on e-Government. Electronic delivery is the delivery of electronic filing and electronic administrative document by electronic means into an electronic mailbox. The law recognizes two types of delivery, the electronic delivery carried into own hands and electronic delivery, which is not carried into own hands. The documents, in which the law imposes on the service into own hands are electronically delivered with acknowledgment of receipt of the delivery from the sender in the form of a delivery confirmation note sent to the sender. As an important provision can be considered sec. 28, par. 2 of the Law on e-Government, which states: "The electronic official document, including attachments, has the same legal effects as a judgment, request, statement, or other document, including the annexes, which are, under special regulation issues, announced or delivered by public authority in paper form." With this provision the legislature equalized official electronic documents with those that are published, communicated or delivered in paper form. In relation to the court decision another institute should be mentioned, which in current valid legislation does not exist. It is a case when if the court declares a decision and determines the date of delivery of the decision, the participant is obliged to pick it up in the set time frame at the court, otherwise the decision will be delivered via the Internet into the electronic mailbox.

Ad b) Another important issue in relation to the electronic form of a judicial decision is the question of the requirements for decision. In terms of the theory of law we distinguish between substantive and procedural requirements of the decision. Substantive requirements of any decision are the header, verdict, justification and the remedies. [6] In the case of resolutions, however there are cases where justification is not necessary. Pursuant to the sec. 222 of Spore Civil Procedure, the written form of the judgment is signed by judge. This provision shall also apply to the resolution. Legal provisions about formal requirements of the signature in connection with electronic form of the decisions shall be modified, since an electronic document containing specific decision could not meet the same formal requirements which is the handwritten signature of the judge. The modification of this provision could distinguish between paper form and electronic form of the decision in the sense that the formalities of the those two forms of decisions would be governed separately. Handwritten signature of the judge would be in the case of an electronic form replaced with qualified electronic signature that each judge would have.

Ad c) Electronic documents, in our case – judicial decisions, may be made either in electronic form, then it is based on the character entry (eg. keyboard) or character output from other procesing [7] or may be made by conversion from paper form to electronic form, while the second mentioned process is called digitization. This can be done in several ways that have an impact on the subsequent use of the document [4]. In that regard it may be added that the conversion can be carried out the other way around, that is to transform the document from electronic form into paper form. The most common and typical way of digitizing is that the document is scanned, while the output electronic document may be in the form of an image in which the content is expressed graphically or as a text enabling subsequent automated processing of data. The process of converting electronic documents into paper form (the opposite of digitization) has not a single-word name, but the most used method is to print an electronic document. In this connection it should be noted that the conversion is not printing a document, because it is regarded as direct part of the creating of the document itself. At present, it is not customary to create the document by hand - writing, but by the computer and then it is necessary to print the document. Conversion is thus a process in which the document in electronic form is transformed into paper form for various other reasons, for example because of convenience, for a fear of losing credibility of electronic document, out of habit or because of protection [4]. Legally, it is important to maintain the content credibility of the document during its converting.

The strongest and the primary way of how to do the conversion is an authorized conversion of documents. In the Slovak Republic, the conversion process is governed by the Law on e-Government, particularly in the fourth part, and this distinguishes the conversion and guaranteed conversion. Pursuant to the sec. 35, par. 1 of this law, the conversion is a process in which the entire information content of the original:
a) electronic document is transformed into the newly created document in paper form,
b) document in paper form is transformed into the newly created electronic document,
c) electronic document is transformed into the newly created electronic document, which has a different format than the original electronic document [5].
The Law on e-Government also lays down the procedure of guaranteed conversion, institute of certification clause, possible conversion limitations and joint provision about the guaranteed conversion. The conversion has in the current erra of computerization of various processes a great importance, and this is also declared in sec. 39, par. 1 of the Law on e-Government, which stipulates that the newly created document coming from the guaranteed conversion, which is inextricably linked with a certification clause has the same legal effects and can be used for legal purposes to the same extent as the original document by transformation of which it was created [5]. Conversion is a process that is closely related to the issue of electronic form of a judicial decision, since the application of specific electronic judicial decision in subsequent proceedings or the need of referral to other authorities are only possible through the guaranteed conversion.

4. Conclusion

Informatization of society is currently one of the primary tasks of the European Union, which has set itself the goal of becoming the most dynamic and competitive economy by 2020, and the means should be the information and communication technologies and the building of information society. The Slovak Republic as a member state of the European Union is taking steps, through which it follows the process of informatization of society. It is important to analyze the processes in the other Member States which can be considered as inspiration in the Slovak Republic. The issue of electronic form of a judicial decision in the administrative judiciary is in some countries already a reality. For example, in the Czech Republic, Law no. 150/2002 Coll. Administrative Procedure Code regulates the service of documents by electronic means and judicial decisions are not of this form of delivering excluded as it is in the Slovak Republic.
In conclusion, the process of electronization of the judiciary in the Slovak Republic still has a long way to go, but as partial positive steps can be considered the possibility of filings and other further submissions to courts in electronic form. In the near future it can be expected that the electronic form of the judicial decision will become a reality also in the Slovak Republic.

Acknowledgements
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Session: Industrial Engineering, Innovations

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THE VEHICLE OWNERSHIP LEVEL IN RELATION TO THE CALCULATION OF PARKING SPACES

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Abstract: *The vehicle ownership level describes how many people per car are there in the selected area. Its value is the key factor to determine the vehicle ownership coefficient, which significantly affects necessary amount of parking places (coefficient can increase the number of spaces by up to 75 % or reduce by up to 27 %). The analysis of the national standard ČSN 73 6110 showed that there are some uncertainties that can affect the correct value of the vehicle ownership level. For example, uncertain time and area of the vehicle ownership level but also ambiguity in the calculation of parking spaces in relation to the vehicle ownership level.*

Keywords: *vehicle ownership level, parking space, standard*

1. Introduction

Parking is an important issue in the most of the cities. The main reason is the growing number of personal vehicles and their prioritizing by inhabitants over other commuting methods. To improve the situation, it is important to affect the traffic policy of cities, but also fulfil the necessary demand by setting all the factors which affects the parking spaces calculation. One of the more important factor is the vehicle ownership level. The vehicle ownership level describes how many people per car are there in the selected area. Value of the vehicle ownership level currently affects the number of parking spaces via the vehicle ownership coefficient ka. That coefficient should contain a number of vehicles per a selected area and accordingly increase or reduce a number of the necessary parking spaces.

2. The issue of the vehicle ownership coefficient

Using data of the Czech Statistical Office and the Central Registry of Road Vehicles were determined the vehicle ownership levels since 1974 till 2015 [1], [2]. While during 1974 were registered 113 personal vehicles (vehicles category M1) per 1000 inhabitants, which means almost every ninth person owned a vehicle, during 2015 were registered 477 personal vehicles per 1000 inhabitants which means that almost every second person owns a vehicle. The number of vehicles was increased during last 40 years by more than 435 %.

The Czech technical standards use the vehicle ownership level to set the vehicle ownership coefficient. Each of the standards set the basic values of the coefficient, which are based on the initial state of the vehicle ownership level, and the value is set to 1. When the real vehicle ownership level is higher than the initial state, the coefficient is higher than 1 and that's why the counted number of the parking spaces is increased. When the real vehicle ownership level is lower, also coefficient is lower than 1 and the number of the parking spaces is reduced.

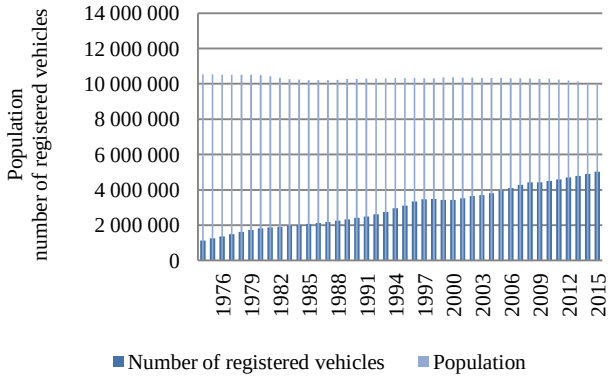

Figure 1: The number of registered vehicles and the number of inhabitants in CZ

Table 1 The vehicle ownership coefficient

Vehicle ownership level	*700	600	500	400	333	290
	**1:1.43	1:1.67	1:2.00	1:2.50	1:3.00	1:3.50
Vehicle ownership coefficient	1.75	1.50	1.25	1.00	0.84	0.73

* Number of vehicles/1000 inhabitant
** 1 vehicle/number of inhabitants

The Czech standard ČSN 73 6110 Design of urban roads issued in 1974 defined two initial states of the vehicle ownership level; 200 spaces per 1000 inhabitants (1:5) and 280 spaces per 1000 inhabitants (1:3.5). Later, the standard ČSN 73 6110 Design of urban roads issued in 1986 used only one initial state of the vehicle ownership level; 280 spaces per 1000 inhabitants (1:3.5). The next standard is the currently valid national technical standard which sets the initial state of the vehicle ownership level as 400 spaces per 1000 inhabitants (1:2.5) [3].

When we compare the values of the initial state of the vehicle ownership level in each of the standards with the real values of the vehicle ownership level based on the number of inhabitants and the number of registered

vehicles in the Czech Republic, we can say that the older standards used as the initial state of the vehicle ownership level values higher than the real value was. According to that we can assume that the standards were based on some future perspective. However, the currently valid standard sets the initial state of the vehicle ownership level to the exactly same value as was the real value of the vehicle ownership level in the year when the standard was issued.

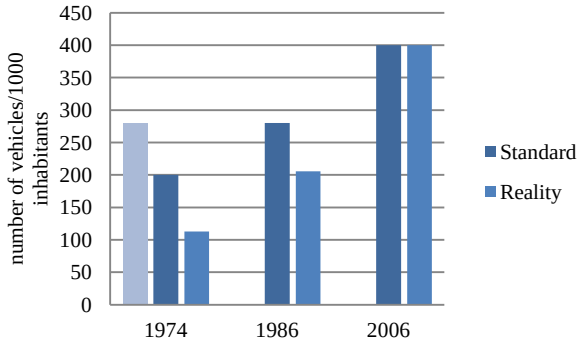

Figure 2: The comparison of the real vehicle ownership level and the initial state used in standards

The current standard states that the value of the vehicle ownership level is set by a planning documentation created for selected area and should take into account a policy of municipality, if such documents exists.

The comparison of the real vehicle ownership level (a ratio of the number of vehicles according to a vehicle registry and the number of inhabitants in the same time period) to the vehicle ownership level used in planning documentation. The following graph shows that attitude is quite different, which is the most probably caused by the different parking policy. Some of the municipalities tend to set a higher vehicle ownership coefficient to increase the number of parking places (like Brno, Český Těšín, Hradec Králové, Karviná, Pardubice). Other municipalities like České Budějovice, Opava, Ostrava tend to reduce the number.

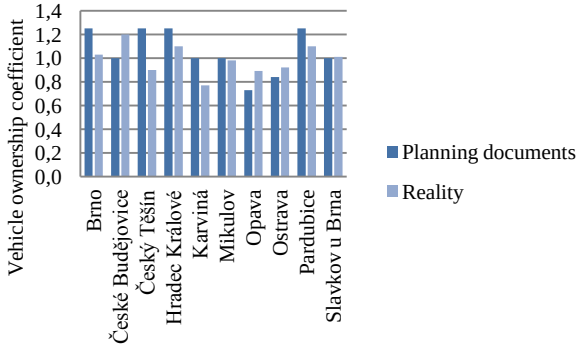

Figure 3: The comparison of the vehicle ownership coefficient in the planning documents to the real values

3. The discussion about the vehicle ownership level

As was mentioned above, the vehicle ownership coefficient is the key factor to determine the number of the parking spaces because it can increase the number by up to 75 %, or reduce by up to 27 %. The standards however contain some uncertainties which make determining of the vehicle ownership level and the vehicle ownership coefficient difficult. These uncertainties may lead to the arguments during the building permit processes.

3.1 The time uncertainty of the vehicle ownership level

The standard doesn't set clearly to what time period should be the vehicle ownership level set to. Previous standards used some future perception when setting the initial state of the vehicle ownership level. However, the currently valid standard doesn't have anything like that. The initial state of the vehicle ownership level was determined according to the real state of vehicle ownership level in the Czech Republic during year when the standard was issued (400 vehicles per 1000 inhabitants), during last year the real vehicle ownership level grew to 477 vehicles per 1000 inhabitants. That's why it would be appropriate to include some kind of the progression in the initial state of the vehicle ownership level or to set the valid time period, as it is set for intensity and capacity calculation of roads and intersections.

3.2 The sources and unity of the vehicle ownership level

The standards states that the value of the vehicle ownership level is set by the planning documents in selected area and it should also take into account the municipality policy, if such documents exist. However, these documents exist only in some of the municipalities and aren't updated on regular basis to correspond to the real development of the vehicles numbers. The only exception may be larger cities, which issue the traffic year books with updated values of the vehicle ownership levels (like TSK Praha). The standard does not set how to determine the value of the vehicle ownership level for places where these documents do not exist.

In addition to that the same vehicle ownership coefficient is used in ČSN 73 6110 for parking spaces used to short and overnight parking. This assumption would mean that vehicles do not move during a day. The overnight parking spaces can be determined according to the vehicle registry, as there is the correlation between the number of overnight parking vehicles and the number of living inhabitants. However, the short term parking spaces are also used by visitors from other areas due to a work, a tourism or other activities.

3.3 The area of the vehicle ownership level

The standard states that the vehicle ownership level is determined for the selected area, however it is not specified how big should this area be (part of a city, a city, a region, …). The standard refers to the planning documents, which mean metropolitan plans, area plans or regulatory plans. The planning documents are however used by different authorities, metropolitan plans are used

by regions, area plans are used by municipalities and regulatory plans are used by villages or parts of the city.
To illustrate the number of "moving" cars, the analysis of commuting times was done, based on the data of the Czech Statistical Office. The analysis showed that 40 % of a car movement is done by personal vehicles (not considering more passengers in one car). The analysis also showed that in bigger cities is the number of incomers higher than the number of outcomers. On the other side, for example, in villages with under 1000 inhabitants, over 90 % of them commute to work out of the village as is showed in the following figure.

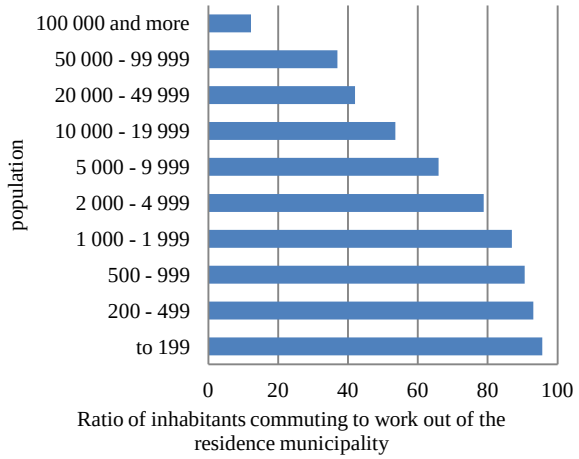

Figure 4: The ratio of inhabitants commuting to work out of the residence municipality

However, there can be exceptions, like smaller municipalities with large industrial areas like Modřice, Lanškroun, Otrokovice etc. For example, the Modřice village has registered 2222 personal vehicles, but number of commuting vehicles to work to the village is 1282, which is more than half of the registered vehicles in the whole village. Determining the vehicle ownership level may be easily misleading due to that.

6. Conclusions

Determining the vehicle ownership level used for the calculation of the number of short term and overnight parking spaces is not totally clear. The currently valid standard ČSN 73 6110 showed some uncertainties, which may lead to the wrong calculation of the parking spaces necessary needed. For example, the standard does not specify for what area or in what time period should be the vehicle ownership level considered. The similar issues were solved in past in the Slovakia Republic and led to the exclusion of the vehicle ownership coefficient out of the parking spaces calculations.

Acknowledgements

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SPATIAL FACTORS AFFECTING USERS' EXPERIENCE IN URBAN UNDERGROUND ENVIRONMENTS: THE REVIEW OF EMPIRICAL STUDIES

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Abstract: *Underground buildings attract hundreds of users every day and increasingly they perform as urban activity nodes. However, despite the high human activity, the space below the ground level is often perceived as unattractive, second-category place, which causes anxieties and fears. Underground environments are associated with a strong discomfort and by many users are considered as unsafe and dangerous. This study uncovers key behavioral obstacles related to the use of subterranean facilities designated for public use. Based on the comprehensive analysis of the selected studies, it identifies the attributes of physical environment which can affect users' experience. The outcomes show that humans' experience in underground environments can be influenced by both architectural and urban factors. The spatial variables identified as the key factors relate to the city context, the nearest surroundings as well as to the architectural features.*

Keywords: *underground architecture, spatial factors, comfort, safety, literature review*

1. Introduction

Urban underground space plays a crucial role in creating cities which are able to deal with today's global challenges. The subterranean location is recognized as a way to reduce some of the functional and social problems of contemporary metropolises, including the issues related to transport, communication, density and overcrowding. Underground buildings attract hundreds of users every day and increasingly they perform as urban activity nodes. However, despite of the high human activity below the ground level, the subterranean pedestrian crossings, tunnels or public transport stations are often perceived as unattractive, second-category spaces, which cause anxieties and fears. Users' experience in subterranean space is associated with several psychological, physiological and social problems affecting their comfort and safety. Existing literature distinguishes several obstacles to underground space: individuals' negative attitudes, cognitive and functional difficulties, lack of social control, poor visibility or overview [1], [2], [4]. These behavioral aspects are extremely important for the final users, but they are often overlooked in the design process. Because of their subjective nature, they are also difficult to measure and consequently they rarely become subjects of empirical studies.

This research aims to overview contemporary evidence-based studies focusing on the relation between human and physical environment of contemporary underground space and to identify spatial factors affecting users' experience in facilities designated for public use.

2. Methodology

The analysis is based on the comprehensive literature review of empirical studies conducted in the years 2000-2016. The papers selected for the analysis were chosen using Scopus citation database. The search of the papers was conducted based on the specific keywords such as 'underground urban planning', 'underground architecture' and 'underground space design', as well as 'experience', 'safety', 'comfort', 'accessibility', 'wayfinding', 'visibility'. The papers were reviewed based on the title, keywords and abstract. This procedure has resulted in the collection of 62 articles, which were further studied in detail. Based on this review, 13 papers were selected for the final research. The papers selected for the analysis focus solely on the influence of physical environment on uses' experience. The papers discussing the significance of other factors such as temperature, light (illumination), noise, air quality or social parameters related to privacy and congestion are excluded from the analysis. Similarly, the analysis does not account for the papers related to working places such as underground offices, mines, etc., but focuses on underground facilities designed for public use only.

3. Results

The majority of the selected studies deal with the analysis of subterranean public space designated for railway and metro stations. Only 3 papers discuss the utilization aspects of different building types, such as underground shopping malls [15], underground streets [12] and multifunctional areas [10].

Based on the review of the selected research papers, one can identify key behavioral variables which relate to both cognitive (wayfinding, orientation, navigation), functional (accessibility, movement behavior), physiological (thermal, acoustic comfort) and to psychological and social aspects (visibility, overview, attractiveness, presence of people). Some of the studies focus just on one variable, while other analyze all of them together investigating general comfort, safety or users' satisfaction.

Spatial factors determining users' experience that were most frequently recognized by the selected studies are shown in Table 1. The factor that has been most often identified (5 out of 13 articles) is the spatial geometry, which may be described as building's shape, volume, proportions of different parts of the building and the

relation between them. This factor was reported as an important variable for behavioral aspects related in particular to visibility and orientation [15], accessibility [14], acoustic comfort [12] as well as to general comfort and safety in underground metro stations [3], [6]. Other layout-related factors that have been highlighted in the reviewed studies include:

1) the position and the number of vertical communication cores [4], [5], [14], [15];
2) the presence and the position of non-structural elements, e.g. separation walls [7], exit doors [4] or another objects hindering visibility [3];
3) the functional deployment [4], [3], [12], [8].

As far as the interior design is concerned, the recognized spatial factors include:

1) materials and textures [6], [4], [14];
2) the presence of information signs [11], [14];
3) the presence of art [6], [13].

Besides the above architectural features, two key urban factors can also be identified. The first factor named as 'local integration' describes the building's relation with the nearest surroundings. It can be understood as a pedestrian accessibility from the surroundings, physical connectivity with other buildings as well as functional connectivity of above and underground levels. This factor has been mentioned in 4 of the selected studies which means, that it was recognized as often as the above mentioned layer-related factors. The second urban factor named as 'global integration' deals with object position in the city context (distance to the city center). Despite the fact that this factors has been recognized only by 2 studies, it has been reported as one of the most important aspects when it comes to users' safety in underground space [8], [9].

Table 1. Spatial factors affecting users' experience in facilities designated for public use; source: own elaboration based on the review of the examined studies

Spatial factor[1]	No. of studies
Spatial geometry (L)	5
Position/number of vertical communication cores (L)	4
Local integration	4
Functional deployment (L)	4
Presence/position of non structural elements (L)	3
Materials and textures (ID)	3
Presence of information signs (ID)	2
Presence of art (ID)	2
Global integration	2

[1] Factors named by the author of this paper
Factors related to: (L)- layout; (ID)- interior design

Less frequently mentioned factors, which were indicated only once in selected studies include: depth of the facility [9], canopy design [6], architectural light [6], specific equipment in the surroundings [3] and within the underground facility [14].

4. Conclusions

This paper shows that humans' experience below the ground level is influenced by both architectural and urban factors. The review of the relevant empirical papers recognizes key spatial factors which can affect users' safety and comfort. The identified factors relate to 4 different levels of build environment:

1) the layout;
2) the interior design;
3) the nearest surroundings;
4) the city context.

The recognized spatial factors can be considered as key aspects that should be carefully studied during the design process of underground metro and railway stations. Further studies are, however, still needed in order to identify specific solutions which could meet the users' expectations. These results may not only support architects and interior designers, but also should be of particular relevance for local and regional planning authorities.

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COMPARISON OF BREAD KVASS FERMENTED WITH DIFFERENT YEASTS

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Abstract: *The past several decades have seen a sharp increase across the globe in the consumption of caloric beverages. Kvass is a soft drink traditional to Eastern European countries, typically produced by fermenting kvass mash with yeast (traditionally Saccharomyces cerevisiae). Bread kvass is produced by soaking dried bread rusks in hot water contrary to kvass that is made from malt extract. Dairy yeast Kluyveromyces marxianus is positive for glucose and sucrose fermentation, therefore it could be applied to kvass beverage production. The aim of this study was to compare physico-chemical and sensory characteristics of kvass fermented with S. cerevisiae and K. marxianus. Strain K. marxianus DSM 5422 was obtained from Leibniz-Institute DSMZ-German Collection of Microorganisms and Cell Cultures. Naturally fermented bread kvass was made from dried rye bread rusks. Active acidity of kvass samples was measured with pH meter and dry matter was determined with a digital refractometer. Sensory evaluation of kvass samples was conducted by 30 trained panelists and 150 consumer panelists. Kvass fermented with S. cerevisiae had higher dry matter content (8.6%) and lower pH (3.88) compared to kvass fermented with K. marxianus (7.0% and 4.60, respectively). Results of hedonic evaluation did not show significant differences ($p>0.05$) between the preference of kvass samples among panellists, consumers, however, prefered kvass fermented with S. cerevisiae. Evaluators reported considerable differences in colour ($p<0.05$) while aroma of both kvass samples was similar.*

Keywords: *kvass, non-traditional yeast, hedonic evaluation, Saccharomyces cerevisiae, Kluyveromyces marxianus*

1. Introduction

1.1 Kvass beverage

The past several decades have seen a sharp increase across the globe in the consumption of caloric beverages [13]. Although their regular intake has been associated with human health problems, carbonated soft drinks remain one of the most frequently consumed ready-to-drink beverages in the world [3]. Soft drinks are defined as water-based flavoured drinks usually with added carbon dioxide and with nutritive, non-nutritive, and/or sweeteners with other permitted food additives [14]. They present particular characteristics such as high sugar content and acidity, and are available on the market in many flavours [3].

Kvass is a soft drink traditional to Eastern European countries, typically produced by fermenting kvass mash with yeast (traditionally *Saccharomyces cerevisiae*); alcohol content in kvass must be less than 1.2% alcohol by volume. Kvass, a non-alcoholic beverage, is produced from rye or dried rye bread by natural fermentation [7]. Kvass quenches thirst, is invigorating and refreshing. Because of the favourable composition of the microflora (lactic acid bacteria, yeast), kvass is enriched with B group vitamins, as well as lactic acid and carbon dioxide; it is a product of incomplete alcoholic and lactic acid fermentation [11]. Kvass has beneficial effects on the digestive tract; furthermore, energy value of naturally fermented kvass is only 25 kcal (105 kJ) per 100 ml [8], which is about ½ less than in typical soft drinks. Most of the beneficial substances come from the raw materials used in naturally fermented kvass production – rye bread and malt, especially in non-pasteurized kvass.

1.2 Yeast alternatives

There is tremendous diversity among yeasts and the application of modern microbiological and molecular approaches has resulted in renewed focus on the biology and industrial potential of yeasts other than *S. cerevisiae*. Nowadays, an upsurge of interest in providing suitable starter and adjunct cultures for food production has been observed. Many researchers have proposed a variety of cultures as alternatives to baker's yeast, including *Kluyveromyces marxianus* [12]. The dairy yeast *K. marxianus*, described as a homothallic, hemiascomycetous yeast, is phylogenetically related to *S. cerevisiae* and positive for assimilation a wide range of sugars [5]. As a dairy yeast, *K. marxianus* can be grown in cheese whey (lactose fermentation), which is the main by-product of the dairy industry, and its disposal causes serious environmental problem [4]. *K. marxianus* has also been successfully used in bread making instead of baker's yeast [2] and for agave must fermentation in tequila production, showing increased volatile compound content comparing with a *S. cerevisiae* baker's yeast [10].

Recently, a *K. marxianus* strain has been experimentally grown and studied in a non-conventional dairy product factory in Latvia, therefore additional uses of this yeast in other food sectors have been considered. One of the potential uses could be kvass production, as *K. marxianus* is positive for glucose and sucrose fermentation.

Sensory parameters such as aroma, taste and colour are critical in the acceptance of products; therefore the aim of this research was to compare physico-chemical and sensory characteristics of kvass fermented with *S. cerevisiae* and *K. marxianus*.

2. Materials and methods

2.1 Microorganisms

Strain *K. marxianus* DSM 5422 was obtained from Leibniz-Institute DSMZ-German Collection of Microorganisms and Cell Cultures and maintained on agar plates containing 2% glucose and recultivated in semi synthetic medium containing lactose 50 g/L, yeast extract 5 g/L, $MgSO_4 \cdot 7H_2O$ 1.4 g/L, KH_2PO_4 1.0 g/L, K_2HPO_4 0.1 g/L, $(NH_4)_2SO_4$ 5.0 g/L at 30℃ with agitation 180 rpm. The wet cells were harvested by centrifugation at 5000 rpm for 10 min and then were used for kvass preparation. Dry baker's yeast S. *cerevisiae* from Lallemand Ltd. was used for comparison.

2.2 Kvass preparation

For bread kvass production, the additional materials were used: rye bread rusks (Liepkalni Ltd.), lactic acid bacteria *Leuconostoc mesentericus* (Chr. Hansen Ltd.), beet sugar (Dansukker Ltd.) and dark malt (Liepkalni Ltd.). Kvass was produced according to Lidums et al. [8]: for 1 litre of kvass mash, 200 g of rye bread rusks and 2 g dark malt were soaked in 2 litres of hot water (78±2 °C). Bread rusks were left to soak for 3 hours, then the water-bread rusk suspension was filtered (300 microns) and the liquid fraction was cooled down. 1 g baker's yeast (or proportionate amount of wet *K. marxianus*), 2 units of lactic acid starter and 30 % of the estimated quantity of sugar were added to 1 litre of kvass mash. The total quantity of sugar for kvass production is 30 g; therefore 10 g of sugar were added prior to fermentation. The fermentation of kvass mash took 9 hours at 29 ± 1 °C. After fermentation kvass was placed in a refrigeration chamber to cool down to 3 ± 1 °C. After cooling, the remaining sugar was added (blending). Kvass was maturated for 12 hours at 6 ± 1 °C (total production time 25 hours). Afterwards kvass was filled in 0.5 l PET bottles and stored at 4 ± 1 °C for 12 hours before physicochemical analysis and sensory evaluation.

2.3 Physico-chemical analysis

Kvass quality parameters are defined by the Regulation No 926/2010 "Quality and classification requirements for kvass and kvass (malt) beverage" of the Cabinet of Ministers of the Republic of Latvia. The parameters defined are 1) dry matter content - 3.0 to 14.0 percent by weight, and 2) acidity - 2.0 to 3.5, expressed as ml of 1n NaOH per 100 ml. Active acidity (pH) of kvass samples was measured by a pH meter (Jenway 3510, Jenway, UK) and dry matter (Brix°) by a digital refractometer (DR301-95, Krüss, Germany).

2.4 Sensory evaluation

A total of 30 trained panellists (18 men and 12 women, average age 22 years) from Faculty of Food Technology, Latvia University of Agriculture participated in initial testing of kvass fermented with *S. cerevisiae* (sample A) and *K. marxianus* (sample B).

As views of consumers are very important, 150 consumers (57% women and 43% men, average age group 25-45) were asked to complete a short questionnaire about their kvass consumption habits and participate in kvass tasting during the Baltics food industry fair 'Riga Food 2015'. 5-point hedonic evaluation (5 – like very much and 1 – dislike very much) was used in order to determine the overall preference of the samples, while line scale showed the intensity of kvass sensory properties (aroma, flavour, acidity, and colour) [6].

2.5 Data analysis

The obtained data processing was performed using mathematical and statistical methods with Microsoft Excel v16.0; differences among results were considered significant if p-value < 0.05. One-way analysis of variance (ANOVA), Tukey's test and independent samples *t*-test were used.

3. Results and discussion

3.1 Physico-chemical parameters

Dry matter content in sample A (kvass fermented with *S. cerevisiae*) was 8.6 ± 0.1% and in sample B (kvass fermented with *K. marxianus*) – 7.0 ± 0.1%. Active acidity (pH) was lower in sample A (3.88 ± 0.02) compared to sample B (4.60 ± 0.03). According to the indexed values of the Regulation No 926/2010, dry matter content and pH value of laboratory produced kvass corresponded to the regulatory scale (experimentally determined conversion factor for pH ~1.8).

3.2 Kvass consumption patterns

Consumption of kvass in mainly dependent on the weather outside, as majority of women (52%) and men (27%) drink kvass when the weather is warmer, i.e., during summer months (Fig. 1.).

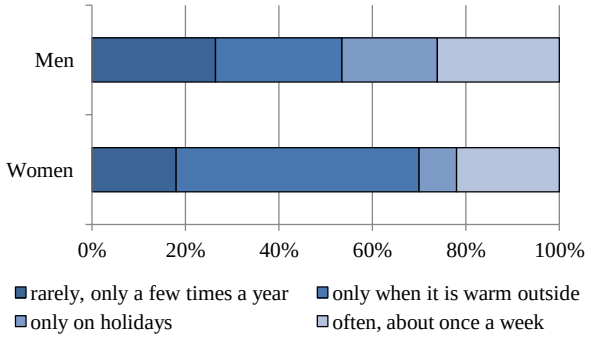

Figure 1: Frequency of kvass consumption

Approximately ¼ of both genders consume kvass once a week and about the same amount of consumers rarely drink kvass. For some men (20%) holidays are the time when they increase kvass consumption. There is a similar amount of consumers of both genders who consume kvass frequently or drink it rarely.

3.2 Kvass sensory evaluation

According to trained panellists the overall preference of kvass drinks range from 4.1 – 'like a little' to 5.0 – 'like very much' (Fig. 2). Hedonic evaluation showed that there were not significant differences (p>0.05) between the

preference of kvass samples among panellists. Results of consumer evaluation reported considerable preference to kvass sample A ($p<0.05$), which was within the range from 'like a little' to 'like very much'. Preference of kvass sample B ranged from 3.5 – 'not sure' to 4.0 – 'like a little'. Preference of kvass fermented with *S. cerevisiae* (sample A) between panellists and consumers was similar ($p>0.05$), yet consumers liked fermented with *K. marxianus* (sample B) less than panellists ($p<0.05$).

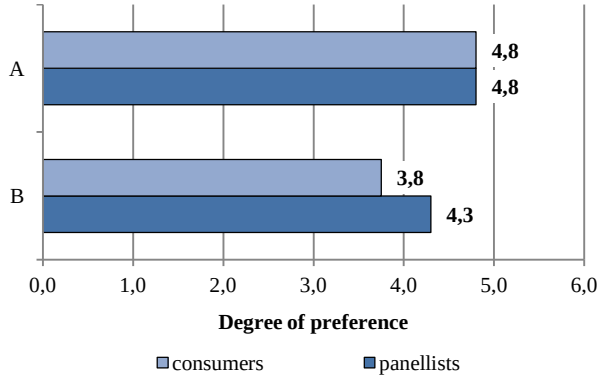

Figure 2: Results of hedonic evaluation of kvass samples

The majority of consumers (56%) reported they would probably not drink kvass with *K. marxianus*, while 15% would not drink kvass with *S. cerevisiae*. 60% of consumers would like to consume kvass with *S. cerevisiae* regularly as it has a more traditional taste. Some consumers liked the aroma, acidity and aftertaste in kvass with *S. cerevisiae*; however others pointed out that it did not have enough acidity, bitterness and CO_2. Kvass with *K. marxianus* was reported to have not enough acidity and aroma; it was too light for typical kvass. Children (of consumers) who did not participate in sensory evaluation said that this sample tasted like lemonade.

This brings us to consider soft drink consumption patterns of consumers, as most of the commercially available beverages sold as kvass are kvass drinks made by diluting grain extract concentrates with water and adding colourings, flavours and artificial sweeteners. Kvass drinks are sometimes produced without the use of yeast, therefore carbon dioxide is added artificially for no fermentation has taken place [9]. Naturally fermented kvass is less likely to have the amount of carbon dioxide found in soft drinks with added CO_2, as yeast produces lower amounts of longer lasting carbon dioxide during natural fermentation. Therefore, naturally fermented kvass could be preferred less than its rival kvass drinks with high CO_2 content, if consumers prefer highly carbonated beverages.

In order to evaluate and compare the intensity of kvass sensory properties, line scale was used. Consumer evaluation showed significant differences between kvass sample A and B in terms of flavour and colour ($p<0.03$) however aroma and acidity of kvass samples was similar ($p=0.33$) (Fig. 3.).

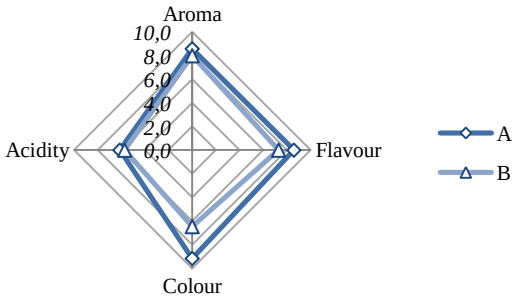

Figure 3: Consumer evaluation of the intensity of sensory properties of kvass samples

Panellists reported considerable differences between colour and acidity of kvass samples ($p<0.03$), but aroma and flavour were comparable ($p>0.26$) (Fig. 4).

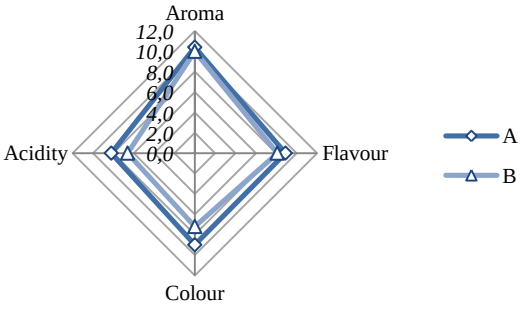

Figure 4: Panellist evaluation of the intensity of sensory properties of kvass samples

Consumers reported that kvass fermented with *S. cerevisiae* (sample A) had a more pronounced flavour while panellists found similar flavour in both samples. Dimitrellou et al. [2] pointed out that analysis of volatile aroma-related compounds and the amounts of total volatiles in bread samples (breads produced by baker's yeast and *K. marxianus*) were not significantly different. Panellists, on the other hand, noted higher acidity in kvass sample A that is also shown as lower pH value.

Colour intensity differences were reported by both groups of evaluators. Kvass sample A had a darker, more intense colour than sample B. Food colour usually is the first quality parameter evaluated by consumers which is critical in the acceptance of products [1]. However, there are no regulations for kvass colour as it is dependent on ingredients used; it is possible that there were inconsistencies within the colour of rye bread rusks and dark malt, therefore, resulting in various colour intensities of kvass mash.

When comparing intensity of sensory properties evaluated by consumers and panellists of the same kvass sample, sample A showed differences between aroma and acidity intensity (Fig. 6). Panellists reported more pronounced aroma and acidity of kvass sample A ($p<0.01$), while flavour and colour had insignificant differences among evaluators.

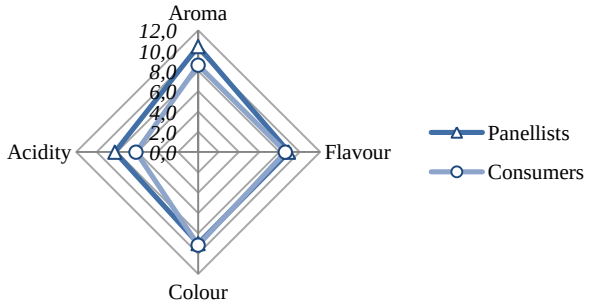

Figure 5: The intensity of sensory properties of kvass fermented with S. cerevisiae

As for kvass sample B (Fig. 6), panellists found kvass aroma to be significantly more intense ($p<0.01$) contrary to consumers. Panellists noted that acidity, flavour and colour of kvass sample B was more distinct, however there was only borderline significance ($p<0.1$).

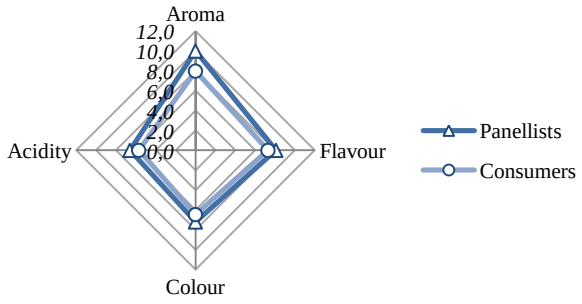

Figure 6: The intensity of sensory properties of kvass fermented with K. marxianus

Consumer soft drink consumption habits play a great role in preference of kvass samples and intensity evaluation of sensory properties. Differences in consumer evaluation are always linked with psychological and environmental aspects [6]. It should be noted that sensory properties of kvass also depend on technological process; therefore kvass produced at a factory could have diverse intensity of sensory properties contrary to kvass produced at laboratory.

4. Conclusions

Dry matter content and active acidity of kvass samples was within the admissible range according to Regulation No 926/2010 of the Cabinet of Ministers of the Republic of Latvia.

Consumer consumption of kvass is mainly dependent on the weather outside, as majority of drink kvass when the weather is warmer, while approximately ¼ of both genders consume kvass once a week. Hedonic evaluation showed that there were not significant differences ($p>0.05$) between the preference of kvass samples among panellists. Preference of kvass fermented with *S. cerevisiae* between panellists and consumers was similar ($p>0.05$), yet consumers liked fermented with *K. marxianus* less than panellists ($p<0.05$). Consumer evaluation showed more pronounced flavour and colour in kvass fermented with *S. cerevisiae*, but aroma and acidity of kvass samples was similar. Panellists reported more pronounced colour and acidity in kvass fermented with *S. cerevisiae*, yet aroma and flavour were comparable. The results suggest that *K. marxianus* DSM 5422 could be suitable for kvass fermentation and production; however additional evaluation of kvass produced at a factory should be carried out.

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COMPARISON OF SOIL CHARACTERISTICS AND UNDERSTOREY VEGETATION PRIMARY PRODUCTION OF ACIDOPHILOUS BEECH FOREST IN TRIBEČ MTS, SLOVAKIA

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Abstract: *Researchers do not pay attention to acidophilous beech forests in Slovakia because these forests cover very small area of Slovakia (2.4 %). In our field work we present results of the productivity of understorey and soil analysis. Field work was performed on two acidophilous beech forests in Tribeč Mts. in 2015 in locality no.1 Kozlíšov vrch and locality no. 2 Prostredný vrch. Only herb-layer was considered, where was applied harvest method in sample plot, sized 1 x 1 m. Above-ground biomass was sorted according to species. Litter mass was divided into woody, leaf, herbaceous, fruits and mixed litter. Laboratory analyses focused on the assessment of chemical soil characteristics soil pH H_2O, soil pH KCl , total Nitrogen (N) content in mg N/kg, humus content in %, total Carbon content (C_{OX}) in %. In both forest communities dominated acidophilous grasses as Luzula pilosa, Avenella flexuosa, with ultra acidic soil reaction of both evaluated phytocoenoses. Forest communities are species-poor with low understorey production maximum documented 78.3 g per square meter. Total litter dry mass was 417.2 g.m^{-2} in Kozlišov, in locality no. 2 it was 535.5 g per square meter. Big differences were not observed in species composition of evaluated communities. However, soil analysis showed great differences in the humus content and total nitrogen content.*

Keywords: *production, soil analysis, Luzulo-fagetum, Tribeč Mts., SW Slovakia*

1. Introduction

Luzulo-Fagetum beech forest habitat is distributed in the mid-European domain of Central and Northern Europe, from plains to lowland hills and from sub-mountainous to high-mountain levels. The area extends from the Spanish Pyrenees in south-western Europe to the Baltic States and Sweden in the North (European Commission, 2007; Ellmauer, 2005). It occurs mainly in old or recent mountainous ranges such as the Black Forest, Bavarian Plateau, the Alps, Carpathians, Ardennes, Vosges, Massif Central, Jura, Pannonic Hills and Bohemian Quadrangle. In Denmark, southern Sweden and northern Germany, it is also found on lowland hilly landscapes. Acidophilus beech forests are extended to 2.4 % in Slovakia (Figure 1) (Forestportal, 2015).

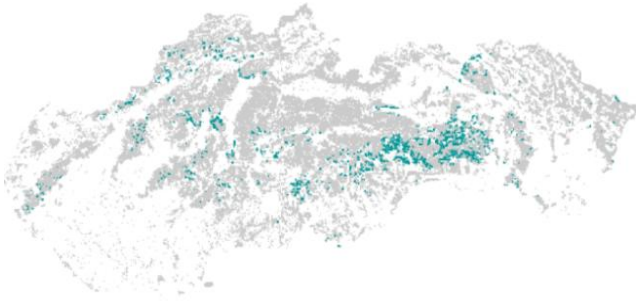

Figure 1: Map of Slovak republic with extending of acidophilus beech forests (forestportal, 2015)

Due to the dense shadow cast by beech, the understorey of this type of forest is sparse and floral diversity rather poor (Thauront, Stallegger, 2008). European beech (*Fagus sylvatica*) forms natural forest stands within a great variety of environmental conditions, including the whole soil pH gradient found in temperate forests (Ellenberg, 2009). In European legislation, *Luzulo-Fagetum* beech forests are situated at habitats with acid soils in hilly, sub-mountain and mountain areas of Middle Europe (Kučera et al. 2010). The aim of study was to compare primary productivity and soil characteristics in two acidophilous beech forest in Tribeč Mountains, SW Slovakia.

2. Material and Methods

The field work was performed on two acidophilous beech forests in Tribeč Mountains in 2015.

2.1 Study area

The study was conducted in Tribeč Mountains (Zlaté Moravce district, SW Slovakia). The sample plots were situated in acidophilous beech forests:
Locality no. 1: Kozlišov vrch (Velčice cadaster), GPS N 48°27´59.2´´ E 18°16´00.8´´, 490 m.s.n.m., exposition: N, slope: 35°.
Locality no. 2: Prostredný vrch Gamekeeper´s cottage (Skýcov cadater), GPS (Skýcov), GPS N 48°30´36.7´´ E 18°24´02.3´´, 538 m.s.n.m., exposition NW, slope: 5°

2.2 Direct sampling method

2.2.1 Above-ground biomass

In our research only herb-layer was considered. For primary production estimation of understorey vegetation we applied harvest method by direct sampling of individual plants according to Dykyjová et al. (1989). Herb-layer biomass was collected from sample plot, sized 1 x 1 m. Excavated plants were first sorted according to species and then transported to laboratory in Nitra and dried in oven 80°C to constant mass. The dry mass was estimated separately for individual species and calculated for 1 m^2.

2.2.2 Litter dry mass

Estimation of the litter mass was conducted in the similar way as the above-ground biomass. The litter was collected from forest floor - soil surface, the same sample plot 1 x 1 m. It was divided into woody, leaf, herbaceous, fruits and mixed litter. Mixed litter represents every category of litter which was not possible to differentiate. Then was transported to laboratory in Nitra, where it was dried in oven 80°C to constant mass. After drying litter was weighted on analytical balance and calculated for 1 m^2.

2.3 Soil analysis methods

Two soil samples were taken from a depth of 0.20 m in each distance. Soil samples were analysed in laboratory in Nitra. The collected soil samples were dried in the laboratory at room temperature. After drying, samples were homogenised and sieved through 2 mm grain size. Laboratory analyses focused on the assessment of chemical soil characteristics according to Fiala et al. (1999):

soil pH H_2O, soil pH KCl , total Nitrogen (N) content in mg N/kg, humus content in %, total Carbon content (C_{OX}) in %.

3. Results and discussion

3.1 Primary production of understorey vegetation

In Tribeč Mts. in acidophilous beech forest in 2015 was found following primary production: in locality no. 1 it was 37.9 g per square meter, where 6 species were documented for quadrat. Locality no. 2 represents 4 species for quadrat with primary production 78.3 g per square meter. Higher biomass production caused occurring of *Vaccinium myrtillus* (211 individuals). Kubíček, Jurko (1975) estimated above-ground biomass of herb-layer in different forest communities. Authors found production of *Luzulo-Fagetum* in Male Karpaty 40.65 kg per ha, with 5 recorded species in fytocenological relevé. Among the values reported in literature for beech forests throughout central Europe, the herb layer biomass in the nutrient poor beech forest at Solling (27–56 kg ha-1) represented the lower end of the range (Schulze et al. 2009). The biomass of the moss layer may be larger than that of the herbaceous layer, for example as at Solling (Schulze et al. 2009).

Number of recorded species in both evaluated localities replying low species diversity. These forest communities are shady and seem dark in summer, and may even appear to be species-poor compared with some mixed deciduous forests (Grossman, 2015).

Dominant species in evaluated plot sites were *Luzula pilosa* with percentage 74.19 % and *Avenella flexuosa* 16.17 % (Figure 2) in community in Kozlišov vrch. Negative effect to vegetation can produce presence of invasive *Solidago canadensis*, which is very competitive. Other recorded species in locality were *Hieracium murorum*, *Veronica officinalis* and *Fagus sylvatica* with negligible percentage of biomass production (8.65 %). In Prostredný vrch dominated *Avenella flexuosa* 64.30 % *Vaccinium myrtillus* 30.69 % (Figure 3). Bilberries do not produce fruits in studied locality, only one plant had berry fruits sized 0.5 cm with 0.01 g. Records of bilberries harvesting show that it is not effective because of irregular small harvest fruits (Kramár, 2000). Eliáš (1984) claimed that harvesting of bilberries is slow and inefficient.

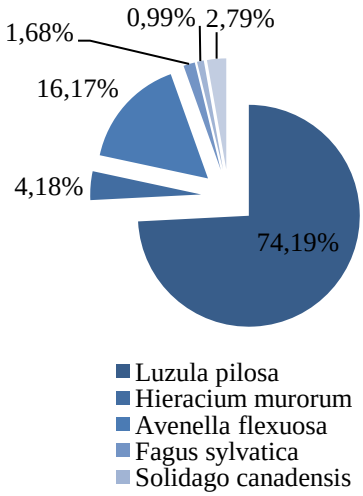

Figure 2: Percentage of species in primary production in locality no. 1

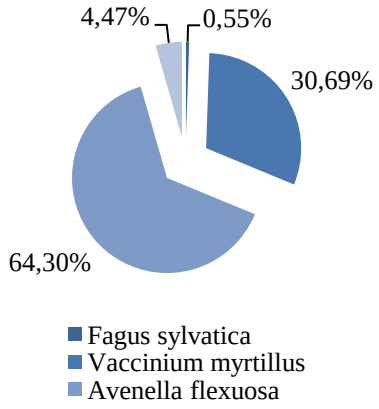

Figure 3: Percentage of species in primary production in locality no. 2

Dražil et al. (2005) characterised forest community as biotop with dominated acidophilous grasses in

understorey. In the most favorable types dominate *Luzula luzuloides*, in our case *Luzula pilosa*, in the more acidic *Vaccinium myrtillus* and *Avenella flexuosa*, in the most extreme are common mosses (forestportal, 2015).

3.2 Primary production of litter mass

Total litter dry mass was 417.2 g per square meter in Kozlišov. The most of litter fall represents mixed litter 41.18 % (136 g), where were included not possible to sort parts of litter. Woody litter represents trunk, branches and dead wood in percentage almost 21 % (Figure 4). Fruit litter reached 24.27 % and leaves litter 12.20 %. Total aboveground litter fall under beech stands has a number of components which include leaf, as the main component, and other components of twigs, discarded buds, small pieces of woody components and pieces of bark. Periodically, a significant proportion of litter fall may contain inflorescence and fruit components (Khanna et al. 2009).

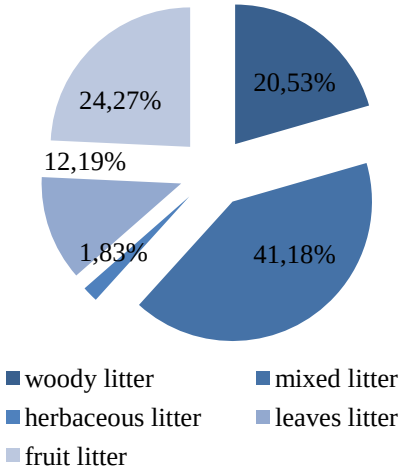

Figure 4: Percentage of litter dry mass in primary production in locality no. 1

Mass of litter is comparing with locality no. 2 with litter fall production 535.5 g per square meter, where mixed litter produced 32.57 % (Figure 5). Other categories of litter mass (woody, leaves, fruit) represented about 20 %. Herbaceous litter in locality no. 2 was not documented. The phytomass amount in forest stands in Slovakia is in general 100-500 metric tonnes per one hectare. From this amount, 5-10 % reaches the forest soil as litter fall yearly. For the annual quantity of decomposing litter in young beech forest stands aged 29 -35 years report Slodičák and Novák (2008) a value ranging 3.1 -5.8 t- ha-1, for a beech-spruce stand, it was recorded 4.6 – 5.5 t.ha-1 (Novák, Slodičák, 2009), for an older beech stand 4.7 t.ha-1 (Lebreta et al., 2001). Accumulation of forest litter is much dependent on forest type and on conditions for development (Zonn, 1956). Under different conditions, the same forest type may produce different litter amounts (Barna et al. 2011).

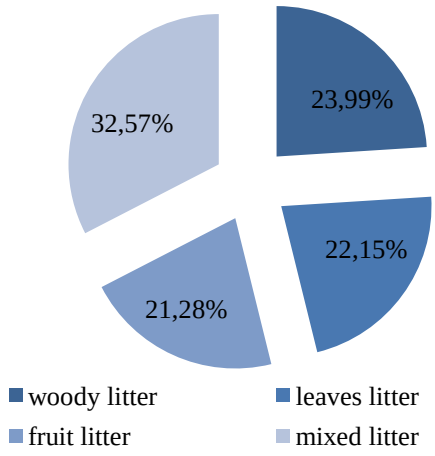

Figure 5: Percentage of litter dry mass in primary production in locality no.2

3.3 Comparison of soil characteristics

Acid soils are substrate specific with low-nutrient content. Extremely acidic soils in our country have soil pH 3 – 4. Soil reaction of both evaluated phytocoenoses is extremely acidic. Table 1 represents soil characteristics of acidophilous beech forest, where pH value in H_2O in locality no. 1 was 4.4, in KCl 3.15. In locality no. 2 was more acid pH H_2O 3.89 and pH KCl is ultra-acidic 2.83. This finding was also confirmed by Eliáš (1984). Therefore, the understorey is species-poor, because in these soil can grow only few species. Species which can grow in these soil-reaction conditions are called as acidophytes and vegetation as acidophilous (Eliáš, 1985).

Table 1 Soil characteristics of acidophilous beech forests

Locality	*pH H_2O*	*pH KCl*	*Humus content %*	*Cox %*	*Total N content mg N/kg*
Number 1	4.40	3.15	0.91	0.53	7000
Number 2	3.89	2.83	8.17	4.74	9000

Kontriš et al. (2011) contribution about soil probes shows data on spruce monoculture influence on thickness of litter horizon, consistence, oxidative-reductive processes, soil reaction and content of Ca, Mg, K, Na, Mn, Fe, Zn and P cations.

Soil organic matter (humus content, total Carbon content) is a base part of soil. Soil organic matter content in locality no. 1 is very low incomparable with locality no. 2, where is very high. It could by caused by higher litter mass in locality no. 2. Total Nitrogen content is high in both evaluated communities (7000 – 9000 mg N/kg). Higher total Nitrogen content (9000 mg N/kg) can indicate occurring of *Vaccinium myrtillus* in locality no. 2. Jurko (1990) characterised this species with eco-value 4, as species in rich soil nitrogen.

4. Conclusions

Acidophilous beech forests are evaluated as species-poor forest communities, with dominated typically acidphytes *Avenella flexuosa* and *Luzula pilosa*, with low understorey production (38 – 80 g per square meter). Production of litter fall is high in both communities (417 – 536 g per

square meter). Soil reaction is evaluated as ultra acid pH 2.83 in locality no. 2 with very high soil organic matter (humus content – 8.17 %, total Carbon content – 4.74 %). Big differences were not observed in species composition of evaluated communities. However, soil analysis showed great differences in the humus content and total nitrogen content.

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MODELS OF MIND THAT ARE IMPLIED BY CONGITIVE SCIENCE

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Abstract: *In the history of cognitive science were proposed two competing models of mind: functionalist and neural model. The functionalist model of mind is a pure symbol manipulation (computation). This model has two versions: mind is computer that is based on conscious manipulation of external data, and mind as innate system of knowledge that is based on unconscious manipulation of mostly internal data. Psychological models of mind developed as an alternative, and are based on neural accounts of "mind": neural networks, embodied mind, distributed mind and social/collective mind.*

Keywords: *cognitive, mind, computation, embodiment, knowledge*

1. Introduction: Two paradigms of mind in cognitive science

The field of cognitive science is not a united enterprise not only in terms of subjects of research, but also and especially with regard to theoretical frameworks that are implied by particular streams. There have been two different theoretical frameworks that are based on completely different tradition of thought resulting in different models of mind. The first paradigm is the original framework of cognitive science, and is based on so called "functionalism". The second is younger, and developed as a critical alternative to the first paradigm. This one is called "neural theory". Both of them are currently in use, but the second one is dominant.

1.1 Functionalist models of mind: Computational Theory of mind

This model of mind comes originally from the Artificial Intelligence research but it's argued for also in one of the current version of cognitive neuroscience, and has been applied also in generative linguistics by Noam Chomsky.

There have been two versions of Computational theory. They imply the same theory of mind but different theory of knowledge. Both argue for manipulation of symbols. Both versions share the same assumption that those operations are not derived from experience, that mind is able to operate independently of human intentionality. They are solely biologically innate, and that those functions are used by mind to manipulate empty meaningless symbols that are representations of some content. Both models share the presumption that all behaviour (all interactions, the whole discourse) is a product of mind, i.e. that it is an externalisation of either problem solving or cognitive system. Since they differ in theory of knowledge, the model of mind as computer is based on consciousness, but the model as system of knowledge rather on cognitive unconscious. Only the model of mind as computer is manipulation of external data, whereas mind as system of knowledge is computation based on internal data.

1.2 Mind is innate conscious processor of external information: mind is computer (problem solver)

This model of mind was derived from the simulation of human thought on computer programs in the research of the Artificial Intelligence, and influenced by Alan Turin: mind consists of functions like e.g. "read", "write", "address" as the most basic operations, on which all cognition is based. Mind ist defined as a General Problem Solver. Mind is based solely on processing of external data that are "raw" in the sense that they are taken by mind without prior reflection. Data are only inputs, not experiences in phenomenological sense. They are not reflected, just taken in, and processed: "

Mind as problem solver is based mostly on consciousness. This is one of the differences from similar model of mind as "innate system of knowledge" (next chapter).

In the original version called "cognitivism" or "classic theory" was assumed that the only properties of mind that are innate, and make up human thought, are based on symbolic logic: This model of mind is implied by the original version of Artificial Intelligence, and the authors of "General Problem Solver" Newell and Simon:

"The program's ability to discover proofs for theorems in logic showed that, with no more capabilities than it possessed—capabilities for reading, writing, storing, erasing, and comparing patterns-—a system could perform tasks that, in humans, require thinking. To anyone with a taste for parsimony, it suggested (but, of course, did not prove) that only these capabilities, and no others, should be postulated to account for the magic of human thinking"

The difference between two versions of this common premise is in the theory knowledge. [1]

In later versions of the Artificial Intelligence research was the conception of mind as computer extended to cover more than only logical operations. This modified version was proposed by Marvin Minsky. The mind is capable of solving problems not only by using logic but also through common sense. Minsky calls all possible operations Ways to think: e.g. reasoning by analogy, imagination, planning, impersonation etc. [2].

1.3 Mind is innate system of knowledge (cognitive system)

This paradigm is also based on mind that is innate, and that has functions that manipulate symbols. Function that have Turing properties are presupposed too. The difference from the model proposed by both versions of the AI-research is in the conception of the nature of what symbols represent. According to the AI, mind manipulates symbols that represent only data that are external, i.e. that come from perception and sensation. Only those data are supposed to be represented by symbols. The model of mind as innate system of knowledge is also based on computation, but that computation runs only within a cognitive system: "You can talk about the computational level -- In theory, though we don't know how, you can talk about the neurophysiological level, nobody knows how, but there's no real algorithmic level. Because there's no calculation of knowledge, it's just a system of knowledge. To find out the nature of the system of knowledge, there is no algorithm, because there is no process. Using the system of knowledge, that'll have a process, but that's something different." [3]

This model is applied in cognitive neuroscience, but only in the version called "standard cognitive neuroscience" (Marr, King, Gallistel). David Marr provided the explanation of visual system, and Randy Gallistel the explanation of animal cognition. Noam Chomsky advocates for their views: "if you take a look at animal cognition, human too, it's computational systems. Therefore, you want to look the units of computation. Think about a Turing machine, say, which is the simplest form of computation, you have to find units that have properties like "read", "write" and "address." That's the minimal computational unit, so you got to look in the brain for those. You're never going to find them if you look for strengthening of synaptic connections or field properties, and so on. You've got to start by looking for what's there and what's working and you see that from Marr's highest level" [4].

The model was applied in generative linguistics as the explanation of syntax: „The operation Merge is as simple as possible – it involves minimal computation. That means when you form something new from X and Y, you don't change X, Y, and you don't impose an order on them, so the output of Merge of X, Y is set containing X and Y, {X, Y}. That's the best case, and it makes sense." [5]

2. Psychological models of mind (There is no mind but only brain: psychological model is neural model of mind)

This framework dominates in current discourse, and is an alternative to both versions of the functionalist model of mind. This paradigm is based on the rejection of the conception of mind as a operation of functions and manipulation of symbols.

Instead of manipulation of symbols that is utterly innate, a psychological alternative of association of content of various kinds was proposed, that is based on neural structures. Associations can take different forms, not only networks, but also integrations or metaphor. Thought is not manipulation of meaningless data. The most significant difference from the previous paradigm is the rejection of the functionalist claim that mind generates behavior (interactions, discourse). There has been a common consensus across all cognitive disciplines of this paradigm that the opposite is true: that mind doesn't generate behavior but only reflects and supports it. Behaviour as interactions between organisms and their environments is the primary source of human cognition. There is no mind, there is only a brain reflecting and supporting conscious experience. The so called "mind", which is actually brain, is connected with the environment of an organism. The nature of this connection has been explained differently during the history of cognitive science: this paradigm started with the association between stimulus and response (neural networks). This model has been accepted, it has not been modified but only added to other models of mind: embodied mind, distributed mind and collective mind.

2.1 Mind is neural Network

This version of cognitive neuroscience is known as "connectionism" or "associativism", and developed as an alternative against the functionalist model of mind as symbol manipulation. There is no mind that would manipulate symbols but only brain reflecting the interaction of an organism with the environment: "A theory attributed to Donald Hebb, that associations between an environmental stimulus and a response to the stimulus can be encoded by strengthening of synaptic connections between neurons." [6]

Chomsky describes the tension in neuroscience between the functionalist model of mind and this psychological, associationist model of mind:

„However, it could be -- and it has been argued in my view rather plausibly, though neuroscientists don't like it -- that neuroscience for the last couple hundred years has been on the wrong track. There's a fairly recent book by a very good cognitive neuroscientist, Randy Gallistel and King, arguing -- in my view, plausibly -- that neuroscience developed kind of enthralled to associationism and related views of the way humans and animals work. And as a result they've been looking for things that have the properties of associationist psychology" [7]

This conception of mind doesn't imply the Embodiment of mind in body, and in the environment yet, and it's implied by cognitive psychology: **"**The separation of man and environment in modern psychological theories, in Cognitive psychology: particular in cognitive psychology, is a consequence of viewing humans as input-output systems when mental activity is based on linear processing of information from the environment: sensations, perceptions, and mental activity in general, are regarded as something related to the inner processing of environmental information by the senses and by the brain. The senses receive the stimuli which then run along the nervepaths to the centers analyzing the incoming information and creating interpretations of the events occurring outside the brain and body. This is the internalist account of mind, according to which mind and world are considered separate" [8]

Even if criticized, this model of mind is still accepted in all following versions of cognitive science that are based on Embodiment. However, neural networks are regarded only as an addition to other cognitive processes that are supposed to arise due to embodied experience.

2.2 Embodied mind

The general assumption is that mind is contained in the body. In this framework there is a research paradigm Neural Theory. Experience is generated by self reflection of body during the interactions with the environment. That's why all experience that comes from the reflection of the body must determine not only human concepts, but also reason. This aspect of embodied mind was advocated by George Lakoff and Mark Johnson, and became famous and influential as Metaphor Theory: "In the neural theory, conceptual metaphor arises in childhood when experiences regularly occur together, activating different brain regions. Activation repeatedly spreads along neural pathways, progressively strengthening synapses in pathways between those brain regions until new circuitry is formed linking them. The new circuitry physically constitutes the metaphor, carrying out a neural mapping between frame circuitry in the regions and permitting new inferences. The conceptual metaphor MORE IS UP (as in "prices rose," "the temperature fell") is learned because brain regions for quantity and verticality are both activated whenever you pour liquid into a glass or build any pile." [9]

Two versions of this paradigm are currently active, but both of them share the same theory of knowledge.

Interpretation Psychological – associations of content. This paradigm is based on common theory of knowledge based on so called embodiment, and is directed against the computational theory of mind. Embodiment is the alternative to both versions of the computational theory of mind, and challenges the view that the basis of knowledge is internal (i.e. innate system of knowledge) and also the view that the knowledge is calculated from meaningless data. According to the Embodiment, knowledge is generated by the interaction of the organism with its environment. The outcome of such interactions – experience – is therefore held for the basis of knowledge.

2.3 Mind is embodied but also distributed/extended

This conception of mind is not an alternative, but only extension of the "embodied mind". The conception of mind as not only embodied but also distributed into the environment was formulated as "autopoesis", younger version "distributed/extended theory of mind" originally proposed by Andy Clark and Chalmers, in various versions also "biocognitive theory" (Alexander Kravchenko, Zlatev). Evan Thompson uses the term "mind as life" (or cognition is life). [10]

This theory of knowledge is a basic paradigm that is "autopoeisis". The first project in cognitive science under this paradigm research into how every human and animal organism is essentially coupled with its environment is called "Biology of Cognition", and comes from Humbert Maturana and Francesco Varela [10]. The principle of the essential interconnection was named "autopoeisis".

Current research of what aspects of the environment determine human cognition is known as "enactive cognitive science". Another project of cognitive science within this model of mind is a research of the nature of experience as a reflection: "neurophenomenology" (Evan Thompson). According to this theory of knowledge, cognitive science should reflect every aspect of experience in the broad sense of interactions between organism and its environment [11]

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2.4 Mind is embodied, distributed/extended but extended not only into the environment but also into cognition of Others (social, collective mind)

Mind is viewed as essentially social and collective because knowledge based on experience is determined by thought of others: „It is different if we take individuals to be social persons. Their minds are social in origin and function. A theory of "extended minds" claims that they extend beyond the skins of the organisms. When we interview individuals, we have a look at multivoiced minds. The use of focus groups (nach Markova et al. 2007) is a method that tries to view the whole group as a thinking and talking society in miniature; ideas, cognitions, memories and emotions are distributed among members. What one individual says, thinks or feels is interdependent with what other members say, think and feel (or have said in the past or might say in the future)" [12]. Models of embodied and distributed mind are seen as too limited, since they don't reflect the determination of cognition by cognition of other members of the same environment: „Biocognitive theory, as I understand it, claims that cognitive processes are embodied (and environmentally coupled), but within impersonal organism-system framework. In my view, this cannot account for meaning and content. Biocognitive theory is more about living systems than meaning-making persons. The organism-environment system underrates the role of others and the distinction between these other meaning-making agents and artefacts (and other external objects) that cannot make meaning on their own" [13].

Model of this sort is argued for e.g. in theories like: "dialogism" (Per Linell) and Ethnometodology (Dell Heims).

In cognitive neuroscience this social mind is called; integrated distributed cognitive network: "Human cultures can be regarded as massive distributedcognitive networks, involving the linking of minds , often with large institutional structures that guide the flow of ideas, memories, and, knowledge through the cultural-cognitive network. Artists work within various subsystems of those broader networks; they are situated in space and time, defining themselves as members of a specific tribe and generation. They may influence the cognitive activity of their tribe, by influencing and modifying its symbols, images, and other expressive forms. Thus, they are workers within the network, highly placed within the distributed cognitive system." [14]

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HOXB8 GENE POLYMORPHISM IN FUR CHEWING CHINCHILLA – PRELIMINARY RESEARCH

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Abstract: *The fur chewing in animals is being mentioned among the obsessive- compulsive disorders. It is a group of behavioral dysfunctions of unknown origin, occurring in almost all vertebrates. Hoxb8 gene is involved in embryonic development and is extensively expressed in the CNS, in the regions responsible for grooming behavior in mammals. The loss of function mutation in Hoxb8 gene induces phenotypic symptoms comparable to the human trichotillomania - obsessive – compulsive disorder, in the course of which the patients uncontrolled pluck their hair from different areas of the body. The aim of the study was to analyze Hoxb8 gene sequence in fur chewing chinchillas for the presence of single nucleotide polymorphisms (SNPs). On the basis of the analyzed sequences, the presence of two point mutations was detected: transversion A>C (g.1451C>A), resulting in the substitution of proline to glycine and the transition A>G (g.1654A>G), resulting in substitution of aspartic acid to glycine. In the analyzed group were detected both homozygous AA, GG, and heterozygous AG.*

Keywords: *Hoxb8 gene, fur chewing, chinchilla*

1. Introduction

Obsessive - compulsive disorders (OCD) affect 2-3% of the human population. Their treatment is extremely difficult and is mainly based on cognitive behavioral therapy, and in some cases, pharmacotherapy. There are many scientific works trying to determine the biological basis of OCD, but the understanding of this type of diseases is based on the creation of a suitable animal model that reproduces the phenotypic effects and, if possible, the neuronal symptoms [1, 2, 3, 4, 5]. Obsessive - compulsive disorders, aside from induced phenotypic effects, are often an ailment of animals, both farmed and accompanying. Due to the vague causes and the lack of effective treatments, they are a big problem for breeders. And that, horses and pigs biting metal rods [6, 7], birds plucking their feathers [8], dogs and cats licking and gnawing a hair on the legs and tail [9], or chinchillas chewing their fur coat [10](Figure 1), became the object of study of many scientists. Strong interest in obsessive-compulsive disorders, directed the attention of researchers towards the genetics. Currently, in order to better understand the bases of OCD in humans, animal genetic models are using, among which are mouse mutants exhibiting symptoms of fur chewing, inter alia, the Hoxb8 gene mutation [11].

1.1 Hoxb8 gene mutation

Hoxb8 is part of a mammalian homeobox complex, containing 39 transcription factors. These factors are best known for their roles in the early stages of embryonic development when determining the anterior-posterior

Figure 1: Fur chewing chinchillas

position of animals [12]. But this is not their only function. Hoxb8 is extensively expressed in the CNS, in the regions responsible for the behavior of rodents in hair grooming. The loss of function mutation in Hoxb8 gene induces phenotypic symptoms comparable to the human trichotillomania - obsessive – compulsive disorder, in the

course of which the patients uncontrolled pluck their hair from different areas of the body [13]. Therefore researchers decided to use a line of genetically modified mice as a model of the disease [11]. Studies have shown that mice with a mutation of the gene Hoxb8 chewed their hair coat themselves and others mice in the same cage, leaving large areas of the body without the coat. In one cage, usually was "dominant" animal , which bit fur of others, and if it was left alone, bit hair of its own. All mice in this line, both homo- and heterozygotes have shown a normal reaction to heat, cold, pain and pleasure [13].

2. Material and Methods

The material for the study was the lower limbs muscle tissue obtained from chinchillas carcasses from fur chewing and normal ones. No animal was slaughtered directly for the needs of this research. Tissues were from carcasses, representing a by-product formed during the normal process conducted for the purpose of obtaining fur on one of the Polish chinchilla farms. Tissues, until the DNA isolation, were stored in a freezer at -20°C. DNA isolation were performed with using of the commercial kit to isolating nucleic acids.

Primers for the PCR reaction, due to the high complementarity of gene sequence in different species, were designed on the base of mouse Hoxb8 gene sequence, available in the NCBI database (NCBI Ref. Seq.: NM_010461.2). Each PCR amplification was conducted in a 20 µL reaction mixture, which included 0.4 µM of each primer, 200 µM dNTPs, 3mM MgCl2, 0.25 U of Taq polymerase (Promega), 1× bufor Taq, and approximately 30 ng of genomic DNA as a template. The amplification went through 30 cycles of 94°C denaturation for 30 s, annealing at 61°C for 30 s, extension for 45 min, and a final extension for 8 min at 72°C in Arktik Thermal Cycler (Thermo Scientific). PCR products were sequenced using ABI Prism 377 DNA Sequencer and analyzed in bioinformatic software (FinchTV, CodoneCode Aligner).

3. Results

PCR products resulted in two fragments containing the coding sequence: first a 208 bp (1257-1465 bp, N = 14) and the second with a length of 201 bp (1500-1701 bp, N = 16). On the basis of the analyzed sequences, the presence of two point mutations was detected: transversion A>C (g.1451C>A), resulting in the substitution of proline to glycine and the transition A>G (g.1654A>G), resulting in substitution of aspartic acid to glycine. In the analyzed group were detected both homozygous AA, GG, and heterozygous AG.

4. Conclusions

As a result of the attempts to understand and know the causes of obsessive – compulsive disorders carried out so far, it seems to be reasonable to conduct additional studies, which could significantly broaden the knowledge on the subject. Studying the Hoxb8 gene polymorphism in fur chewing chinchillas will enable us to verify the hypothesis of the genetic background of the disease.

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DNA SPERM DAMAGE IN BLUE FOX BY COMET ASSAY – PRELIMINARY RESEARCH

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Abstract: *A comet assay (SCGE) is an accurate cytogenetic test that allows to detect changes which result from harmful activity of endogenous and exogenous factors in single cells. The aim of the research was to estimate the degree of DNA damage in blue fox sperm stored in cold store conditions based on the storage time. The tests were performed on the sperm collected from 10 breeding blue foxes coming from the farm in southwest Poland. The sperm was diluted with MIII extender to the concentration of 10 million/ml. Alkaline variant of the comet assay was used and the sperm directly after dilution (0h) as well as after 24, 48 and 72 h of storing in 0 – 4°C was evaluated. Percentile DNA contents in comet's head and tail were measured by CASP 1.2.0 programme. On the basis of obtained results it was stated that storage of sperm through 24-72h caused decreasing of percentile DNA content in a comet's head and thereby increasing of its content in a comet's tail which testifies to increasing the level of sperm DNA damages while storing in cold store conditions.*

Keywords: *comet assay, sperm damage, DNA damage, blue fox*

1. Introduction

Artificial insemination as a method of controlled reproduction was used in blue foxes breeding not until the end of XX century in contrast to breeding of farm animals where it was commonly used. Insemination allows to limit the number of males in procreation and also to use the best specimens with the most wanted features. In this process, diluted semen stored in the state of deep freezing or in liquid form is often used. It is important to storage the semen in such a form and conditions in order to minimize damage level of sperm genetic material.

Insemination is usually associated with improvement of herd's fertility and fecundity considering higher percentage of born cubs as well as preventing development of different illnesses transmitted during natural mating of animals. Getting interspecies cross-breeds is the other benefit.

The comet assay (SCGE, single cell gel electrophoresis) is an accurate, simple and quick method that allows to detect and measure the damage degree of single cell's genetic material [4]. Evaluation of damages by means of the comet assay can be performed in the conditions of alkaline or neutral pH which only enables to identify breaks of double-stranded DNA. Performing the assay in alkaline conditions allows to detect DNA strands' breaks, both single and double as well as alkaline-labile sites [10]. Damaged in such a way, DNA fragments are released and migrate in agarose gel during electrophoresis. Cells analysed under a microscope take the shape similar to comets (that explains the name of the assay) the head of which is comprised of cell's nucleus whereas the tail contains DNA fragments that underwent migration [7].

The aim of the research was to estimate DNA integrity degree of blue fox sperm stored in cold store conditions based on the time of its storage.

2. Material and methods

The survey material was the sperm collected from 10 breeding blue foxes coming from the farm in southwest Poland. The semen was acquired during insemination of farm females. It was diluted with MIII extender to the concentration of 10 million/ml and then estimated by means of the comet assay (0h). The samples of semen were stored in cold store in temperature 0 - 4°C and tested after 24/48/72h of storage.

To evaluate sperm DNA damage degree, an alkaline variant of the comet assay according to Singh et al. (1988) [11] was used. Basic slides were covered with a layer of 0.5% agarose with normal melting point. Next, 5µl of diluted semen was mixed with 75 µl of 0.5% agarose with low melting point (LMPA), then applied on the earlier prepared basic slide and left to hardening. This layer was covered with 75µl of LMP agarose. After agarose was solidified, slides were suffused with cooled lysis buffer (NaCl, NaOH, EDTA, Tris, Sodium Lauryl Sarcosinate, Triton X-100, DMSO – Sigma Aldrich) with pH 10 and incubated in darkness for 24h in temperature +4°C. After incubation, the slides were delicately transferred to the device for horizontal electrophoresis, suffused with cooled electrophoresis buffer (NaOH, EDTA – Sigma Aldrich) (pH >13) and incubated for 20 minutes in room temperature. After that, electrophoresis at parameters 25V, 300 mA, 20 minutes, without light access was performed. After electrophoresis was finished, slides were neutralised, dried and dyed with ethidium bromide.

The test analysis was performed under a fluorescent microscope Zeiss Imager.A2 coupled with a camera AxioCam MRc5 at magnification 400x. 10 random pictures of every slide's fields of view were performed. CASP 1.2.0 programme was used for cells' measurement.

3. Results

Influence of time of sperm storage in cold store conditions on integrity of its genetic material was researched. Percentile DNA content in comet's head and tail was estimated.

Table 1. Percentile DNA content in a comet's head

Animals	*Time of keeping in cooling conditions*			
	0h	*24h*	*48h*	*72h*
1	99.48	99.37	98.43	98.03
2	99.33	99.48	97.82	97.52
3	99.13	99.46	97.00	96.32
4	99.17	99.04	98.06	97.78
5	99.02	98.93	98.53	98.76
6	98.86	99.05	98.67	97.96
7	98.80	98.56	98.45	97.58
8	99.05	98.75	98.46	97.82
9	98.91	99.20	98.58	98.23
10	98.99	98.31	98.41	97.98
Mean	99.07	99.02	98.24	97.80
SD	0.21	0.39	0.50	0.63

Mean DNA content in the comet's head in fresh semen was stated at the level of 99.07%. This value between individual specimens varied within the limits 98.80–99.48%. Slightly lower mean of % DNA content in the head that amounted 99.02% was observed in the sperm stored in cold store conditions for 24 hours. Values of this parameter were in the range of 98.31–99.48%. Greater loss of genetic material was observed in the samples stored for 48 and 72 hours. After 48 h, 98.24% of DNA was stated on average in the comet's head whereas after 72 h this content was determined on the level of 97.80%. This parameter's value between individual specimens after 72 h of storage was located in relatively wide range of 96.32–98.76% comparing to the other measuring groups where differences between the lowest and the highest content in the given group fluctuated on the level of 1-1.5%. Observed loss of genetic material in sperm through its smaller amount in the comet's head depending on the time of storage (0h-72h) can be considered as small, without significant influence as DNA content after 72h was only diminished by 1.27%, on average.

Table 2. Percentile DNA content in a comet's tail

Animals	*Time of keeping in cooling conditions*			
	0h	*24h*	*48h*	*72h*
1	0.53	0.63	1.57	2.00
2	0.68	0.53	2.18	2.41
3	0.82	0.54	3.00	3.66
4	0.66	0.96	1.94	2.23
5	0.98	1.11	1.48	1.24
6	1.14	0.95	1.33	2.06
7	1.20	1.45	1.57	2.42
8	0.97	1.21	1.54	2.18
9	1.09	0.75	1.45	1.78
10	1.01	1.70	1.59	2.02
Mean	0.91	0.98	1.76	2.20
SD	0.23	0.39	0.50	0.62

With extension of time of semen storage in cold store conditions, increase of percentile DNA content in a comet's tail was observed. In fresh sperm, mean 0.91% DNA content in a comet's tail with fluctuations in particular individuals in the range of 0.53 – 1.20% was stated. As in the case of % DNA content in a comet's head where a slight decrease after 24h was observed, a little increase of % DNA content amounting 0.98% was stated in a comet's tail. This parameter fluctuated in a wide range of 0.53 - 1.70%. Evident increase of % DNA content in a comet's tail was observed after 48 and 72 h, being 1.76% and 2.20%, respectively, which reflects decrease of DNA content in a comet's head in these time ranges. After 72 h of semen storage, wide range of values of this parameter from 1.24 to 3.66% was observed. Increase of percentile DNA content in a comet's tail depending on the time of semen storage in cold store conditions in temperature 0-4^{o}C (0-72h) was averagely 1.29%.

Slight loss of DNA in a comet's head is equivalent to increase of its content in a comet's tail, however, mean value of both parameters is less than 1.5%. It testifies to negligible damage of sperm genetic material as well as its usability for insemination, even after 72 hours of storage in cold store conditions. It can be concluded that protective substances contained in the extender used to determine sperm concentration influenced small level of spermatozoons damage.

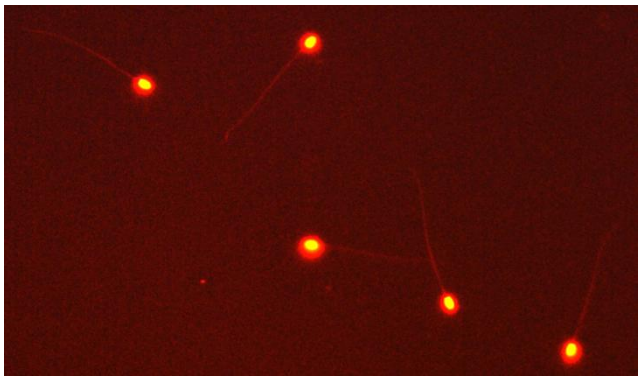

Figure 1: SCGE assay - microscopic image of sperm cells in blue fox semen (400x magnification)

Performed research is the first trial to estimate the degree of sperm DNA damage of blue foxes using SCGE test. The analysis was carried out with use of alkaline modification of the assay that allows to detect greater number of damages and evaluation was performed on the basis of percentile DNA content in a comet's head and tail. Both analysed parameters give clear information about content or loss of genetic material being ones of most often used comet parameters beside the length of a tail and whole comet and also tail moment which also considers comet's shape [1].

The comet assay method was applied in sperm evaluation of breeding animals: boar [5, 6] and equine [9], lab animals such as mice and rats [3, 2], and also in tests of human semen [8]. In surveys performed on boar [5] and equine [9], the degree of DNA damages based on time

and conditions of semen's storage concerning temperature and supplement of protective substances was performed.

4. Conclusions

The comet assay proved to be an accurate and proper method to estimate sperm DNA integrity in blue foxes and their biological ability to fertilization.

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MATHEMATICAL MODEL OF ONE-DIMENSIONAL CONTINUUM IN STATE OF COMBINED BENDING-GYRATORY VIBRATION

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Abstract: *The basic building element of propeller shafts dynamic models is an one-dimensional continuum. Formulating of the mathematical model is based on the assumption of formation of combined bending and gyratory vibration while the one-dimensional continuum making relative transverse vibrations in rotating space. This assumption is accepted for the reason that propeller shaft is loaded during operation by harmonic and dynamic and excitation and bending moments whose vectors being perpendicular to the plane of the joint fork and rotating together with the shaft. The continuum element makes general spatial movement consisting of rotating and relative spherical motion. Taking into account fhe dynamic and elastic force effects conditions and using Euler-Bernoulli deflection line equation and Schwedler theorem, the continuum equation of motion for a complex variable in a general cut being derived.*

Keywords: *vibration, bending, gyratory, motional, equation, propeller, shaft*

1. Introduction

This paper focuses on deriving the equation of motion of an one-dimensional continuum combined, spatial and bending-gyratory vibration. Assuming the formation of the continuum relative transverse vibration in the space rotating with constant speed. In that case, the continuum element making general spatial motion which is composed of three simple movements - namely rotation, shift and spherical motion. When formulating the equation of motion, taking into account the balance of inertia and elastic force effects acting on the continuum element. Equilibrium conditions being completed using the Euler-Bernoulli deflection line equation and the Schwendler theorem. The equation of motion being modified in the complex plane of the cross-section.

2. Continuum element equilibrium conditions

Let´s deal with the issue of a homogeneous field with constant annular cross-section having an internal radius r_1, the outer radius r_2 and the length l, as shown in the Figure 1.

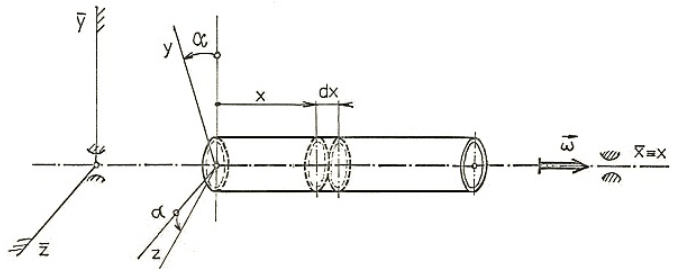

Figure 1

Besides the geometric parameters, the homogeneous field is further characterized by the weight parameter ρ (density) and the stiffness parameter E (modul of elasticity in tension - compression). Let´s obtain the homogeneous field equations of the motion from the force system equilibrium shown in Figure 2. The force system equilibrium acts on the continuum element length *dx* which being imaginary released and removed from the system. The inertial effects acting on the element can be in the center of the element generally replaced by the inertial force having components $\mathbf{D}_y$, $\mathbf{D}_z$ and the moment of inertia couple having components $\mathbf{M}_{Dy}$, $\mathbf{M}_{Dz}$.

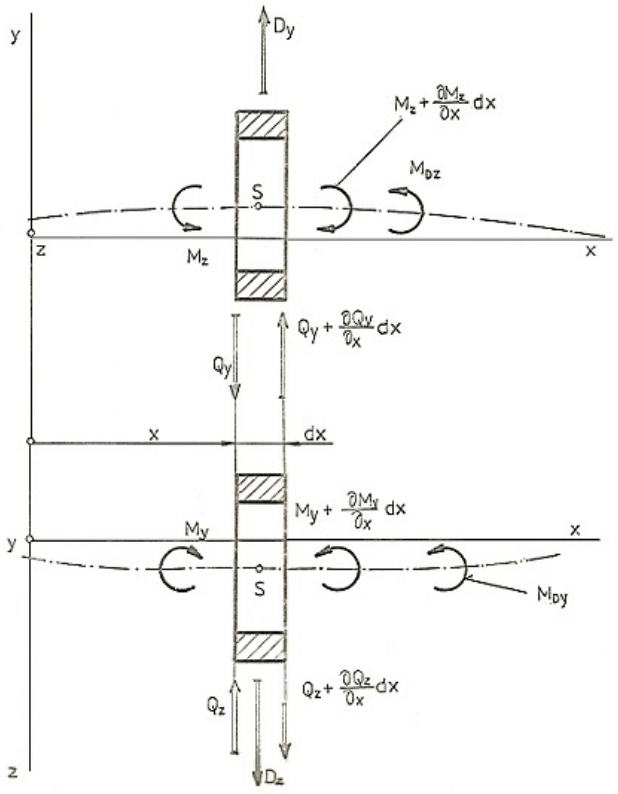

Figure 2

The remaining elements of the force system, as indicated in Figure 2, replacing the effects of the removed part of the continuum section. Described force system being in equilibrium if the conditions met in the following form:

$$D_y + \frac{\partial Q_y}{\partial x} dx = 0 ,$$
$$M_{Dz} + Q_y dx - \frac{\partial M_z}{\partial x} dx = 0 , \quad (2.\ 1)$$
$$D_z + \frac{\partial Q_z}{\partial x} dx = 0 ,$$
$$M_{Dy} + \frac{\partial M_y}{\partial x} dx - Q_z dx = 0 .$$

3. Derivation of inertial effects acting on continuum element

In the case of bending-gyratory vibration, the continuum element makes general spatial motion which is composed of three simultaneous simple motions: rotation, displacement and spherical motion. The position of the element with the length *dx*, which is to coordinate *x*, can be described in the general position by coordinates α, β, γ, y, z, whose importance being evident from Figure 3.

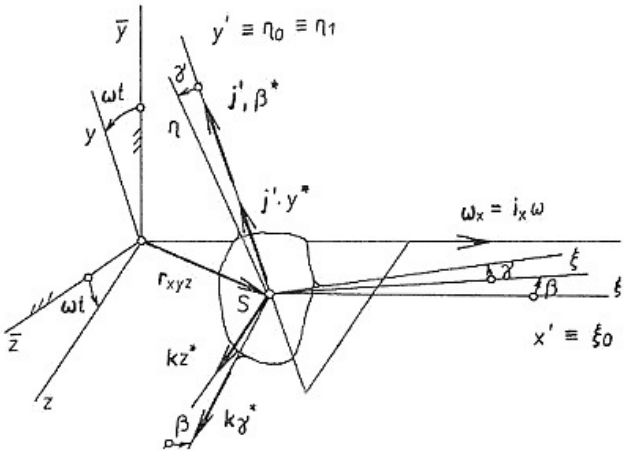

Figure 3

To express the inertial effects on the continuum element, it is prefereble to replace described spatial motion by sliding movement of the system x_s, y_s, z_s, the beginning of which being identified with the element centre (S) and the relative spherical movement around the centre. This replacement being realized by distribution of general planar motion of x', y', z' system on displacement of x_s, y_s, z_s system and the relative rotation around the axis x' while the element centre being chosen as the reference point. Position of the element being determined by the position vector of the reference point **r** and the angles **α**, **β**, **γ** - see Figure 3. The exact meaning of these angles is evident from Figure 5 where the element rotation at its relative spherical motion is clearly defined. The resulting inertia effects on the continuum element are determined by the inertial effects superposition from the displacement and also from the secondary spherical motion. The inertial force of the sliding motion being obtained from the following equation:

$$d\mathbf{D} = - dm\mathbf{a} . \quad (3.\ 1)$$

The weight of the continuum element being expressed in the following form:

$$dm = \mu dx , \quad (3.\ 2)$$

where μ is the weight of the continuum length.

Dynamic models (the characteristic of the dynamic models will be in this paper explored) are formed by sections of the annular cross-section. The weight of the unit of length being expressed thus directly for the annular cross-section in the following form:

$$\mu = \pi\rho\,(r_2^2 - r_1^2) . \quad (3.\ 3)$$

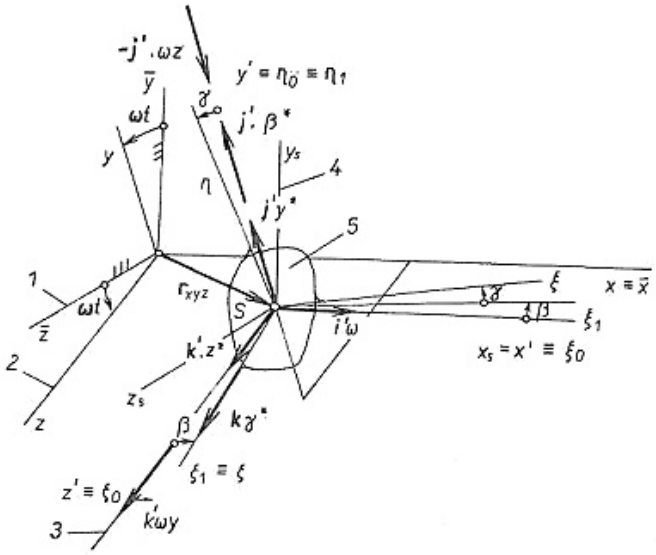

Figure 4

Because dealing with the derivation of equations of motion of the continuum segment doing bending-gyratory vibration, thus in the case of bending oscillations in the rotating space, it may be advantageous to formulate the equations of motion of the continuum-section in the rotating space which is probably advantageous in terms of inertial effects expression on the continuum element. It should be emphasized that considering the case of rotation of the x, y, z system by constant angular velocity.

$$\dot{\alpha} = \omega = \text{konst.} \quad (3.\ 4)$$

Assuming the constant angular velocity of system rotation being respected in solving all the tasks mentioned in this paper. If the results are given of some quantities depending on the ω, the angular velocity being understood as a parameter. The acceleration of the center being achieved by time derivative of the position vector.

$$\mathbf{r} = [x, y, z] . \quad (3.\ 5)$$

The vector **r** is expressed in the rotating system, however, it is necessary to differentiate the basic scheme $\bar{x}$, $\bar{y}$, $\bar{z}$. Once the implementation of relevant derivates performed, the acceleration vector of the reference point obtained.

$$\mathbf{a} = [0, \ddot{y} - \omega^2 y - 2\omega\dot{z}, \ddot{z} - \omega^2 z + 2\omega\dot{y}] , \quad (3.\ 6)$$

The acceleration vector of the reference point being again expressed in the rotating system. The inertia force vector

in the rotating system can be expressed in the following form:

$$\mathbf{D} = -\mu dx\,[0|\ddot{y} - \omega^2 y - 2\omega\dot{z}|\ddot{z} - \omega^2 z + 2\omega\dot{y}] \qquad (3.7)$$

To express the inertial effects of relative spherical motion, let us introduce a spherical coordinate system ξ, η, ζ , firmly attached to the continuum element so that the mentioned coordinate system is identical to the three principal axes of the element of the inertia. If implemented a constant of the annular cross´ continuum element

$$\bar{\mu} = \frac{\pi\varrho}{4}\left(r_2^4 - r_1^4\right) \ , \qquad (3.8)$$

may the inertia element that is in the ξ, η, ζ system diagonal,

$$\mathbf{J}_{\xi,\eta,\zeta} = \left[dJ_\xi\ , dJ_\eta, dJ_\zeta\right] \ , \qquad (3.9)$$

rewritten into a simple form:

$$\mathbf{J}_{\xi,\eta,\zeta} = \bar{\mu}\ dx\ [2\ ,\ 1,\ 1] \ . \qquad (3.10)$$

In the equation (3.10), there were „overlooked“ differentially small quantities of the second order. The general position of the continuum element (of the ξ, η, ζ system) can be - with respect to the x_s, y_s, z_s system doing translational movement - described by an independent coordinates α, β, γ whose importance is evident from Figure 3. First, it is realized rotation around the axis $x_s = \xi_1$ about an angle α by the constant angular velocity $\dot{\alpha} = \omega$, followed by system rotation around the axis $\eta_1 \equiv \eta_2$ about the angle β by the instantaneous angular velocity $\dot{\beta}$ and the final rotation by the instantaneous angular velocity $\dot{\gamma}$ about an angle γ takes place about the axes $\zeta \equiv \zeta_2$.

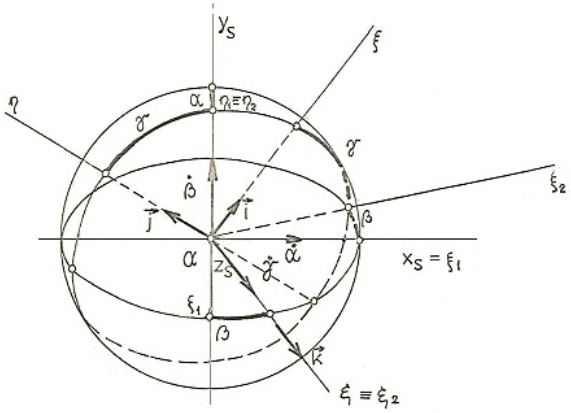

Figure 5

Rotation of the element about the angles β, γ correspond to the continuum deformation in the planes xz, xy. These are very small angles. In next solutions, this fact allows to receive strong simplification. The instantaneous angular velocity vector is expressed in the ξ, η, ζ system expressed in the following form:

$$\boldsymbol{\omega}_{\xi,\eta,\zeta} = \begin{bmatrix} \omega\cos\beta\cos\gamma + \dot{\beta}\sin\gamma \\ \dot{\beta}\cos\gamma - \omega\cos\beta\sin\gamma \\ \omega\sin\beta + \dot{\gamma} \end{bmatrix} \ . \qquad (3.11)$$

In case of very small angles, namely, β, γ, the vector (3.11) is rewritten to the form

$$\boldsymbol{\omega}_{\xi,\eta,\zeta} = \begin{bmatrix} \omega + \dot{\beta}\gamma \\ \dot{\beta} - \omega\gamma \\ \dot{\gamma} + \omega\beta \end{bmatrix} \ . \qquad (3.12)$$

The angular momentum vector which is determined directly from the equation

$$\mathbf{U} = \mathbf{J} \times \boldsymbol{\omega} \ , \qquad (3.13)$$

(both the inertia matrix and the instantaneous angular velocity vector are expressed in the ξ, η, ζ system) has the form:

$$d\mathbf{U}_{\xi,\eta,\zeta} = \begin{bmatrix} dJ_\xi\omega + dJ_\xi\dot{\beta} \\ dJ_\eta\dot{\beta} - dJ_\eta\omega\gamma \\ dJ_\zeta\dot{\gamma} + dJ_\xi\omega\beta \end{bmatrix} \ . \qquad (3.14)$$

Because of choosing a continuum element center as the reference point, the inertial effects of relative spherical motion are created only by the momentum vector of the inertia couple which can be determined simply by applying the second impulse theory, with regard to d'Alembert principle taken as negative derivative of the angular momentum vector - by the time. The angular momentum vector is expressed in the ξ, η, ζ system, the time derivative should be performed in the x_s system which performes translational movement. Let´s take an equation for the vector time derivative in the base system in case the vector is expressed in a rotating system. This equation can be written in the following form:

$$\mathbf{M}_{D\xi,\eta,\zeta} = -\left[\dot{\mathbf{U}}_{\xi,\eta,\zeta}\right]_{\xi,\eta,\zeta} - \boldsymbol{\omega}_{\xi,\eta,\zeta} \times \mathbf{U}_{\xi,\eta,\zeta} \ . \qquad (3.15)$$

The symbol $\left[\dot{U}_{\xi,\eta,\zeta}\right]_{\xi,\eta,\zeta}$ represents the angular momentum vector expressed in the ξ, η, ζ system and derived by the time in the same system. After substituting the vectors (3.12.), (3.14.) into the expression (3.15) - after performing prescribed operations - we get the inertia couple vector moment.

$$d\mathbf{M}_{D\xi,\eta,\zeta} = \left[dM_{D\xi}\ , dM_{D\eta}\ , dM_{D\zeta}\right] \ , \qquad (3.16)$$

Its components expressed in the ξ, η, ζ have the form:

$$\begin{aligned} dM_{D\xi} &= -dJ_\xi\ddot{\beta}\gamma - dJ_\xi\dot{\beta}\dot{\gamma} - dJ_\zeta\dot{\beta}\dot{\gamma} - dJ_\zeta\dot{\beta}\omega\beta + \\ &+ dJ_\zeta\omega\gamma\dot{\gamma} + dJ_\zeta\omega^2\beta\gamma + dJ_\eta\dot{\beta}\dot{\gamma} + \\ &+ dJ_\eta\omega\dot{\beta}\beta - dJ_\eta\omega\gamma\dot{\gamma} - dJ_\eta\omega^2\gamma\beta \ , \\ dM_{D\eta} &= -dJ_\eta\ddot{\beta} + dJ_\eta\omega\dot{\gamma} - dJ_\xi\omega\dot{\gamma} - dJ_\xi\dot{\gamma}\dot{\beta}\gamma - \\ &- dJ_\xi\beta\omega^2 + dJ_\xi\omega\dot{\gamma} - dJ_\xi\omega\beta\dot{\beta}\gamma + \end{aligned} \qquad (3.17)$$

$$+ dJ_\eta\dot{\gamma}\dot{\beta}\gamma + dJ_\eta\omega^2\beta + dJ_\eta\omega\dot{\beta}\beta\gamma \ ,$$
$$dM_{D\zeta} = - dJ_\zeta\ddot{\gamma} - dJ_\zeta\omega\dot{\beta} - dJ_\eta\dot{\beta}\omega - dJ_\eta\dot{\beta}^2\gamma +$$
$$+ dJ_\eta\omega^2\gamma + dJ_\eta\omega\beta\gamma^2 + dJ_\xi\omega\dot{\beta} -$$
$$- dJ_\xi\omega^2\gamma + dJ_\xi\dot{\beta}^2\gamma - dJ_\xi\dot{\beta}\omega\gamma^2 \ ,$$

From the equations (3.9), (3.1) it is obvious that the following applies:

$$dJ_\eta = dJ_\zeta \ , \qquad dJ_\xi = 2dJ_\eta = 2dJ_\zeta \ . \tag{3. 18}$$

The moment vector components of the inertia couple can be simplified to the following form:

$$dM_{D\xi} = - dJ_\xi\ddot{\beta}\gamma - dJ_\xi\dot{\beta}\dot{\gamma} - dJ_\zeta\dot{\beta}\omega\beta + dJ_\zeta\omega\dot{\gamma}\gamma +$$
$$+ dJ_\zeta\omega^2\beta\gamma + dJ_\eta\omega\dot{\beta}\beta - dJ_\eta\omega\gamma\dot{\gamma} -$$
$$- dJ_\eta\omega^2\gamma\beta \ ,$$
$$dM_{D\eta} = - dJ_\eta\ddot{\beta} - dJ_\xi\dot{\gamma}\dot{\beta}\gamma - dJ_\xi\omega^2\beta - \tag{3. 19}$$
$$- dJ_\xi\omega\beta\dot{\beta}\gamma + dJ_\eta\dot{\gamma}\dot{\beta}\gamma + dJ_\zeta\omega^2\beta +$$
$$+ dJ_\zeta\omega\dot{\beta}\beta\gamma \ ,$$
$$dM_{D\zeta} = - dJ_\zeta\ddot{\gamma} - dJ_\eta\dot{\beta}^2\gamma + dJ_\eta\omega^2\gamma + dJ_\eta\omega\dot{\beta}\gamma^2 -$$
$$- dJ_\zeta\omega^2\gamma + dJ_\xi\dot{\beta}^2\gamma - dJ_\xi\dot{\beta}\omega\gamma^2 \ ,$$

Assuming the validity of relations in the equation of (3. 18), the subtotals are listed in the moment vector folders of the null inertia couple:

$$- dJ_\zeta\dot{\beta}\dot{\gamma} + dJ_\eta\dot{\beta}\dot{\gamma} = 0 \tag{3. 20}$$

in relation to $dM_{D\xi}$;

$$dJ_\eta\omega\dot{\gamma} - dJ_\xi\omega\dot{\gamma} + dJ_\zeta\omega\dot{\gamma} = 0 \tag{3. 21}$$

in relation to $dM_{D\eta}$;

$$- dJ_\zeta\omega\dot{\beta} - dJ_\eta\dot{\beta}\omega + dJ_\xi\omega\dot{\beta} = 0 \tag{3. 22}$$

in relation to $dM_{D\zeta}$.

In the equation of (3. 19), due to the small angles of rotation of the continuum element β, γ are neglected the components containing products of quantities β, γ, $\dot{\beta}$, $\dot{\gamma}$, and in the relation to $dM_{D\xi}$, there is neglected a component $dJ_\xi\ddot{\beta}\gamma$. With the regard to the above-described simplification, a moment of inertia couple vector is obtained in a relatively simple form:

$$d\mathbf{M}_{D\xi,\eta,\zeta} = \begin{bmatrix} 0 \\ - dJ_\eta\ddot{\beta} - (dJ_\xi - dJ_\zeta)\omega^2\beta \\ - dJ_\zeta\ddot{\gamma} - (dJ_\xi - dJ_\eta)\omega^2\gamma \end{bmatrix} . \tag{3. 23}$$

If the inertia matrix elements (3.9) are expressed according to the equations (3.8), (3.10), the vector (3.19) can be rewritten to the following form:

$$d\mathbf{M}_{D\xi,\eta,\zeta} = - \bar{\mu}dx \begin{bmatrix} 0 \\ \ddot{\beta} + \omega^2\beta \\ \ddot{\gamma} + \omega^2\gamma \end{bmatrix} . \tag{3. 24}$$

For the small angles as β, γ may be considered the axes ξ, η, ζ being parallel to the corresponding axes of the x, y, z rotating system and then, the equality of vectors is approximately valid:

$$d\mathbf{M}_{Dx,y,z} = d\mathbf{M}_{D\xi,\eta,\zeta} \ . \tag{3. 25}$$

The inertial effects acting on the element of the shaft were derived in the general position of the element, and assuming that the continuum is at the time *t* deformed according to Figure 6.

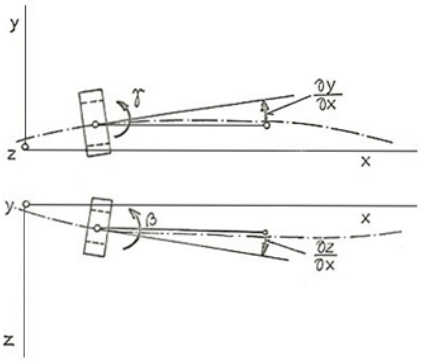

Figure 6

For small angles as γ, β (Fig. 3.4) the following applies:

$$\beta = -\frac{\partial z}{\partial x} \ , \ \gamma = \frac{\partial y}{\partial x} \ . \tag{3. 26}$$

Vectors of the inertial force and of the moment of inertia couple can be rewritten into the form suitable for further solutions:

$$d\mathbf{D}_{x,y,z} = - \mu dx \begin{bmatrix} 0 \\ \frac{\partial^2 y}{\partial t^2} - \omega^2 y - 2\omega\frac{\partial z}{\partial t} \\ \frac{\partial^2 z}{\partial t^2} - \omega^2 z + 2\omega\frac{\partial y}{\partial t} \end{bmatrix} , \tag{3. 27}$$

$$d\mathbf{M}_{Dx,y,z} = - \bar{\mu}dx \begin{bmatrix} 0 \\ \frac{\partial^3 z}{\partial x\,\partial t^2} + \omega^2\frac{\partial z}{\partial x} \\ \frac{\partial^3 y}{\partial x\,\partial t^2} + \omega^2\frac{\partial y}{\partial x} \end{bmatrix} . \tag{3. 28}$$

4. Derivation of continuum equation of motion

The bending moment vector of the elastic forces

$$\mathbf{M} = \left[M_x \, , M_y \, , M_z\right] \ , \tag{4. 1}$$

is modified to the form corresponding to the relations (3.22), (3.23),

$$\mathbf{M} = -\,EJ\left[0, \frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 y}{\partial x^2}\right] , \tag{4. 2}$$

where E is the modulus of elasticity in tension, eventually pressure,

$$J = \frac{\pi}{4}(r_2^4 - r_1^4) \tag{4. 3}$$

is a moment of an inertia - of an annular cross-section.

As mentioned in the introduction to this chapter, section continuum equations of motion are obtained from the equations (2. 1) - from the force system´s equilibrium conditions acting on the loose element of the continuum section. If we exclude from these equations the components of shear forces, Q_y , Q_z , we get the following:

$$\frac{\partial M_{Dz}}{\partial x} - D_y - \frac{\partial^2 M_z}{\partial x^2}\cdot dx = 0 \ , \qquad \frac{\partial M_{Dy}}{\partial x} + D_z + \frac{\partial^2 M_y}{\partial x^2}\cdot dx = 0 \ . \tag{4. 4}$$

To equation (3.28) are substituted the corresponding vector elements (3.23), (3.24), (4.2). That´s how the equations of motion of the bending-gyratory vibrations of the annular cross-section´s one-dimensional continuum are obtained.

$$EJ\frac{\partial^4 y}{\partial x^4} - \bar{\mu}\frac{\partial^4 y}{\partial x^2\,\partial t^2} - \bar{\mu}\omega^2\frac{\partial^2 y}{\partial x^2} + \mu\frac{\partial^2 y}{\partial t^2} - \\ - 2\mu\omega\frac{\partial z}{\partial t} - \mu\omega^2 y = 0 \ , \tag{4. 5}$$

$$EJ\frac{\partial^4 z}{\partial x^4} - \bar{\mu}\frac{\partial^4 z}{\partial x^2\,\partial t^2} - \bar{\mu}\omega^2\frac{\partial^2 z}{\partial x^2} + \mu\frac{\partial^2 z}{\partial t^2} + \\ + 2\mu\omega\frac{\partial y}{\partial t} - \mu\omega^2 z = 0 \ .$$

Substituting for μ, $\bar{\mu}$, J of the relations (3.4), (3.8) a (4.3), coefficients in equations (4.5) can be expressed using the basic continuum segment parameters which have been described above. After modifying we get the final form of the equations of motion.

$$\frac{\partial^4 y}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 y}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 y}{\partial x^2}\right) + \\ + \frac{4\varrho}{E(r_2^2 + r_1^2)}\left(\frac{\partial^2 y}{\partial t^2} - 2\omega\frac{\partial z}{\partial t} - \omega^2 y\right) = 0 \ , \tag{4. 6}$$

$$\frac{\partial^4 z}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 z}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 z}{\partial x^2}\right) + \\ + \frac{4\varrho}{E(r_2^2 + r_1^2)}\left(\frac{\partial^2 z}{\partial t^2} + 2\omega\frac{\partial y}{\partial t} - \omega^2 z\right) = 0 \ .$$

If we want to build a continuum segment transfer matrix which together binds vectors of state (the amplitudes of state quantities) on the edge of the continuum segment, it is first necessary to perform analytical solutions of equations (4. 6) where *y, z* are real functions of real variables *x, t*. Let´s introduce a complex function of reale variables:

$$v = y + iz \ , \tag{4. 7}$$

This describes the displacement of the continuum cut center to coordinate x in the general time t. The second of the equations, (4. 6), is multiplied by the imaginary unit *i*. Then, both equations being summed:

$$\frac{\partial^4 y}{\partial x^4} + i\frac{\partial^4 z}{\partial x^4} - \frac{\varrho}{E}\left[\left(\frac{\partial^4 y}{\partial x^2\,\partial t^2} + i\frac{\partial^4 z}{\partial x^2\,\partial t^2}\right) + \\ \omega 2\partial 2y\partial x 2 + i\partial 2z\partial x 2 + 4\varrho E r 22 + r12 \\ \left[\left(\frac{\partial^2 y}{\partial t^2} + i\frac{\partial^2 z}{\partial t^2}\right) + 2\omega\left(-\frac{\partial z}{\partial t} + i\frac{\partial y}{\partial t}\right) - \omega^2(y + iz)\right] \\ = 0 \ . \tag{4. 8}$$

Because of applying the following relations

$$\frac{\partial^2 v}{\partial x^2} = \frac{\partial^2 y}{\partial x^2} + i\frac{\partial^2 z}{\partial x^2} \ , \ \frac{\partial^4 v}{\partial x^4} = \frac{\partial^4 y}{\partial x^4} + \frac{\partial^4 z}{\partial x^4} \ ,$$

$$\frac{\partial v}{\partial t} = \frac{\partial y}{\partial t} + i\frac{\partial z}{\partial t} \ , \ \frac{\partial^2 v}{\partial t^2} = \frac{\partial^2 y}{\partial t^2} + i\frac{\partial^2 z}{\partial t^2} \ ,$$

$$\frac{\partial^4 v}{\partial x^2\,\partial t^2} = \frac{\partial^4 y}{\partial x^2\,\partial t^2} + i\frac{\partial^4 z}{\partial x^2\,\partial t^2} \ , \tag{4. 9}$$

$$-2\,\omega\frac{\partial z}{\partial t} + 2i\omega\frac{\partial y}{\partial t} = i\omega 2\left(\frac{\partial y}{\partial t} + i\frac{\partial z}{\partial t}\right) = \\ = i2\omega\frac{\partial v}{\partial t} \ ,$$

the equation can be rewritten as

$$\frac{\partial^4 v}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 v}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 v}{\partial x^2}\right) + \\ \frac{4\varrho}{E(r_2^2 + r_1^2)}\left(\frac{\partial^2 v}{\partial t^2} - \omega^2 v + 2i\omega\frac{\partial v}{\partial t}\right) = 0 \ . \tag{4. 10}$$

5. Conclusions

In this paper, the mathematical model of spatial, combined, bending-gyratory vibration of an one-dimensional linear continuum is derived. The mathematical model is formulated in a complex plane of general cut of the continuum.The model can be used both for the calculation of natural frequencies and shape oscillations and for caltulation of steady response in case of oscillation enforced by discrete excitation in any cut of the continuum. From the structure of the mathematical model, it is clear that natural frequencies of relative transverse oscillations are dependent on the angular velocity of continuum rotation. For each operating state, which is given by a constant speed (by angular speeds) of rotation, that there are other modal and spectral properties of continuum relative transverse oscillations. For the rotor will be a critical state when the natural frequency of relative transverse vibrations equal the angular velocity of rotation. Such a state will be referred to as the speed resonance.

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TRANSFER MATRICES DERIVATION OF BASIC ELEMENTS OF PROPSHAFTS DYNAMIC MODELS

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Abstract: *The transfer-matrix method is suitable for solving modal and spectral characteristics and dynamic deformation and stress analysis of shaft systems with articulated joints. In the article, the authors focusing on deriving the transfer matrices of basic elements of the shaft system dynamic model, namely continuum section of constant annular cross-section, and additional material and flexible storage discrete substitution. The derived transfer matrices can be used for calculations of natural frequencies and vibration shape in case of natural vibration and steady state forced vibration vectors in state of combined bending-gyratory vibration of shaft systems with dominant elements of an one-dimensional linear continuum.*

Keywords: *dynamic, model, propeller, shaft, transfer, matrix*

1. Introduction

Transfer matrices of dynamic model individual building elements bind state variables amplitudes in peripheral sections of elements arranged into a state vector. The state vector contains an amplitude of deflection, a slope of deflection line, a bending moment and a shearing force. The transfer matrices are based on an exact analytical model solutions.

2. Transfer matrix of a continuum section

Let´s deal with the case of a constant cross-section homogenous field in the shape of an annulus with an inside radius r_1, an outer radius r_2 and a length l, as shown in Figure 1.

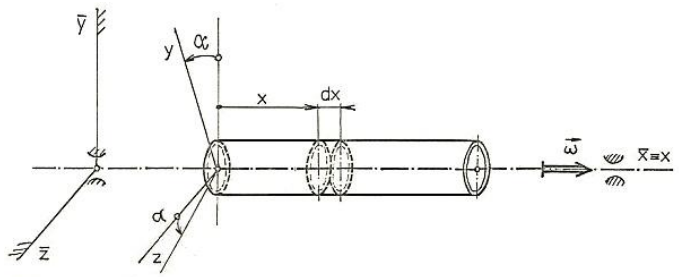

Figure 1

Besides the geometrical parameters, the field is further characterized by the weight parameter ρ (density) and the stiffness parameter E (modulus of elasticity in tension - compression).

$$J = \frac{\pi}{4}(r_2^4 - r_1^4) . \qquad (2.\ 1)$$

The equation above expresses a quadratic moment of an inertia. Equations of motion of a spatial bending-gyratory vibration of an one-dimensional continuum section of constant cross-section in the shape of an annulus have as in [2] the following shape:

$$\frac{\partial^4 y}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 y}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 y}{\partial x^2}\right) + \frac{4\varrho}{E(r_2^2 + r_1^2)}\left(\frac{\partial^2 y}{\partial t^2} - \right.$$
$$- 2\omega\partial z\partial t - \omega 2y = 0,$$
$$\frac{\partial^4 z}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 z}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 z}{\partial x^2}\right) + \frac{4\varrho}{E(r_2^2 + r_1^2)}\left(\frac{\partial^2 z}{\partial t^2} + \right. \qquad (2.\ 2)$$
$$+ 2\omega\partial y\partial t - \omega 2z = 0.$$

To build a transfer matrix of a continuum section which binds state vectors (amplitudes of state variables) on the edges of the continuum section, it is necessary to perform analytical solution of equations (2. 2) where *y, z* are the real functions of the real variables x, t. Let´s introduce a complex function of the real variables

$$v = y + iz \ , \qquad (2.\ 3)$$

which describes a continuum section center deflection at the coordinate *x* in the general time *t*. The second of the equations, (2. 2), describing the movement in the plane (x, z) must be multiplied by an imaginary unit *i*, and the two equations must be summed together:

$$\frac{\partial^4 y}{\partial x^4} + i\frac{\partial^4 z}{\partial x^4} - \frac{\varrho}{E}\left[\left(\frac{\partial^4 y}{\partial x^2\,\partial t^2} + i\frac{\partial^4 z}{\partial x^2\,\partial t^2}\right) + \right.$$
$$+ \omega 2\partial 2y\partial x 2 + i\partial 2z\partial x 2 +$$
$$+ \frac{4\varrho}{E(r_2^2 + r_1^2)}\left[\left(\frac{\partial^2 y}{\partial t^2} + i\frac{\partial^2 z}{\partial t^2}\right) + 2\omega\left(-\frac{\partial z}{\partial t} + \right.\right. \qquad (2.\ 4)$$
$$+ i\partial y\partial t - \omega 2y + iz = 0.$$

The equation (2. 4) can be rewritten into the following form:

$$\frac{\partial^4 v}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 v}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 v}{\partial x^2}\right) +$$
$$+ \frac{4\varrho}{E(r_2^2 + r_1^2)}\left(\frac{\partial^2 v}{\partial t^2} - \omega^2 v + 2i\omega\frac{\partial v}{\partial t}\right) = 0. \qquad (2.\ 5)$$

The continuum section equation of motion, (2. 5), is homogeneous equation both in case of self-bending-

gyratory vibration, and in case of forced steady bending-gyratory oscillations. - We will only consider discrete harmonic excitation in selected cuts of the continuum. Altogether, therefore, it will be cases where it is possible to find a particular integral equation (2. 5) in the following form:

$$v(x, t) = v(x)\, e^{ikt} \quad . \tag{2. 6}$$

In case of natural oscillation, the constant *k* is an unknown natural frequency which also will be denoted as Ω; in case of steady forced vibrations, the constant *k* is an excitation frequency $\bar{\omega}$. The solution (2. 6) will be substituted into the equation (2. 5). After making an appropriate modification, we will come to the following amplitude equation:

$$v^{IV}(x) + pv^{II}(x) + qv(x) = 0, \tag{2. 7}$$

In this equation, the complex function of real variable

$$v(x) = y(x) + iz(x) \tag{2. 8}$$

represents a displacement amplitude on the x-coordinate. The coeficients p,q in the equation (2. 7) can be expressed in the following form:

$$p = \frac{\varrho}{E}(k^2 - \omega^2),\ q = -\frac{4\varrho(k+\omega)^2}{E(r_2^2 + r_1^2)} \quad . \tag{2. 9}$$

The amplitude equation (2. 7) corresponds to the following characteristic equation:

$$\lambda^4 + p\lambda^2 + q = 0 \ , \tag{2. 10}$$

Its roots can be expressed as:

$$\lambda_1 = \beta_1 \ , \lambda_2 = i\beta_2 \ , \quad \lambda_3 = -\beta_1 \ , \ \lambda_4 = -i\beta_2 \ , \tag{2. 11}$$

where

$$\beta_1 = \left[-\frac{p}{2} + \left(\frac{p^2}{4} - q\right)^{\frac{1}{2}}\right]^{\frac{1}{2}}, \quad \beta_2 = \left[\frac{p}{2} + \left(\frac{p^2}{4} - q\right)^{\frac{1}{2}}\right]^{\frac{1}{2}} \tag{2. 12}$$

are positive and real numbers. General solution of the amplitude equation (2. 7) (after the usual editing and using the Euler´s formula and defining relations for the functions sh x, ch x) is received in the following form:

$$v(x) = A\ ch\ \beta_1 x + B\ sh\ \beta_1 x + C\ cos\ \beta_2 x + D\ sin\ \beta_2 x \ , \tag{2. 13}$$

where

$$A = A_1 + iA_2 \ , \ B = B_1 + iB_2 \ , \quad C = C_1 + iC_2 \ , \ D = D_1 + iD_2 \tag{2. 14}$$

are complex constant of integration. In the relation (2. 13), the complex amplitude v (x) is expressed on the x-coordinate using (2. 8) while substituted for complex constant of integration of the relations (2. 14):

$$y(x) + iz(x) = (A_1 + iA_2)ch\ \beta_1 x + (B_1 + iB_2)sh\ \beta_1 x + (C_1 + iC_2)cos\ \beta_2 x + (D_1 + iD_2)sin\ \beta_2 x \ . \tag{2. 15}$$

By comparing the real (imaginary) parts on the left and right side of the previous relation, we get the real functions of real variables, which express amplitudes of fluctuations in the directions of coordinate axes of rotating system.

$$y(x) = A_1\ ch\ \beta_1 x + B_1\ sh\ \beta_1 x + C_1\ cos\ \beta_2 x + D_1\ sin\ \beta_2 x \ , \quad z(x) = A_2\ ch\ \beta_1 x + B_2\ sh\ \beta_1 x + C_2\ cos\ \beta_2 x + D_2\ sin\ \beta_2 x \ . \tag{2. 16}$$

For calculating constants of integration it is necessary to make functions derivation to the third order, including:

$$\begin{aligned} y'(x) &= \beta_1 A_1 sh(\beta_1 x) + \beta_1 B_1 ch(\beta_1 x) - \beta_2 C_1 sin(\beta_2 x) + \beta_2 D_1 cos(\beta_2 x), \\ y''(x) &= \beta_1^2 A_1 ch(\beta_1 x) + \beta_1^2 B_1 sh(\beta_1 x) - \beta_2^2 C_1 cos(\beta_2 x) - \beta_2^2 D_1 sin(\beta_2 x), \\ y'''(x) &= \beta_1^3 A_1 sh(\beta_1 x) + \beta_1^3 B_1 ch(\beta_1 x) + \beta_2^3 C_1 sin(\beta_2 x) - \beta_2^3 D_1 cos(\beta_2 x), \\ z'(x) &= \beta_1 A_2 sh(\beta_1 x) + \beta_1 B_2 ch(\beta_1 x) - \beta_2 C_2 sin(\beta_2 x) + \beta_2 D_2 cos(\beta_2 x), \\ z''(x) &= \beta_1^2 A_2 ch(\beta_1 x) + \beta_1^2 B_2 sh(\beta_1 x) - \beta_2^2 C_2 cos(\beta_2 x) - \beta_2^2 D_2 sin(\beta_2 x), \\ z'''(x) &= \beta_1^3 A_2 sh(\beta_1 x) + \beta_1^3 B_2 ch(\beta_1 x) + \beta_2^3 C_2 sin(\beta_2 x) - \beta_2^3 D_2 cos(\beta_2 x). \end{aligned} \tag{2. 17}$$

From the relations (2. 16), (2. 17), relations between status variables at the left edge of cut of a continuum section and constans of integration are obtained for the x = 0:

$$\begin{aligned} A_1 &= \frac{B_2^2 y(0) + y''(0)}{B_1^2 + B_2^2}, \ B_1 = \frac{B_2^2 y'(0) + y'''(0)}{\beta_1(B_1^2 + B_2^2)}, \\ C_1 &= \frac{B_1^2 y(0) - y''(0)}{B_1^2 + B_2^2}, \ D_1 = \frac{B_1^2 y'(0) - y'''(0)}{\beta_2(B_1^2 + B_2^2)}, \\ A_2 &= \frac{B_2^2 z(0) + z''(0)}{B_1^2 + B_2^2}, \ B_2 = \frac{B_2^2 z'(0) + z'''(0)}{\beta_1(B_1^2 + B_2^2)}, \\ C_2 &= \frac{B_1^2 z(0) - z''(0)}{B_1^2 + B_2^2}, \ D_2 = \frac{B_1^2 z'(0) - z'''(0)}{\beta_2(B_1^2 + B_2^2)}. \end{aligned} \tag{2. 18}$$

State variables at the beginning of the shaft are expressed by the Euler-Bernoulli deflection line equation in the form:

$$y''(0) = -\frac{M_z(0)}{EJ} \ , \ z''(0) = -\frac{M_y(0)}{EJ} \ . \tag{2. 19}$$

According to the Schwedler theorem, the following is written:

$$y'''(0) = -\frac{Q_y(0)}{EJ} \ , \ z'''(0) = -\frac{Q_z(0)}{EJ} \ . \tag{2. 20}$$

To the relations (2. 16), (2. 17) are substituted constants of integration (2. 18), in which are expressed the second and third deflection derivatives by using shear forces and bending moment. After the appropriate modification, it looks as follows:

$$
\begin{aligned}
y(x) &= \frac{y(0)}{\beta}(\beta_2^2 Z_1 + \beta_1^2 Z_3) + \frac{y\prime(0)}{\beta}\left(\frac{\beta_2^2}{\beta_1} Z_2 + \right.\\
&+\beta 12\beta 2Z4 - Mz(0)\beta EJZ1 - Z3 - Qy(0)\beta EJ\\
&\left(\frac{Z_2}{\beta_1} - \frac{Z_4}{\beta_2}\right),\\
y\prime(x) &= \frac{y\prime(0)}{\beta}(\beta_1\beta_2^2 Z_2 - \beta_1^2\beta_2 Z_4) + \frac{y\prime\prime(0)}{\beta}(\beta_2^2 Z_1 +\\
&+\beta 12Z3 - Mz(0)\beta EJ\ \beta 1Z2 + \beta 2Z4 - Q\\
&y(0)\beta EJZ1 - -Z3\ ,\\
-\ M_z(x) &= \frac{y(0)EJ}{\beta}(\beta_1^2\beta_2^2 Z_1 - \beta_2^2\beta_1^2 Z_3) +\\
&+\frac{y\prime(0)EJ}{\beta}(\beta_1\beta_2^2 Z_2 - \beta_1^2\beta_2 Z_4) - \frac{M_z(0)}{\beta}(\beta_1^2 Z_1 +\\
&+\beta 22Z3 - Q\ y(0)\beta\ \beta 1Z2 + \beta 2Z4\ ,\\
-\ Q_y(x) &= \frac{y(0)EJ}{\beta}(\beta_1^3\beta_2^2 Z_2 + \beta_1^2\beta_2^3 Z_4) +\\
&+\frac{y\prime(0)EJ}{\beta}(\beta_1^2\beta_2^2 Z_1 - \beta_1^2\beta_2^2 Z_3) - \frac{M_z(0)}{\beta}(\beta_1^3 Z_2 -\\
&-\beta 23Z4 - Q\ y(0)\beta\ \beta 12Z1 + \beta 22Z3\ ,\\
z(x) &= \frac{z(0)}{\beta}(\beta_2^2 Z_1 + \beta_1^2 Z_3) + \frac{z\prime(0)}{\beta}\left(\frac{\beta_2^2}{\beta_1} Z_2 + \right.\\
&+\beta 12\beta 2Z4 - M\ y(0)\beta EJ\ Z1 - Z3 - Q\ z(0)\beta EJ\\
&\left(\frac{Z_2}{\beta_1} - \frac{Z_4}{\beta_2}\right),\\
z\prime(x) &= \frac{z(0)}{\beta}(\beta_1\beta_2^2 Z_2 - \beta_1^2\beta_2 Z_4) + \frac{z\prime(0)}{\beta}(\beta_2^2 Z_1 +\\
&+\beta 12Z3 - M\ y(0)\beta EJ\beta 1Z2 + \beta 2Z4 - Q\\
&z(0)\beta EJZ1 - - Z3\ ,\\
-\ M_y(x) &= \frac{z(0)EJ}{\beta}(\beta_1^2\beta_2^2 Z_1 - \beta_1^2\beta_2^2 Z_3) +\\
&+\frac{z\prime(0)EJ}{\beta}(\beta_1\beta_2^2 Z_2 - \beta_1^2\beta_2 Z_4) - \frac{M_y(0)}{\beta}(\beta_1^2 Z_1 +\\
&+\beta 22Z3 - Q\ z(0)\beta\ \beta 1Z2 + \beta 2Z4\ ,\\
-\ Q_z(x) &= \frac{z(0)EJ}{\beta}(\beta_1^3\beta_2^2 Z_2 + \beta_2^3\beta_1^2 Z_4) +\\
&+\frac{z\prime(0)EJ}{\beta}(\beta_1^2\beta_2^2 Z_1 - \beta_2^2\beta_1^2 Z_3) - \frac{M_y(0)}{\beta}(\beta_1^3 Z_2 -\\
&-\ \beta 23Z4 - Q\ z(0)\beta\ \beta 12Z1 + \beta 22Z3\ .
\end{aligned}
\qquad (2.\ 21)
$$

To symplify the notation, the following designation was in the relations (2. 21) introduced:

$$
\begin{aligned}
&Z_1 = ch(\beta_1 x)\ ,\ Z_2 = sh(\beta_1 x)\ ,\\
&Z_3 = \cos(\beta_2 x)\ ,\ Z_4 = \sin(\beta_2 x)\ ,
\end{aligned}
\qquad (2.\ 22)
$$

$$
\beta = \beta_1^2 + \beta_2^2\ . \qquad (2.\ 23)
$$

If introduced state vectors at the left edge of a cut of a continuum section (at the coordinates x = 0) in the following form

$$
\mathbf{V}(0) = \lceil \mathbf{Y}(0), \mathbf{Z}(0) \rceil\ , \qquad (2.\ 24)
$$

where

$$
\mathbf{Y}(0) = \left[y(0), y'(0), -M_z(0), -Q_y(0)\right]\ , \qquad (2.\ 25)
$$

$$
\mathbf{Z}(0) = \left[z(0), z'(0), -M_y(0), -Q_z(0)\right]\ , \qquad (2.\ 26)
$$

and in the right edge of a cut of a continuum section (at the coordinates x) in the following form

$$
\mathbf{V}(x) = \lceil \mathbf{Y}(x), \mathbf{Z}(x) \rceil\ , \qquad (2.\ 27)
$$

where

$$
\mathbf{Y}(x) = \left[y(x), y'(x), -M_z(x), -Q_y(x)\right]\ , \qquad (2.\ 28)
$$

$$
\mathbf{Z}(x) = \left[z(x), z'(x), -M_y(x), -Q_z(x)\right]\ , \qquad (2.\ 29)
$$

the relations (2. 21) can be written in the following matrix form

$$
\mathbf{V}(x) = \mathbf{H}(x) \cdot \mathbf{V}(0)\ , \qquad (2.\ 30)
$$

where

$$
\mathbf{H}(x) = \begin{bmatrix} \mathbf{H}_y(x)\ , & \mathbf{0} \\ \mathbf{0} & , \mathbf{H}_z(x) \end{bmatrix} \qquad (2.\ 31)
$$

is a transfer matrix of a continuum of a length x. For sub-matrices in the relation (2. 31) is valid

$$
\mathbf{H}_y(x) = \mathbf{H}_z(x) = [h_{rs}(x)]_1^4\ , \qquad (2.\ 32)
$$

where

$$
\begin{aligned}
h_{11}(x) &= \frac{1}{\beta}(\beta_2^2 Z_1 + \beta_1^2 Z_3)\ ,\\
h_{12}(x) &= \frac{1}{\beta}\left(\frac{\beta_2^2}{\beta_1} Z_2 + \frac{\beta_1^2}{\beta_2} Z_4\right)\ ,\\
h_{13}(x) &= \frac{1}{\beta EJ}(Z_1 - Z_3)\ ,\\
h_{14}(x) &= \left(\frac{Z_2}{\beta_1} - \frac{Z_4}{\beta_2}\right)\frac{1}{\beta EJ}\ ,\\
h_{21}(x) &= \frac{\beta_1\beta_2}{\beta}(\beta_2 Z_2 - \beta_1 Z_4)\ ,\\
h_{22}(x) &= \frac{1}{\beta}(\beta_2^2 Z_1 + \beta_1^2 Z_3)\ ,\\
h_{23}(x) &= \frac{1}{\beta EJ}(\beta_1 Z_2 + \beta_2 Z_4)\ ,\\
h_{24}(x) &= \frac{1}{\beta EJ}(Z_1 - Z_3)\ ,\\
h_{31}(x) &= EJ\frac{\beta_1^2\beta_2^2}{\beta}(Z_1 - Z_3)\ ,\\
h_{32}(x) &= EJ\frac{\beta_1\beta_2}{\beta}(\beta_2 Z_2 - \beta_1 Z_4)\ ,\\
h_{33}(x) &= \frac{1}{\beta}(\beta_1^2 Z_1 + \beta_2^2 Z_3)\ ,\\
h_{34}(x) &= \frac{1}{\beta}(\beta_1 Z_2 + \beta_2 Z_4)\ ,\\
h_{41}(x) &= EJ\frac{\beta_1^2\beta_2^2}{\beta}(\beta_1 Z_2 + \beta_2 Z_4)\ ,\\
h_{42}(x) &= EJ\frac{\beta_1^2\beta_2^2}{\beta}(Z_1 - Z_3)\ ,\\
h_{43}(x) &= \frac{1}{\beta}(\beta_1^3 Z_2 - \beta_2^3 Z_4)\ ,
\end{aligned}
\qquad (2.\ 33)
$$

$h_{44}(x) = \frac{1}{\beta}(\beta_1^2 Z_1 + \beta_2^2 Z_3)$.

3. Transfer matrix of discrete material

In the following section, we deal with a derivation of the transfer matrix of the discrete material, shown in Figure 3.1. Consider a discrete material of a mass *m* and a matrix of an inertia $J_{\xi,\eta,\zeta}$. A coordinate system $J_{\xi,\eta,\zeta}$, in which an inertia of matrix is expressed, consists of three principal axes of an inertia of a discrete material. Assume equality of axial moments of inertia to the axes η, ζ. If denoted $J_\eta = J_\zeta = J_1$, $J_\xi = J_0$, the matrix of inertia of a considered dynamic model element can be written as

$$\mathbf{J}_{\xi,\eta,\zeta} = \lceil J_0 , J_1 , J_1 \rfloor \ . \qquad (3.\ 1)$$

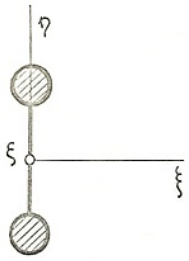

Figure 2

The dynamic model having a discrete lumped material compensation is devided by imaginary cuts, according to Figure 2. Force effects in a cut behind a discrete material (a right edge) are equivalent to a force system consisting of inertial effects, acting on the discrete material, and force effects in a cut before a discrete material (a left edge). Equivalence conditions have the following form:

$$\begin{aligned} &Q_{yP} = Q_{yL} - D_y \ , \ Q_{zP} = Q_{zL} - D_z \ , \\ &M_{yP} = M_{yL} - M_{Dy} \ , \ M_{zP} = M_{zL} + M_{Dz} \ . \end{aligned} \qquad (3.\ 2)$$

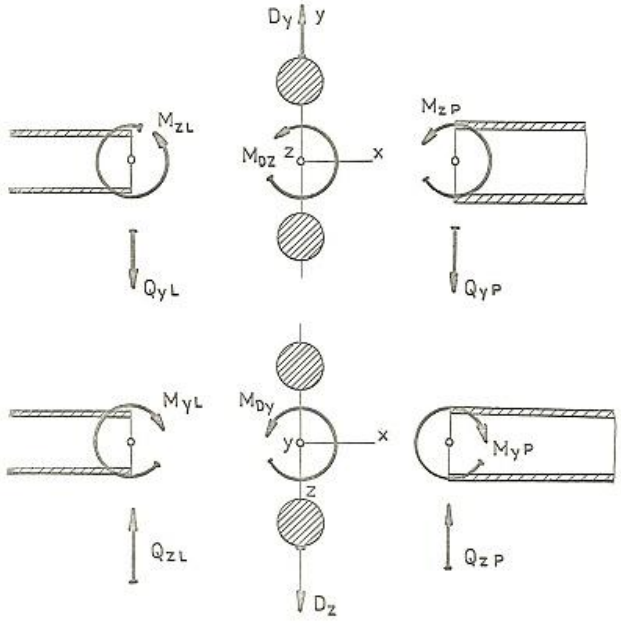

Figure 3

From physical nature of the problem, the following validity of relations is valid:

$$y_P = y_L \ , \ y'_P = y'_L \ , \ z_p = z_L \ , \ z'_P = z'_L \ . \qquad (3.\ 3)$$

To express inertial effects acting on a discrete material, the knowledge derived in [L5] are used, because the discrete material makes exactly the same kind of motion as a continuum section element. Inertia force and moment of inertia couple vectors can be written in the following form:

$$\mathbf{D}_{x,y,z} = -\,m\lceil 0, \ddot{y} - \omega^2 y - 2\omega\dot{z}, \ddot{z} - \omega^2 z + 2\omega\dot{y} \rfloor . \qquad (3.4)$$

$$\mathbf{M}_{Dx,y,z} = \lceil 0 \ , -J_\eta\ddot{\beta} - (J_\xi - J_\zeta)\omega^2\beta \ , J_\zeta\ddot{\gamma} - \\ -J\xi - J\eta\omega 2\gamma \ . \qquad (3.\ 5)$$

Complex shear force and complex bending moment in a cut behind a discrete material are in the form:

$$\begin{aligned} &Q_P(0,t) = Q_L(0,t) + m\left\{\left[\frac{\partial^2 v(x,t)}{\partial t^2}\right]_{x=0} - \right. \\ &- \omega 2v0,t + 2i\omega\partial v(x,t)\partial tx=0 \ , \\ &M_P(0,t) = M_L(0,t) - J_1\left[\frac{\partial^3 v(x,t)}{\partial x\,\partial t^2}\right]_{x=0} - \\ &- (J_0 - J_1)\omega^2\left[\frac{\partial v(x,t)}{\partial x}\right]_{x=0} \ . \end{aligned} \qquad (3.\ 6)$$

Because of looking for a solution of equation (2. 5) in the form $v(x,t) = v(x)e^{ikt}$, where a constant *k* is in case of natural vibration an unknown natural frequency Ω, so in case of a forced vibration by a driving frequency $\bar{\omega}$ it seems the above mentioned complex functions of real variables can be written in the shape of the product:

$$\begin{aligned} &Q_P(0,t) = Q_P(0)e^{ikt}, Q_L(0,t) = \\ &= Q_L(0)e^{ikt}, \\ &M_P(0,t) = M_P(0)e^{ikt}, M_L(0,t) = \\ &= M_L(0)e^{ikt}, \ v(0,t) = v(0)\,e^{ikt}. \end{aligned} \qquad (3.\ 7)$$

After modifying an amplitude of the complex shear force and complex bending moment, the following is obtained from relations (3. 6), (3. 7):

$$\begin{aligned} &Q_P(0) = Q_L(0) - m_1 v_1(0)(\omega + k)^2 \ , \\ &M_P(0) = M_L(0) + J_1 k^2\left[\frac{\partial v(x)}{\partial x}\right]_{x=0} - \\ &- (J_0 - J_1)\omega^2\left[\frac{\partial v(x)}{\partial x}\right]_{x=0} \ . \end{aligned} \qquad (3.\ 8)$$

By comparing the real and imaginary parts in equation (3. 8), the amplitude components of shear force and bending moment are obtained:

$$\begin{aligned} &Q_{yP}(0) = Q_{yL}(0) - m(\omega + k)^2 \cdot y(0) \ , \\ &Q_{zP}(0) = Q_{yL}(0) - m(\omega + k)^2 \cdot z(0) \ , \\ &M_{zP}(0) = M_{zL}(0) + J_1 k^2 y'(0) - \\ &- (J_0 - J_1)\omega^2 y'(0) \ , \\ &M_{yP}(0) = M_{yL}(0) + J_1 k^2 z'(0) - (J_0 - \end{aligned} \qquad (3.\ 9)$$

$-\mathrm{J}_1)\omega^2 z'(0)$.

State vectors behind and before a discrete material can be in accordance with definition (2. 27) expressed in the form

$$\mathbf{V}_\mathrm{p} = \begin{bmatrix}\mathbf{V}_{\mathrm{yP}} \\ \mathbf{V}_{\mathrm{zP}}\end{bmatrix} \ , \ \mathrm{V}_\mathrm{L} = \begin{bmatrix}\mathbf{V}_{\mathrm{yL}} \\ \mathbf{V}_{\mathrm{zL}}\end{bmatrix} \ , \tag{3. 10}$$

where

$$\mathbf{V}_{\mathrm{yP}} = \begin{bmatrix} y(0) \\ y'(0) \\ -\mathrm{M}_{\mathrm{zP}}(0) \\ -\mathrm{Q}_{\mathrm{yP}}(0)\end{bmatrix}, \mathbf{V}_{\mathrm{zP}} = \begin{bmatrix} z(0) \\ z'(0) \\ -\mathrm{M}_{\mathrm{yP}}(0) \\ -\mathrm{Q}_{\mathrm{zP}}(0)\end{bmatrix},$$
$$\mathbf{V}_{\mathrm{yL}} = \begin{bmatrix} y(0) \\ y'(0) \\ -\mathrm{M}_{\mathrm{zL}}(0) \\ -\mathrm{Q}_{\mathrm{yL}}(0)\end{bmatrix}, \mathbf{V}_{\mathrm{zL}} = \begin{bmatrix} z(0) \\ z'(0) \\ -\mathrm{M}_{\mathrm{yL}}(0) \\ -\mathrm{Q}_{\mathrm{zL}}(0)\end{bmatrix}. \tag{3. 11}$$

According to the relations (3. 9), (3. 10), (3. 11), the state vector in a cut behind a discrete material can by expressed in the following form:

$$\mathbf{V}_\mathrm{p} = \begin{bmatrix} \mathrm{y}(0) \\ \mathrm{y}'(0) \\ -\mathrm{M}_{\mathrm{zL}}(0) - \mathrm{J}_1\mathrm{k}^2\mathrm{y}'(0) + (\mathrm{J}_0 - \mathrm{J}_1)\,\omega^2\mathrm{y}'(0) \\ -\mathrm{Q}_{\mathrm{yL}}(0) + \mathrm{m}(\omega + \mathrm{k})^2 \ \cdot \ \mathrm{y}(0) \\ \mathrm{z}(0) \\ \mathrm{z}'(0) \\ -\mathrm{M}_{\mathrm{yL}}(0) - \mathrm{J}_1\mathrm{k}^2\mathrm{z}'(0) + \ (\mathrm{J}_0 - \mathrm{J}_1)\,\omega^2\mathrm{z}'(0) \\ \mathrm{Q}_{\mathrm{zL}}(0) + \mathrm{m}\ (\omega + \mathrm{k})^2 \ \ \mathrm{z}(0) \end{bmatrix}. \tag{3. 12}$$

The previous vector can be written in the shape of the product

$$\mathbf{V}_\mathrm{p} = \mathbf{M} \cdot \mathbf{V}_\mathrm{L} \ ,$$

where

$$\mathbf{M} = \begin{bmatrix}\mathbf{M}_\mathrm{y} \ , \ \mathbf{0} \\ \mathbf{0} \ , \ \mathbf{M}_\mathrm{z}\end{bmatrix} \tag{3. 13}$$

is the transfer matrix of a discrete material. Submatrices in the relation (3. 13) have the following form:

$$\mathbf{M}_\mathrm{y} = \mathbf{M}_\mathrm{z} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -\mathrm{J}_1\mathrm{k}^2 + (\mathrm{J}_0 - \mathrm{J}_1)\omega^2 & 1 & 0 \\ \mathrm{m}(\mathrm{k} + \omega)^2 & 0 & 0 & 1 \end{bmatrix}. \tag{3. 14}$$

4. The transfer matrix of elastic storage

A detailed description of the discrete material transfer matrix derivation won´t mentioned. The process is similar as in case of a discrete material, with the difference that, in terms of equivalence figure instead of inertial effects of elastic force components. The transfer matrix of a discrete material can be written in the form

$$\mathbf{C} = \begin{bmatrix}\mathbf{C}_\mathrm{y} \ , \ \mathbf{0} \\ \mathbf{0} \ , \ \mathbf{C}_\mathrm{z}\end{bmatrix} \ , \ \mathbf{C}_\mathrm{y} = \mathbf{C}_\mathrm{z} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -\mathrm{c} & 0 & 0 & 1 \end{bmatrix} \ , \tag{4. 1}$$

where *c* is the stiffness of an isotropic, elastic, sliding, statically understood rotor radial storage.

5. Conclusion

In the paper, the transfer matrices of basic elements of propeller shaft dynamic models with dominant elements in the form of an one-dimensional linear continuum, with additional discrete materials and elastic storage, are derived. Transfer matrices are derived assuming formation of combined bending-gyratory vibration of a continuum. The continuum makes relative transverse spatial oscillations in the system making rotation with a constant angular velocity.

Derived transfer matrices can be used both for calculating natural frequencies and shapes of oscillations of continuum´s relative transverse oscillations, and for dynamic deformation and strain analysis in cases of discrete harmonic excitation in defined cuts of the continuum.

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CRITICAL ANGULAR VELOCITIES OF CARDAN SHAFT BENDING-GYRATORY VIBRATION

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Abstract: *During operation of some types of trucks, permanent flexural deformations of propshafts between an engine and a gearbox appear. This paper theoretically explains and exemplifies causes of these deformations. Propshafts are in the steady state stressed by the dynamic exciter bending torques of harmonic course and their vectors are perpendicular to the rotating plane of an appropriate fork of Hook´s joint. The mentioned exciter torques cause relative lateral oscillations of the propshaft in its rotating area. When formulating a mathematical model, therefore isn´t justified assumption of a fixed inclination of the rotating shaft´s line deflection, which is generally accepted in the literature. It is necessary to assume formation of the relative transverse spatial oscillation in the system of the shaft, which makes rotation around Hook´s joints´ centers connector in the static equilibrium position.*

Keywords: *frequency, natural, vibration, bending, transverse, shafts, joints*

1. Introduction

In drives with Hook´s joints, there are assumptions for the formation of combined bending-gyratory vibration of shafts. The propshafts are in the steady state stressed by the dynamic exciter bending torques of harmonic course and their vectors are perpendicular to the rotating plane of an appropriate fork of Hook´s joint [6]. The mentioned torques are generated in the steady state due to the transmission of a torque by Hook´s joints and cause lateral oscillation of the propshaft in its rotating area.

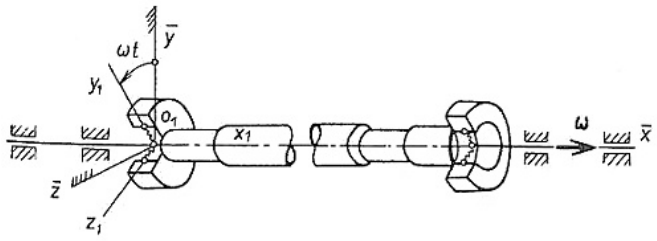

Figure 1

When formulating a mathematical model of a continuum section, therefore isn´t justified assumption of a fixed inclination of the rotating shaft´s line deflection, which is generally accepted in the literature, but it is necessary to assume formation of the relative transverse spatial oscillation in the system of the shaft 0 (x, y, z) - as shown in Figure 1 - which makes rotation by an angular velocity ω. The described kind of vibration will be hereinafter regarded as combined bending-gyratory vibration.

2. Mathematical model

To analyse critical angular velocities of the propshaft, a dynamic model, shown in Figure 1, has been used. The model consists of an one-dimensional continuum sections having a constant cross section shaped like an annulus area. On the outer edges thus graduated one-dimensional continuum are positioned discrete compensations of concentrated materials - equivalent replacements of Hook´s joints´ inner fork. The discrete masses are bound to the rotating system by isotropic elastic displaceable fictive springs whose static rigidity is determined from the shaft deformation under the effect of a known force. In terms of bending-gyratory vibration, the continuum section is defined by geometrical parameters r_1, r_2, l (the inner radius, the outer radius, the length), the weight parameter ϱ (the density), rigidity parameter E (the modulus of elasticity in tension-compresion) and further the operating parameter ω (the angular velocity of rotation of propshaft system). The Hook´s joint replacement is determined by a mass *m*, a diagonal matrix of inertia $J_{\xi,\eta,\zeta}$ (at time t = 0 is ξ ≡ x, η ≡ y, ζ ≡ z) as well as an operational parameter ω. A parameter *k* (the static stiffness of an isotropic flexible displaceable storage) must be specified for the flexible storage.

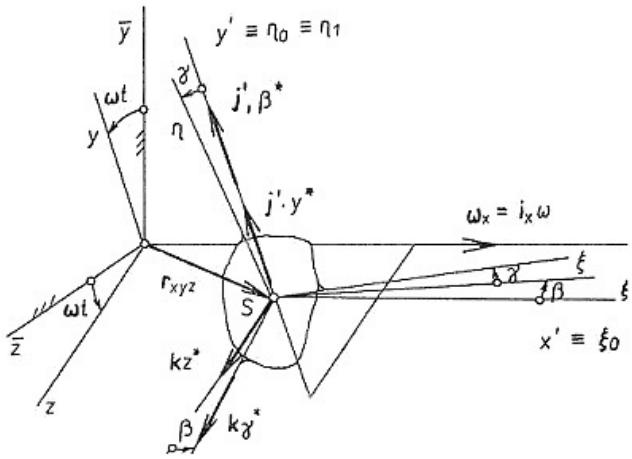

Figure 2

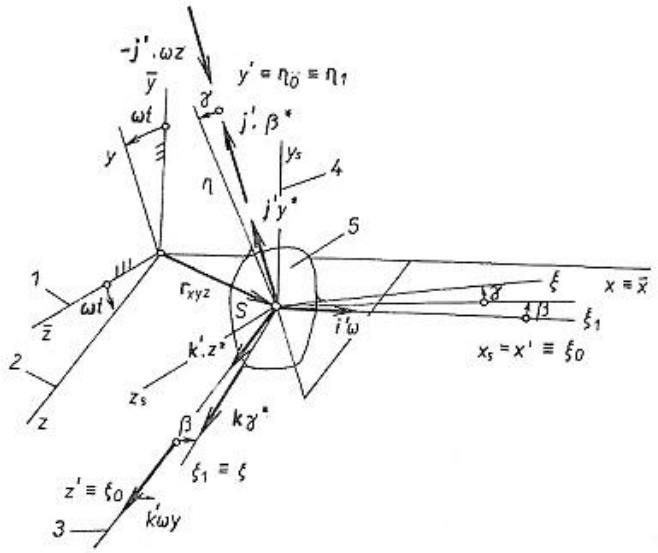

Figure 3

If there is formation of combined bending-gyratory vibration, the continuum element, eventually the discrete mass, makes general spatial movement (Figure 2) composed of rotation of the system 0(x, y, z) around the axis x = $\bar{x}$ by constant angular velocity $i_x\omega$, displacement of the system S (x′, y′, z′) by instantaneous angular velocity with the components $j\overset{*}{y}$, $k\overset{*}{z}$ and the spherical motion by instantaneous angular velocity with the components $j \cdot \overset{*}{\beta}$, $k\overset{*}{\gamma}$. To express inertial effects acting on the element continuum, eventually on the discrete mass, it´s preferred to replace equivalently the vector $\omega_{xyz} = i_x\omega$ for the vectors $\omega_{x'y'z'} = i'_x\omega$ and $v_{sx'y'z'} = k'\omega y - j'\omega z$ (Figure 3). The general spatial motion can be differentiated to displacement 41 of the system S (x_s, y_s, z_s) and the relative spherical movement 54 with its center in the element center, eventually in the discrete mass center. The inertial effects can be replaced by the inertial force vector from displacement

$$D_{x'y'z'} = - m\,[a_{s41}]_{x'y'z'} \quad , \tag{2.1}$$

where

$$[a_{s41}]_{x'y'z'} = \left[0, (\overset{**}{y} - \omega^2 y - 2\omega\overset{*}{z}), (\overset{**}{z} - \omega^2 z + 2\omega y)\right] \tag{2.2}$$

is an acceleration vector of the reference point and a torque vector of the inertia couple

$$M_{D\xi\eta\zeta} = \begin{bmatrix} 0 \\ -J_\eta \overset{**}{\beta} - \omega^2\beta(J_\xi - J_\zeta) \\ -J_\zeta \overset{**}{\gamma} - \omega^2\gamma(J_\xi - J_\eta) \end{bmatrix} \quad . \tag{2.3}$$

The relations (2.1), (2.3) can be modificated for the continuum element of constant annular cross section to the shape

$$dD_{x'y'z'} = - \mu dx\,[a_{s41}]_{x'y'z'} \quad , \tag{2.4}$$

where

$$\mu = \pi\varrho\,(r_2^2 - r_1^2) \quad , \tag{2.5}$$

$$dM_{D\xi\eta\zeta} = \bar{\mu}\,dx \begin{bmatrix} 0 \\ -\overset{**}{\beta} - \omega^2\beta \\ -\overset{**}{\gamma} - \omega^2\gamma \end{bmatrix} \quad , \tag{2.6}$$

while

$$\bar{\mu} = \frac{\pi\varrho}{4}\,(r_2^4 - r_1^4) \quad . \tag{2.7}$$

The equation (2.3) is derived for small angles β, γ defining the rotation of an element, eventually the rotation of a discrete mass, due to the relative bending continuum deformation. There are neglected small quantities of the second order (members containing mutual products of quantities $\beta, \overset{*}{\beta}, \delta, \overset{*}{\delta}$). It is therefore possible to ask about

$$dM_{D\xi\eta\zeta} = dM_{Dx'y'z'} \quad . \tag{2.8}$$

Equations of motion of the continuum section are obtained from equilibrium conditions of inertia and elastic force effects acting on the loose continuum section element in the form

$$\begin{aligned} &\frac{\partial^4 y}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 y}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 y}{\partial x^2}\right) + \frac{4\varrho}{E(r_2^2+r_1^2)}\left(\frac{\partial^2 y}{\partial t^2} - \right. \\ &\left. - 2\omega\partial z\partial t - \omega 2y = 0\right) , \\ &\frac{\partial^4 z}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 z}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 z}{\partial x^2}\right) + \frac{4\varrho}{E(r_2^2+r_1^2)}\left(\frac{\partial^2 z}{\partial t^2} + \right. \\ &\left. + 2\omega\partial y\partial t - \omega 2z = 0\right) . \end{aligned} \tag{2.9}$$

If we introduce a comprehensive cross-section center deflection

$$v(x, t) = y(x, t) + iz(x, t) \quad , \tag{2.10}$$

the previous equations can be modificated to the shape

$$\frac{\partial^4 v}{\partial x^4} - \frac{\varrho}{E}\left(\frac{\partial^4 v}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 v}{\partial x^2}\right) + \frac{4\varrho}{E(r_1^2+r_1^2)}\left(\frac{\partial^2 v}{\partial t^2} - \right. \tag{2.11}$$
$$\left. - \omega 2v + 2i\omega\partial v\partial t = 0\right) .$$

3. Method of solution

If there is combined bending-gyratory vibration, the propshaft makes relative spatial bending oscillations in the system rotating with constant angular velocity ω. The natural frequency of the relative spatial bending vibration depends on the angular velocity of rotation of the rotating system. Critical situation for the system when the natural frequency of relative vibration being equal to the angular velocity of rotation.

$$\omega_{krit} = \omega = \Omega(\omega) \quad . \tag{3.1}$$

As the first is specified the natural frequency of the relative vibration. By changing the parameter ω in the program data file, the values $\Omega_i = (\omega_i)$ and the curves are obtained at selected points $\Omega_i = \Omega_i(\omega)$. The values of critical angular velocities are obtained as intersections of curves $\Omega_i = \Omega_i(\omega)$ with the line $\Omega = \omega$ (Figure 5). The natural frequency of the relative spatial bending vibration is obtained by using the transfer-matrix method. If the system (the propshaft) oscillates by one of the main eigen modes, the instantaneous state vector in a rotating system can be written in the shape of the product

$$v(x, t) = \mathbf{V}(x)e^{i\Omega t} \quad , \tag{3.2}$$

where

$$\mathbf{V}(x) = \lceil v(x), v'(x), -M(x), -Q(x) \rceil \tag{3.3}$$

This is a state vector amplitude (further „a state vector"). Then, the dynamic model can be divided into basic articles described by transfer matrices which bind marginal state vectors of an appropriate article. Transfer matrices of discrete mass, flexible storage and continuum section can be written in the form

$$\mathbf{M} = \begin{bmatrix} 1, & 0, & 0, 0, \\ 0, & 1, & 0, 0, \\ 0, & -J_1\Omega^2 + (J_0 - J_1)\omega^2 & 1, 0, \\ m(\Omega + \omega)^2, & 0 & 0, 1, \end{bmatrix} , \tag{3.4}$$

$$\mathbf{K} = \begin{bmatrix} 1, & 0, & 0, & 0, \\ 0, & 1, & 0, & 0, \\ 0, & 0, & 1, & 0, \\ -k, & 0, & 0, & 1, \end{bmatrix} , \tag{3.5}$$

$$\mathbf{H}(x) = [\mathbf{H}_{11}(x) \,\vdots\, \mathbf{H}_{12}(x) \,\vdots\, \mathbf{H}_{13}(x) \,\vdots\, \mathbf{H}_{14}(x)] \quad , \tag{3.6}$$

where

$$\mathbf{H}_{11}(x) = \frac{1}{\beta_1^2 + \beta_2^2} \begin{bmatrix} \beta_2^2 \cosh\beta_1 x + \beta_1^2 \cos\beta_2 x \\ \beta_2^2 \beta_1 \sinh\beta_1 x - \beta_1^2 \beta_2 \sin\beta_2 x \\ (\beta_2^2 \beta_1^2 \cosh\beta_1 x - \beta_1^2 \beta_2^2 \cos\beta_2 x)\, EJ \\ (\beta_2^2 \beta_1^3 \sinh\beta_1 x + \beta_1^2 \beta_2^3 \sin\beta_2 x)\, EJ \end{bmatrix} , \tag{3.7}$$

$$\mathbf{H}_{12}(x) = \frac{1}{\beta_1^2 + \beta_2^2} \begin{bmatrix} \frac{\beta_2^2}{\beta_1} \sinh\beta_1 x + \frac{\beta_1^2}{\beta_2} \sin\beta_2 x \\ \beta_2^2 \cosh\beta_1 x + \beta_1^2 \cos\beta_2 x \\ (\beta_2^2 \beta_1 \sinh\beta_1 x - \beta_1^2 \beta_2 \sin\beta_2 x)\, EJ \\ (\beta_2^2 \beta_1^2 \cosh\beta_1 x - \beta_1^2 \beta_2^2 \cos\beta_2 x)\, EJ \end{bmatrix} , \tag{3.8}$$

$$\mathbf{H}_{13}(x) = \frac{1}{\beta_1^2 + \beta_2^2} \begin{bmatrix} (\cosh\beta_1 x - \cos\beta_2 x) \frac{1}{EJ} \\ (\beta_1 \sinh\beta_1 x + \beta_2 \sin\beta_2 x) \frac{1}{EJ} \\ \beta_1^2 \cosh\beta_1 x + \beta_2^2 \cos\beta_2 x \\ \beta_1^3 \sinh\beta_1 x - \beta_2^3 \sin\beta_2 x \end{bmatrix} , \tag{3.9}$$

$$\mathbf{H}_{14}(x) = \frac{1}{\beta_1^2 + \beta_2^2} \begin{bmatrix} \left(\frac{1}{\beta_1} \sinh\beta_1 x - \frac{1}{\beta_2} \sin\beta_2 x\right) \frac{1}{EJ} \\ (\cosh\beta_1 x - \cos\beta_2 x) \frac{1}{EJ} \\ \beta_1 \sinh\beta_1 x + \beta_2 \sin\beta_2 x \\ \beta_1^2 \cosh\beta_1 x + \beta_2^2 \cos\beta_2 x \end{bmatrix} . \tag{3.10}$$

In the relations (3.7 to (3.10) is introduced the following relation:

$$J = \frac{\pi}{4}(r_2^4 - r_1^4) \quad , \tag{3.11}$$

$$\beta_1 = \left[-\frac{p}{2} + \left(\frac{p^2}{4} - g\right)^{\frac{1}{2}}\right]^{\frac{1}{2}}, \; \beta_2 = \left[\frac{p}{2} + \left(\frac{p^2}{4} - g\right)^{\frac{1}{2}}\right]^{\frac{1}{2}}, \tag{3.12}$$

where

$$p = \frac{\varrho}{E}(\Omega^2 - \omega^2) \; , \; q = -\frac{4\varrho(\Omega+\omega)^2}{E(r_2^2 + r_1^2)} \quad . \tag{3.13}$$

The method uses the knowledge of some marginal state vectors elements of a propshaft. From the binding relations between marginal state vectors, the frequency equation can be defined. Marginal state vectors of a dynamic model (Figure 1)

$$\mathbf{V}_1 = \begin{bmatrix} v_1(0) \\ v_1(0) \\ 0 \\ 0 \end{bmatrix} , \mathbf{V}_{c+5} = \begin{bmatrix} v_0(l_0) \\ v_0(l_0) \\ 0 \\ 0 \end{bmatrix} \tag{3.14}$$

(designated by indexes of Figure 4) are bound together by the relation

$$V_{c+5} = P \,.\, V_1 \quad . \tag{3.15}$$

The transfer matrix of the system

$$\mathbf{P} = [p_{rs}]_1^4 \tag{3.16}$$

is obtained by successive matrix multiplication, according the relation

$$\mathbf{P} = \mathbf{K}_2 \,.\, \mathbf{M}_2 \,.\, \mathbf{H}_0 \,\ldots\, \mathbf{H}_i \,\ldots\, \mathbf{H}_1 \,.\, \mathbf{M}_1 \,.\, \mathbf{K}_1 \quad . \tag{3.17}$$

After substituting the vectors (3.14) and the transfer matrix (3.16) to the binding relation (3.15) and after performing matrix multiplication, the system of homogenous equations is obtained:

$$\mathbf{F} \,.\, \mathbf{V} = \mathbf{0} \,. \tag{3.18}$$

The vector of unknowns is introduced in the form

$$\mathbf{V} = [v(0)\,, v'(0)\,, v_0(l_0)\,, v'_0\,(l_0)] \;. \tag{3.19}$$

Then, the system matrix has the following form:

$$\mathbf{F} = \begin{bmatrix} p_{11}\,, & p_{12}\,, & -1, & 0 \\ p_{21}\,, & p_{22}\,, & 0, & -1 \\ p_{31}\,, & p_{32}\,, & 0, & 0 \\ p_{41}\,, & p_{42}\,, & 0, & 0 \end{bmatrix} \,. \tag{3.20}$$

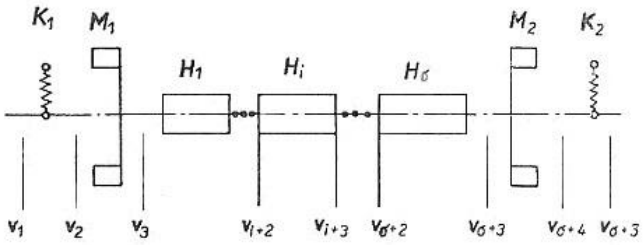

Figure 4

The frequency equation is obtained under the condition of nontrivial solution of the system (3.18), in the form

$$\det \mathbf{F} = 0 \,. \tag{3.21}$$

The frequency determinant, det **F** = D(Ω), is a complex function of the frequency Ω. Natural frequencies of the system are found as the roots of the nonlinear algebraic equation D(Ω) = 0. The roots of this equation (which is infinitaly many, due to the physical nature of the problem) are only found in the interval (Ω_{min} , Ω_{max}). In this interval, functional values of the function D(Ω) in points Ω_{min}+ jΔΩ, j = 0, 1, 2, …, are calculated. If between two neighboring points occurs change of the sign function D(Ω), it means that between these points, there is an odd number of natural frequencies, while between points where the sign change doesn´t occur, there is an ever number of natural frequencies (in this case, zero is an even number, too). In cases of no close natural frequencies, it is enough to take from hundredths to thousandths of length of frequency interval Ω_{max} - Ω_{min}. Natural frequencies can be calculated with the required accuracy. If the change of the sign function D(Ω) occured during the transition from Ω_{min}+ jΔΩ k Ω_{min}+ (j+1) ΔΩ, then the interval < Ω_{min}+ jΔΩ; Ω_{min} + (j+1)ΔΩ > is browsed through the step equal ΔΩ/10. The refinement process is terminated if the following for the number $\varepsilon < 1$ applies:

$$\left[\frac{D(\Omega)}{D(\Omega_{min})}\right] < \varepsilon \,. \tag{3.22}$$

The value of the left endpoint of the smallest length where there is change of sign of a frequency determinant, it´s the natural frequency. The frequency determinant is calculated for a given frequency Ω by using the DET (Ω, D) procedure, where the formal parameter Ω is as a natural frequency and the parameter D as a frequency determinant value for this frequency. The parameters we work with: Ω a $\overline{\Omega}$ - the instantaneous frequencies distant from each other about $\Delta\overline{\Omega} = \Delta\Omega/10^i$ for i = 0, 1, 2 … D and $\overline{D}$ - frequency determinant values along a row for frequencies Ω a $\overline{\Omega}$. The parameter D_{min} is the frequency determinant value for the frequency Ω_{min}. The parameter Ω has a significance of a higher frequency with which the sign change of D (Ω) function occurred by the first step ΔΩ. The input parameters are the following: n, ϱ, E, k_1, k_2, m_1, m_2, $J_{\zeta 1}$, $J_{\zeta 2}$, $J_{\eta 1}$, $J_{\eta 2}$, $J_{\xi 1}$, $J_{\xi 2}$, Ω_{min}, Ω_{max}, ΔΩ, ε, ω, l_1, r_{11}, r_{21}, l_2, r_{12}, r_{22}, …, l_n, r_{1n}, r_{2n}. The output parameters are the ascending ordered natural frequencies of relativ lateral vibration in that interval, found with the specified accuracy.

4. Application

When calculating natural frequencies of relative bending vibration by using the programm VFOKP, the input parameters defining the transfer matrix of discrete mass (the weight and inertia matrix elements) and the parameter defining the transfer matrix of flexible storage (the spring stiffness) must be calculated. Parameters defining the transfer matrix of a continuum section can be directly subtracted from manufacturing drawing, eventually these are material constants (specific gravidity, modulus of elasticity in tension or compression). In addition to these parameters defining a mathematical model, it is necessary to specify parameters arising from method of solution. It´s the relative accuracy ε (as sufficient is adviced to take ε = 0,1, or 0,01), the frequency interval < Ω_{min}, Ω_{max} > in which we seek natural frequencies with the step ΔΩ and the operating parameter ω. The input parameters for one variant of drive of a real vehicle are shown in the Table 1. Natural frequencies calculations of relative vibration are performed for different values of ω by changing of the parameter ω in a data file. Dependence $\Omega_i(\omega)$ for the assessing variant of a drive is shown in Figure 5. Looking at the diagram, it is clear that values of critical angular velocities of combined bending-gyratory vibration in the assessing variant (in terms of design parameters for a specific vehicle) are about 50 % lower than critical angular velocities of simple steady circular vibration are. Approximately, these can be considered to be natural frequencies of relative spatial bending vibrations at zero angular velocity of rotation. Approximately, these are values of $\Omega_i(0)$.

Designation	*Dimension*	*Value*	*Designation*	*Dimension*	*Value*
N	-	5	L (2)	m	1475 · 10^{-3}
RO	kgm^{-3}	7,8 · 10^{3}	L (3)	m	30 · 10^{-3}
E	Nm^{-2}	2,1 · 10^{11}	L (4)	m	75 · 10^{-3}
k1	Nm^{-1}	3,89 · 10^{7}	L (5)	m	120 · 10^{-3}
k2	Nm^{-1}	7,22 · 10^{7}	R1 (1)	m	32,5 · 10^{-3}
M1, M2	kg	5,663	R1 (2)	m	40 · 10^{-3}
JD1, JD2	kgm^{2}	1,25 · 10^{-2}	R1 (3)	m	30 · 10^{-3}
JE1, JE2	kgm^{2}	1,25 · 10^{-2}	R1 (4)	m	0
JK1, JK2	kgm^{2}	2,22 · 10^{-2}	R1 (5)	m	29 · 10^{-3}
OMIN	s^{-1}	10	R2 (1)	m	45 · 10^{-3}
OMAX	s^{-1}	5000	R2 (2)	m	45 · 10^{-3}
DOM	s^{-1}	10	R2 (3)	m	45 · 10^{-3}
EPS	-	0,1	R2 (4)	m	25 · 10^{-3}
OJ	s^{-1}	200	R2 (5)	m	42,5 · 10^{-3}
L (1)	m	80 · 10^{-3}		m	

Table 1: Basic input parameters of the program

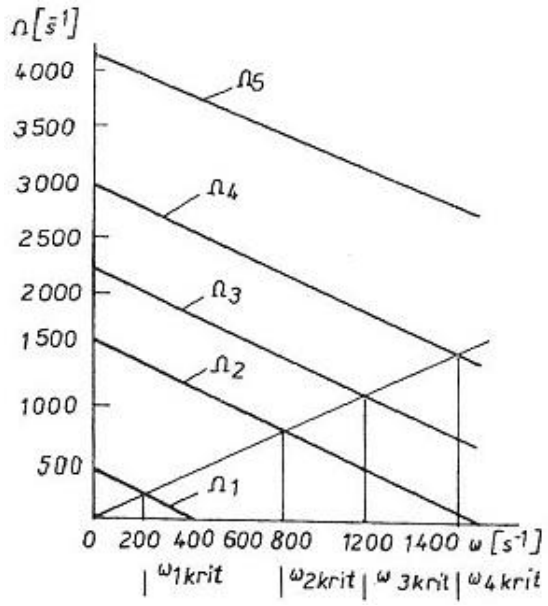

Figure 5

5. Conclusion

Relative lateral vibration of a propshaft as a result of excitation sources specific for Hook´s joints drives, brings to the system dependence of the frequency spectrum on the angular velocity of Cardan shafts rotation. It´s therefore an evolutive system. Numerical analyzes have showed that critical speed of combined bending-gyratory vibration, speed resonance, are up to 50 % lower than natural frequencies of relative lateral vibration at ω = 0, respectively simple steady gyratory vibration of propshaft, which are usually discovered. If the speed resonance appear in the operational area, there is danger of a disorder (disorder of permanent bending deformation of a propshaft) as a result of excitation sources which have circular excitation frequency equal to the angular velocity of propshaft rotation.

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CARDAN SHAFT STEADY STATE RESPONSE ON ROTATING TORQUE EXCITATION

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Abstract: *Drive with Hook´s joints is a transverse oscillating evolutive system. The spectrum of natural frequencies of relative transverse bending vibration quite considerably depends on the operating parameter of a drive, i. e. on the angular velocity of propshaft system rotation. As a result of angular velocity increasing, the values of relative vibration natural frequencies decrease. In some particular cases, the decrease is about 50 %. This fact is especially dangerous in cases of drives whose shafts speeds are during operation in the area just below the critical speeds. Then, it´s necessary to deal not only with the question of the speed resonance position, but also analyzing the dynamic deformation and other state variables in the individual sections of a shaft. The transfer-matrix method can be used also in case of rotating parts of gear pumps whose shafts make flexural oscillation during the rotation.*

Keywords: *shaft, dynamic, deformation*

1. Introduction

The above mentioned solution of the problem is especially actual for a vehicle concept where Cardan gear mechanism is between a clutch and a gearbox (Figure 1), where: *1* - a vehicle frame; *2* - a drive unit; 3 - a transmission; *4* - a shaft coupling; *5, 8* - a complete cross of Hook´s joint; *6,7*- a divided propeller shaft; *9* - a transmission shaft. The engine rotational speed of a propshaft is no reduced and it is continuous changing in the operation area. As a result of possible „roll over" when shifting to a lower gear (in the kontext of vehicles to which the processed method is applied), let´s consider for a maximum angular velocity of 300 rads^{-1}. Given the continuous use of the operating area, propshafts must be operated in subcritical region. As regards long propshafts whose length is approximately at 1500, 2000-mm interval, so in order to satisfy the condition mentioned above, strain on geometrical characteristics of the section must be extreme. Shafts are based on robust and cause an adverse dynamic load around a connecting shaft. That has the effect of service life shortening of design knots, especially bearings. Therefore, in order to avoid an unacceptable increase in weight of a propshaft, it´s necessary to allow the speed resonance in the vicinity of an operating engine speed maximum. Only determination of the natural frequencies position and shapes of oscillations, however, in this case, isn´t sufficient to assess the resistance of a propshaft to the transversal oscillation but it´s necessary to deal with the analysis of forced bending vibration of a propshaft. Based on the knowledge of deformations and stress at selected sections of a propshaft, it´s then possible relatively reliably to assess the durability of a propshaft to the transverse oscillation. As the most significant sources of excitation can be considered excitation by bending torques of which are propshafts strained due to the transfer of power flow by Hook´s joints, further propshaft edge kinematic excitation due to the drive unit spatial oscillation and imbalances excitation of a propshaft.

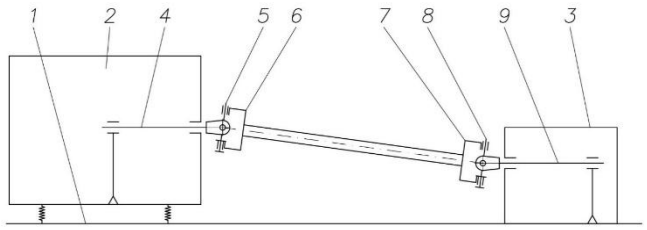

Figure 1

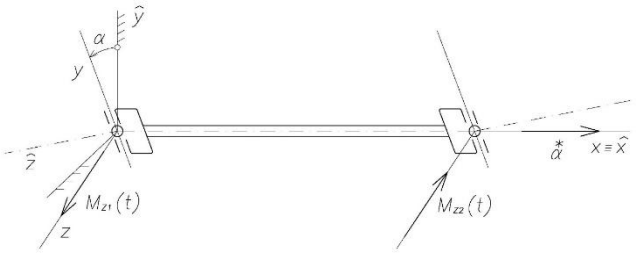

Figure 2

The paper is focused on state variables solution, i. e. amplitudes of deflection, deflection line tilt, bending torque and shear forces - in selected sections of a propshaft and during excitation process performed by above mentioned bending torques of which are propshafts strained due to the power flow transfer by Hook´s joints. The excitation torques (Figure 2) have an approximately harmonic waveform. Their vectors are perpendicular to the inner forks of a shaft, and rotating.

2. Mathematical model

Steady response to the above mentioned excitation torques is examined on a dynamic model (Figure 4). This is formed by bound sections of an one-dimensional continuum of a constant annular cross-section. On outer edges of the system, there are placed discrete compensations of Hook´s joints. The mentioned discrete masses are bound to the rotating system by fictitious

springs. Springs stiffness, statically understood, is determined based on the relocation of the relevant Hook´s joint center, as a consequence of the static deformation of the related shaft, under the effect of the chosen unit of power. In the left margin, this is the shaft coupling, on the right margin, this is the shaft of the gearbox.

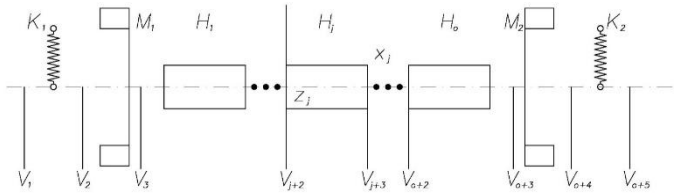

Figure 3

The calculation is executed using the usual calculations methods and includes bending and shear deformation. Flexibility of the related shafts is so concentrated to the locations of the Hook´s joints centers. The continuum section (Figure 3) is defined by the geometric parameters r_1, r_2, l (the inner radius, outer radius, length), the mass parameter ρ (density), the rigidity parameter *E* (modulus of elasticity in tension or compression) and the operational parameter ω (angular velocity of the rotation of the propshaft system). The Hook´s joint replacement is determined by the mass *m*, the diagonal matrix of inertia J = $J_{\xi\eta\zeta} = [J_0, J_1, J_1]$ (at time t = 0 je ξ≡*x*, η≡*y*, ζ≡*z*) as well as the operational parameter ω. With regard to the flexible storage, it´s necessary to specify the parameter *k* - static rigidity of flexibly and isotropic sliding storage. Excitation torques are discrete, acting on the edges of the propshaft (Figure 4). They are considered in the following shape:

$$M_1(t) = M_1 e^{i\bar{\omega}t}\,,\ M_2(t) = M_2 e^{i\bar{\omega}t}\,, \qquad (2.\ 1)$$

where

$$M_1 = M_{z1} + iM_{y1}\,,\ M_2 = M_{z2} + iM_{y2} \qquad (2.\ 2)$$

are complex amplitudes of excitation torques. Excitation circular frequency $\bar{\omega}$ is considered as generally different from the angular velocity of rotation ($\bar{\omega} \neq \omega$). It can be expected that due to the rotating of the excitation torques occurs to the transverse oscillation of the shaft in the rotating area. It can be generated combined bending-gyratory vibration, for which are used equations of motion, that are derived in [1] in the following form:

$$\begin{aligned}&\frac{\partial^4 y}{\partial x^4} - \frac{\rho}{E}\left(\frac{\partial^4 y}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 y}{\partial x^2}\right) + \\ &+ \frac{4\rho}{E\left(r_2^2 + r_1^2\right)}\left(\frac{\partial^2 z}{\partial t^2} - 2\omega\frac{\partial z}{\partial t} - \omega^2 y\right) = 0\,,\end{aligned} \qquad (2.\ 3)$$

respectively

$$\begin{aligned}&\frac{\partial^4 z}{\partial x^4} - \frac{\rho}{E}\left(\frac{\partial^4 z}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 z}{\partial x^2}\right) + \\ &+ \frac{4\rho}{E\left(r_2^2 + r_1^2\right)}\left(\frac{\partial^2 z}{\partial t^2} + 2\omega\frac{\partial y}{\partial t} - \omega^2 z\right) = 0\,, \\ &\frac{\partial^4 v}{\partial x^4} - \frac{\rho}{E}\left(\frac{\partial^4 v}{\partial x^2\,\partial t^2} + \omega^2\frac{\partial^2 v}{\partial x^2}\right) + \\ &+ \frac{4\rho}{E\left(r_2^2 + r_1^2\right)}\left(\frac{\partial^2 v}{\partial t^2} - \omega^2 v + 2i\omega\frac{\partial v}{\partial t}\right) = 0\,,\end{aligned} \qquad (2.\ 4)$$

where can be introduced a complex deflection

$$v(x,t) = y(x,t) + iz(x,t)\,. \qquad (2.\ 5)$$

Boundary conditions (complex shear force and bending torque in the outer peripheral sections of the first and last continuum field - indexing shown in Figure 3), can be expressed in the form:

$$\begin{aligned}&\mathbf{Q_3(t)} = \mathbf{k_1 v_1}(0,t) + \\ &+ \mathbf{m_1}\left\{\left[\frac{\partial^2 v(x_1,t)}{\partial t^2}\right]_{x_1=0} - \boldsymbol{\omega}^2\mathbf{v_1(0,t)} + \right. \\ &\left. \mathbf{+ 2i\omega\,\partial v1(x1,t)\partial tx1=0}\right.,\end{aligned} \qquad (2.6)$$

$$\begin{aligned}&\mathbf{M_3(t)} = -\mathbf{J_{11}}\left[\frac{\partial^3 v_1(x_1,t)}{\partial x_1\partial t^2}\right]_{x_1=0} - (\mathbf{J_{01}} - \\ &\mathbf{- J11\omega 2\partial v1(x1,t)\partial x1x1=0} + \mathbf{M1}(t)\,,\end{aligned}$$

$$\begin{aligned}&\mathbf{Q_{0+3}}(t) = -\mathbf{k_2 v_0(l_0,t)} - \\ &- \mathbf{m_2}\left\{\left[\frac{\partial^2 v_0(x_0,t)}{\partial t^2}\right]_{x_0=l_0} - \boldsymbol{\omega}^2\mathbf{v_0(l_0,t)} + \right. \\ &\left. \mathbf{+ 2i\omega\partial v0(x0,t)\partial t2x0=l0}\right.,\end{aligned} \qquad (2.7)$$

$$\begin{aligned}&\mathbf{M_{0+3}(t)} = \mathbf{J_{12}}\left[\frac{\partial^3 v_0(x_0,t)}{\partial x_0\partial t^2}\right]_{x_0=l_0} + (\mathbf{J_{02}} - \\ &\mathbf{- J12\omega 2\partial v0(x0,t)\partial x0x0 = l0} + \mathbf{M2(t)}\end{aligned}$$

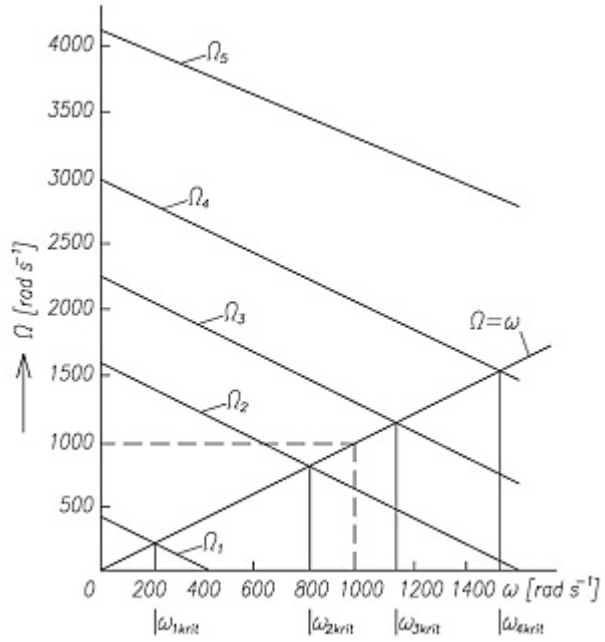

Figure 4

3. Method of solution

The task can be solved using transfer matrix method. With respect to the excitation torques shape, the instantaneous

state vector can be written in any section of rotating system in the form

$$\mathbf{V}(x,t) = \mathbf{V}(x)e^{i\bar{\omega}t}\,, \tag{3.1}$$

where

$$\mathbf{V}(x) = [\mathbf{Y}(x),(x)]\ , \tag{3.2}$$

where the subvectors in rotating area planes have the form

$$\mathbf{Y}(x) = \begin{bmatrix} y\ \ (x) \\ y'\ \ (x) \\ -M_z\ (x) \\ -Q_y\ (x) \end{bmatrix},\ \mathbf{Z}(x) = \begin{bmatrix} z\ \ (x) \\ z'\ \ (x) \\ -M_y(x) \\ -Q_z\ (x) \end{bmatrix}. \tag{3.3}$$

They include amplitude of deflection, deflection line tilt and bending torque and shear force negative amplitudes. Transfer matrices of discrete mass, flexible storage and continuum section of length *l* can be obtained in the form

$$\mathbf{M} = \begin{bmatrix} \mathbf{M_y} & \mathbf{0} \\ \mathbf{0} & \mathbf{M_z} \end{bmatrix}, \mathbf{K} = \begin{bmatrix} \mathbf{K_y} & \mathbf{0} \\ \mathbf{0} & \mathbf{K_z} \end{bmatrix}\ ,\ \mathbf{H} = \begin{bmatrix} \mathbf{H_y} & \mathbf{0} \\ \mathbf{0} & \mathbf{H_z} \end{bmatrix}, \tag{3.4}$$

where

$$\begin{aligned} \mathbf{K_y} = \mathbf{K_z} &= \begin{bmatrix} 1, & 0, & 0, & 0 \\ 0, & 1, & 0, & 0 \\ 0, & 0, & 1, & 0 \\ -k, & 0, & 0, & 1 \end{bmatrix}, \\ \mathbf{M_y} = \mathbf{M_z} &= \begin{bmatrix} 1, & 0, & 0,0 \\ 0, & 1, & 0,0 \\ 0, & -J_1\omega^2 + (J_0 - J_1)\omega^2, & 1,0 \\ m(\bar{\omega} + \omega)^2, & 0, & 0,1 \end{bmatrix}, \end{aligned} \tag{3.5}$$

$$\mathbf{H_y} = \mathbf{H_z} = [h_{rs}]_1^4 = [\mathbf{H_{11}}|\mathbf{H_{12}}|\mathbf{H_{13}}|\mathbf{H_{14}}]\,, \tag{3.6}$$

while

$$\begin{aligned} \mathbf{H_1} &= \frac{1}{\beta_1^2+\beta_2^2}\begin{bmatrix} \beta_2^2 ch\beta_1 l + \beta_1^2 cos\beta_2 l \\ \beta_1\beta_2(\beta_2 sh\beta_1 l - \beta_1 sin\beta_2 l) \\ EJ\beta_1^2\beta_2^2(ch\beta_1 l - cos\beta_2 l) \\ EJ\beta_1^2\beta_2^2(\beta_1 sh\beta_1 l + \beta_2 sin\beta_2 l \end{bmatrix}, \\ \mathbf{H_2} &= \frac{1}{\beta_1^2+\beta_2^2}\begin{bmatrix} \beta_2^2/\beta_1 sh\beta_1 l + \beta_1^2/\beta_2 sin\beta_2 l \\ \beta_2^2 ch\beta_1 l + \beta_1^2 cos\beta_2 l \\ EJ\beta_1\beta_2(\beta_2 sh\beta_1 l - \beta_1 sin\beta_2 l) \\ EJ\beta_1^2\beta_2^2(ch\beta_1 l - cos\beta_2 l \end{bmatrix}, \\ \mathbf{H_3} &= \frac{1}{\beta_1^2+\beta_2^2}\begin{bmatrix} 1/EJ(ch\beta_1 l - cos\beta_2 l \\ 1/EJ(\beta_1 sh\beta_1 l + \beta_2 sin\beta_2 l \\ \beta_1^2 ch\beta_1 l + \beta_2^2 cos\beta_2 l) \\ \beta_1^3 sh\beta_1 l - \beta_2^3 sin\beta_2 l \end{bmatrix}, \\ \mathbf{H_4} &= \frac{1}{\beta_1^2+\beta_2^2}\begin{bmatrix} 1/EJ(1/\beta_1 sh\beta_1 l - 1/\beta_2 sin\beta_2 l \\ 1/EJ(ch\beta_1 l - cos\beta_2 l \\ \beta_1 sh\beta_1 l + \beta_2 sin\beta_2 l) \\ \beta_1^2 ch\beta_1 l + \beta_2^2 cos\beta_2 l \end{bmatrix}. \end{aligned} \tag{3.7}$$

In the previous relations, the following designations are introduced

$$\begin{aligned} \beta_1 = \Bigg\{ &-\frac{\rho}{2E}(\bar{\omega}^2 - \omega^2) + \Bigg[\frac{\rho^2}{4E^2}(\bar{\omega}^2 - \omega^2) + \\ &+4\rho\omega 2 + \omega 2E(r22 + r12)1212, \\ \beta_2 = \Bigg\{ &-\frac{\rho}{2E}(\bar{\omega}^2 - \omega^2) + \Bigg[\frac{\rho^2}{4E^2}(\bar{\omega}^2 - \omega^2) + \\ &+4\rho\omega 2 + \omega 2E(r22 + r12)1212. \end{aligned} \tag{3.8}$$

Deriving of the above-mentioned transfer matrices of system individual cells system goes beyond the scope of this work. Its details are described in [1]. It should be emphasized that transfer matrices contain known constants, respectively algebraic expressions composed of known geometry, mass and stiffness parameters of dynamic model basic elements. The state vectors are bound in the peripheral sections of a relevant cell through transfer matrices. State variables in the right peripheral section of j-th field can be determined in dependence on state vriables in the left peripheral section, based on the relation

$$\mathbf{V_{i+1}} = \mathbf{H_j}.\mathbf{V_i}\ ,\ j = 1,\ldots\ldots\ldots\ldots 0,\ i = j+2\ . \tag{3.9}$$

The same applies here:

$$\begin{aligned} &\mathbf{V_2} = \mathbf{K_1}.\mathbf{V_1}\ ,\ \mathbf{V_3} = \mathbf{M_1}.\mathbf{V_2}\,, \\ &\mathbf{V_{0+4}} = \mathbf{M_2}.\mathbf{V_{0+3}}\ ,\ \mathbf{V_{0+5}} = \mathbf{K_2}.\mathbf{V_{0+4}}\,. \end{aligned} \tag{3.10}$$

Peripheral state vectors

$$\mathbf{V_1} = \lceil\mathbf{Y_1}|\mathbf{Z_1}\rceil\ ,\ \mathbf{V_f} = \lceil\mathbf{Y_{f1}}|\mathbf{Z_{f1}}\rceil\ ,\ f = 0{+}5, \tag{3.11}$$

where

$$\begin{aligned} \mathbf{Y}_1 = \begin{bmatrix} y_1(0) \\ y_1'(0) \\ -M_{z1} \\ 0 \end{bmatrix},\ \mathbf{Z_1} = \begin{bmatrix} z_1(0) \\ z_1'(0) \\ -M_{y1} \\ 0 \end{bmatrix}\ , \\ \mathbf{Y}_f = \begin{bmatrix} y_0(l_0) \\ y_0'(l_0) \\ -M_{z2} \\ 0 \end{bmatrix}\ ,\ \mathbf{Z}_f = \begin{bmatrix} z_0(l_0) \\ z_0'(l_0) \\ -M_{y2} \\ 0 \end{bmatrix} \end{aligned} \tag{3.12}$$

are bound together by transfer matrix of the system.

$$\mathbf{P} = \begin{bmatrix} \mathbf{P_y}, \mathbf{0} \\ \mathbf{0}, \mathbf{P_z} \end{bmatrix}\ ,\ \mathbf{P_y} = \mathbf{P_z} = [\mathbf{P_{rs}}]_1^4, \tag{3.13}$$

according to the relation

$$\mathbf{V_f = P \,.\, V_1} \quad . \tag{3.14}$$

Transfer matrix is obtained by gradual multiplication, according to the relation

$$\mathbf{P = K_2 . M_2 . H_0 \ldots\ldots H_j \ldots\ldots H_1 . M_1 . K_1} \,. \tag{3.15}$$

After substituting peripheral vectors and transfer matrix to the relation, and matrix multiplication, two systems of four non-homogenous linear equations are obtained (written again in the state matrix)

$$\mathbf{A_y \,.\, B_y = D_y} \quad , \quad \mathbf{A_z \,.\, B_z = D_z} \quad , \tag{3.16}$$

where

$$\mathbf{A_y = A_z} = \begin{bmatrix} p_{11} & p_{12} & -1 & 0 \\ p_{21} & p_{22} & 0 & -1 \\ p_{31} & p_{32} & 0 & 0 \\ p_{41} & p_{42} & 0 & 0 \end{bmatrix} \tag{3.17}$$

are matrices of systems,

$$\mathbf{B}_y = \begin{bmatrix} y_1(0) \\ y_1'(0) \\ y_0(l_0) \\ y_0'(l_0) \end{bmatrix} \,, \quad \mathbf{B_z} = \begin{bmatrix} z_1(0) \\ z_1'(0) \\ z_0(l_0) \\ z_0'(l_0) \end{bmatrix} \tag{3.18}$$

are left sides vectors (containing previously unknown non-zero elements of system state peripheral vectors - amplitudes of deflections and deflection line tilt at the edges of the shaft),

$$\mathbf{D_y} = M_{1z} \cdot \begin{bmatrix} p_{13} \\ p_{23} \\ p_{34} - \frac{M_{2z}}{M_{1z}} \\ p_{43} \end{bmatrix} \,,$$

$$\mathbf{D_z} = M_{1y} \cdot \begin{bmatrix} p_{13} \\ p_{23} \\ p_{34} - \frac{M_{2y}}{M_{1y}} \\ p_{43} \end{bmatrix} \tag{3.19}$$

are right sides vectors (containing known amplitudes of the excitation torques and transfer matrix system elements). In this context, it must be noted that in case of using the numerical implementation, analytical expressions in transfer submatrices elements, $\mathbf{P_y = P_z} = [p_{rs}]_1^4$, are not used, but in the program, there are defined two-dimensional fields K, M, H, P, in accordance with the above relations, with the angular velocity ω and the circular excitation frequency $\bar{\omega}$. The appropriate matrix multiplications are numericaly executed in the procedure. In the process of solving equations, state vector elements are obtained at the left edge of the propshaft:

$$y_1(0) = \frac{p_{42}(p_{33}M_{1z} - M_{2z}) - p_{32}p_{43}M_{1z}}{p_{31}p_{42} - p_{32}p_{41}}, \tag{3.20}$$

$$y_1'(0) = \frac{p_{31}p_{43}M_{1z} - p_{41}(p_{33}M_{1z} - M_{2z})}{p_{31}p_{42} - p_{32}p_{41}},$$

$$z_1(0) = \frac{p_{42}(p_{33}M_{1y} - M_{2y}) - p_{32}p_{43}M_{1y}}{p_{31}p_{42} - p_{32}p_{41}},$$

$$z_1'(0) = \frac{p_{31}p_{43}M_{1y} - p_{41}(p_{33}M_{1y} - M_{2y})}{p_{31}p_{42} - p_{32}p_{41}}.$$

State vector (i. e. the amplitude of deflection, the deflection line tilt, bending torque negative amplitude and the shear force) is obtained by successive matrix multiplication in any section of a shaft (in the rightmost section of the i-th field), according to the following relation:

$$\mathbf{V_{j+3} = H_j \ldots\ldots\ldots H_1 . M_1 . K_1 . V_1} \,. \tag{3.21}$$

When giving certain form of the angular velocity of propshaft rotation and excitation (circular) frequency $\bar{\omega}$, being the possibility to construct amplitudes of deflections waveforms, deflection line tilt, the bending torque and the shear force along the propshaft length in the planes $\widehat{x,y}$a $\widehat{x,z}$ (from the points calculated in the selected chains). And in addition, in the selected sections, it´s possibility to draw the waveforms of state variables amplitude-frequency characteristics from the calculated points, at the angular speed of the propshaft rotation ω. State variables amplitude-frequency characteristics indicate a state change in the appropriate section, depending on the excitation frequency $\bar{\omega}$, with constant amplitude of the excitation torque. The excitation torque being changed in relation to the selected step $\Delta\bar{\omega}$.

4. Aplication

From the application perspective, it´s interesting case excitation torques being perpendicular to an one plane of the coordinate system, for example $\widehat{x,y}$. In the plane $\widehat{x,z}$, the system of four homogeneous linear equations is obtained for unknown components of vectors boundaries, while the system has a nontrivial solution only if a determinant of the system is equal to zero. This condition is satisfied if the excitation frequency $\bar{\omega}$ being just equal to the natural frequency Ω. At a given angular velocity of propshaft rotation and excitation (circular) frequency $\bar{\omega}$, it´s possibility to construct waveforms of amplitudes of deflections, deflection line tilts, bending torques and shear forces, along the propshaft length, in planes $\widehat{x,y}$a $\widehat{x,z}$ (from the points calculated in the selected chains). And in addition, in the selected sections, it´s possibility to draw the waveforms of state variables amplitude-frequency characteristics from the calculated points, at the angular velocity of the propshaft rotation ω. In this case, the one-parameter quantity solutions is satisfactory, and the system is probably unstable. Due to that and to the continuous use of operational area, the amplitude-frequencies characteristics (Figure 6) have the practical importance only for $\bar{\omega} \in (0, \Omega_{1K})$. Outside the resonant area, the trivial solution only, $z_0(l_0) = z_1'(l_0) = z_1(0) = z_1'(0) = 0$, suits the mentioned system of homogeneous equations. The time when subvectors being maximal in the plane $\widehat{x,y}$, the state vectors having the value of zero in the plane $\widehat{x,z}$. In

this case, the subvectors perpendicular to the excitation torques directions in the plane being considered as absolute state vectors. To calculate state variables in the selected section of a propshaft, the program EMBUZ has been processed.

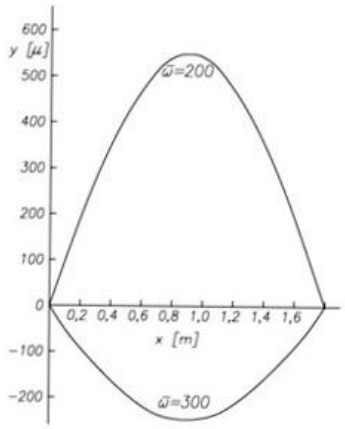

Figure 5

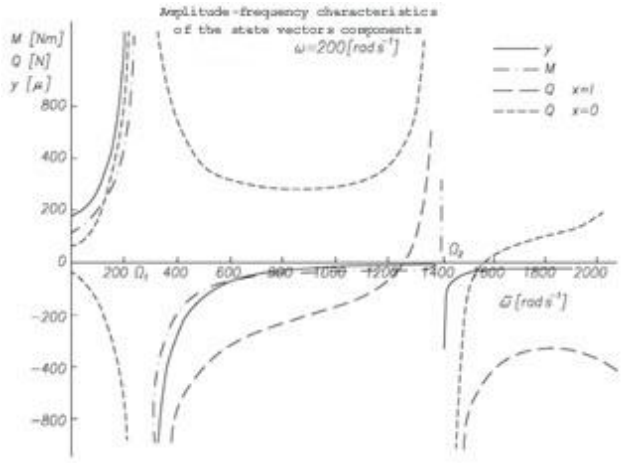

Figure 6

Input parameters of the program:
o – the number of cylinder-type cells with annular cross-section; ρ – shaft material density; k_1, k_2- stiffness storage at the propshaft edges; m_1, m_2 - discrete compensations weights of Hook´s joints; $J_{\xi 1}, J_{\xi 2}$ - torques of innertia of Hook´s joints compensations to the axis ξ; $J_{\eta 1}, J_{\eta 2}$- torques of innertia of Hook´s joints compensations to the axis η; $J_{\zeta 1}, J_{\zeta 2}$ - torques of innertia of Hook´s joints compensations to the axis ζ; M_{1z}, M_{2z}- excitation torques amplitudes at the propshaft edges; $\bar{\omega}_{min}$- minimum excitation frequency; $\bar{\omega}_{max}$- maximum excitation frequency; $\Delta\bar{\omega}$ - excitation frequency step; ω - the angular velocity of propshaft system rotation; l_i - o-membered field of shaft cells lengths; r_{1i} — o-membered field of shaft cells inner radiuses; r_{2i} — o-membered field of shaft cells outer radiuses.

Output parameters of the program:
$\bar{\omega}$ — instantaneous excitation frequency ($\bar{\omega} = \bar{\omega}_{min} + k\,\Delta\,\bar{\omega}$); $\mathbf{V}_1$- initial state vector; $\mathbf{V}_2$ – state vector behind the first spring; $\mathbf{V}_3$ - state vector behind the first mass; $[\mathbf{V}_1, \ldots\ldots\ldots \mathbf{V}_{3+0}]$ – matrices columns as state vectors at the right edges of individual shaft cells; $\mathbf{V}_{4+0}$ - state vector behind the right mass; $\mathbf{V}_{5+0}$ - end-state vector. Processed software allows calculating state variables amplitudes - expressed in the rotating area of 0 (x,y,z) - in the selected section of a propshaft. State variables of an one variant of a propshaft of a real vehicle drive are shown in the Figure 5. The Figure 6 shows the amplitude-frequency characteristics of the state variables at the sections where gaining its maximum.

5. Conclusion
Rotating excitation causes relative lateral vibration of a propshaft in its system making the rotation. Then, the propshaft makes combined bending-gyratory vibration. Processed software allows to perform state variables calculations in the selected propshaft sections. The state variables are calculated in the propshaft rotating area at selected operating parameter, i. e. the angular velocity of the rotation. State variables amplitude-frequency characteristics are obtained in the selected propshaft sections by changing excitation frequency. Through applying these method, it is possible more reliably than previously to assess the propshaft resistance to the transversal oscillation already in the stage of drive design planning, and thus, the probability of faults on a real vehicle substantially reduces.

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BENDING OSCILLATIONS ANALYSIS OF KINEMATIC EXCITATED PROPSHAFT

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Abstract: *In vehicle propulsion systems, one of the major sources of driveshafts transverse oscillations excitation is kinematic excitation of the edge of a shaft due to the spatial oscillations of a drive unit. The paper presents a method for calculating the dynamic deformation of the propeller shaft due to spatial oscillations of the drive unit. For the calculation, the transfer-matrix method is used. The excitation is implemented in the calculation using the boundary conditions. It´s calculated course deflection and other state vector elements (slope of the deflection line, bending torque, shear force) along the length of the shaft, the angular velocity in the area above and bellow the resonance). The method has been tuned and verified on a real variant of the vehicle and it is in good agreement with calculations modal and spectral properties of the propshaft.*

Keywords: *dynamic deflection, course, kinematic excitation, driveshaft, state vector*

1. Introduction

Drive unit body makes due to unbalance of the inner rotating masses, and eventually other sources of excitation, spatial oscillations. This chapter describes the solution of steady forced vibration of a connecting shaft, caused by that movement of a drive unit. The solution being performed on a dynamic model, which is shown in Figure 1. 1. The aim is to calculate the state vectors amplitudes (eventually amplitude-frequency characteristics) of the selected sections of the connecting shaft when the outer spring endpoint making movement (the point A in Figure 1. 1.)

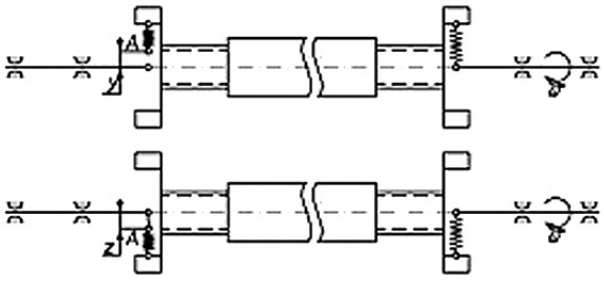

Figure 1.1

2. Kinematic excitation implementation into mathematical model

Because of connecting shaft equations of motion being in a rotating space, it´s necessary to transform the known excitation displacements $\bar{y}_b(t)$, $\bar{z}_b(t)$ (movement in the x-axis direction being not considered) from the basic to the system rotating with constant angular velocity.

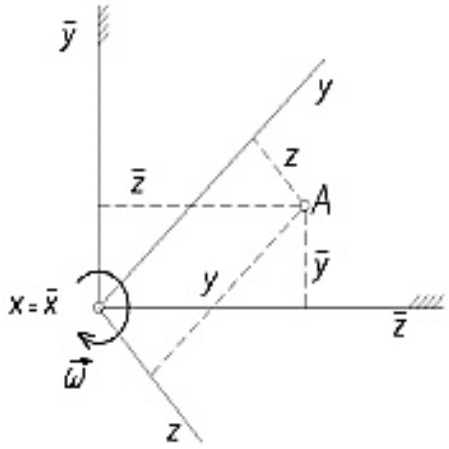

Figure 2.1

According to Figure 2. 1, it can be directly written

$$y_b(t) = \bar{y}_b(t)\cos\omega t + \bar{z}_b(t)\sin\omega t \ , \qquad z_b(t) = \bar{z}_b(t)\cos\omega t - \bar{y}_b(t)\sin\omega t \ . \tag{2.1}$$

Point A motion in the basic system which occurs as a result of drive unit spatial vibration can be approximately described using harmonic functions in the form

$$\bar{y}_b(t) = \bar{y}_b \sin\bar{\omega}t \ , \qquad \bar{z}_b(t) = \bar{z}_b \sin(\bar{\omega}t - \varphi) \ , \tag{2.2}$$

where $\bar{y}_b$, $\bar{z}_b$ are amplitudes of deflection components, $\bar{\omega}$ is the excitation frequency, φ is phase angle.

The complex excitation deflection of the rotating space

$$v_b(t) = \bar{y}_b \sin\bar{\omega}t \ \cos\omega t + \bar{z}_b \sin(\bar{\omega}t - \varphi)\sin\omega t + i[\bar{z}_b \sin(\bar{\omega}t - \varphi)\cos\omega t - \bar{y}_b \sin\bar{\omega}t \ \sin\omega t]$$

being modified using the summation formulas and Euler equation to the form

$$v_b(t) = v_{Ib}e^{i(\bar{\omega}-\omega)t} + v_{IIb}e^{-i(\bar{\omega}+\omega)t} \quad , \tag{2.3}$$

where

$$v_{Ib} = \frac{1}{2}[\bar{z}_b \cos\varphi - i(\bar{y}_b + \bar{z}_b \sin\varphi)] \quad ,$$
$$v_{IIb} = \frac{1}{2}[-\bar{z}_b \cos\varphi + i(\bar{y}_b - \bar{z}_b \sin\varphi)] \tag{2.4}$$

are partial amplitudes of complex excitation deflection.
Regarding to the excitation, elastic force components in the elastic storage acting to the discrete mass m_1 being specified.

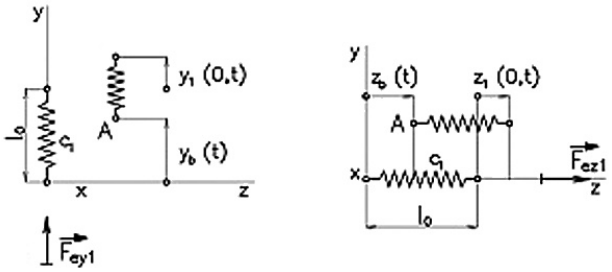

Figure 2.2

According to Figure 2.2, it can be directly written

$$F_{ey1} = c_1[y_b(t) - y_1(0,t)] \quad ,$$
$$F_{ez1} = c_1[z_b(t) - z_1(0,t)] \quad . \tag{2.5}$$

Complex shear force and bending torque in the leftmost shaft first field section being received in the form

$$Q_1(0,t) = c_1[v_1(0,t) - v_b(t)] + + m_1\{\left[\frac{\partial^2 v_1(x_1,t)}{\partial t^2}\right]_{x_1=0} - \omega^2 v_1(0,t) + + 2i\omega\left[\frac{\partial v_1(x_1,t)}{\partial t}\right]_{x_1=0}\} \quad , \tag{2.6}$$

$$M_1(0,t) = -J_{11}\left[\frac{\partial^3 v_1(x_1,t)}{\partial x_1\,\partial t^2}\right]_{x_1=0} - (J_{01} - J_{11})\omega^2\left[\frac{\partial v1(x_1,t)}{\partial x_1}\right]_{x_1=0} \quad .$$

If the complex excitation deflection being in the form (2.3), the complex deflection, complex shear force and complex bending torque of the of the leftmost shaft first field section can be assumed in the form

$$v_1(0,t) = v_{1I}(0)\,e^{i(\bar{\omega}-\omega)t} + v_{1II}(0)\,e^{-i(\bar{\omega}+\omega)t} \quad ,$$
$$Q_1(0,t) = Q_{1I}(0)\,e^{i(\bar{\omega}-\omega)t} + Q_{1II}(0)\,e^{-i(\bar{\omega}+\omega)t} \quad , \tag{2.7}$$
$$M_1(0,t) = M_{1I}(0)\,e^{i(\bar{\omega}-\omega)t} + M_{1II}(0)\,e^{-i(\bar{\omega}+\omega)t}.$$

From the amplitudes equality condition of corresponding functions on the left and right sides of relations which being obtained by substitution the equation (2.7) to the equation (2.6), expressions for the partial amplitudes of the complex shear force and complex bending torque of leftmost shaft first field section being obtained in the form

$$Q_{1I}(0) = c_1[v_{1I}(0) - v_{Ib}] - m_1 v_{1I}(0)\bar{\omega}^2,$$
$$M_{1I}(0) = J_{11}(\bar{\omega} - \omega)^2 v'_{1I}(0) - (J_{01} - J_{11})\omega^2 v'_{1I}(0) \quad ,$$
$$Q_{1II}(0) = c_1[v_{1II}(0) - v_{IIb}] - m_1 v_{1II}(0)\bar{\omega}^2 \quad ,$$
$$M_{1II}(0) = J_{11}(\bar{\omega} + \omega)^2 v'_{1II}(0) - (J_{01} - J_{11})\omega^2 v'_{1II}(0) \quad .$$

Taking the leap from the complex variables to real components, the partial state vectors in the leftmost shaft first field section can be written in the form

$$\mathbf{V}_{3I} = [\mathbf{Y}_{3I}, \mathbf{Z}_{3I}] \quad , V_{3II} = [\mathbf{Y}_{3II}, \mathbf{Z}_{3II}] \quad , \tag{2.8}$$

where the partial subvectors in appropriate planes have the form

$$\mathbf{Y}_{3I} = \begin{bmatrix} y_{1I}(0) \\ y'_{1I}(0) \\ -J_{11}y'_{1I}(0)(\bar{\omega} - \omega)^2 + (J_{01} - J_{11})\omega^2 y'_{1I}(0) \\ -c_1 y_{1I}(0) + c_1 y_{bI} + m_1 y_{1I}(0)\bar{\omega}^2 \end{bmatrix},$$

$$\mathbf{Z}_{3I} = \begin{bmatrix} z_{1I}(0) \\ z'_{1I}(0) \\ -J_{11}z'_{1I}(0)(\bar{\omega} - \omega)^2 + (J_{01} - J_{11})\omega^2 z'_{1I}(0) \\ -c_1 z_{1I}(0) + c_1 z_{bI} + m_1 z_{1I}(0)\bar{\omega}^2 \end{bmatrix},$$

$$\mathbf{Y}_{3II} = \begin{bmatrix} y_{1II}(0) \\ y'_{1II}(0) \\ -J_{11}(\bar{\omega} + \omega)^2 y'_{1II}(0) + (J_{01} - J_{11})\omega^2 y'_{1II}(0) \\ -c_1 y_{1II}(0) + c_1 y_{bII} + m_1 y_{1II}(0)\bar{\omega}^2 \end{bmatrix},$$

$$\mathbf{Z}_{3II} = \begin{bmatrix} z_{1II}(0) \\ z'_{1II}(0) \\ -J_{11}z'_{1II}(0)(\bar{\omega} + \omega)^2 + (J_{01} - J_{11})z'_{1II}(0)\omega^2 \\ -c_1 z_{1II}(0) + c_1 z_{bII} + m_1 z_{1II}(0)\bar{\omega}^2 \end{bmatrix} .$$

Vectors (2.8) can be written in the form

$$\mathbf{V}_{3\nu} = \mathbf{M}_{1\nu}.\mathbf{C}_1.\mathbf{V}_{1\nu} \quad , \nu = I,II \quad .$$

Similarly, the partial subvectors in the rightmost section $V_{(o+3)}$ of the last o-th field of the connecting shaft and partial end-state vectors of the connecting shaft $V_{(o+5)}$ being bound together by the relation

$$\mathbf{V}_{(o+5)\,\nu} = \mathbf{C}_2.\mathbf{M}_{2\nu}.\mathbf{V}_{(o+3)\,\nu} \quad , \quad \nu = I, II \quad . \tag{2.9}$$

3. Transfer matrices of the physical model discrete elements

Discrete masses and flexible storage transfer matrices can be written in the form

$$\mathbf{M}_{\mu,\nu}=\begin{bmatrix}\mathbf{M}_{y\mu,\nu} & , & 0\\ 0 & , & \mathbf{M}_{z\mu,\nu}\end{bmatrix},\qquad \mathbf{C}_{\mu}=\begin{bmatrix}\mathbf{C}_{y\mu} & , & \mathbf{0}\\ \mathbf{0} & , & \mathbf{C}_{z\mu,}\end{bmatrix}, \tag{3.1}$$

where for $\mu = 1, 2$

$$\mathbf{M}_{y\mu,I}=\mathbf{M}_{z\mu,I}=\begin{bmatrix}1 & 0 & 00\\ 0 & 1 & 00\\ 0 & -J_{1\mu}(\bar{\omega}-\omega)^2+(J_{0\mu}-J_{1\mu})\omega^2 & 10\\ m_{\mu}\,\bar{\omega}^2 & 0 & 01\end{bmatrix}, \tag{3.2}$$

$$\mathbf{M}_{y\mu,II}=\mathbf{M}_{z\mu,II}=\begin{bmatrix}1 & 0 & 00\\ 0 & 1 & 00\\ 0 & -J_{1\mu}(\bar{\omega}+\omega)^2+(J_{0\mu}-J_{1\mu})\omega^2 & 10\\ m_{\mu}\,\bar{\omega}^2 & 0 & 01\end{bmatrix}, \tag{3.3}$$

$$\mathbf{C}_{y\mu}=\mathbf{C}_{z\mu}=\begin{bmatrix}1 & 0 & 0 & 0\\ 0 & 1 & 0 & 0\\ 0 & 0 & 1 & 0\\ -c_{\mu} & 0 & 0 & 1\end{bmatrix}. \tag{3.4}$$

Marginal partial state vectors being received in the form

$$\mathbf{V_{1\nu}}=[\mathbf{Y_{1\nu}},\mathbf{Z_{1\nu}}],\ \mathbf{V_{f\nu}}=[\mathbf{Y_{f\nu}},\mathbf{Z_{f\nu}}],\ f=o+5,\ \nu=I,II, \tag{3.5}$$

where

$$\mathbf{Y}_{1\nu}=[y_{1\nu}(0),\ y'_{1\nu}(0),0,c_1 y_{b\nu}],\quad \mathbf{Z}_{1\nu}=[z_{1\nu}(0),\ z'_{1\nu}(0),0,c_1 z_{b\nu}], \tag{3.6}$$

$$\mathbf{Y}_{f\nu}=[y_{0\nu}(l_0),\ y'_{0\nu}(l_0),0,0],\quad \mathbf{Z}_{f\nu}=[z_{0\nu}(l_0),\ z'_{0\nu}(l_0),0,0],$$

while excitation deflections amplitudes in the rotating coordinate system which appearing in relations (3.6), have the following form:

$$\begin{aligned} y_{bI}&=\frac{1}{2}\bar{z}_b\cos\varphi,\\ z_{bI}&=-\frac{1}{2}(\bar{y}_b+\bar{z}_b\sin\varphi),\\ y_{bII}&=-\frac{1}{2}\bar{z}_b\cos\varphi,\\ z_{bII}&=\frac{1}{2}(\bar{y}_b-\bar{z}_b\sin\varphi). \end{aligned} \tag{3.7}$$

4. Transfer matrices of the continuum section

I-th field of the shaft is described by differential equation

$$\frac{\partial^4 v}{\partial x^4}-\frac{\rho}{E}\left(\frac{\partial^4 v}{\partial x^2\,\partial t^2}+\omega^2\frac{\partial^2 v}{\partial x^2}\right)+\frac{4\rho}{E(r_2^2+r_1^2)}\left(\frac{\partial^2 v}{\partial t^2}-\right.$$
$$\left.-\omega 2v+2i\omega\partial v\partial t=0.\right. \tag{4.1}$$

The continuum section equation of motion (4.1) is homogeneous equation both in the case of natural bending-gyratory vibration, and in the case of forced steady bending-gyratory oscillations, because being considered the discrete harmonic excitation in selected sections of the continuum.

Always will therefore be the cases where it´s possible to find a particular integral equation (4.1) in the form

$$v(x,t)=v(x)e^{ikt}. \tag{4.2}$$

In the case of natural oscillation, the constant k is an unknown natural frequency, which is denoted as Ω,

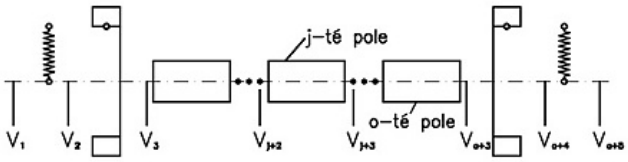

Figure 4. 1

in case of steady forced vibrations, it´s the excitation frequency $\bar{\omega}$. Relations for state variables in the rightmost section of the j-th field (see Figure 4.1), depending on the state variables in the leftmost section, can by be again written as matrices in the following form:

$$\mathbf{V_{(j+3)\nu}}=\mathbf{H_{j\nu}}.\mathbf{V_{(j+2)\nu}},\ \nu=I,II. \tag{4.3}$$

For the partial submatrices, it can be written:

$$\mathbf{H_{j\nu}}=\begin{bmatrix}\mathbf{H_{yj\nu}} & , & \mathbf{0}\\ \mathbf{0} & , & \mathbf{H_{zj\nu}}\end{bmatrix}, \tag{4.4}$$

where

$$\mathbf{H_{yj\nu}}=\mathbf{H_{zj\nu}}=[\mathbf{H_{rs}}]^{\mathbf{4}}_{\mathbf{1j\nu}}, \tag{4.5}$$
$$j=1,2,\ldots\ldots\sigma,\ \nu=I,II.$$

5. Calculating marginal state vectors

Boundary state vectors of the connecting shaft are bound together by the following relations:

$$\mathbf{V_{f\nu}}=\mathbf{P_{\nu}}.\mathbf{V_{1\nu}},\ f=o+5,\ \nu=I,II. \tag{5.1}$$

Transfer matrix of the system

$$\mathbf{P}_{\nu}=\begin{bmatrix}\mathbf{P}_{y\nu,} & \mathbf{0}\\ \mathbf{0} & , & \mathbf{P}_{z\nu}\end{bmatrix},\ \nu=I,II, \tag{5.2}$$

where

$$\mathbf{P_{y\nu}} = \mathbf{P_{z\nu}} = [\mathbf{P_{rs}}]_{1\nu}^{4} \quad , \quad \nu = \text{I, II} \tag{5.3}$$

is obtained by successive matrix multiplication, according to the rule

$$\mathbf{P_\nu} = \mathbf{C_2} \,.\, \mathbf{M_{2\nu}} \,.\, \mathbf{H_{o\nu}} \ldots\ldots \mathbf{H_{j\nu}} \ldots\ldots \mathbf{H_{1\nu}} \mathbf{M_{1\nu}} . \mathbf{C_1} \,. \tag{5.4}$$

From relations (5.2), (5.1) and (3.5), it´s obtained

$$\mathbf{Y_{f\nu}} = \mathbf{P_{y\nu}} \,.\mathbf{Y_{1\nu}} \,, \quad \mathbf{Z_{f\nu}} = \mathbf{P_{z\nu}} \,.\, \mathbf{Z_{1\nu}} \,, \quad \nu = \text{I, II} \,. \tag{5.5}$$

Substituting (5.3), (3.6) to (5.5), after performing matrix multiplication, two systems of linear equations are obtained. These can be written for ν = I, II in the form

$$\mathbf{A_{y\nu}} . \mathbf{B_{y\nu}} = \mathbf{D_{y\nu}} \,, \quad \mathbf{A_{z\nu}} \,.\, \mathbf{B_{z\nu}} = \mathbf{D_{z\nu}} \,, \tag{5.6}$$

where

$$\mathbf{A_{y\nu}} = \mathbf{A_{z\nu}} = \begin{bmatrix} P_{11} \,, P_{12} \,, -1, 0 \\ P_{21} \,, P_{22}, 0, -1 \\ P_{31} \,, P_{32} \,, 0, 0 \\ P_{41} \,, P_{42} \,, 0, 0 \end{bmatrix} \tag{5.7}$$

are systems matrices,

$$\mathbf{B_{y\nu}} = \lceil y_{1\nu}(0),\, y'_{1\nu}(0) \,, y_{0\nu}(l_0), y'_{0\nu}(l_0), \rfloor, \quad \mathbf{B_{z\nu}} = \lceil z_{1\nu}(0), z'_{1\nu}(0), z_{0\nu}(l_0), z'_{0\nu}(l_0), \rfloor \tag{5.8}$$

left side vectors,

$$\mathbf{D_{y\nu}} = -C_1 Y_{b\nu} \lceil P_{14}, P_{24}, P_{34}, P_{44}, = \rfloor \,, \quad \mathbf{D_{z\nu}} = -C_1 Z_{b\nu} \lceil P_{14}, P_{24}, P_{34}, P_{44}, = \rfloor \tag{5.9}$$

right side vectors.

By solution of described systems, the unknown elements of peripheral state subvectors are obtained. Then, the subvectors of the initial state vectors can be written in the form

$$\mathbf{Y_{1\nu}} = c_1 Y_{b\nu} \lceil w_{1\nu}, w_{2\nu}, 0, 1 \rfloor \,, \quad \mathbf{Z_{1\nu}} = c_1 Z_{b\nu} \lceil w_{1\nu}, w_{2\nu}, 0, 1 \rfloor \,, \tag{5.10}$$

where was introduced a designation

$$W_{1\nu} = (P_{44\nu} . P_{32\nu} - P_{34\nu}, P_{42\nu}) . D_\nu^{-1}, \quad W_{2\nu} = D_\nu^{-1} (P_{41\nu}, P_{34\nu} - P_{31\nu}, P_{44\nu}) \,, \tag{5.11}$$

while

$$D_\nu = P_{31\nu} P_{42\nu} - P_{32\nu} P_{41\nu} \,. \tag{5.12}$$

6. State vectors calculation in selected sections along the shaft

Partial state vector at any connecting shaft section (in the rightmost section of the j-th field) being calculated by successive matrix multiplication, according to the relation

$$\mathbf{V_{(j+3)\nu}} = \mathbf{H_{j\nu}} \ldots\ldots\ldots \mathbf{H_{1\nu}} . \mathbf{M_{1\nu}} \,.\, \mathbf{C_1} \,.\, \mathbf{V_{1\nu}} \,. \tag{6.1}$$

The resulting state vector in the said shaft section is obtained according to the releation

$$\mathbf{V_{j+3}} = \mathbf{V_{(j+3)I}} + \mathbf{V_{(j+3)II}} \,. \tag{6.2}$$

7. Application of the method to real vehicle propulsion

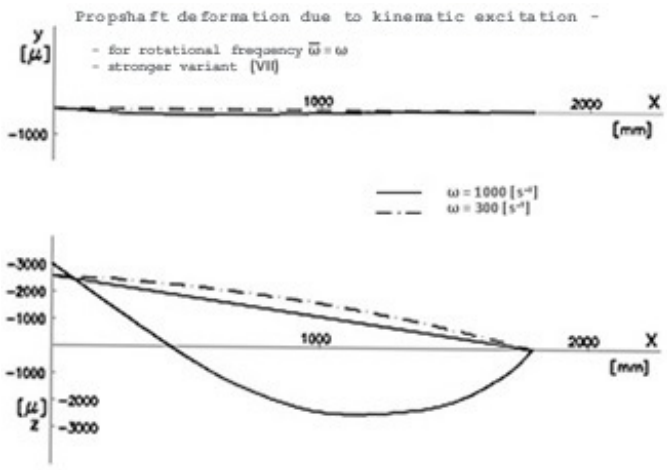

Figure 7.1

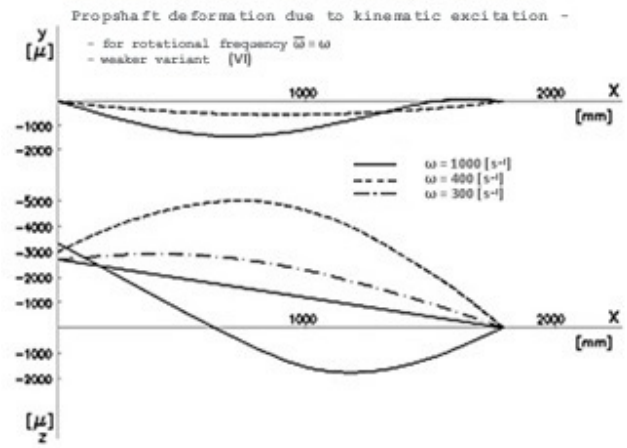

Figure 7.2

Processed and debugging method allows to determine the course of the deflection amplitudes in the individual sections of the propshaft, across the operating area. Application ot the method allows obtaining operational state vectors at any propshaft section and confronting individual operating states with allowable stress and strain.

The paper includes two examples of calculations of two variants of real vehicle propulsion.

8. Conclusion

When designing articulated shaft mechanism in propulsion machines, especially trucks, it´s necessary to pay attention to the study of dynamic phenomena occuring in drives during theirs operations. Checking the shafts in terms of torsion, even when considering the cyclical, alternating, or throbbing or pulsating torsional loads to ensure trouble-free operation, it´s not enough. It is not enough even to dimension the shafts to kinetostatic loading mechanism. It must take into account the shaft mechanism natural dynamics and study the behaviour of the shafts in the vicinity of resonance state mechanisms, or their subsystems, possibly their parts. In the paper, the authors have studied the transverse oscillations, dynamic deflections, occuring due to the spatial oscillations of the drive unit. That is therefore a study of the state when the Cardan shaft kinematically driven in the periphery of the shaft which is located in a drive unit, i. e. the engine and gearbox.

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Session: Pedagogy, Psychology

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EXTERNAL MOTIVATION FACTORS IN THE THERAPY OF ADDICTS

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Abstract: *Motivational factors in solving addiction problems are not yet a researched enough area, while their importance is indisputable in accepting and keeping abstinence. By dividing motivational factors into internal and external ones, we can also set fields of action for scientific disciplines such as social work and psychology. While working with internal motivation, psychotherapy is necessary, whereas concerning external factors sociotherapy and specialised social counseling for the addict´s family are required. It is possible to support motivational pressure on the family´s side using social work methods.*

Key words: *addictid, familly, external factors, social work*

1. Introduction

Since the birth of civilisation, addiction has been an integral part of human society. Research conducted in the history of mankind emphasizes the fact that man has used psychoactive substances since time immemorial in daily, hedonistic, religious rituals or even as medicine. It would be thus unrealistic to expect it to be different in modern times. Many people deal with their problems (often also unreasonable curiosity or boredom) by using medicine, drinking alcohol, or turn to other psychoactive substances. However, these substances are not going to help them solve their problems and will only offer a temporary relief until the problem occurs again. It is only a short step from a simple habit to addiction which represents a very serious medical, economical and social problem of today's modern society. It also concerns today's trendy virtual addictions and gambling. A young person who sees regular consumption of alcohol, cigarettes or other addictive substances around them (especially in the environment of their closest relatives) from an early age can easily get an impression that they are ordinary, harmless or even socially beneficial phenomena for the good of society. In a family, we experience both successes and failures, adopt basic habits, a family is also an influence on our attitude towards consumption of psychoactive substances, affects further development of addiction and its maintaining or not dealing with the situation. The abuse of addictive substances, for instance in relation to committing crime, is classified in a specific group of risk factors referred to as dynamic – changing in time [1].

We should therefore seek the ways of intervening effectively and, at the same time, support them with relevant research results. Complex services offered to addicted persons based on these findings are a prerequisite for effective interventions. The motivation to change is one of the factors influencing the entire process of change, which is why we will address it further.

According to [2] an important part of treatment of the addicted is motivation aiming to motivate a client to change their previous lifestyle so they do not have the need to seek psychoactive substances. The author thinks that no treatment method can be successful unless a patient cooperates. However, many addicts are not motivated by an effort to undergo treatment, but by social circumstances such as loss of employment, partner's pressure, the threat of imprisonment, etc. Treatment doesn't stand only for overcoming physical and psychological symptoms of addiction, but also focuses on the patient's way of life, their undesirable and harmful habits, their family, social, work and, in some cases, legal problems. Abstinence from a psychoactive substance is not an end, but a means of living a healthier and socially more acceptable life. A patient is not only passive receiver, but also has to actively participate in their treatment.

1.1 External motavition factors

We see motivation as a process of guiding, maintaining and energizing behaviour, a process of increase or decrease in individual's activities. This basic personality dimension substantially changes because of the influence of drugs resulting in, on the one hand, consequent decrease in interest in anything else than drug-related matters and loss of energy needed for individual's growth and prosperity on the other. Motivation is also one of four factors (the other three being the degree of addiction, quality of individual's personality, and quality of their environment, including social environment) determining the successful outcome of treatment [3].

In the context of problematic motivation of addicted persons, [4] emphasizes the significance and the way of leading motivational interviews with clients. It is important that the professional takes on the role of a facilitator who helps the client to explore and solve their ambivalence to change.

De Leon describes motivation in the practice of therapeutic community with addicts as a part of the "Essential Treatment-Related Perceptions" complex, the characteristics of which we present, for the sake of clarity, in the table below [5].

Table 1: "Essential Treatment-Related Perceptions" [5]

Circumstances (external motivation)	Various life situations may represent a motivational factor for seeking treatment. Talking about addictions, these problems may include legal, fiscal, health, family, and employment problems. They are individual and change over time. The user perceives them as external pressure, which must be utilized by treatment to sustain the client in the process of change.
Motivation (inner)	Clients are motivated to treatment in case that the reason for entering treatment is the realization of the need for personal change. These may be positive (desire to live in a different way, personal growth, improvement of relationships) as well as negative (eliminating the feeling of guilt, shame, hatred, despair, etc.).
Readiness	Users may be motivated to change, but may have not accepted the necessity for treatment. Clients prefer other solutions to their situation than entering the community (changes in relationships, employment, location, conversion). Users ready for treatment have rejected all other alternatives and perceive the entry into the community as their only possible alternative.
Suitability	Users may be motivated to change, but may not necessarily perceive the community programme as reflecting their needs. Suitability refers to a good match between the individual's needs and what the treatment offers. Sustainability means the client's acceptance of community's approach, philosophy, social learning, and commitment to a long-term treatment process in the therapeutic community.

The recovery process in a therapeutic community and its effectiveness are influenced by all mentioned factors, which we should keep in mind in the process of working with an addicted client. Our reflections stem from many years of working with groups of addicts and of research conducted in the field [6].

1.2 External motivation factors in the familly

The circumstance category creates pressure, which in turn keeps the client in the healing process. This is known as motivational pressure, which pushes the addicted client towards staying in the healing process, and the most important factor perceived here is working with the family, which can keep this pressure up. Level of motivation when entering treatment significantly foreshadows patient's remaining in treatment and its outcome. Motivation is of paramount importance [7] and the knowledge of its individual components has a major influence on possible interventions and sustaining an addict in abstinence. In our opinion, it also may be the predictor of an early drop-out.

One of the major issues of this time appears to be a large group of parents incapable of dealing with the behavior of their psychoactive substance-abusing child. These parents have a very limited ability of looking at their child objectively, which is natural due to their parental role hindering them in doing so. If the child´s behavior becomes unacceptable, they come with a request for help, preferably immediate, to solve the situation at once. They have serious difficulties in their own emotional experience, with the enormous feelings of guilt, failure in the parental role and self-blame appearing. Upon being offered help and integration into a group of parents in similar situations they are taken aback, they do not understand the reason, nor do they feel the need to change. Generally, 8 out of 10 parents do not come again and we can only hope they are seeking help elsewhere. The question of what to do is normal once the parents get into an insoluble situation, under the kind of pressure that makes them face problems within themselves. As a matter of fact, here, there are not many options. An abstaining parent, who has come a long way working on themselves, and now their child starts abusing psychoactive substances, is an even more complicated category. Their view of their child interconnects with their own experience, with their view of themselves, with their feelings of guilt, and in this case, they do not know what to do. Even though this looks impossible to unnderstand on the outside, it is indeed real.

The use of family's potential in the recovery process of an addicted client is one of the important factors of the whole intervention effort of professionals. Many authors confirm that family is not sufficiently established in our system of care for an addicted client. Family have an irreplaceable role not only in the process of development of individual's addiction, but also in maintaining their motivation on the "way back". If we are not able to sustain the family in the recovery process, addict's motivation gets lower and thereby the effectiveness of the whole process is also reduced. We lack professionals in the health sector, in which working with addicted clients is incorporated, and that's why it is very important in this context to support the field of social work.

We don´t only see it in crisis centers only, but also in a wider spectre of application as in specific courses for parents with children or expecting couples. The aforementioned therapy could represent a guideline to raising children and conserving healthy relationships inside a family. Then there are future consequences. If young people learn to raise children without violence, its line will weaken and an ambiance of acceptance, understanding and affectionate relationships [8].

2. Conclusion

Research results point[6] to the fact that significant factor for this reasoning is the legitimacy of social work especially in the family and friend system, i.e. in the social environment of an addicted client. Family problems show high severity in the perception of addicted clients, although it may seem different on the outside. Utilizing this research outcome supports the idea of supporting the development of social work interventions and effective strategies by means of its working methods.

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VISUAL ART CREATIVITY AS AN ALTERNATIVE THERAPY FORM AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER

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Abstract: *Nowadays, when both: social and educational reality is changing, a diagnosis of autism spectrum disorders among children has increased. Autism spectrum includes children diagnosed with classic and atypical autism, Asperger syndrome and other related pervasive development disorder. There are many methods of working with children with autism spectrum. Therapy through art is a form of an alternative form of therapy with child based on the analysis of educational development needs, "strengths" and deficiencies resulting from the nature of disorders located on the autism spectrum.*

Keywords: *autism, aspergera syndorme, mandala, therapy through art*

1. Introduction

Autistic spectrum disorders are increasingly diagnosing among children. Currently, the term most commonly used is spectrum of autistic disorder or Autistic Spectrum Disorders - ASD, due to the data derived from empirical studies, saying that specific disease entities, belonging to the group of pervasive developmental disorders are not well separated or homogeneous and do not exclude comorbidity other disorders. The prevalence of autism spectrum disorders (ASD) in the general population is 0.1-0.6%, predominantly among men (3-4: 1); ASD occurs in 1/91 3- to 17-year olds and 1/110 8-year-old children [1].

1.1 Autism spectrum – Asperger Syndrome

Autism spectrum, called sometimes autistic spectrum is a group of general development children's disorders, similar in terms of social - emotional, cognitive and behavioural symptoms possible to classify them, starting with those where we are dealing with the weakest intensity of autism to those where symptoms of autism are the strongest [2]. These are classic and atypical children's autism, as well as Asperger syndrome, childhood disintegrative disorders and other pervasive developmental disorders. Some people add to the spectrum of autistic disorders high functioning autism, differentiating it from Asperger's syndrome [3]. In some way, in a greater or lesser extent, connected with autism spectrum disorders could be: pragmatic language impairment, non - verbal learning disabilities, Hyperlexia, as well as ADHD including stereotypic behaviour. Some of the children representing autism spectrum disorder is also affected by other diseases or forms of disability, then we call it autism with joins or mixed disorders. Impaired language development and childhood psychosis with early process can be applied here, because of similar children's behaviour, especially in their youngest age. L. Kanner has mentioned five characteristics of this disease [4]:

1. The inability to establish relationships and interact with people, appearing from birth;
2. The inability to communicate with other using a language;
3. An obsessive desire for the preservation of sameness and resistance to change;
4. A fascination for objects, not people;
5. Sporadic occurrence of high intellectual capacity;

Autism is diagnosed more often among boys than among girls [5]. Tony Attwood called Asperger's syndrome as a different approach to life, where looking for knowledge and truth are priorities. [6] One mother having a child suffering from this type of disease, described that her son "was affected by a particular type of autism called Asperger's syndrome, which makes receiving the real world in a specific way" [7]. Asperger syndrome is therefore an autistic spectrum disorder and affects people with higher end of the spectrum. Generally, these people achieve a higher level of competence in all key areas of development (social interaction, language / communication patterns of behaviour). H. Kantor defines child with Asperger syndrome as a "strange". This child often gives considerable attention to details that no one else notices, directly and bluntly expresses his views, which can even be offensive or unpleasant for the others. Child with Asperger syndrome gets angry when someone can not read his mind. [8] Wing (1983) provided following clinical features of Asperger syndrome[9]:

- lack of empathy;
- naive, wrong in a given situation, one-sided reaction type;
- pedantic, repetitive speech;
- poor non – verbal communication;
- strong interest in particular subjects
- clumsy, poorly coordinated motility and strange posture.

H. Asperger has mentioned about following features of Asperger syndrome [9]:

- "disruption of social integration"
- pedantic, strange language and the lack of reciprocity in contact;
- impairment of non-verbal communication;
- repetitive, stereotyped pattern of behaviour and activities;
- single, specific skills and interests.

H. Asperger additionally mentioned about:

- extensive vocabulary and very good logical thinking;
- unexpected reactions and sensations of sense;
- poor coordination of movements and clumsiness;
- little control of their own behaviour.

H. Asperger highlighted the characteristic in this kind of autism, the ability among patients to use the speech at the same time with disturbed intonation and body language. This efficiency of speech is a factor differentiating forms of autism. A child affected with Asperger syndrome not always gives any impression of having this syndrome, and his behaviour for a long time may not arouse any suspicion. At the beginning the problems in social functioning tend to be discreet, however problems increase during adolescence [11]. This child is characterized by deficits in the sphere of the understanding of social situations, motives, thoughts and feelings of others, which is associated with different brain functioning [12]. It is so-called theory of mind deficit (a triad of deficits). These individuals also face difficulty recognizing emotional states expressed through facial expressions and gestures, e.g. joy, sadness, anger, fatigue [13]. Children with Asperger syndrome have problems with the practical application of language in a social context and behaviour which for others may be obvious (free exchange of opinions, listening, non repetitive of what someone said, eye contact during conversation , understanding statements not literally, understanding that they can not always rule the others). Therefore, many people with Asperger syndrome choose to interact with objects, not with people. They do not always notice and understand the thoughts and feelings of other people, therefore, have difficulty reading the intensity of emotions. Often their range of facial expressions and body language are limited, what is related to the fact that they often misinterpret facial expressions and body language of others [14]. Among people with Asperger syndrome occurs deficiency in terms of non-verbal basis of social interactions, such as imitation, social motivation, reading or prediction of intention and the reasons for other people‘s behaviour. At school, it is easy to notice the lack of social "sense" among students affected by Asperger syndrome, who are confused about interactions taking place in class. In such situation, the student with Asperger syndrome can look for different ways of dealing with his peer, from an attitude of "cool" intellectual, talking through his hat, to an asocial person avoiding contact with other. Acts of communication are usually directed "to" the particular person, and not "with" a person – as it supposed to be, causing speaking in a monologue among people with Asperger syndrome[15]. Social difficulties during communication causes very big stress; stressed person has a tendency to repeat something without interruption; he is aware that he has committed a mistake, but do not know how to fix it; stress causes physical/ mental exhaustion and need for a nap or need to go outside. High levels of stress may also contribute to aggressive behaviour towards other people. The child shows excessive excitement about currently existing situation; he may seem to be indifferent while in fact he is concerned; may have a violent temper; it is difficult for this child to control the impulsive thoughts and action; he can laugh at during serious situation and cry during humorous situations; he is not able to identify emotions, e.g. sadness or anger. A student needs to make things very clear; having own beliefs might be annoyed that people disregard it; he gets upset when other people ignore the rules. A child with Asperger syndrome have difficulty to understand what another person might think; he can assume that everyone thinks and feels the same as he and the others have the same knowledge about particular topic as he; while doing something does not realize that it might hurt someone's feelings; this person has difficulty understanding read text, especially when it refers to the people; often extremely believe that is absolutely right. He has a need to control games and activities; invents games imitating reality; he is not absorbed in games if he has no control on them; prefers activities without competition elements. The functioning of children with Asperger's disorder causes interpersonal relations problems, which can often result irregularities in the personality development and involve in shaping the personality of an individual. The term "lonely in crowd" often refers to children with Asperger syndrome. The phenomenon of alienation in society seems to have definitely a negative impact on the overall well-being of the individual and his mental health, which often reveals a lack of faith in their own abilities and inability to adopt specific social roles. [16].

1.2 Art therapy as an alternative form of working with children with Asperger Syndrome Disorder

A very significant element depending on the proper functioning of a child with Asperger's syndrome is therapy. Each therapeutic program should include a clear structure. Variety of methods should be used to enable comprehensive support for the development of the child. It is important when therapy takes place in the natural environment, whereas it should be focused on developing the ability to communicate, including non-verbal forms of communication. Equally important is the integration of the child with peers. An alternative therapeutic form for children with Asperger syndrome can be an art therapy. Konieczna (2007) highlights: "an art is the basis for any educational activities and aesthetic and also moral development of human being. Moreover, the fact that interests about this particular area increases is a result of communication deficiencies, which indicates today's society" [17]. Therefore, the aim of art therapy is a pursue self-determination, self-realization and self-expression in society. Masgutowa (1997) claims that it is about "working with experiences and subjective meanings, events given by the personality, the consequences" [18]. Impact through creativity can be a way to release all conflicts and express repressed emotions or subconscious fears. Therapy through art stimulates the activity of the person, encouraging to cross their own possibility borders, which can be caused by his low self-esteem. It shows what really human being is able to do and achieve through visual art creativity, whilst, in most cases, had never faced this before. It helps to be

satisfied from the achievements in the field of art. This increases the role of positive emotions and positive thinking in the functioning of the person and shows how intuition and imagination are important to understand yourself and to change your own image.

It is also an extremely useful tool during the therapy focused on disorders in interpersonal relations. It shows how to observe and explore the world through many senses. It helps to make contact with the environment, develop interpersonal skills and meets the need of acceptance by society, but also allows to accept the others. Through the act of creation you can look closely and profoundly others and relations with them. In addition, the presentation of their achievements (exhibitions, shows) prevents isolation. Integration of human art, getting to know each other again and to express his "I" in an unusual way, improves the contacts with others. Art therapy helps to solve a child's with Asperger syndrome problems, such as social relations disturbances. Furthermore, through self-knowledge and self-creation art therapy results problems solving concerning self-definition, defining their own desires, dreams and finding a place in the modern world. It is identified with the need of creation, expression themselves, their emotions and is helps to reveal their own thoughts and experiences. Art creativity is sometimes an effective way to communicate with the world, allows to believe in your own abilities and find the meaning of life. Wojnar notes that the world of art is the real environment of human existence, where every human's action expresses, feelings, ideas and this is everything "what makes up his individual creative personality, as well as elements of the external world getting to the artist through his senses, intellect, sensibility. Art can thus be defined as a link between the outside world and the inner world "[19]. Therapy through art is a special type of therapy aimed at human and the environment where he lives. It is designed to restore or strengthen health, however the main goals include improving life's quality. Art therapy triggers creativity, balances the deficiencies and psychophysical limitations, is helpful to accept yourself and the other people. As a result, it releases creative expression, emotions leading to induce positive changes in behaviour and attitude of a child exhibiting abnormal motivated anxiety. Wygotsky notes that participation in the creative process has a healing power. Art has purifying effects - its experiencing, especially lively at the level of activity and not only its perception [...] causes exploring the deep and truly humanistic truths about life, which intensifies the spiritual power of person. Art should be a way to build a life, it helps to live, makes life fuller and gives meaning to life"[20]. Therapeutic art impact upon human being can have two forms: passive or active. The passive impact is about active contact with the broadly defined art i.e. fine art, music, theatre, film. It takes place under the supervision of a therapist who decide on the type and form of art in concerning a particular child. The art work is often an "image" of the child's personality. Drawing on a basic level does not require any additional formal preparation or priming a canvas, building a skeleton or taking the form from the multiple steps needed for the production of paintings, sculptures and graphics. As a result of the simplicity of drawing technique between conception and creation of the vision there are no intermediate steps. Holding a tool, a hand can directly react to every change of emotion, mood the flow of thoughts. He can "dance" on the piece of paper. A close relationship between painting and the biological mechanisms results in individual character of the drawing and every piece of work is unique, one of a kind; it is extremely difficult to reproduce exactly identical handwritten composition. Drawing has a significant effect regarding children which do not want to, or for some reason can not verbally express their emotions and feelings. This applies especially to children who are inhibited, resisting or have a problem with the control of your emotions. An example could be an attempt to describe the passion or pain, however the words are not enough and when fine art is suitable. On the other hand, non verbal information describing the experiences may be a reason to feel uncertain. Therefore, there is possibility to use the drawing / art, to get to the content difficult to put into words, and then use words to understand the content of art / artistic creativity [21]. Drawing can be treated as a kind of mediator between the content (the experiences) difficult to verbalize (e.g. result of strong, unpleasant emotions) and the verbalized. Verbalization of this second content can further reduce the earlier anxiety or fear caused by the lack of category defining experience. This is in particular important for therapy of children, who have difficulty to describe their experience. The drawing is the simplest and the most primitive form of human's creative expression. Mandala form appears in the drawings children's descended from all of the word's cultures. This is a first shape that can be observed in artistic expression of children. However, circle is drawn by the children since the age of 2. [22]. Drawing the mandalas are a type of message, the symptom of their creative activity, a form of expression arising from the need to communicate feelings, thoughts, experiences, has to express something and inform the recipient about something [23]. Mandala used during therapeutic activities in working among children with Asperger syndrome are first of all a support for knowledge assimilation, understanding the material, improving communication skills; it is an impulse to take other forms of activity, including express themselves in speech and in writing. Mandala drawing can be both: symptom of free (natural) expression and the intended expression. Natural expression is instinctive, spontaneous, authentic, it is creative and unconscious, express the need for self-realization [24]. Mandala drawing is the result of the child's own activity. Student's self activity during mandala art work is the form of creative activity; if the child will have this intrinsic motivation to act, there will exist a personal relationship to the activities (drawing a mandala) and the feeling that he discovers something new, important for himself [25]. Child's creativity (drawing a mandala) can

be completely guided by the therapist (the commands, partial tasks, questions, imposed topic, colour scheme, theme), and can only be inspired, stimulated by him (for example, through the use of instrumental music during the therapy). Fine art stimulates children's verbal creativity, and yet "the language education of children through creative activity is (...) a natural way to prepare them for the role of active people who could effectively express their own needs and communicate with the environment in every situation and in every environment" [26].

2. Conclusion

Art therapy affects the specific mental processes and structures of the human personality and also affects cognitive processes, targeting interests hierarchy of values and mobility stimulating certain forms of activity. This method can be used independently from the age and health. People choosing art therapy do not need to have artistic ability or previous experience. Art therapy gives people with autism spectrum who have problems with communication the opportunity to express their emotions. This creates situations when they have possibility to express themselves through a variety of artistic methods. It allows to stimulate the comprehensive development and to better understand themselves; it also raises the level of self-acceptance through the experience of their abilities and the personal agency. Art therapy also helps to let go off all negative emotions and aggression and gives the therapists a better understanding of the child's capabilities, needs, experiences, emotions expressed during their tasks. It is often very difficult for all people to express their emotions, experiences, thoughts and describe what we want. For people with autism spectrum it is often impossible. Art therapy gives them the opportunity to express themselves, contact with the world through the created fine arts and is therefore a unique form of therapy among both children and adults with autism spectrum disorders.

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EFFECTS OF MODERN TECHNOLOGIES ON TEACHING ENGLISH VOCABULARY TO PRIMARY SCHOOL LEARNERS

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Abstract: *The aim of this paper is to investigate the use of modern technologies (for instance, Kahoot!, Voki, Buncee, and Answergarden) on teaching English to primary school learners in Poland. Thus, empirical research based on learners' observations and pre- and post-study tests was carried out to assess students' development of English vocabulary. There were two groups that participated in the study and learned English with different tools: traditional and modern. The results of their tests were analysed and compared with Mann-Whitney's test to show if the difference in results was statistically significant.*

Keywords: *effects of modern technologies on learning, teaching English vocabulary, modern technologies and learning, modern tools for learning*

1. Introduction

Recent research show that information and communication technologies have a great impact on teaching English (Richardson 2006 or Wible 2008). They lead to the use of digital tools in today's classrooms that are beneficial for the learners. Thus, such tools help in better vocabulary acquisition and in the development of four skills: reading, listening, speaking, and writing.

The present study is based on empirical research into English vocabulary teaching. Two groups of Polish learners from the sixth form in Poland were taught with the use of different tools – the first with the help of traditional ones (for instance, books, exercise books, and paper photocopies), and the second with the help of digital ones (for example, Kahoot!, Voki, Buncee, and Answergarden). The results of students' pre- and post-tests and observations of their development of English vocabulary show that modern technologies lead to extending learners' vocabulary storage.

2. Theoretical background

In the past, technology was used at schools to source and consume information but today the learners create and develop the content by using modern technologies, for instance, Voki, Buncee, or Answergarden. This fact encourages the teachers to use digital tools at their work and participate in the change from a "read Web" to a "read / write Web" (Richardson 2006 or Thompson 2007). Thus, even young learners are encouraged to write and speak in a second language and to see the opportunities of new technologies in the process of learning. Such technologies help to acquire new vocabulary that is one of the most important part in a foreign language teaching since 1910 when John Dewey stated that vocabulary is a tool for thinking about meanings that it expresses. Thus, vocabulary can be defined as "the words we must know to communicate effectively: words in speaking (expressive vocabulary) and words in listening (receptive vocabulary)" (Neuman and Dwyer, 2009: 385). However, vocabulary learning is a continual process that involves an understanding of the word's definition and the word's usage in different contexts and that needs time and repetitions (Stahl and Nagy, 2006).

3. Methodology

The following section illustrates the project developed by the present author for introducing English vocabulary to primary learners from the sixth form in Poland.

3.1 The goal of the project

The goal of the project was to demonstrate and evaluate the use of modern technologies in English vocabulary teaching. It is claimed that the use of modern technologies help to broaden learners' vocabulary which was investigated during the study.

3.2 Participants

There were 44 participants involved in the study: 28 girls and 16 boys aged 12 from two sixth forms in the primary school in Poland. Their level of English was elementary. The 'a' class was instructed by means of traditional paper tools which I will refer to as the 'traditional' group, while the other 'b' class was instructed by means of digital tools which I will refer to as 'digital' group. Each group consisted of 22 members: 16 girls and 8 boys in the traditional group, and 12 girls and 8 boys in the digital group.

3.3 Design and procedure

The present study focuses on the impact of using modern technologies by learners in acquiring English vocabulary.

The two groups of learners were taught vocabulary connected with the use of various pedagogical tools. The traditional group was taught with the use of paper materials only whereas digital group was taught with the use of modern technologies. I chose Kahoot!, Voki, Buncee, and Answergarden as leading sources in the digital group. All the students from two groups learn the

same vocabulary and the curriculum was prepared on the basis of *Sky High 3* course book.

At the beginning of the study all the learners wrote a pre-test to prove that they did not have any prior knowledge of English vocabulary that was tested. This test consisted of: choosing the correct word in the sentence (I), matching English words with their Polish equivalents (II), putting a correct word in the sentence (III), and completing a table with an appropriate verb, noun, or adjective that was formed from the base word.

After that, the learners were taught English, in particular vocabulary, using different tools – paper exercises and digital exercises. After the lapse of five months of learning both groups were asked to write a post-test that was the same as the previous one.

3.4 Pre-tests results

Before the study, both groups were administered a two-page pre-test that was identical with the post-test and whose results form the basis of this analysis. The four tasks involved: choosing the correct word in the sentence (I), matching English words with their Polish equivalents (II), putting a correct word in the sentence (III), and completing a table with an appropriate verb, noun, or adjective that was formed from the base word. The students could score 20 points.

The average number of points from the pre-test in two groups was at the same level – 8 points that is 40%. As far as choosing the correct word is concerned – exercise 1, an average number of points in two groups was 3 points that means 15%. In matching English words with their Polish equivalents the learners in two groups scored 2 points on average that means 10%. Putting a correct word in the sentence was the most difficult exercise for two groups, they score 1 point on average that means 5%. The last exercise of completing a table with an appropriate verb, noun, or adjective was as difficult as the second exercise for two groups since the learners scored 2 points on average that means 10%. The results of the pre-tests are presented below.

Table 1. The results of the pre-test in the paper group

Paper group	*Points*	*Points in %*
Student 1	6	30%
Student 2	6	30%
Student 3	6	30%
Student 4	6	30%
Student 5	8	40%
Student 6	8	40%
Student 7	8	40%
Student 8	8	40%
Student 9	8	40%
Student 10	8	40%
Student 11	8	40%
Student 12	8	40%
Student 13	8	40%
Student 14	8	40%
Student 15	8	40%
Student 16	8	40%
Student 17	8	40%
Student 18	8	40%
Student 19	10	50%
Student 20	10	50%
Student 21	10	50%
Student 22	10	50%
TOTAL	176	40%

Table 2. The results of the pre-test in the digital group

Digital group	*Points*	*Points in %*
Student 1	6	30%
Student 2	6	30%
Student 3	6	30%
Student 4	6	30%
Student 5	6	30%
Student 6	8	40%
Student 7	8	40%
Student 8	8	40%
Student 9	8	40%
Student 10	8	40%
Student 11	8	40%
Student 12	8	40%
Student 13	8	40%
Student 14	8	40%
Student 15	8	40%
Student 16	8	40%
Student 17	8	40%
Student 18	10	50%
Student 19	10	50%
Student 20	10	50%
Student 21	10	50%
Student 22	10	50%
TOTAL	176	40%

Table 3. The average results of the pre-test in the paper and the digital group

Primary school learners				
Pre-test	*Average number of points*		*Percentage*	
	Paper group	*Digital Groups*	*Paper group*	*Digital group*
Exercise 1	3/20	3/20	15%	15%
Exercise 2	2/20	2/20	10%	10%
Exercise 3	1/20	1/20	5%	5%
Exercise 4	2/20	2/20	10%	10%

3.5 Post-tests results

After completing the classes, both groups were administered a two-page post-test that was identical with the pre-test and whose results form the basis of this analysis.

The paper group scored only 75% in the post-test as compared to 90% in the digital group.

As far as the first exercise that was choosing the correct word is concerned, an average number of points in two groups scored by the paper group and the digital group was 5 points that means 25% of all points at the test and 100% in this particular exercise. In matching English words with their Polish equivalents the paper group scored 4 points on average that means 20% whereas the digital group scored 5 points on average that means 25%. Putting a correct word in the sentence and completing a table with an appropriate verb, noun, or adjective was equally difficult for two groups. The paper group scored 3 points on average that means 15% in these two exercises and the digital group scored 4 points on average that means 20% in these two exercises. The results of the post-tests show a 15% difference between the groups that was according to

Mann-Whitney's test statistically significant (p-value <0,0001). The results of the post-tests are presented below.

Table 4. The results of the post-test in the paper group

Paper group	*Points*	*Points in %*
Student 1	12	60%
Student 2	13	65%
Student 3	13	60%
Student 4	14	70%
Student 5	14	70%
Student 6	14	70%
Student 7	14	70%
Student 8	15	75%
Student 9	15	75%
Student 10	15	75%
Student 11	15	75%
Student 12	15	75%
Student 13	15	75%
Student 14	15	75%
Student 15	15	75%
Student 16	16	80%
Student 17	16	80%
Student 18	16	80%
Student 19	16	80%
Student 20	17	85%
Student 21	17	85%
Student 22	18	90%
TOTAL	330	75%

Table 5. The results of the post-test in the digital group

Digital group	*Points*	*Points in %*
Student 1	16	80%
Student 2	16	80%
Student 3	17	85%
Student 4	17	85%
Student 5	17	85%
Student 6	18	90%
Student 7	18	90%
Student 8	18	90%
Student 9	18	90%
Student 10	18	90%
Student 11	18	90%
Student 12	18	90%
Student 13	18	90%
Student 14	18	90%
Student 15	18	90%
Student 16	18	90%
Student 17	18	90%
Student 18	19	95%
Student 19	19	95%
Student 20	19	95%
Student 21	20	100%
Student 22	20	100%
TOTAL	396	90%

Table 6. The average results of the post-test in the paper and the digital group

Primary school learners				
Post-test	*Average number of points*		*Percentage*	
	Paper group	*Digital Groups*	*Paper group*	*Digital group*
Exercise 1	5/20	5/20	25%	25%
Exercise 2	4/20	5/20	20%	25%
Exercise 3	3/20	4/20	15%	20%
Exercise 4	3/20	4/20	15%	20%

Table 6. The average results of the post-test in paper and digital group in general

Primary school learners				
Tests	*Average number of points*		*Percentage*	
	Paper group	*Digital Groups*	*Paper group*	*Digital group*
Pre-test	8/20	8/20	40%	40%
Post-test	15/20	18/20	75%	90%

4. Conclusion

Modern technologies can serve as valuable resources that revolutionize the process of teaching English vocabulary. Such tools support primary learners' vocabulary acquisition and develop their creativity and collaboration among peers, teachers, or professionals in various fields. Moreover, such tools help to provide effective and efficient feedback to primary students and increase their motivation.

The results of the presented study indicate that digital tools enhance learners' vocabulary acquisition. Learners that used such tools while learning scored more points in the test and broaden their English vocabulary. The findings allow to draw a conclusion that such tools should support the process of teaching English vocabulary to primary school learners.

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READING STRATEGIES IN PEDAGOGIC REALITY

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Abstract: *This paper describes the selected planned educational activities in the field of education by encouraging the development of reading literacy skills and reading strategies. This mainly concerns the activities proposed to implement e.g. within the framework of the regional action plan project in the Moravian-Silesian Region (2016 - 2019), but also about other important educational readership, targeted towards current activity as examples of good practice*.

Key words: *functional literacy, reading literacy, reading strategies, action planned reading activities*

1. Introduction

Reading and writing are integral parts of the education of readers, together forming one of the most important components of literacy activities of preschool age, pupils attending primary and secondary schools, undergraduates, and the adult public. No record of knowledge and information is possible without knowledge of letters. Literacy is a prerequisite for both general and specific training required for any individual in society. One of the priorities of educational policy in the Czech Republic, which is also a reality of the Moravian-Silesian region, is to create the best possible conditions for the development of reading skills, strategies, i.e. the art of reading texts, understanding, navigating in the text identity, e.g. searching, processing, comparing various information, reproducing and interpreting data, knowledge, experience. Support for conceptually sophisticated reading of educational activities can develop specific reading strategies in teaching and the reality of its spilling over into everyday life, regardless of age differentiation of the population of a given region.

1.1 Readership support priorities

In the Czech Republic, especially in the Moravian-Silesian Region, the development of literacy is supported across all educational levels. The reasons for this literacy initiative are certainly morefold. It is obvious that the results of an international survey of reading literacy (PISA 2009) [2] in the Moravian-Silesian region were very alarming (fifteen year old students achieved, in comparison with their peers from the entire country in this investigation, the worst results). Understanding the need to support the development of functional literacy with an appeal for the improvement of literacy across all age groups of preschool children, school age - for pupils in primary and secondary schools, leads to clear educational goals. This is the perception of reader education not only as a lifelong process, but also as a lifelong need. The key readership strategies that lead to understanding written information include: information retrieval, information processing, and the evaluation of information. The planned educational priorities in the Moravian-Silesian region in the period 2016-2019 include improving literacy, promoting literacy through education, supporting the education of teachers in the problems of teaching literacy skills, creating conditions for personal and material consultations for pupils with special needs in reading literacy. Motivation and interest of schools for co-operation in promoting the development of education towards reading has good foundations, not only with the regional representatives. It concerns which of the chosen literacy support reading activities do not remain only in the preparatory phase, but are shifted to realization for individual school and extracurricular subjects.

1.2 Understanding literacy concepts and terminology

Basic knowledge and understanding of key concepts in educating readers are an important springboard for innovative educational reader literacy through teaching activities. It is an important stimulus to support the thinking activities of a person equipped with functional literacy, reading literacy, and a sufficient database of reading strategies.

Functional literacy

This is human skills for the implementation of various activities necessary for life in contemporary civilization. It includes literary, documentary, and numerical literacy e.g. the ability not only to read, but also to understand complex texts, fill in forms, understand graphs, tables, etc. (Průcha, 2009). [1]

Reading literacy

Complex knowledge and skills that will enable a person to deal with written texts that are commonly encountered in everyday life (Průcha, 2009). [1]

According Klumparová (2009) [3], we can see reading strategies as self-directed activities of the reader, i.e. metacognitive, affective, and volitional strategies. Thanks to self-realisation strategies, we can control and direct our own cognitive activities. Conditional self-control deals with affective strategies. The will can be influenced by intentional and intuitive control and management of learning activities.

2. Examples of good practise

Improve literacy in education at different types of schools, especially in the transition from primary to secondary schools, can be performed in the Moravian-Silesian Region through lectures, consulting and presentation activities on professional topics, making available professional literature for reading education comprehension (e.g. Familiarization with current outputs of Czech and international reading literacy studies and research). From organizational forums that support reader education, literacy and creative workshops, examples of good practice, critical thinking workshops for teachers and students, meetings with authors, and readings all prove effective. Properly selected readership activities can prevent communication and readership pitfalls in practice. The Moravian-Silesian region is a region with high unemployment, an industrial zone of the Czech Republic with support and interest in the processes of self-education and retraining. Among the most successful forms of supporting an increase in literacy skills are reader-oriented contests and projects of educational and non-educational institutions. e.g. Poetry Day - Festival (parade) of reader-focused activities, creative activities, exhibitions and competitions for elementary and secondary schools in co-operation with the school and the municipal library in Ostrava, co-operation with the Ostrava literary café Academia. An artistically oriented media show, organized by the Secondary Technical School in Ostrava - Vítkovice, has traditionally been, for more than a dozen years, held under the auspices of the national poetry festival to commemorate the birth of the Czech poet, K. H. Macha. This year (2016), the central theme of the event is the well-known motto "No man is an island unto himself."

3. Working with texts promotes reading

The new concept of the "Maturita" state graduation exam in the Czech language and in literature, especially in sections of the oral test, leads students to critical thinking, analysis of extracts of artistic and non-artistic text is based on the theoretical and practical knowledge (skill) of the pupil reader's critical approach to a literary text and the author's context. Working with linguistic and figurative means, stylistic practices across functional styles create a skill for the general understanding of a text, understanding its ideas, and applying the read information into everyday life. Successful reading experience points to the need to read regularly continuous and discontinuous texts, as well as artistic and non-artistic texts. In June 2016, in the Moravian-Silesian Region, survey-based research took place on the reading strategies of fifteen year old students, researching the level of the target group of students at the end of the period of basic education. The research was conducted by an expert team of teachers and students of Palacký University in Olomouc at the Faculty of Pedagogy. The questionnaire survey was attended by 1,199 respondents. The questionnaire did not check the knowledge of the students, but led the student to reflect on their level of skill in reading and understanding the information being read. The outputs of the research will bring e.g. data on which reading strategies students use in reading, which kinds of texts and information sources are popular, what is the position of reading patterns, and so on. Among the most interesting findings, we selected students' answers in order to define the understanding of the concepts of "reading strategies" and "what books mean to me".

The problem of the definition of "reading strategies from the perspective of selected students":

Pupil A: "Reader strategy is to read the text to have as much information as possible."

Pupil B: "Reader strategy is careful reading, so we can memorize as much of the text as possible."

Pupil C, "Reading strategy is reading with comprehension. Here we know how a person man can work with the text. "

Pupil D: "Reading strategy is the style that someone reads."

The problem is with pupil meditative reflection on the meaning of the concept of "books":

Pupil A: "A book is a friend, because I know the people, the book is a guide, it shows a new fact, the book is knowledge, because I learn things I did not know, the book is the way, because it shows me something new."

Pupil B: "A book is a friend, because I can read when nobody else has time, the book is an escape from the real world into a fantasy world, the book is the way, e.g. from the present to the past."

Pupil C: "The book is entertainment culture, the book is a fun experience, the book is finding answers, the book is a mirror of the author, the book is an escape for the main attraction in a test."

With effective school work with texts, there is a marked change of the roles of teachers (as educator, tutor, facilitator, co-author, assessor, reader) and their necessary historical and regional updates in the field of further education and reading experience.

4. The foundation of readership comes from the family

Parents have, and can develop, a positive relationship between the child and books. The Moravian-Silesian Region supports the education of parents in reading e.g. the activities of cultural institutions, particularly libraries, reading clubs, reading and creative circles, reading theatrical trailers, e.g. by organizing a theatre pilgrimage in Ostrava, directed by the Moravian-Silesian Theatre, etc. Children can be brought to reading, as well as students and adults, through public education by film viewers (from simple animated film adaptations of literary works, to film documentaries about the authors, which we can see in activities of the Luna Cinema, and the Film Viewer Club, etc.). Libraries have become a place of intergenerational learning by organizing intergenerational reading. Even the commercial area in the Moravian-Silesian region is not set aside from interest in the education of readership, e.g. Dům knihy (the House of Books) in the city centre has become a cultural meeting place of authors and readers. Readers interested in personally meeting living literary authors is high. Among successful current readings with authors, we can name the writers: V. Vondruška, V. Klaus jr., K.A. Samková, M. Čepelka, T. Sedláček, J. Kolbaba, I. Pekárková, Žantovský, B. Kohoutová, J. Dušek, and

others. In cultural institutions and schools in northern Moravia, national and international reader motivated projects have been successfully implemented. e.g. "The Czech Republic reads to children" (in Ostrava in March 2016, O. Ruml read the books "Berta a Ufo" / "Berta and the UFO" and "Tappiho putování po šumících mořích"/"Tappi's wanderings on the murmuring sea).

5. Conclusion

This article discusses the need to promote reading activities through developing reading strategies, education towards reading. The text emphasizes the interconnection of co-operation between national and regional education policy in terms of developing the curriculum in relation to lifelong learning. Examples of good reading practice show interest of the teaching and non-teaching public in the Moravian-Silesian region of the currently implemented and planned reader-conceived literacy initiatives across all age groups in school and extracurricular (cultural) institutions. The Moravian-Silesian region is under growing pressure to increase pro-learning culture that is the basis for the learning-society and its shared bidirectional model of intergenerational learning and monitoring the changing roles of the teacher and pupil in the local and international context.

Acknowledgements

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ADMINISTRATIVE EMPLOYEES´ VIEW OF COMMUNICATION WITH PEOPLE WITH HEARING DISABILITY

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Abstract: *The contribution offers basic information on communication between people with hearing disability and administrative employees. The attention is paid to the classification of people with hearing disability and factors which may influence their communication. The contribution is executed from administrative employees´ point of view while the administrative employees work for various institutions and were addressed at the area of the Czech and Slovak Republic using a quantitative research method of a semi-structured questionnaire.*

Keywords: *person with hearing disability, personality of people with hearing disability, communication, perception, social perception.*

1. Introduction

The aim of this contribution is to offer basic information on people with hearing disability regarding communication with administrative employees. The contribution offers a basic introduction into the terminology connected to the matter of people with hearing disability. The personality of individuals with hearing disability is also mentioned in the contribution. The points which may show how administrative employees of various institutions perceive people with hearing disability were chosen from the research.

1.1 Perception (Social Perception) Regarding Communication

Communication is influenced by the way in which we perceive the announcement of the other person; it is also influenced by self-perception. Our previous experience influences the process of perception of the other person; this experience results in deformation of facts and influence what we choose from the announcement of the speaker and how we understand it. These factors are called mistakes in the perception during communication [1].

Social perception is applied in the course of social interaction based on the perception of other people using external signs. The content of the words is usually less significant compared to perception of the others itself based on the manifestation of external signs accompanying social interaction. The factors, which influence social interaction, may be divided into internal and external. The situational context, verbal message, nonverbal and paralingual means belong to the external factors. Pygmalion effect, cognitive consonance, cognitive dissonance, psychological affinity, implicit theory and individually differentiated sensitivity of perception belong to the internal factors [2].

1.2 Terminological Basis of Naming People with Hearing Disability

People with hearing disability are often named in a not unified way, in particularly by wide public. People with hearing defect, regardless which defects it is, are very often called "deaf". It is possible to encounter a cultural definition to call deaf people with a capital letter "Neslyšící" ("Deaf") in the Czech Republic. These people are considered to be members of cultural and language minority and are not considered to be disabled [3].

The naming of hearing disability refers to a very heterogeneous group of people, which is differentiated according to the degrees and type of the hearing disability. The notion hearing disability combines three basic categories of people. These categories are "deaf", "hearing-impaired" and "deafened". Each of these categories shows various qualities whose structure is influenced and formed by other factors, which contain quality and quantity of the hearing disability itself, age when the hearing disability occurred, mental disposition of the individual, treatment that the individual underwent and possibly other accompanying disability [4].

Langer [In 5] considers the naming and marking people, who have various loss of hearing to be problematic. The stable and accepted notion is the notion hearing disabled, which has lately been accompanied by the notion person. A person with hearing disability is the notion, which emphasizes especially human individuality and only then it states the information on the state, possibly disability. All people with hearing disability are altogether called people with hearing disability regardless the degree, type and the time of occurrence of hearing disability [5].

1.3 Personality of Individuals with Hearing Disability

We see the personality as a mental whole which is characteristic by its internal unity and structure of its individual elements, individual specifics and differences compared to other personalities and also development continuity which means the stability of psychological features even in the course of various development changes. The personality is seen as a functional integrated whole, which is individually typical and relatively stable in its characteristic features [6].

The personality of a person is created in the course of the development of an individual under the influence of external and internal factors. The personality is determined biologically and on its basis the uniqueness of each person is created. The genetics of an individual is also influential in this area; it influences the nature of psyche. A significant factor having an influence upon the forming of a personality is the social factor, where the forming of a personality is influenced by contact with other people, at early age especially contact with parents which influence the forming of the personality of an individual. Health disability represents a risk that a limitation in the development of normal functions might occur. The risk of the occurrence of certain psychological deviation is lower by a hearing-impaired individual than by a deaf individual [7].

Based on this statement, it may be judged that it is not possible to classify people with hearing disability in one group and see them in the same way as each person with hearing disability is influenced by various internal and external factors. The type and degree of the disability may, however, does not have to, influence the development of a personality in a certain area.

A huge influence upon the development of the personality of an individual with hearing disability is the background, where the individual grows up and lives, especially family background. The hearing defect may influence the perception of speech of individuals with hearing disability to various extent; the degree of achieved communication competences significantly influences his personality as loss of hearing leads to stimulus deprivation based on the limited or missing sound stimulus. It results in secondary handicap, i.e. communication barrier [8].

The lack of knowledge and prejudices of the hearing society, which the individuals with hearing disability encounters, are usually a barrier during overcoming difficulties in particular in mutual understanding. When communicating with the intact society they feel tension, maximal focusing and in case of misunderstanding a failure. The chain of frustration and doubts of oneself occurs. In some cases there may occur isolation of the person with hearing disability and refusal of the intact society [9].

Based on the research of a couple of years some people with hearing disability show certain features as aggressiveness, impulse behaviour, emotional deprivation, shallowness, attaching to concrete things, sameness, resignation, weak fantasy, egocentrism, inability of empathy, apathy, dependence, lack of self-confidence and other. It is necessary to emphasize that all the mentioned negative features do not have to occur by the individuals with hearing disability, there is only higher risk that they will occur based on the hearing disability [10].

2. Methodology

The aim of the questionnaire research was to establish how administrative employees of various institutions perceive clients with hearing disability.

The method of empirical research, the method of questioning, was used to collect the data. The questionnaire research was chosen as a research technique. The reason for the chosen technique was anonymity. The questionnaire was sent to administrative employees in an electronic version regarding their time possibilities. The sample of respondents was chosen at random in various institutions at the area of the Czech and Slovak Republic.

Altogether 44 answers were received. The average age of the respondents was 34.2 years, 77.3% of the total number of respondents were women.

The chosen results are analysed, graphically processed and commented on.

The acquired data were processed using a simple scale: excellent, good, bad, neutral and a scale: definitely yes, yes, definitely no, no.

3. Chosen Research Results´ Analysis

1. What is your relationship to people with hearing disability?

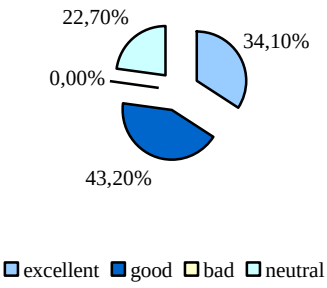

Figure 1: On the scale: excellent, good, bad, neutral 43.2% of respondents answered that they have a good relationship with people with hearing disability, 34.1% of respondents stated that their relationship with people with hearing disability is excellent and 22.7% consider their relationship with the people with hearing disability to be neutral. 0% of respondents marked their relationship as bad.

2. Do you assume that people with hearing disability are problematic?

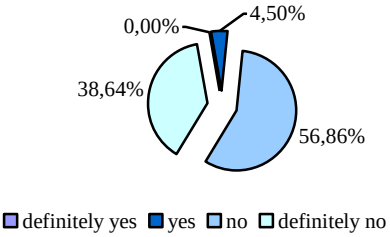

Figure 2: On the scale: definitely yes, yes, no, definitely no 56.8% of respondents chose the possibility: no, 38.6% of respondents assume that people with hearing disability are definitely not problematic, 4.5% believe that people with hearing disability are problematic. 0% of respondents chose the categorical option: definitely yes.

3. Do you think that people with hearing disability tend to behave aggressively more than hearing people?

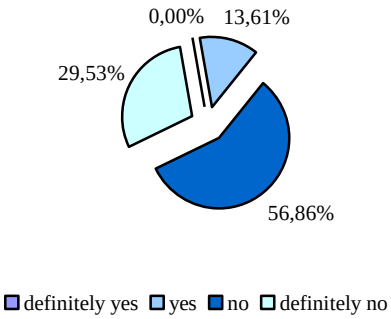

Figure 3: On the scale: definitely yes, yes, no, definitely no, 56.8% of respondents chose the option: no. 29.8% of respondents chose the option: definitely no. 13.6% of respondents assume that: yes, people with hearing disability tend to behave aggressively more than hearing people. The option: definitely yes was chosen by 0% of respondents.

4. Do you think that people with hearing disability are more passive than hearing people?

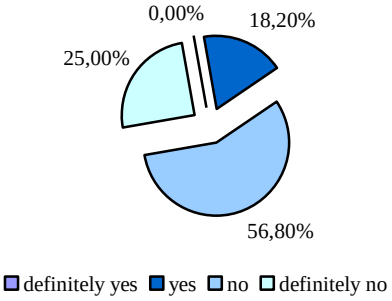

Figure 4: On the scale: definitely yes, yes, no, definitely no, 56.8% of respondents chose the option: no. 25% of respondents marked the option: definitely no and 18.2% of respondents marked the option: yes, people with hearing disability are more passive than hearing people. The option definitely yes was chosen by 0% of respondents.

4. Conclusion

It is possible to assume based on the results of the research that people with hearing disability, not mentioning exceptions, are not perceived differently from hearing people by the addressed administrative employees. Administrative employees do not consider people with hearing disability to be problematic and they also do not assume that they tend to behave aggressively. Simultaneously, they do not have the feeling that people with hearing disability are more passive compared to hearing people, even though some of them encountered aggressive as well as passive behaviour of clients with hearing disability. None of the administrative employees stated that he or she has a bad relationship with people with hearing disability, a certain part stated a neutral attitude, which may be seen as professional reaction.

Administrative employees are in the situation which is not exactly easy, there are many demands placed on them as on employees of the given institution and a certain reaction is expected from them, at the same time they are exposed to a situation where there is a communication barrier on both sides. People with hearing disability are exposed to stressful situations, when the communication barrier creates a gap between the two worlds. It is not always possible to use an interpreter of Czech signed language, possibly they do not want him or her or they assume that they do not need to order one and they rely on lip reading, despite that fact that an unexpected situation may occur for example in the form of a lip reading barrier (beard, dazzling, noise etc.). It is not possible to expect administrative employees to know the Czech signed language (even though it is possible to notice that administrative employees acquire the basics of this language more often), it is only possible to call for a greater extent of empathy, tolerance and helpfulness towards clients with hearing disability. Simultaneously, people with hearing disability should be patient and willing to communicate in other way than the language which they prefer if it is different from the national language of the given country.

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SELECTED MODELS OF SCHOOL SOCIAL WORK

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Abstract: *The paper objective is to analyse and characterize past and current views of school social work and its gradual development and various perspectives. The presented models introduce key ideas and concepts which have created and influenced practice of school social work. Specific differences of the individual models guaranteed selection and use of a suitable model in various conditions of various countries.*

Keywords: *school social work, selected models*

1. Introduction

In order to establish and implement school social work in Slovakia, an important phase is examination of the models of school social work. Only on the basis of such examination and cooperation with experts, we can design a really effective model of functioning of school social work in our conditions.

2. Models according to Alderson

In the process of systematization of school social work, Alderson was one of the first who categorized work of school social workers into models. Descriptions of the models characterized their central ideas, goals, concepts, values, and specific tasks of school social workers. There are four basic models [1].

2.1 Traditional Clinical Model

The model focuses on pupils with social and emotional needs that influence their potential to learn. The goal is to enable pupils to function effectively in school environment. Social workers focus on pupils as their clients and their parents, as according to this model, sources of difficulties are psychological and emotional problems resulting from a family, specifically from parent-child relationships. Social workers carry out their activities by case work and group work with families, and make efforts to develop positive relationships in the spirit of cooperation between pupil, family, and school. The model is based on personality psychology, psychoanalysis, social psychology, and case social work [2].

2.2 School Change Model

In the model, school social workers focus on school environment, and their goals are changes of those school norms and conditions that are dysfunctional. They focus on school as an entity. The causes of problems are seen in school's conditions, norms, and policy. Their task is to work directly with school's pupils, employees, and management, individually or in groups. Social workers are in a role of mediators and counsellors. The model is based on the theory of social sciences [3].

2.3 Community School Model

The model focuses only on disadvantaged communities that do not trust school and do not understand its functioning. Therefore, the goals of the system are development of school programmes to assist pupils who are victims of poverty, and improvement of their conditions. Educating a community and development of mutual understanding are also important. These goals are achieved by social workers through including school in community activities, mediation, advocacy, and networking. The model is based on the communication theory and the community school concept [1].

2.4 Social Interaction Model

The last model by Alderson focuses on problem identification in pupils-school interaction. The goal is enhancement of development of mutual system of assistance, and elimination of barriers between pupils and school. School social workers' activities include making mutual communication more effective and developing a system of mutual assistance through work with individuals, groups, and communities. These goals are achieved by school social workers through capacitation, counselling, and mediation. The model is based on the system and communication theory, and the theory of social sciences [2].

3. Models according to Speck

The author of these models that were designed on the basis of development of the school system and school social work in Germany focused on the macro level when drafting them. Their development was also significantly influenced by modernization, and social and political changes. In these models, a great emphasis is put on consequences of modernization on socialization of children and the tasks resulting from it for school social workers and school [4].

3.1 Model based on socialization and modernization theories

The model focuses on identification and elimination of increasing threats for and problems of children and youth. Its goal is assistance focused on coping with life events,

achieving school success in children and youth, and enhancing their competences. School social workers assist in identity and personality development, and coping with school and out-of-school difficulties. Development of pupils' social competences is also important. The model is based on the socialization and modernization theory [2].

3.2 Model based on school theories

The model focuses on school itself, its functions, and developments. Its goal is a school reform. If school conditions react inadequately to pupils' changed conditions, they can be a source of difficulties. Therefore, school social workers influence the whole system of a school through a reform. They aim to optimize pupils' life and school conditions. It is based on the school, modernization, and socialization theories [3].

3.3 Model based on transformation theory

The model focuses on pupils' individual risks and insecurities, problems, and relationships. The emphasis is on intensive cooperation with parents and communities to eliminate pupils' problems and threats. Schools social workers assist in achieving pupils' success both in school and leisure activities. They develop positive cooperation with parents and encourage changes in educational processes [3].

3.4 Model oriented on role and profession theories

The model focuses on a controversy between social pedagogy and social work, and penetrations and differences between the professions. The goal is to make assistance for pupils more effective, and particularly to define the scope of specific experts in school environment, and thus to make their system of work and system of assistance more effective and stronger [5]. The model focuses on pupils and school as well as on professionals assisting pupils. It is based on the idea that the consequences of modernization and increase of problems lead to realization of the need of social work entering the school environment. Therefore, one of the main goals is improvement of cooperation with all professionals through their identification of and emphasis on how they differ, and clear definition of their competences. The model is based on the theory of profession and the theory of roles [4].

4. Model according to Costin

In the models above, there is a lack of advocacy of school social workers. It has its significant place in the Costin's model. The model focuses on inadequate conditions in school and community, and studies these systems that pupils are in interaction with also in stressful situations. The goal is to bring a positive change into pupil-school-community relationships and to reduce pressure put on pupils as disproportionate pressure can worsen functioning in some pupils at school. School social workers assess school and community conditions with focus on equal availability of opportunities. They serve as counsellors, advocates, negotiators, and mediators for all parts of these systems, both individually and in groups [5].

5. Conclusions

Individual models show various forms of school social work. They help us recognize dominant problems and difficulties, and influences of individual approaches with aim to reduce or eliminate them. The Alderson's models do not perceive pupils as part of a system and do not work with the system as a whole. Despite that, the most widely used model in the present is the traditional clinical model. When choosing a model, school social workers must take multiple factors into consideration. They include assessment of available resources – own resources, client's resources, community and school resources, and client's needs. None of the models is used in its pure form; on the contrary, it is beneficial if multiple combinations of the models are used, depending on specific situations and environments. All the models reflect the necessity of communication and linkage between school and communities, and their aim is to be useful for pupils in coping with their life events.

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QUALITY MANAGEMENT SYSTEMS IN SOCIAL SERVICES

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Abstract: *The paper focuses on the quality management models. Social services should be provided in adequate quality; to achieve this level, quality standards in social services are used. In the paper, we discuss selected quality management models, particularly the TQM, EFQM, and CAF models. We clarify how the models work and how they can help organizations in enhancing the quality of provided services in Slovakia.*

Keywords: *social services, quality standards, quality management systems, Slovakia*

1 Introduction

In the present, quality in social services is of increasing significance that should get into a centre of attention of each provider of social services. An important quality indicator in social services facilities is satisfaction with provided services. Quality levels of social services express levels of society's development and standards.

Quality of social services closely relates to quality management in social services which can be referred to as a way used to manage an organization to achieve business success based on the basic concepts including: orientation on a customer, partnerships with suppliers, and employees' development and involvement. Quality management is inseparable part of total quality management in an organization; it is a coordination of activities focused on leadership and management of an organization with focus on quality, which essentially means meeting customer requirements [6].

In the paper chapters below, we introduce individual quality management models.

2 Selected quality management models

When we talk about a quality management system, we can say it is a voluntary quality management system in a providing organization based on the principles of organization's self-assessment and its aim of continuous improvement. That has led to development of quality management models that are used by social services organizations in the present [7].

Organizations and institutions pay more and more attention to continuous improvement of their processes, offered services, and functioning of whole organizations. One of the basic tools to ensure quality for clients is quality management models that focus on achieving quality goals. Such models include: the EFQM, TQM, or CAF models. We characterize the models in detail.

2.1 TQM (Total Quality Management) Model

The TQM model was originally developed in the USA and Japan as a management system for organizations focused on customer satisfaction [8].

This model can be considered a total management model whose aim is to sustain continuous improvement of total performance of an organization [4].

The tools of the TQM model provide new options for management. In a relatively short period of time, this model has developed from theory to practical planning, implementation, management, and improvement of all processes in an organization [5].

This model is not limited by norms and regulations, but it is an open system that absorbs everything positive that can be used for development of an organization. It represents such an approach to building and sustaining a quality management system that relies on culture and philosophy rather than defined norms and recommendations. This model is the most progressive philosophy of modern quality management. The most essential criterion is total customer satisfaction and not mere meeting of their requirements. The TQM is an approach to increasing the competition, effectiveness, and flexibility of a whole organization through planning and understanding of all activities, and depends on each individual on all levels. It is characteristic for including a whole organization, all departments, and all employees in the process of increasing the quality of products.

The TQM model is based on eight principles:

1) Customer-focused principle,
2) Principle of managing people and team work,
3) Principle of partnership with suppliers,
4) Principle of development and involvement of people,
5) Process-centred principle,
6) Principle of continual improvement and innovations,
7) Principle of measurable results,
8) Principle of responsibility to environment [3].

2.2 EFQM (European Foundation for Quality Management) Model

The EFQM excellence model is a practical tool that helps organizations on their way to excellence through measurements, helps them understand where their gaps are, and provides them with stimuli for resolutions. This model admits there are many approaches to achieve continuous improvement in all aspects of performance, and it is based on assumptions that successful results with

aspect on performance, clients, employees, and a society are obtained through partnership, resources, and processes [2].

The use of this model has become a strategic issue for organizations which want to excel in modern competitive environment [9].

The model is based on nine criteria; five of these are "Enablers" and four are "Results". The dynamic nature of the model is hidden behind a relationship between the enablers and the results. Innovations and education help to improve the enablers that in turn help to achieve better results. The enablers include planning and development of approaches that create preconditions for achieving excellent results. The main aim of assessment and examination is improvement of the activities focused on promotion of defined strengths and areas to be improved. These criteria consist of five parts:

- Leadership,
- Policy and strategy,
- Employees,
- Partnership and resources,
- Processes.

The results measure excellence and the extent of values that are offered by an organization for involved parties, and also effectiveness and efficiency of an organization. The results are found with focus on perceptions of involved parties, organization's intentions, and external comparisons. The results consist of four parts:

- Customer results (customer satisfaction),
- People results (employee satisfaction),
- Society results (effects on a society),
- Key performance results (business results) [3].

2.3 CAF (Common Assessment Framework) Model

The CAF model was developed by the European Institute of Public Administration and is a result of cooperation between the EU ministers responsible for public administration (state administration and self-government). It has been developed to provide a trustworthy image of effectiveness of functioning of public/state administration; it is offered to organizations of the public sector in Europe as an assistance tool in implementation of management techniques into public administration. The pilot version of the CAF model was presented in 2000, and the first improved version was presented in 2002. In 2005, an approach to quality was united with the Lisbon Strategy agenda and the CAF 2006 was developed. When compared with the EFQM excellence model, the advantage of the CAF model is its demonstrative nature and ease of administration of self-assessment. The goal is to increase effectiveness of functioning, to seek spaces for improvement in the area of quality of provided services, and particularly spaces for better use of resources [6].

In the present, a newer version of the CAF 2006 is available, i.e. the CAF 2013. In the manual of the CAF 2013, the model is defined as a tool of total quality management that was developed by the public sector for the public sector, inspired by the EFQM excellence model. The model is based on the assumption that successful results in organizational performance related to customers, employees, and a society are achieved through leadership by managing planning and a strategy, employees, partnerships, resources, and processes. It provides a view of an organization from various angles at the same time, and uses the holistic approach to analysis of organizational performance.

The CAF model is available free of charge for the public sphere as a user-friendly tool for assistance to public-sector organizations in all Europe with the use of quality management techniques to improve performance. The CAF model was designed to be used in all parts of the public sector and can be applied in public administration organizations in Europe on national/federal, regional, and local levels.

The goal of the CAF model is to become a catalyst for a total improvement process in an organization and has five main purposes:

1) To implement the culture of excellence and principles of total quality management (TQM) into public administration;
2) To lead them gradually to the fully integrated PDCA (Plan-Do-Check-Act) cycle;
3) To facilitate the self-assessment of public-sector organizations in order to obtain a structured image of an organization followed by motives for improvement;
4) To act as a bridge across the various models used in quality management, both in public and private sectors;
5) To facilitate bench learning between public-sector organisations [1].

As a tool of total quality management, the CAF model reports itself to the principles of excellence originally defined by the EFQM excellence model, transfers them into the context of the public sector/the CAF model, and its goal is to improve public-sector organizational performance through these principles. The principles form a difference between traditional bureaucratic public-sector organizations and those that are oriented on total quality management.

Principle 1: Results orientation

An organization is oriented on results. Achieved results are favourable for all involved parties (authorities, citizens/customers, partners, and people working in an organization) related to set goals.

Principle 2: Citizen/Customer focus

An organization focuses on the needs of current as well as potential citizens/customers. It involves them in development of products and services, and improvement of its performance.

Principle 3: Leadership and constancy of purpose

The principle connects visionary and inspiring leadership with constancy of purposes in the changing environment. Leaders set clear mission, vision, and values. They also create and maintain inner environment in which their employees can be fully involved in meeting organization's goals.

Principle 4: Management of processes and facts

The principle leads an organization from a perspective that an expected result can be achieved more effectively if relevant resources and activities are managed as a process,

and if effective decisions are based on data and information analysis.

Principle 5: Involvement of people

Employees on all levels are an essence of an organization and their full involvement allows all their abilities to be used in favour of an organization. Employees' input should be maximized through their development and involvement, and by providing the work environment of shared values and culture of trust, openness, empowerment, and appreciation.

Principle 6: Continuous improvement and innovation

Continuous improvement and innovation should be a permanent goal of an organization.

Principle 7: Mutually beneficial partnerships

Public-sector organizations need others to achieve their goals; therefore, they should develop and maintain partnerships with added value. An organization and its suppliers are independent; and mutually beneficial relationships increase ability of both to create a value.

Principle 8: Corporate social responsibility

Public-sector organizations must accept their social responsibility, respect ecological sustainability, and attempt to meet the main expectations and requirements of the local and global communities.

Excellence principles are included in the structure of the CAF model. The model and continuous improvement of nine criteria lead an organization to a higher level of maturity after some period of time. There are four levels of maturity for each principle; thus, an organization can have an idea about its way to excellence [1].

3 Conclusion

The paper objective was to provide information about possible quality management models that help increase quality in organizations.

The basic goal of firms and organizations is to increase performance, effectiveness, and quality. Organizations which decide to increase quality of provided services proceed to tools to achieve a goal which is satisfaction of a client, i.e. a receiver of social services. The above-characterized systems allow progress. It is necessary to say that initiating a quality management system does not automatically lead to improvement of a firm, an organization. It is a long-term process that should lead to improvement of involved parties and customer satisfaction in the end.

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IS ENGLISH GOING TO THE DOG(E)? LANGUAGE PLAY STRATEGIES AND IDENTITY CONSTRUCTION IN DOGESPEAK

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Abstract: *Memes are said to be an example of online activity which alters the linguistic landscape. One of such memes, Doge, has given rise to a new Internet language variety, namely, Dogespeak. What makes Dogespeak recognizable is its unconventional grammar rules and a skilful manipulation of language. Since its appearance on the Internet, the Doge template has been used in advertising or fashion industry. It can be also noticed that the Doge meme making is a multiperson process. Netizens engage in a collaborative task of creating memes and through the collective lens express their feelings about the surrounding world. This group collaboration happens at the cultural and linguistic level. With the use of Doge corpus, certain characteristics of Dogespeak as well as language play strategies are analyzed. The aim of this paper is to show that Dogespeakers take an active part in the creation of online community which comments on the current events.*

Keywords: d*ogespeak, dogespeak community, language play, internet meme*

1. Introduction

DAVID Crystal claims that the Internet has given rise to new language variations and has led to expansion of language creativity. The Internet allows people to form and join some online communities who share common beliefs or interests. This online meeting can be done in many ways, for instance, through chats, blogs or forums. Members of the community use their own language, Dogespeak among others, to communicate their ideas.

Doge has become a new Internet meme in the last few years. Its origins trace back to the picture of a Shiba Inu posted by the dog's owner on her personal blog. In consequence, some Internet users began playing with the image and placing some short and colourful phrases around it. Is a Doge meme only an image of a dog with a humorous caption or does it present something more meaningful?

The aim of this paper is to present Dogespeak as a unique and innovative form of language play. This paper explains that Dogespeak leads to the creation of a community which centres around this linguistic phenomenon.

2. What is a Doge meme?

According to Stryker, the origins of Internet memes are difficult to identify. The term *meme* was coined by Richard Dawkins, a British biologist, and it referred to all cultural ideas which were passed on from one person to another. In *The Selfish Gene* Dawkins enumerated three properties of a meme: longevity, fecundity (fertility) and fidelity (true to the original) [1]. Dennett claimed that memes spread very quickly and the meme making process is based on copying and immitation [2]. With the emergence of the Internet, the term *meme* has expanded its meaning. In his essay *The Language of Internet Memes* Patrick Davison has defined meme as a part of cultural joke spread from one user to another [3]. For Jenkins, memes are the outcome of cooperation among users. Jenkins claims that memes evolve and change and they influence the way people think, behave and act [4]. For Shifman, the term Internet meme refers to the dispersion of videos, images or jokes from one person to another [5]. Shifman also enumerates three frames within which Internet memes function, namely, *hypersignification*, *prospective photographs* and *operative signs* [6]. Knobel and Lankshear claim that Internet memes are spreading at lightning speed. They can be defined as the rapid spread of a particular idea or other unit of cultural "stuff" [7]. In their paper, Knobel and Lankshear mention two types of memes: *static* and *remixed*. Unlike static memes which are not altered by the Internet users, remixed ones replicate via evolution, adaptation or transformation [8]. Most of the Internet memes, Doge memes among others, belong to the latter category. Zappavigna claims that thanks to the popularity of social networking sites, such as Reddit, Facebook or Twitter, Internet memes are spreading quickly [9]. In the mid-2000s, Internet users have started uploading funny photos of their pets and have paved the way for new trends in Internet meme culture. In consequence, a vast number of memes presenting animals, such as LOLcats or Doge memes, have flooded the Internet. LOLcats are images of cats with amusing captions in non-Standard English. Doge memes, on the other hand, present a photo of a dog with short ungrammatical phrases around it. Although Dogespeak popularity has grown over the last few years, it is claimed that this Internet variety destroys language. Clay Shirky calls Internet memes, Lolspeak and Doge speak among others, the dumbest creative act. According to Shirky, Internet memes are created with a minimum effort and anyone can insert a silly caption to the image of a dog [10].

Despite some criticism, David Crystal and Naomi Baron claim that Internet variations of English have a positive influence on language. It is claimed that Dogespeak is a

unique and innovative form of language play. This Internet phenomenon is also at the centre of the collective action.

3. Participatory culture

One of the key characteristic features of Web 2.0 is collaboration. The sense of freedom and collaboration on the Internet has enabled people to share music, thoughts and ideas. It is believed that Web 2.0 enables Netizens to share a collective interest. Jenkins calls this group 'participatory culture' which creates and shares their creations with one another [11]. Engagement and solidarity guarantee successful collaboration and enable members to 'archive, annotate, appropriate, and recirculate media content in powerful new ways' [12].

As far as Dogespeak is concerned, collaboration occurs at the linguistic and the cultural level. Dogespeakers use the existing Doge template and then remix, alter and intertextualise it to produce new and surprising linguistic combinations. Doge memes are the outcome of the new form of the social capital, and they present the knowledge of the collective intelligence. Dogespeak contains specific vocabulary which is a characteristic feature of this digital social group [13]. Detailed analysis of Dogespeak lexicon will be discussed further in the paper.

It cannot be denied that the emergence of Web 2.0 has led to creation of participatory culture in which individuals do not passively consume the content but they actively evaluate, reshape and spread it. Netizens can reach an extended audience as they are not limited by geographic boundaries.

4. Case study

The variable nature of the Internet makes it difficult to choose which Doge memes to investigate. To carry out the research I have decided to follow two sites with the largest number of voters, namely, reddit.com and icanhascheezburger.com. Both websites are free and users may upload the images of dogs and comment on them. To present linguist variation and creativity of Dogespeak, ten Doge memes were selected using the below criteria:

1. They had to be from the last month of the year 2016;
2. They had to be Doge memes or comments found on the forum;
3. They had to contain at least two words in Dogespeak.

While conducting the research, some general questions were asked:

1. What is the meme message?
2. Does the meme evoke any reactions?

4.1 Language play in Dogespeak

It cannot be denied that Dogespeakers play with English in creative ways showing their metalinguistic competence. They break grammar rules and establish their own unique patterns. Doge play involves combination of a modifier with a noun, verb or adjective. In the doge corpus, 'such + noun' was the most popular combination. It appeared in each analyzed Doge meme, for instance 'such equality,' 'such marriage.' Other modifiers, such as 'so,' 'much' and 'very' also appeared in the Doge memes. Although these combinations differ from Standard English, they are favoured by Dogespeakers. In the Doge corpus there were not any combinations of a modifier with an article or preposition.

Another notable feature of Doge play is spelling. In the analyzed corpus, a few common ways of spelling have been distinguished:

Table 1 Dogespeak spelling

Spelling	*Examples*
Acronym	2deep2u
Deletion of letters	lern
Letter shift	tkaing
Different spelling for the same vowel sound	such fashun

It is said that Doge's spelling violates Standard English and shows Dogespeakers linguistic inability. It can be argued that Dogespeakers prove their familiarity with the rules of language through creative use of spelling. It is believed that minimum knowledge of English is required to understand Doge jokes.

On the basis of the collected Doge memes, it can be inferred that every meme tells its own story summarized with a picture and words around the image. Although there is a doge template, as shown in Figure 1, which Dogespeakers may follow, users prefer to include more personal content into the meme. Those memes change the original idea to show irony and absurd, as shown in Figure 2. According to Knobel and Lankshear, it is important to know the original idea in order to understand the irony [14].

Figure 1: Prototypical Doge template

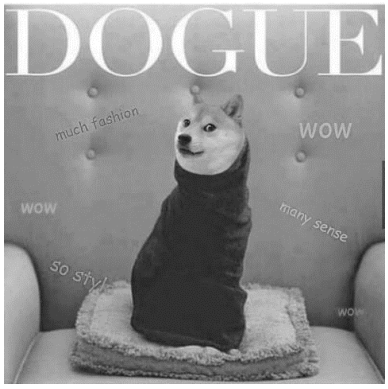

Figure 2: Dogue, a Doge parody of the famous magazine Vogue

It is believed that any sentence can be changed into Dogespeak. For instance, Shakespeare's *Romeo and Juliet* was translated into Dogespeak by Reddit users [15]. They engaged in a collaborative narrative task. Users shared a common code with its own conventions and rules.

Memes are the outcome of collaborative work among Doge speakers. According to Jenkins, culture is collectively created by the users. Engagement guarantees fruitful collaboration and encourages users to alter media content in creative ways [16]. As Zappavigna notices, meme making is not a one person task but a multiperson cooperation [17]. Memes are shared and re-created by the community. Dogespeakers engage in fruitful collaboration, exchange their ideas or post comments on social networking sites, reddit.com among others.

Memes are applicable to any cultural idea. For instance, Delta Airlines has uploaded a meme on the Internet to promote its services.

Figure 3: Delta Airlines meme advertisement

Apart from advertisements, Doge memes appear on T-shirts as a sarcastic answer to some political decisions made all over the world. The below T-shirt (Figure 4) presents some cliché slogans used by politicians before elections.

Figure 4: Doge meme T-shirt

The above examples prove that Doge meme is applicable to a variety of situations, such as fashion industry or advertising. Doge meme making is collaborative work through which people comment on the world. This mutual exploration of Doge humour cements the doge community. It cannot be denied that Dogespeak has flooded the Internet and influenced private as well as public conversations. For instance, one of the politicians made use of Dogespeak to refer to his political rival: *Wow. Such Obamacare funding* [18]. In 2014, the creator of Flappy Bird, a phone game, withdrew it and gave rise to Flappy Doge game. The Dogecoin car is another example of doge influence on our daily life. In 2014, Reddit made a decision to sponsor Josh Wise, the driver, with Dogecoin. The above examples show how flexible and popular dogespeak is.

5. Conclusion

Dogespeak users manipulate English to their own advantage. They try to push language boundaries as far as possible to show their linguistic competence and impress the audience. Dogespeak community aims to play with language. As Cook states, this language play is a central feature of Doge speak. It distinguishes between users who are 'in' or 'out' [19].

It is argued that the Internet is hindering people's ability to think creatively [20]. Despite some criticism, analysis of Dogespeak proves that the Internet is a rich pool of everyday creativity. Dogeusers do not imitate other memes, but create something new, fresh and surprising.

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DETERMINING CORE COMPONENTS OF COMPUTER-SUPPORTED COLLABORATIVE LEARNING WITHIN EDUCATIONAL MANAGERIAL GAME CONTEXT

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Abstract: *The exploratory factor analysis has been used to determine which selected inner components of computer-supported collaborative learning (CSCL) should be considered as the core components. The research itself builds on three models of group learning, namely cooperative learning elements, the "Big Five" in the teamwork model and the theoretical framework of CSCL. The analysis of data collected from university students participating in a managerial group game suggests that future research in the field of CSCL should consider social identity, helping behavior, shared mental models, mutual performance monitoring and team orientation as the most important components of group learning activities.*

Keywords: *CSCL, group learning, models, learning components, factor analysis*

1. Introduction

This study is a report on searching for computer-supported collaborative learning (CSCL) core components within the context of an educational simulation group game. The *collaborative learning* is comprehended here – in accordance with [2, 7, 21, 30] – as a group learning activity where groupmates have to discuss, negotiate and coact on a group task whereby they learn from each other and become knowledge creators. Computer support in CSCL indicates afterwards that an important part of a group learning activity takes place in a virtual space using digital technologies. Concepts similar to collaborative learning such as *cooperative learning* or simply *group learning* are understood as synonyms in this study.

Not every group activity can be perceived as collaborative learning [16, 18]. But the sole existence of the group produces opportunities to form relationships between group members and establishes inner-group rules. It is therefore possible to identify series of group components which would have influence on promoting and, in consequence, on efficiency of collaborative learning. For example, in empirical studies where authors ask students which components of CSCL were the most challenging for them, the results point to clarity of objectives, teamwork, motivation of the group members, time management and accountability [19] or course structure, emotional support and communication medium [30].

For a comprehensive insight into the CSCL internal mechanism, however, it is essential to differentiate which of those components represent the core – e.g. are indispensable – and which of them are just subcomponents of the core components. From a set of core components it is therefore possible to build a model of CSCL, which should be a relevant base for future research in the field.

2. Known models of learning in a group

According to previously published work, there already exist some models of collaborative learning showing what to implement in order to obtain an effective group learning method. This section introduces models relevant for their own enquiry. Other models can be found for example in [1], [14], [23] or [27].

2.1 Key elements of cooperative learning

Probably the oldest and best known relevant model is a quintuple of cooperative learning *key elements* postulated by Johnson brothers [16, 17]:

1) *Positive interdependence* – by the words of authors: "the first requirement for an effectively structured cooperative lesson is that students believe that they 'sink or swim together'" [16]. The 'positive' expresses here an essence of collective outcome – a group mate succeeds if and only if other group members succeed. That is in contrast to competitive learning based on 'negative' interdependence where a student succeeds only if others fail. The concept of positive interdependence is appreciated by several researchers [11, 22, 23], but as it is noted in [7], it is not easy to achieve this relationship, particularly in an online learning environment.

2) *Individual accountability* – this key element arises when "performance of individual students is assessed, the results are given back to the individual and the group, and the student is held responsible by group mates for contributing his or her fair share to the group's success" [16]. [11] agree with the individual accountability principle as they claim that "is it also important for all individuals in the group to feel they are providing a unique and visible contribution to the group effort". Without individual accountability within the group there is a risk of social loafing – a phenomenon when a group member exerts less effort than others.

3) *Interpersonal and small-group skills* – builds on the premise that "We are not born instinctively knowing how to interact effectively with others. Interpersonal and small-group skills do not magically appear when they are needed" [16]. Interpersonal and small-group skills like ability to learn independently, good communication skills, ability to adapt to changing circumstances or critical thinking skills therefore have to be acquired. "Many of the

learners do not know that they do not know how to work collaboratively online" [32].

4) *Group processing* – consists of evaluating a group activity and giving appropriate feedback. Authors of the model declare that "effective group work is influenced by whether or not groups reflect on (i.e. process) how well they are functioning" [16]. Some feedback should come from the tutor, but the tenet of this component is on anticipation of reciprocal feedback between group members. Feedback can encompass both group member behaviors and work outcomes and can affect levels of cooperation, communication, motivation and even satisfaction with group learning [24].

5) *Promotive interaction* – is distinguished by sharing useful resources, helping behavior and mutual assistance. Equally important here are elementary utterances such as complements, acknowledgements or encouragements from a colleague [14], which generate a friendly atmosphere within the group. Requirement for reciprocal helping and supportive behavior of group members is derived from Vygotsky's social-constructivistic concept of *zone of proximal development* in which "learners who receive help can perform an activity they would not be able to perform by themselves" [33]. Initially, the model of cooperative learning assumed that promotive interaction is an exclusive part of face-to-face communication, yet subsequently authors acknowledged that it is possible to convey them even through digital technologies [17].

2.2 Big Five in teamwork

As the work teams and the learning groups have many similar attributes, there is an obvious effort to adapt teamwork models to collaborative learning. Primarily suitable is the "Big Five in teamwork" model developed by Salas, Sims and Burke [28] under which the following components significantly influence the effectiveness of work teams:

1) *Team leadership* – is present in learning groups, albeit in a different form compared to the work teams. In [9] it is claimed that "effective learning in learning teams, especially in virtual learning teams, tends to benefit more from shared leadership than individual leadership". So the decision-making process in a learning group can be defined as a type of participatory process in which multiple individuals collectively analyze problems, consider and evaluate alternative courses of action and select the best solution [3]. Measuring the leadership grade of learning groups can be done using a concept of hypothesis-driven thinking developed in [1]. It is a group ability to consider all possible options by asking "What will we do if …" and make decisions on this basis.

2) *Mutual performance monitoring* – is defined as an "ability to develop common understandings of the team environment and apply appropriate task strategies to accurately monitor teammate performance" [28]. It is known that the more complex a task is, which means the greater the number of elements and the higher the degree of interactivity between those elements, the more important the mutual performance monitoring will be [9]. In essence, there are combined two group issues, namely common understanding of the collective work and awareness of the work of others. The evidence of the importance of these group issues can be found e.g. in [2] or [4].

3) *Backup behavior* – is a group ability to evaluate and flexibly react to events within the group.

4) *Adaptability* – is a group ability to identify changes and opportunities for innovation and subsequently optimize routines. It is possible to conclude from full description in [28] that *adaptability* together with former *backup behavior* are subcomponents of Group processing presented in the cooperative learning model.

5) *Team orientation* – compared to previous components it is an attitudinal issue of group members. It means "not only a preference for working with others but also a tendency to enhance individual performance through the coordination, evaluation, and utilization of task inputs from other members while performing group tasks" [28]. However, implications for collaborative learning are disputable as in [9] it is suggested that "it is a condition that is difficult to control in the educational context, since students usually have no say in team formation and/or choice of assignments, and is therefore not a variable that could/should be influenced".

Additionally to the previous components, the authors of the "Big Five" model introduced the following three "supporting and coordinating mechanisms" as the necessary pillars of the whole model:

1) *Shared mental models* – build on a common understanding and the awareness of team and task aspects essential for becoming effective as a team [9, 28]. In practice this means that learning teams are developing certain *group norms* which determine the expected behavior of group members. Thanks to the established norms, teammates should be able to better predict behavior of their colleagues and thus save time, profit from shared resources and avoid work duplication [8, 14].

2) *Closed-loop communication* – entails that "message was received and that the content and meaning was understood as intended" [9]. Closed-loop and the same time flexible communication is conditional for follow-up actions on which communicating counterparts agreed [25]. According to [6, 10] long delays between messages and unclosed conversations are common problematic issues in the online asynchronous communication tools such as a discussion forum or e-mail.

3) *Mutual trust* – is expected to be important for successful online interactions. As [15] summarize, trust between people allow them risk more, share knowledge, exchange resources and overcome embarrassment or threat. Despite – or maybe because of – Smith [29] argues that "trust represents one of the most critical issues facing online collaborative groups". The reason is that without mutual trust group members will expend time and energy inspecting each other and rather they will perceive behavior of others as disagreement, missed deadlines or similar damaging activity disrupting group integrity [28, 29].

2.3 Theoretical framework of learning in CSCL

The last model presented here is a theoretical framework designed by Kwon *et al*. [22], in which authors took into account some specifics of CSCL. Their framework is divided into two main parts – *group regulation* and *socio-emotional interaction*. The first part consists of many already mentioned components: group process, individual responsibility, positive interdependence, monitoring process, evaluating strategies and outcomes and high interactivity among members (similar to closed-loop communication). In addition, there are two new ones:

1) *Identifying goals and tasks* – this component declares that without common group objectives accepted by all group members it is not possible to effectively collaborate on a task. "A clear identification of the goals and the responsibilities of each member will result in elaborating an adequate working methodology, good planning and timing, and a fair and viable assignment and distribution of the constituent tasks to be performed" [6]. Empirical evidence of the importance of common group objectives can be found in [5] or [19].

2) *Time management* – is considered to be a mandatory skill of every CSCL participant. "The learner must work to develop new time management strategies so that they do not miss important interactions or fall behind with activities and assignments" [12]. Time management as the most important factor influencing group learning was recognized for example in [19] or [31].

Finally, there is *socio-emotional interaction* as the second part of the model. As authors liken: "If the group regulation is fuel of an engine, the socio-emotional interaction is the motor oil that lubricates movement of members and protects them from friction" [22]. Socio-emotional interactions are even more important in CSCL setting, as theirs appearances are limited and therefore they are not naturally granted [21].

3. Research aim and methodology

The objective of this research is to cross-check 13 selected components of CSCL and identify which of them are the most important and should be labeled as *core components*. On input, there were almost all components from models presented in the previous section: *interpersonal and small-group skills*, *group processing* (including backup behavior and adaptability), *positive interdependence*, *mutual trust*, *individual responsibility*, *promotive interaction* (aka *helping behavior*), *team leadership*, *mutual performance monitoring*, *shared mental models (*aka *group norms*), *closed-loop communication*, *identifying goals*, *time management* and *socio-emotional interaction*. Only team orientation was not selected as Fransen *et al*. [9] argued that this component is not relevant for learning teams.

A semestral simulation managerial game 'Manahra', whose participants are students of economics at Masaryk University, was chosen as the testing environment. Groups of students represent management teams of car manufacturers and tackle a wide portfolio of tasks and duties requiring collaboration and communication through digital technologies. At the end of the semester all students were asked to complete a survey, which among other things investigated the presence of the selected components during the group learning activities. For every component four statements were prepared, such as: 'our group always carefully thought out our decisions', 'most group members managed their group obligations on time' or 'I would like to work with this group in the future'. Students responded on the scale *definitely agree – rather agree – rather disagree – definitely disagree – not sure*. A reductive search method of core components consists in the principle that uniform responses to different statements indicate equal dimension of issue (i.e. equal component). An exploratory factor analysis is used to ascertain this fact.

4. Findings

During autumn 2015, 168 students divided into 10 groups participated in the managerial game Manahra. The survey was completed by 56 students (6 leaders, 12 subgroup leaders and 38 ordinary members) from all groups. The grade distribution of respondents is similar to the grade distribution of all students. The low number of rows in the data matrix, however, has become a limiting factor for the analysis, which was confirmed by the reliability test of input data. Thus it was necessary to omit more than a half of statements from the input in order to carry out the factor analysis. In the end, it was possible to compile a set of 22 statements with very high inner reliability (Cronbach's $\alpha = .91$). Finally, the exploratory factor analysis (KMO = .687) reveals 5 components explaining 70.65% of values as seen in Table 1.

Tab. 1 Statements grouped by the factor analysis

Component #1 – Social identity
I would like to work with this group in the future.
I am proud I have been part of our group.
Component #2 – Helping behavior
Members of our group kept to themselves some important information that should be shared with others.
We were unable to complete group assignments without cooperation between the members of our group.
I provided all required resources to support other group members.
A friendly atmosphere prevailed in our group.
Component #3 – Shared mental models
We were able to sort out all personal conflicts and disagreements.
The norm of our group was that one helps others with group assignments.
We have set a way to deal with differences of opinion within the group.
Component #4 – Mutual performance monitoring
We were able to take advantage of unique skills and abilities of each group member for better group results.
Our group always carefully thought out our decisions.
My group members depend on me for information and advice.
When my group members succeed in their jobs, it works out positively for me.
We regularly take time to inform others about our work progress.
Component #5 – Team orientation
In our group we can rely on each other to get the job done.
For our group it would be a big loss if one of us was moved and we continued to work without them.
For certain actions within the common assignment, a sufficiently capable person missed in our group.
I think that all group members felt responsibility for accomplishing the group task.
I think that we have set acceptable deadlines for completing the task.
Most group members managed their group obligations on time.
Discussion in our group was chaotic and disorganized.
In our group, we usually quickly agreed on what we needed to settle.

There is already empirical evidence that between selected components of CSCL exist strong relations (see for example [9], [14] or [26]. Therefore, it was expected that the factor analysis would combine some of input components together, e.g. there would be no difference between them from the statistical point of view. In reality, however, the factor analysis rearranged the measured statements into new units. It is therefore necessary to inductively derive the meaning of final components from the advice of newly grouped statements. The principle of factor analysis suggests that every final component should expresses one specific issue of collaborative learning within the context of an educational simulation game.

The first final component indicates the level of a student's identification with his or her group, which means a certain subset of a component initially considered to be labeled as 'socio-emotional interaction'. This partial result suggests assumption that social interactions promoting 'sense of community' are the most prominent within learning groups. This is in accordance with the theoretical concept of *social identity*, which is based on an individual's knowledge that he or she belongs to a certain social group and that it means certain consequences [15, 26]. The impact of this social identity component could be crucial, because the direct effect of an identification process is the acceptance of group rules and norms [13]. Additionally, according to a model described in [27] social identity influences group cohesion, group norms of collaboration, social accountability of group members and the overall level of cooperation between group members.

The second final component confirms the significance of *helping behavior* and *promotive interaction* that lead to a friendly group atmosphere. The third final component then fits into the concept of *shared mental models*. Is it because statements within this final component display awareness of important group aspects and existence of rules according to which group members behave. It is also in accordance with a two-dimensional model in [14] explaining why learners are willing to join a CSCL process – the explanation is that it is norms of collaboration and task conflict that are crucial for effective group learning. The meaning of the fourth final component is quite obviously the *mutual performance monitoring.*

The situation in the last final component is the most complicated as there are eight statements initially considered for six other CSCL components. Accountability, positive interdependence, mutual trust, time management, competencies as well as flexible communication are mixed here. What does it mean? Consistent attitudes to these statements told us that group members were reliable, responsible, competent, communicative and organized. Briefly, it is possible to say that they were disciplined toward group work. This approach is very close to the component of *team orientation* from the "Big Five" model. Authors declare that "team orientation is not only a preference for working with others but also a tendency to enhance individual performance through the coordination, evaluation, and utilization of task inputs from other members while performing group tasks" [28]. Although team orientation was not expected to be a subject of testing, the results of the factor analysis indicate that it is this component which should be considered as the one of the core components of computer-supported collaborative learning.

5. Conclusion

It is necessary to consider some limitations of this research such as the simulation game environment of learning groups or not such a high quantity of rows in the data matrix. The results, therefore, suggest existence of at least five distinctive core components of CSCL, which should not be omitted during research of long-lasting educational group activities with computer support. Namely they are *social identity*, *helping behavior*, *shared mental models*, *mutual performance monitoring* and *team orientation*. The social dimension is strongly represented here, as not only social identity but also helping behavior builds on emotional relationships between members. The outcome interpretation on the general level is that for an efficient learning group in CSCL settings students have to identify themselves with theirs group, set up and adhere group norms, prioritize work for group instead work on their own and monitor, support and help each other. Other input components such as positive interdependence, mutual trust, closed-loop communication, time management, etc. will probably be subcomponents with some relationship to these core components. This should be the topic of follow-up research with more accurate measuring.

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RELATIONSHIP BETWEEN PERSONALITY TRAITS AND RESILIENCE IN UNIVERSITY STUDENTS

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Abstract: *The objective of our research was to find out relationship between resilience and personality traits in university students. The sample consisted of 492 first year students of nine faculties of universities in Bratislava with various study focus (mean age = 19.98, SD = 1.57). We used the Child and Youth Resilience Measure CYRM-28 and the personality inventory NEO-FFI. We found moderate positive relationships between individual capacities and extraversion / conscientiousness. Extraversion also correlates with contextual factors. Agreeableness is positively correlated with relationship to caregiver and contextual factors. The relationship between neuroticism and individual capacities was negative and moderate. Extraversion, conscientiousness, neuroticism and agreeableness explain 38.2% of the variability of individual capacities. Predictors of relationship to caregiver were agreeableness, conscientiousness and openness to experience (R^2 = 0.194). The same proportion of the variability of contextual factors can be explained by the linear relationship with agreeableness, conscientiousness and extraversion.*

Keywords: *resilience, personality traits, Big5*

1 Introduction

The concepts of resilience enable us to explain individual differences between individuals in degree of effective coping with stress and acquisition of the balance in constantly changing living conditions. Resilience includes the ability to adapt to changed conditions as a result of the difficult life situations, trauma or experienced stress, but it is also the ability to adequately regulate experiencing emotions and to progress through adverse life events [1, 2]. In our paper we focus on resilience in the context of the personality traits in university students. Personality traits can be defined as general dimensions of personality and can be measured by their expression in behaviour, emotions and cognition [3]. For our research purpose we emanate from the traditional model of the Big5 containing five traits, i.e. neuroticism (emotional stability/lability, experiencing of negative emotions, psychological balance), extraversion (sociability, activity, optimism, or energy), openness to experience (interest in new experiences, adventures, and impressions), agreeableness (personal traits related to interpersonal behaviour, especially altruism) and conscientiousness (need of systematic planning, organizing and execution of tasks) [4, 5].

According to the findings of foreign authors resilient people are typically more sociable, emotional stable, and able to solve problems [6]. But findings are not uniform. Some authors have stated relationship of resilience with either all traits of the Big5 [7], or with some of them, such as extraversion, conscientiousness and neuroticism [8].

Based on these findings, we wanted to determine how resilience is linked with personality traits and therefore we formulated the following hypotheses and research questions:

H1: Resilience and extraversion are positively related [6, 7, 8].
H2: Resilience and conscientiousness are positively related [7, 8].
H3: Resilience and neuroticism are negatively related [6, 7, 8].
Q1: Are resilience and agreeableness related?
Q2: Are resilience and openness to experience related?

At empirical level we differentiate degrees of individual capacities, relationship to caregivers and contextual factors.

2 Methods

2.1 Research sample

Our research sample consisted of 492 university students from eight universities in Bratislava, Slovakia. Frequency and percentage of participants of each university (faculty) are stated in table 1. Age of participants ranged from 18 to 31 years (M = 19.98; SD = 1.57). Age of the men (M = 20.04, SD = 1.68) and the women (19.95, SD = 1.55) did not differ. The sample included 162 of male students (32.9%) and 330 of female students (67.1%).

Tab. 1 Division of participants according to the faculties

	Frequency	Percent
Faculty of Physical Education and Sports, CU	91	91
Faculty of Education, CU	46	46
Faculty of Arts, CU	147	147
Faculty of Management, CU	59	59
University of Economics	39	39
Faculty of Social and Economic Sciences, CU	14	14
Faculty of Psychology, PEU	50	50
Faculty of Architecture, SUT	46	46
Total	492	492

CU- Comenius University, PEU- Paneuropean University, SUT- Slovak University of Technology

2.2 Methods of data collection

2.2.1 Child and Youth Resilience Measure CYRM-28

Child and Youth Resilience Measure CYRM-28 [9] consider common as well as specific aspects of resilience across different cultures. 28 items are scored on a 5-point scale from 1 = "does not describe me at all" to 5 = "describes me a lot". Theoretical range varies from 28 to 140 points. Higher score indicates increased presence of resilience. Shortened 28- item version measures resilience in three dimensions [10]:

a) Individual capacities- three sub-dimensions (personal skills, peer support, social skills),
b) Relationship to caregiver with two sub-dimensions (physical and psychological caregiving),
c) Contextual factors- contribute to sense of belonging - with three sub-dimensions (spirituality, education, culture).

The dimensions significantly intercorrelate (r = .38 – .48) [11]. The questionnaire is internally consistent (α = .90 for the whole questionnaire, dimensions: α = .79 for individual capacities, α = .72 for relationship to caregiver, α = .86 for contextual factors [12]).

2.2.2 Personality inventory NEO-FFI

The personality inventory NEO-FFI consists of 60 items that are regularly distributed for each dimension that is neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The instrument uses a five-point Likert- type scale ranging from 0 = "strongly disagree" to 4 = "strongly agree". Theoretical range for each dimension varies from 0 to 48 points. Higher score indicates increased presence of personality trait [5].

The questionnaire is internally consistent (α = .76 for neuroticism, α = .75 for extraversion, α = .64 for openness to experience, α = .66 for agreeableness, α = .83 for conscientiousness [5]. Correlation coefficient describing stability over time by test-retest method are within the range r = .83 - .90 [5,13].

3 Results

3.1 Resilience

Among protective factors (e.g. participants expressed agreement with the item with the highest fifth degree on the scale) we include: ability to solve problems without using drugs and alcohol (75.9 %), family that supports participant in hard times (72.9%), parental control (60.2%), feeling of safety in the presence of family members (59.5%) and education (58.8%). On the other hand, 62.6 % of participants did not consider organized religious activities to be important and 34.2 % totally disagreed that spiritual belief is the source of their power.

The questionnaire is internally consistent (α = .847 for the whole questionnaire; for dimensions: α = .760 for individual capacities, α = .810 for relationship to caregiver and α = .693 for contextual factors). Descriptive statistics are displayed in table 2.

Tab. 2 Descriptive statistics of the CYRM-28 in the research sample

	Individual capacities	*Relationships with primary caregivers*	*Contextual factors*
N	463	469	473
Mean	43.95	27.64	33.99
SEM	.25	.23	.27
Median	45.00	29.00	33.00
Mode	48.00	30.00	31.00
SD	5.42	5.00	5.84
Minimum	20.00	9.00	18.00
Maximum	55.00	35.00	49.00
Percentiles 25.	41.00	25.00	30.00
50.	45.00	29.00	33.00
75.	48.00	31.00	38.00

3.2 Personality traits

Based on frequency analysis of answers to each item we concluded the most intense of expressions of personality in our research: determination to overcome given work (70.3%), attempt to be reliable in doing one´s duties (79.5%), friendly (85.7%) or considerate to other people (81.6%), desire for knowledge (73.3%), experience of zeal during book reading or admiring art pieces (64%). Participants were very keen to talk to other people and they were easily to make them laughing (75.1%). At the same time, they did not consider themselves to be very joyful (77.3%). 40.3% of participants got angry because of the way people handle them.

Tab. 3 Descriptive statistics of the NEO-FFI in the research sample

	O	*C*	*E*	*A*	*N*
N	478	483	480	475	482
Mean	29.89	31.55	30.11	30.19	21.00
SEM	.34	.35	.32	.30	.36
Median	30.00	32.00	30.00	31.00	20.0
Mode	28.00	33.00	33.00	31.00	20.0
SD	7.45	7.65	7.08	6.64	7.87
Minimum	10.00	10.00	8.00	6.00	2.00
Maximum	47.00	48.00	47.00	45.00	44.00
Percentiles 25.	24.00	26.00	26.00	27.00	15.75
50.	30.00	32.00	30.00	31.00	20.00
75.	36.00	37.00	35.00	35.00	26.00

O – openness to experience, C – conscientiousness, E – extraversion, A – agreeableness, N – neuroticism

We computed five summary indices: neuroticism (α = .822), extraversion (α = .803), agreeableness (α = .778), openness to experience (α = .729) and conscientiousness (α = .853). In table 3 we display descriptive statistics of the NEO-FFI. The highest mean score was measured in conscientiousness (M = 31.55, SD = .35), the lowest in neuroticism (M = 21, SD = .36).

3.3 Relationship between resilience and personality traits

We found moderate positive relationships of individual capacities with extraversion (r = .487) and conscientiousness (r = .350). Extraversion also correlated with contextual factors (r = .308). Agreeableness is positively correlated with for relationship to caregiver (r = .314) and contextual factors (r = .323). Relationship between neuroticism and individual capacities was negative and moderate (r = -.429). Correlation coefficients of personality traits with resilience (dimensions and sub-dimensions) are stated in table 4.

Tab. 4 Correlation matrix between personal traits and resilience in the research sample

	O	*C*	*E*	*A*	*N*
1	-.003	**.350****	**.487****	.251**	**-.429****
2	-.156**	.279**	.193**	**.314****	-.153**
3	-.078	.195**	**.308****	**.323****	-.165**
4	-.045	.451**	**.510****	.180**	**-.412****
5	-.047	.033	**.317****	**.307****	-.266**
6	.081	**.297****	**.329****	.157**	**-.345****
7	-.168**	.197**	.088	.222**	-.206**
8	-.139**	.256**	.206**	**.319****	-.112*
9	-.076	.118**	.126**	.189**	-.023
10	.064	**.287****	.247**	.191**	-.202**
11	-.116*	.111*	.324**	.312**	-.173**

1 - Individual capacities, 2 - Relationships with primary caregivers, 3 - Contextual factors, 4 - Personal skills, 5 - Peer support, 6 - Social skills, 7 - Physical caregiving, 8 - Psychological caregiving, 9 – Spirituality, 10 – Education, 11 – Culture, O – openness to experience, C – conscientiousness, E – extraversion, A – agreeableness, N – neuroticism, * p < .05, ** p < .01

Further analysis concentrated on differences between groups of participants with high and low degree in each dimension of personality traits. We selected and focused on individual capacities together with extraversion, neuroticism and conscientiousness. Based on 25th, 50th and 75th percentile (table 3) we divided our participants into four categories. In table 5, 6 and 7 we display mean score of individual capacities in created categories. Differences in degree of individual capacities in the categories of extraversion (r_m = .443), neuroticism (r_m = .369) and conscientiousness (r_m = .324) were moderate. Difference in achieved scores between categories of most and least extraverted participants was 6.31 points, between most and least conscientious participants was 5.47 points, between most and least neurotic participants was 4.74 points.

Thanks to regress analysis we further analysed predictors of individual resilience in terms of personality traits. Extraversion, conscientiousness, neuroticism, and agreeableness explained 38.2% of variability of individual capacities ($F(1, 424) = 11.366$, $p < .001$, $R^2 = .382$; extraversion - $\beta = .324$, $t = 7.595$, $p < .001$; conscientiousness - $\beta = .240$, $t = 6.081$, $p < .001$; neuroticism - $\beta = -.233$, $t = -5.494$, $p < .001$; agreeableness - $\beta = .132$, $t = 3.371$, $p \leq .001$). Predictors of relationship to caregivers were agreeableness, conscientiousness and openness to experience ($F(1,431) = 34.509$, $p < .001$, $R^2 = .194$; agreeableness – $\beta = .296$, $t = 6.786$, $p < .001$; conscientiousness - $\beta = .252$, $t = 5.79$, $p < .001$; openness to experience - $\beta = -.157$, $t = -3.623$, $p < .001$). The same portion of the contextual factors (19.4%) could be explained by its linear relationship with agreeableness, extraversion and conscientiousness ($F(1,436) = 34.871$, $p < .001$, $R^2 = .194$; agreeableness – $\beta = .277$, $t = 6.301$, $p < .001$; extraversion - $\beta = .231$, $t = 5.212$, $p < .001$; conscientiousness - $\beta = .140$, $t = 3.206$, $p \leq .001$).

Tab. 5 Differences in the level of individual capacities between four categories of extraversion levels in the research sample

Extraversion	*Mean*	*N*	*Std. Deviation*
1 – very low	40.44	126	6.07
2 – low	43.47	102	4.48
3 – high	45.35	118	4.07
4 – very high	46.75	106	4.26
Total	43.89	452	5.46

r_m = .443

Tab. 6 Differences in the level of individual capacities between four categories of neuroticism levels in the research sample

Neuroticism	*Mean*	*N*	*Std. Deviation*
1 – very low	46.41	134	4.09
2 – low	44.04	96	4.42
3 – high	43.78	112	5.10
4 – very high	40.94	112	6.47
Total	43.91	454	5.45

r_m = .369

Tab. 7 Differences in the level of individual capacities between four categories of conscientiousness levels in the research sample

Conscientiousness	*Mean*	*N*	*Std. Deviation*
1 – very low	41.25	119	6.03
2 – low	44.07	115	4.70
3 – high	44.63	107	4.45
4 – very high	45.99	114	5.08
Total	43.95	455	5.40

r_m = .324

4 Discussion

The objective of the research was to empirically verify assumption about relationship between resilience and selected personality traits depicted in the Big5. According to our results, individual capacities are in relation to extraversion, conscientiousness and neuroticism (H1, H2, H3). Low degree of neuroticism that is in relation to high degree of resilience indicates emotional stability, ability to postpone satisfaction and to resist temptation. Control of impulses and emotions helps in demanding stressful situations to remain calm and to choose appropriate copying strategy. High degree of extraversion, on the other hand, implicates interest in people and events, communicativeness, sociability and assertivity. Creating of big social webs is a source of social support and of many protective factors in demanding situations. In our research, extraversion also correlated with dimension contextual

factors as well as with its sub-dimensions (spirituality, education, culture). According to our findings, higher degree of resilience is moreover in relation to conscientiousness that is defined as needs for organization, planning and reliability. Agreeableness as a particularly important characteristic, mainly in social interaction, is associated with relationship to caregiver and contextual factors, but not with individual capacities (O1). Openness to experience was associated only with the degree of relationship to caregiver (O2).

Our conclusions are consistent with the findings of the American study [8], according to which resilience is in positive relationship with conscientiousness and extraversion and in negative relationship with neuroticism. According to the authors, relationship between resilience and extraversion reflects high level of social activity and ability to form close interpersonal relationships in resilient individuals. Furthermore, conscientiousness suggests active problem solving and task oriented coping. Other available foreign studies have also found positive correlation with conscientiousness, openness to experience and extraversion and negative relationship with neuroticism [14].

Fayombo [7] found positive relationships between resilience and extraversion, openness to experience, agreeableness and conscientiousness. Neuroticism negatively correlated with resilience. Personality traits explained 32% of the variability of resilience. The best predictor of resilience was conscientiousness, followed by agreeableness, neuroticism and openness. Extraversion in this research was not a significant predictor of resilience. The author explains that the extraverts are focused more on the outside world, not the internal sources of coping. These conclusions are not consistent with our finding, namely extraversion, conscientiousness, neuroticism and agreeableness are predictors of individual resilience. The difference in measured ratio of variability was not big (38% vs. 32%).

The results of our research indicate the relationship between personality traits and resilience. We agree with Zhang [15] who empirically supported that personality, or personality traits stated by Big5, are predictors. In further research we would like to continue exploring relationship between resilience and personality, but especially in terms of character and temperament.

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APPROXIMATE NUMBER SYSTEM IN CHILDREN

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Abstract: *Approximate number system (ANS) is used by people (as well as other species) when estimating approximate numerical quantity, magnitude difference of two or more numerical quantities or distance between two objects. We focus our research on description of ANS neural correlates in preschool children. According to our data, we found that it is the participants' ability to visually perceive individual elements within a numerical quantity as total surface area that plays an important part in successful cognitive tasks solving and not numerical competence as such. Our aim is the ANS revision and reformulation as well as redefinition of how to use this system in math education. In present pilot study, we focus on applicability of our cognitive task among preschool children. Our acquired results are limited by low number of participants. However we found relationship between beta band activity in intraparietal sulcus and task difficulty level.*

Keywords: *approximate number system, numerical cognition, EEG, mathematics, arithmetic*

1. Introduction

In literature, experts' interest in understanding neural correlates of mathematical competence is not new. On the contrary, there are studies about connections between pathological damage to neural system and its effects on mathematical functions dating back to the beginning of 20th century. In 1908, Lewandowsky and Stadelman published the very first report about mathematical functions impairment due to brain damage. About two decades later, Henschen (1920) coined the term "acalculia" to describe decrease in cognitive numerical capacity as a result of brain damage. At the beginning of the new century, Dehaene (2011) located general mathematical competence into a brain region situated behind intraparietal sulcus - into parietal lobe. To be more precise, this is the centre of mathematical competences known as arithmetics and with which we came across at elementary school by learning addition, substraction, multiplication and division.

Further ANS characteristic is often described as imprecise internal representation of number (Gallistel & Gelman, 2000; Feigenson et al., 2004) which is not dependent on verbal ability or symbolic math (Xu, Spelke, 2000; Gordon, 2004; McCrink, Wynn, 2007; Spaepen et al., 2011). There are reports (Feigenson et al., 2004; Halberda, Mazzocco, & Feigenson, 2008; Gilmore, McCarthy, & Spelke, 2010; Mazzocco, Feigenson, & Halberda, 2011b; Piazza et al., 2010; DeWind & Brannon, 2012; Park, Brannon, 2014) proving it to be the key system forming the basics of mathematical competence in human adults. From neuroanatomical point of view ANS can be located in intraparietal sulcus (IPS) (Dehaene et al. 2003; Cohen Kadosh et al., 2008) surrounded by inferior (IPL) and superior (SPL) parietal lobe (Dehaene et al., 2003; Dehaene, 2011; Nieder, 2013). Our priority are results from many studies (e.g., Isaacs et al., 2001; Rotzer et al., 2008; Rykhlevskaia et al., 2009; Mussolin et al., 2010) saying that both structure and neural activity in this location reflect interindividual difference in mathematical competence. Simply speaking, the quantity and quality of neural connections in this location positively correlates with the level of mathematical competence. Our long-term hypothesis consists of verifying the usage of the IPS location stimulation via ANS tasks in order to improve general mathematical competence. In our current research, we focus on the description of ANS function in preschool children. We are trying both to eliminate the potential influence of math education on the strategy the participants use to estimate the approximate numerical quantity magnitude and to respond to the fact that there is no sufficient amount of information whether ANS is regulated by ontogenetic specifications.

1.1 ANS description and functions

The first ANS component called approximate arithmetic can be easily observed when estimating numerical quantity with more than four individual elements. This can be illustrated when a black dot array briefly appears on a computer screen (see Fig. 1) and disappears in an instant. If there was another array a moment later and we asked our participant to estimate their sum, we would be using the approximate arithmetic function.

The second component is the ANS sensitivity towards numerical distance scale, sometimes also called approximate number comparison. Numerical distance is here understood as absolute difference between two contrasting quantities. For example median reaction time is shorter and accuracy higher when participants are asked to estimate which is more in a quantity of 12 white dots compared to 3 black (see Fig. 2) than in a quantity of 6 white and 3 black dots (Haist et al., 2015). According to certain authors (Halberda, Mazzocco, & Feigenson, 2008; DeWind & Brannon, 2012; Roitman et al., 2012) estimation accuracy and median reaction time while using ANS adheres to Weber's law (in Plháková, 2007), saying that the intensity of sensual perception is logarithmically contingent on the intensity of presented physical object. If the same task with black and white dots was used, Weber's law (ibidem) would demonstrate that the more significant

difference in number comparison the shorter reaction time and higher accuracy.

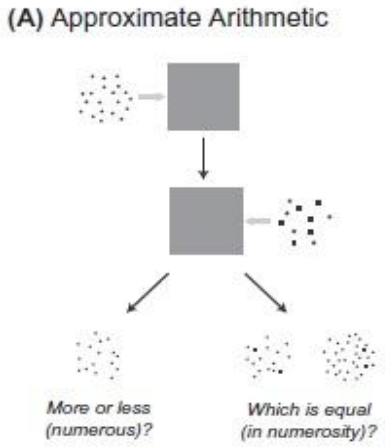

Figure 1: ANS tasks, approximate arithmetic[1]

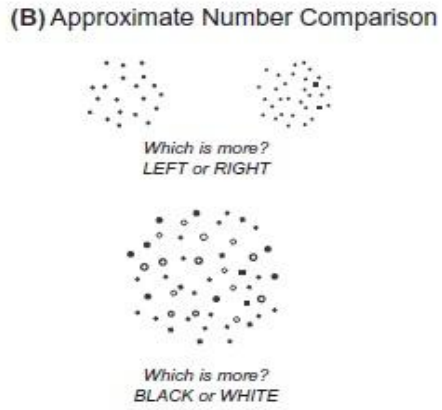

Figure 2: ANS tasks, approximate number comparison[1]

There are controverting authors (e.g., Sasanguie, Defever, Maertens, & Reynvoet, 2013; Sasanguie, Gobel, Moll, Smets, & Reynvoet, 2013; Tibber et al., 2013; Park a Brannon, 2014) arguing that for each study confirming logarithmical relationship (e.g., Gilmore, McCarthy, Spelke, 2010; Piazza et al., 2010, Mazzocco, Feigenson, & Halberda, 2011a; Mazzocco, Feigenson, & Halberda, 2011b; DeWind & Brannon, 2012; Halberda, Ly, Wilmer, Naiman, & Germine, 2012; Libertus, Odic, & Halberda, 2012) there is one controverting it (e.g., Holloway, Ansari, 2009; Inglis, Attridge, Batchelor, Gilmore, 2011; Gobel, Watson, Lervag, & Hulme, 2014). This leads to a sceptical attitude towards Weber's law application in ANS resulting in need of designing a reliable measurement for reaction time and accuracy evaluation. Summing up the essence of ANS functions, we can say that they are fundamental for simple arithmetic development. Without being able to mentally process the concept of "more" or "less" alongside with estimating numerical distance of two numbers, a schoolchild can neither learn how to add or substract nor to multiply or divide.

2 Methodology

Selecting correct methodology and detailed study of variables are currently essential for us due to their possible negative impact in ANS research. A variable such as total surface area of individual elements within a quantity is thought to be crucial with two quantities magnitude comparison. In their research, Negen and Sarnecka (2015) also warned about problems of understanding terms "more" and "less" in preschool children and also the influence of the size of individual elements (in their case dots) when estimating number. Children from 30 to 48 months of age tend to mark as more those quantities with bigger total surface area and not those with more individual elements. It then follows that children concentrated only on the size of total surface area the dots occupy. This has arisen a question if the formulations are correct and comprehensible for children from linguistic point of view or if approximate number system is really a numerical or rather a visual spatial function. The reason is the fact that children unlike adults do not possess any acquired sophisticated strategies how to cope with this task. At the same time we follow Piaget's theory (1999) who claimed that a child's thinking is limited on visual representation (i.e. when children are shown two groups of 4 and 12 sweets, they are able to identify which group is bigger). However, they are not capable of more complex operations such as conservation or reversibility (if we take all 16 sweets and put them into a wide glass and then in front of the child we replace them into a narrow glass so that the surface is higher, they will then think there are more sweets in the narrow glass). By researching the ANS functions and specifics in children we could gain data about what scheme this system carries in the earliest ontogenetic stages. There is however need to thoroughly study all those variables likely to change results interpretation. In our current research, these problematic variables are being identified and studied.

2.1 Participants

Healthy, right-handed preschool children from 5.5 to 6 years of age participated in our research. Participants were recruited from kindergartens in České Budějovice region. In present pilot study we state results based on data acquired from 4 preschoolers.

2.2 Method

Participants are measured in two separate sessions. In the first session, we ask for children's anamnestic data from their parents and the children are then given the Stanford-Binet intelligence test. In the following session, children are measured while solving our designed cognitive tasks on a 64-channel EEG with active electrodes. The research task has been programmed in Presentation programme. The task form itself is based on Park and Brannon's research (2014). The form of their tasks is presented in a section above (Fig. 1 and 2). With certain modifications,

[1] Adopted in Park, J., Brannon, E., M.. (2014) Improving arithmetic performance with number sense training: An investigation of underlying mechanism. Cognition 133 (2014) 188–200).

this type of task can be found in other studies as well (e.g., Mazzocco, Feigenson, & Halberda, 2011a; Mazzocco, Feigenson, & Halberda, 2011b; DeWind & Brannon, 2012). For methodological reasons, we only use one quantity tasks with white and black dots (Fig. 2, lower part). We do so regarding two basic reasons. Firstly, we have already mentioned that preschoolers are incapable of more complex mental manipulations (e.g. number conservation) and therefore we believe the type of task in Fig. 1 is not suitable owing to its difficulty. The next reason is negative influence of the task's spatial architecture on EEG signal. For instance, if participants are shown two different quantities on a computer screen (white dots on the right and black dots on the left) and we want them to say which is more, they have to move their eyes from left to right (or else from right to left) to view both of the numerical quantities. Eye movements have negative influence on spatial architecture of the task on EEG signal that is in a form of noise (artifact) significantly devaluing the signal. Therefore we separate the screen with central cross and place the quantity into the centre. The particular form of our visual stimuli is illustrated in Fig. 3. It is a children's theme we designed to specifically meet our needs.

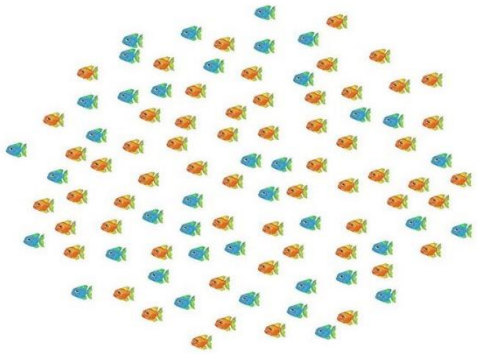

Figure 3: Log-difference 1.5

Research measuring is presented to participants as a children's game with submarine theme since we try to induce their interest and motivation for tasks solving. Children are presented the visual stimuli in a fast sequence (1500 ms for stimulus presentation) and we control precisely spatial stimuli variables such as size and density. For that reason, there is a constant overall number of fish (100 fish) with constant size. To apply the fish layout, Fibonacci grid is used. The fish differ only in colour (orange and blue). According to Park and Brannon's results (2014) we determined five basic log-difference difficulty levels with both colours (from log-difference 1.5 to 1.1), we are nevertheless currently testing less difficult versions (from log-difference 2.5) to provide high success rate and therefore to avoid random tips to misrepresent our measured results. It didn't pass unnoticed that with more difficult log-differences (1.3 and less) the success rate decreases and among some children it does not cross the limit of randomness (50%). Although above we have described ANS as approximate estimation, in these situations it is not certain that children are really using the ANS. The children's statements show that during more difficult log-differences, they were for example wondering which colour they have not answered for a while. Our task starts with basic log-difference (2.5) and after completing a set of ten tasks, the computer calculates the child's success and according to that it changes the task difficulty, i.e. with success rate > 60%, the difficulty is increased, with < 50%, it is decreased and if it is between 51 to 59%, it maintains the current difficulty. In Matlab programme we created a generator which creates randomised fish arrays. Despite the number of fish being constant, the generator commands the number of orange and blue fish to change continuously in accordance with selected difficulty and the fish layout to vary.

3. Results and discussion

In our pilot study, we defined several goals. The first was to confirm if we are able to provide quality EEG signal with minimum artifacts while measuring preschoolers. Secondly, we wondered if children are capable of solving our prepared research task and finally we were interested in the brain activity while solving the task. The EEG signal quality was comparable to adults. The average length of a session never exceeded one hour. The signal was monitored with a 24-bit 64-channel ActiveTwo amplifier with ActiView software and an electrode cap (Active Headcap). Afterwards, we processed the EEG data using extended functions of MNE library (Gramfort et al., 2013) for Python 3.5 programming language. During each data preprocessing, we manually removed all artifacts and found out there was an interpolation of 4 electrodes among two of our participants. Those were electrodes Oz, PO4, PO8 and 02. After that, we segmented the signal into epochs (t= 0 – 3 sec) without baseline and at the same time we referenced it into mean. Then we used spectral analysis across the epochs among all participants and obtained spectral scalp projections for each difficulty (log-difference) of the task. So far, only successful responses have been evaluated which leads us to the answer for the question how difficult these tasks for children are. The easy log (2.5 - 2.2) was solved by all children, however only two of them surpassed log 2.1. While interpreting the results, we have to consider it being a pilot study with a small amount of participants (n=4). Nevertheless, we came across differences in the activity of beta band based on the task log. In Fig. 4 we can observe spectral scalp projections in beta band activity for less difficult logs from 2.5 to 1.7.

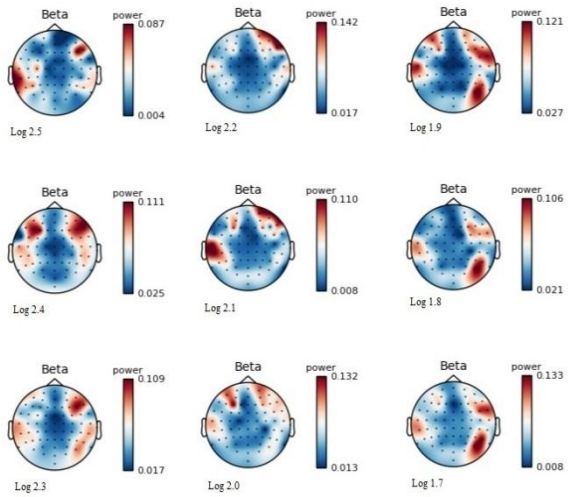

Figure 4: Spectral brain acitivity distribution on scalp for beta band. Analysed time window: 0 - 3000 ms. N(2) for log. 2.5; N (4) for log. 2.4 - 2.2; N(2) for log 2.1 - 1.7.

In Fig. 5 we can then observe spectral scalp projections in beta band activity for more difficult tasks with logs from 1.6 up to 1.1.

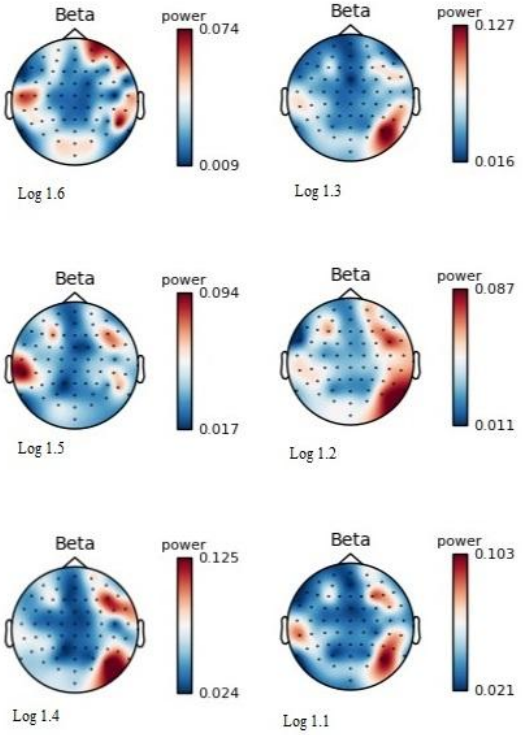

Figure 5: Spectral brain acitivity distribution on scalp for beta band. Analysed time window: 0 - 3000 ms. N(2) for log. 1.6 - 1.1.

We can notice brain activity increase located in the right intraparietal sulcus along with the task difficulty increase. However, due to low number of participants, we did not assess the significance of this feature. We also detected a lack of this activity with easy task logs (2.5 - 2.0). A possible explanation could be insufficient visual diversification of the task leaving the estimation too simple to employ the function of approximate number system. Furthermore, we can observe a significant activity in frontal lobes, especially in the location of frontal eye fields. It is the artifact of eye movements with a power up to 10 Hz which relates directly to the visual processing of our tasks.

4. Intended EEG signal analysis and expected results

After recruiting sufficient number of participants, we intend to compare evoked potentials of children with high task solving success rate to those with low success rate. We expect to find significant differences throughout the task solving, in the first 300 ms in particular, when the task is processed visually. This finding would support our hypothesis that while solving presented tasks, success depends on visual strategies. Another point is to compare EEG data with Stanford-Binet intelligence test results, those measuring mathematical competence in particular. We expect children administered as above average in a preschool mathematical knowledge test to be also successful with our task.

5. Future research

In the following measuring, we intend to change the size of fish so that with different number, they will occupy the same total surface area. Furthermore, we are interested in the potential influence of the stimulus colour (we will use stimuli with the same number of orange and blue fish). Last but not least is the intention to actively change the distance between fish and monitor if changes in spatial layout will influence successful estimation and reaction time length. For the future, we are considering a research focused on ANS functions training influence by using our designed tasks testing basic arithmetic competence.

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MIND MAP: METHODS, PROCEEDINGS AND CONCEPTS OF ASSESSMENT OF THE SOCIAL RISK OF FAMILIES

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Abstract: *The paper is financially supported by UK Grant UK/486/2016 "Assessment of the Social Risk of Families".This report is also supported by research project VEGA 1/0487/14 "Crucial concepts of selected systems theories for assessing social risk rate of families under the terms of child protection". This article presents partial results of research that is oriented on assessment of the social risk of families by the assessors at the department of social and legal protection of children and social guardianship and assessors from selected bodies accredited to carry out the measures of social and legal protection of children and social guardianship. The paper follows assessors' proceedings, methods and concepts when assessing family functioning. Analysis of qualitative research data is based upon phenomenological and hermeneutical scientific way of thinking and follows the intellectual line of ecosocial approach in social work. Part of the focus is dedicated to social constructs of the assessors' ideas that enter the assessing process together with assessor's subjective view of what they think they see in the family and what exists in reality and might be overlooked throughout the assessing process. Part of the paper is a constructed mind map representing categories of evaluating family functioning, which are of interest to the assessors. Abstracted categories were formed by inductive metaananalysis of qualitative research data and they constitute areas of family functioning saturated of indicators of assessment of the social risk of families which assessors notice on the ground.*

Keywords: *family assessment, mind map, ecosocial theory, social constructivism, phenomenology, hermeneutics*

1. Social construction of assessors' ideas about ordinary day of multiproblematic families

Looking at the institution of assessment of the social risk of families, social constructivism then seems very useful in the postmodern social work model. The idea that human knowledge does not originate from the direct contact of senses and things, but is rather in various ways conditioned by subjective categories and priorities, fill us with doubt of whether social work can maintain legitimity of execution of this social and legal protection of children and social guardianship measure [1]. Apart from ethical question of the mandate and assessors' competence for their assessment practice, we could attempt to question the basic thesis of social constructivism. It would, however, have the same significance like proving one generally valid truth about the nature of human experience and its interpretation done by several people. Admitting the existence of construction of the social world, where the important role belongs to language which not only depicts but also helps to create the world, helps us to acknowledge the manifold layeredness of social reality. Leaving the position of someone who is looking for the answers to difficult situations in life, invites one more to discovering hidden and often contradictory meanings. Constant questioning of what assessors think they see is realisable by gathering negative evidence in the investigation, which increases the trustworthiness of the findings. At the same time they offer assessor the distance from the things that are obvious and shift him to less familiar waters, to discovering things they should see and know, but that, for various reasons, stay hidden to them. [2] It is not the objective of this paper to identify social constructs entering the family with the assessor as a person, nevertheless it is important to reflect broader context that the assessment process is set in. This broader context is inevitably influenced by what the assessors think about the family, by what the agency expects they would find out and by the family's expectations towards the assessment and to what extent the family is trying to create an impression of what it would like to be and to discredit the impression of what the others think it is - a multiproblematic family.

2. Investigation in the family - parents'nightmare?

The agenda of assessment of the social risk a family is an intervention into the intimity of its members that the neoliberalism proponents would point out as illegitimate and interfering with human integrity and privacy by the state. The responisble ones for the agenda of assessment are the organs of social and legal protection of children and social guardianship. Featuring the records of dysfunctional families is undoubtedly stigmatising for the family. Strong interest of the assessors to gather evidence concerning its dysfuntionality. Since the assessment process is aimed at revealing hidden problems, sociopathological manifestations and, even worse so, the way it is conducted may give parents the impression that it is a purposeful taking of evidence that they are failing at taking care of their children. Family's harmed reputation is being saved by creating an impression of higer social status which family demonstrates by branded clothes for children, purchasing expensive and low nutrition value food, unaffordable goods and services.[3] Family is sinking deeper into economical problems and fails to notice that economical conditions and social status are not a reason for placing a child into the foster care. [4] Social construction of derivates of assessment process in the society is nailed up by the media and their informing on the details of "warning examples of bad practice". Let us

imagine an entirely different situation, what the assessment process might look like, if social and legal protection of children and social guardianship kept records of exceptionally talented and extraordinarily intelligent children that the society and the state sees as strategic wealth for the future. Families of such children would be considered the source of representation of positive elements and creating space for the maximal possible development of child's potential in their creativity and intellect. The state would support financially purchasing objects for the child's talent's development and enable parents to decide about child's institutional education and financial participation. A fiction? The change of perspective in social constructivism is desirable and does not impose limits onto people, in social constructivism barriers are looked upon as something that the society produced and something that is not definitive, and even less so immutable. Quite the opposite - the elements of social reality are reconstructed in everyday life and put facts in the new light.

3. Methods, proceedings and objectives of conducted research

The aim of the qualitative research was to find out what the assessors consider to be the family at the social risk, how they assess the risk of families and family environment, what signs are in their opinion the indicators of the increased risk of families, what they notice throughout the process and what ways they use to find it out. Questions were oriented on social risk rate of families and the extent of subjectivity of the factors which enter the assessing process. Investigation in the family in Slovakia is carried out without using assessment methodics, standardised tools and often the degree of objectivity can be increased by the presence of multiple assessors during the first investigation in the family. It is therefore disputable, to what extent the selection of fields of family functioning and the degree of estimation of dysfunction in the family depend solely on the subjective view of assessor, their personal and professional experience, sensitivity to the differences in families, estimation of the risk and possible threats to the needs and interests of underage children in multiproblematic families, the norms that the society requires from families, constructions of what is the current preference in the society concerning the institution of family etc. All this contributes to WHAT and WHY the assessors notice and subsequently, how they interprete it. [5] Qualitative research was carried out using the method of semi-structured interviews with assessors at the department of social and legal protection of children and social guardianship and the assessors of accredited subjects, who in accordance with the Act No. 305/Coll. on Social and Legal Protection of Children and on Changing and Amending of other Acts, as amended, carry out the measures of the department of social and legal protection of children and social guardianship.

4. Analysis of the research data in the spirit of hermeneutical and fenomenological tradition

The hereby presented paper constitutes a mind map representing categories of evaluating family functioning, which are of interest to the assessors. Abstracted categories were formed by inductive metaanalysus of qualitative research data and they constitute areas of family functioning saturated of indicators of assessment of the social risk of families which assessors notice on the ground.

In the hereby presented article, indicators of assessment of the social risk rate of families are formulated and interpreted on the foundation of hermeneutical circle, which starts with analysis of acquired data in the qualitative research and subsequent formulation of the risky areas of family functioning. Hermeneutical circle is being closed by returning repeatedly to primary data of the qualitative research, which constitute the background for more detailed analysis of the indicators of assessment of the social risk rate of families and creation of the outputs of the method of anchored theory. Choosing hermeneutical and phenomenological intellectual tradition in factor analysis of selected assessment tools of the social risk of families is related to the effort to avoid reductionism when ustilising technical-rational assessment tools that do not take into account specific differences between families, geographical and multicultural aspects that are tied to the family members and enter with them each and every area of assessing any particular risky manifestation. Entering the process of assessing the social risk of families is the intuitive factor of the assessor as a person and the social construction of the assessment process itself, which is then repeatedly constructed by the subjects of interaction. The aspect of subjectivity is impossible to exclude from the assessing process. In the context of undesirable reductionism of the assessment tools to mechanistic implementation of the interpretations of observed objects of reality, dividing the object from observing the object is an undesirable process. The development of knowledge of the objects of reality in the spirit of phenomenology describes description as a process, in which deformation suffered by the examined object throughout the cognitive process can in no case be avoided. Assessor themself is a medium, whose interpretation of social reality already corresponds only to the reflection of the examined object that is being changed in the cognitive process. Determination of the extent of deformation of described objects of reality is not even measurable with regards to the phenomenological understanding of cognition in human consciousness. To make it possible we would have to get on the position outside consciousness, from which we could compare the object and its reflection in the mind of a person, in our case, of the assessor. [6]

5. Ecosocial approach in assessment of the social risk of families

Ecosocial theory is closely linked to hermeneutical line and works with the concept of lifecourse which distinguishes life stages and the corresponding tasks created as a product of society and are socially and

temporally conditioned. [7] Hermeneutical understanding of the reasons and conditions of emergence of social problems that families have to cope with, is directly linked with what the ecosocial approach calls Everyday or ordinary life. The theory of ordinariness and everydayness holds a pre-eminent position in social work and especially in assessing process. Thiersch builds on a premise that sufficient understanding of "everyday life" of multiproblematic families anticipates that social worker (assessor) disposes of the theory anchored in the hermeneutical problem grasping. [8] The potential of social constructivism in thus constructed concept of lifecourse and Everyday ordinary life is the individul bio-psycho- social and spiritual development of individual as well as family as an integrated system. It is important to understand it as an undetermined way of development realised in various environmental, cultural and historical periods. [9] In the context of the significance of environment in the ecosocial approach and the development of the concept of person in environment, social work was enriched by double perspective, when it is concurrently focused on a person and their environment which complements the specific situation. The requirement of searching for factors in environment, which contribute to maintaining and developing social problems, supports reformist paradigma of social work and it appeared in the 1960's together with the formation of radical and critical theories of social work. "*The environment is not forcefully "riveted" to the concept of the individual's lifecourse anymore, but it is becoming an interal part of the theory.*" [10]

Categories of assessing the social risk of families include:

- Category of parents' psycholpathology, readiness and maturity
- Category of parenting style
- Category of basic life necessities and basic childcare
- Category of sociopathological phenomenons in the family
- Category of acute crisis in the family, situational stress
- Category of youth delinquency
- Category of family history
- Category of shifted boundaries in the area of required behaviour standard, communication, securing the basic life conditions
- Category of shifting the responsibility on one's origins and solving the troubles outside the sources of family
- Category of emotivity and relationships
- Category of needs and the extent of child's imperilment
- Category of method of gathering family information
- Category of participating of the family in problem-solving
- Category of intentional obstacles while assessing the social risk rate of families
- Category of cooperation of subjects in the assessment
- Category of securing the objectivity of assessment
- Category of outward family orientation
- Category of communication
- Category of family structure, status, roles
- Category of conflict solving
- Category of economical income of families and the forms of gaining financial resources
- Category of differences in assessment with regards to intergeneration and multicultural differences, geografical factors and environmental factors

6. Category of parents' psycholpathology, readiness, maturity and parenting style

The listed categories are the working material for creating the mind map that the assessors intuitively follow throughout the work process. Hermeneutical circle is closed by fulfilling the categories by indicators of assessment the social risk of families. For elaboration we chose the first category from the list, and we added to it the evidence and sources that shift the boundaries to the referential scientific disciplines.

Table 1 Category of parents' psycholpathology, readiness, maturity and parenting style

Category	*Evidence*	*Source*
Parents' readiness and maturity parenting style	• Parents' age and the age difference between them • Character, personality, and social skills of the parent • Expectations concerning the birth of a child • Time spent with the child • Physical punsihments, rules, restrictions, humiliating, inadequate expectations • Distribution of power in the family • Parentification of the child • Health handicap of the parent • Socioeconomical status of the family	• Psychopathology of a personality • Psychology of a personality • Intellectual, mental, axiological integrity of a personality • Intuitive parenting • Parenting styles of parents • Socially unstimulating environment for raising a child • Understimulation of the child's development
Parents' criminal activities	• Character of the crimes • Divergence from social and legal norms of society • Acceptance of presence of criminal activities • Engaging underage children in criminal activities • Ability to judge the consequences of one's behaviour • Self-regulation and abity of remorse for the act persecuted/ non-revealed	• Penal Code • Forensic psychology • Anamnesis of committing criminal activities of adult persons
Domestic violence	• Neglect, abuse and maltreatment of the child • Physical, emotional and sexual child or other family member abuse • The extent of threat to	• Penal Code • Family policies • Criminal records • Character of criminal activities • Paediatrics • CAN syndrome

	the child and the ability to build protective factors • History of presence of domestic violence • Triggers and cyclic character of the course of domestic violence • Adopted behaviour models • Acute stressors resulting from the situation and social environment	• Timely intervention • Narcistic and borderline personality disorder • Child's resilience • Socially risky environment
Addiction of parent	• Drug/Non-drug addiction • Current phase of the disease • The extent of imperilment of child's needs and interests	• Development of sociopathological phenomenons linked to addiction • Plan of the disease relapse • Current knowledge from the field of medicine, neurology and brain neuroplasticity • Possibilities of sustitute cure

Our own source

7. Conclusions

Following the hermeneutical and ecosocial approach in social work it is important to view the categories as a social construction of assessors about ordinary days of multiproblematic families. In the sense of constructing the concept of a safe life, manageable by the clients themselves, in which no grave risks or threats dominate, the above-mentioned categories of assessment of the social risk of families present only one of many constructs. Standing out is the task of social work to reveal and explain hidden, not yet discovered possibilities that the healthy part of the society dispones of, burdened by the same problems that in another part cause emergence of grave sociopathological phenomenons. Respecting life, respect towards human and their ability to find both physical and non-physical sources even in seemingly insolvable situations. Inaccessibility of the sources necessary for everyday life, preventing people from developing their potential.

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JOSEPH ALOYS TICHATSCHECK – THE FIRST HELDENTENOR

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Abstract: *The contribution acquaints the readers with the specific male voice type of the "Heldentenor", which is characteristic of the interpretation of the German Romantic opera. Furthermore, the text introduces a personal profile of Joseph Aloys Tichatscheck, Czech singer and prominent European Heldentenor, emerging currently upon the basis of digitized national and international libraries and archives. It charts pinnacles of Tichatscheck's career and follows the world premieres of the Rienzi and Tannhäuser operas as well as his successes as a singer outside Bohemia. All these points have been achieved using historical, music-historical, historical-analytical, heuristic and comparison methods. The text is a fragment of a thesis in progress. The aim of the thesis is to use period sources to reconstruct Tichatscheck's character and process the data perceivable from the available correspondence and newspaper articles of the period press chronologically. The aim of the research is mainly achieving the existence of the first Czech source-based monography of the performer provided with an edition of the sources.*

Keywords: *Dresden, Heldentenor, Rienzi, Tannhäuser, Tichatscheck*

1. Heldentenor

The "Heldentenor" voice type was shaped in coexistence with the emerging opera drama of Richard Wagner. Wagner's idea of the hero concerned not only the expression of voice but also that of captivating appearance. His inspiration lay not only in Rossini's William Tell but also earlier works produced in German-speaking countries, especially Weber's Freischütz or Beethoven's Fidelio, in which an archetypal distinction of good and evil may be found. Continuing loosely in the course of these operas Wagner included multiple heroic parts in his works, which reflected voice endurance. The parts were often conceived for specific singer personages, which led to the development of the now-established voice type of Heldentenor. He of such type has the command of a rich tone, a strong tenor sound with unshakeable middle and lower registers and a baritone timbre. It is the typical and fixed voice type to perform German Romantic and Late Romantic opera and is evidence of the natural retreat of the bel canto due to aesthetic, yet mainly practical reasons. The performance is derived here from the type of the role and is therefore not just a singing part but also a philosophical mission which the performer is initiated into as well as is its further carrier. The singing part is not based on exposed outer tones, but it requires relentless ligamentous musculature and a sense for phrasing from the singer since the tessitura of the characters is high and their long solo passages are exhausting (e.g. Siegfried is a dramatic character only barely within human capabilities). The principal opera roles for the Heldentenor voice type are Rienzi (Rienzi), Tannhäuser (Tannhäuser), Lohengrin (Lohengrin), Tristan (Tristan and Isolde), Siegmund (The Valkyrie), Siegfried (Siegfried, Götterdämmerung), Herodes (Salome).

1.1 Wagner and Czech Singers

A long row of opera singers born within the area of the today's Czech Republic (formerly Austria-Hungaria, Protectorate of Bohemia and Moravia, etc.) played a significant role in the interpretation as well as promotion of Wagner's works. The world-class interpreters, the so-called "Wagnerians", or also the Wagner singers, originating from Bohemia, surely include Ema Destinnová, Ludmila Dvořáková, Eva Randová. Should this criterion be applied to the tenor voice type only, or more specifically to the Heldentenor type, at minimum a brief mention of Karel Burian and Leo Slezák must be made. Yet it appears, according to period sources, that it was Joseph Aloys Tichatscheck (also Tichatschek, Ticháček, Tichatschke, Tichatzek, etc.) who became one of the first, if not the first Heldentenor.

2. Joseph Aloys Tichatscheck

Joseph Aloys Tichatscheck (1807–1886), born as Josef Anton Ticháček, came from a small Bohemian village of Teplice nad Metují. His influence on music, however, exceeded greatly the borders of his homeland. He started his career as a singer in Vienna with the Italian pedagogue, Giuseppe Cicimara. Initially, he went to Vienna as a student of medicine but soon had his debut in the Theater am Kärntnertor (1833) and since 1838 worked already in the Dresden Opera. King Gustav in the Gustav III. or the Masquerade Ball, written by Daniel F. E. Auber was his first large part [1]. The singer performed in Dresden until 1872. His repertoire was very broad and varied in demands for technique. To illustrate the variety of the musical scope, almost unthinkable in today's musical world, he performed in operas of Beethoven (Fidelio), Bellini

(I Capuleti e i Montecchi, Norma, The Puritans), Donizetti (Don Sebastian, The Favourite), Meyerbeer (The Hugenots, Robert the Devil), Mozart (Idomeneus, The Magic Flute, Titus, Die Entführung aus dem Serail), Rossini (William Tell), Verdi (Ernani) or Weber (Der Freischütz, Euryanthe, Oberon).

2.1 Tichatscheck's Professional Career

As an active singing artist (1838-1863) he managed to perform in a total of 1445 opera performances of 34 different composers [3]. He was well-known and sought after especially thanks to his musicality, flawlessly mastered singing technique and the timbre which destined him to perform heroic roles. His broad activities in concerts covered a number of German towns (Leipzig, Berlin, Munich, Hamburg, Frankfurt, Magdeburg), but also certain European stages (London, Manchester, Stockholm, Prague, Moscow).

Figure 1: A photograph of Joseph Aloys Tichatscheck [2].

2.2 Hector Berlioz and Franz Liszt

Giacomo Meyerbeer, Daniel Auber or Hector Berlioz, who witnessed a performance of Rienzi in 1843, all passed judgements regarding the singer using only the greatest of terms. Berlioz addressed Tichatscheck's singing expression as follows: *"Tichatscheck is a tenor of a clear and moving voice, which gains in strength and spontaneity as the drama increases. His singing style is simple but tasteful."* Upon this impulse Berlioz also engaged Tichatscheck in his Requiem, namely for the part of Sanctus, where a tenor solo is included in the score. The correspondence provides the following: *"He is a perfect sight-reader and musician. At first glance and unanimously, free of hypocrisy and any pretence."* [4]. The singer was favoured also by Franz Liszt, who writes in a letter to Wagner: *"It is beyond doubt that Tichatscheck as an artist earns his praise."* [5].

3. Tichatscheck and Richard Wagner

It is one particular composer name that should be associated with Tichatscheck much more than the others, namely that of the German musical reformer Richard Wagner. Plentiful correspondence between the singer and the composer as well as other personages of the period musical life stands as proof of their mutual affection [6]. Apart from their lifelong friendship of both personages Wagner valued the singer highly, spoke of him with adequate respect not just because of his heroic voice and expression but also due to his exceptional musicality [7]. He also saw a devoted promoter of his works in him. *"He did not have to work hard before the rehearsals to learn the music by heart because he was so musical that he was able to sight-read even the most difficult of passages and thus the study of the role was done for him […]. When Tichatscheck had the chance to revise and repeat the given passage a few times during the rehearsals he engrafted it and then only saw to the ways of employing the art of singing and dramatic expression."* [8]. Not only was the singer admired by the composer, but also by the audience in Dresden and the period critique [9] and is understood until today to be the very first Heldentenor, or the singer of heroic appearance characterized by a physiologically invincible voice of baritone timbre.

3.1 Rienzi, der Letzte der Tribunen

On 20 November 1842 in Dresden Richard Wagner introduced his first large dramatic opera "Rienzi, der Letzte der Tribunen (Rienzi, the Last of the Tribunes). It is notable that Dresden was closely connected with his musical life. *"I decided for Dresden, because I knew there was the tenor, Tichatscheck, who was ideal for the main part."* [10]. Despite the fact that Rienzi does not belong to the most performed Wagner's drama and does not bear the features of the transformation of opera into "Gesamtkunstwerk" (Gesamtkunstwerk or "total work of art", which was the composer's long-term vision. The aim was to subordinate all musical and on-stage elements under one goal, namely musical drama with a strong and complex impact on the viewer. Wagner achieved such musical drama only a number of years later with the almost 16-hour-long tetralogy of the Ring of the Nibelung, first performed as a whole in Bayreuth on 13-17 August 1876), the opera had an unequivocally positive influence on the position of the until then neglected composer, opening Wagner's path to German stages. After all, Wagner's first works, The Fairies or The Ban on Love did not gather but the slightest success. On the other hand, the premiere of Rienzi had the opposite impact and Wagner was able to win the home audience's hearts thanks to the opera. A considerable part of the success of the five-act works inspired by the Grand Opera can be contributed to the performances of the soloists – the soprano, Wilhelmine Schröder-Devrient and the heroic tenor, Joseph Aloys Tichatscheck.

Figure 2: Tichatscheck as Rienzi in the Finale of the 3rd act of the homonymous opera (Hoftheater Dresden, 1842) [12]

3.2 Tichatscheck in Wagner's correspondence

Tichatscheck was, in a healthy way, an exhibitionist, and immersed into his parts deeply. He was of an entertaining, somewhat childish nature. This is the way Wagner expresses himself about Tichatscheck several times in his autobiography, *My Life.* It was Wagner's greatest struggle to obtain a worthy cast for his roles and their execution. Without any doubt it was Schröder-Devrient alongside with Tichatscheck who helped simplify his task. In 1842 Wagner had only mediocre forces at his disposal for everything save for the protagonists of the main parts. He writes in his letter to the painter Ernst Benedikt Kietz, dated 6 September, 1842: *"Tichatscheck – his voice is "tailored" – made for my Rienzi. Tichatscheck believes the role to be the best he has ever sung. We shall have a lavishly decorated armour, made of genuine nickel-plated silver, which will cost 400 thaler."* [13]. It can be determined from the contents of the letters dated from the time period of the premiere of "Rienzi, der Letzte der Tribunen" how important an event it was in Wagner's life. With unrelenting enthusiasm Wagner wrote 21 October 1842 about the performance of Rienzi in Dresden to his sister Cecilia and her husband, Eduard Avenarius, to Paris: *"It was literally a pandemic, a revolution in the whole town; I was asked to the stage four times to an endless applause. The people have assured me that the success of Meyerbeer's Hugenotes was nothing compared to Rienzi. Even on the third evening all seats were sold out. The performance was very successful – Tichatscheck – Devrient – all – all was perfect, a thing unheard of. Success! Success! The day has come…"* [14].

3.3 Tannhäuser and Lohengrin

Wagner remained sympathetic to Tichatscheck both as a friend and as a musician and during the course of his career as a singer Tichatscheck performed also in the premiere of Tannhäuser under the direction of the composer himself, 19 October 1845 in Dresden. As a matter of fact, the singer came to the role only gradually and the premiere did not attain much success, contrary to the case of Rienzi. The turning point came primarily in the second and third act, in which the singer suffered from a husky voice [15]. In fact, Wagner began rewriting the opera immediately after the premiere and simplified parts of the said acts. The revised version of Tannhäuser was published in 1860 (including certain changes in the final scene) and is generally known as the so-called "Dreseden" version. When staging the opera in modern times the so-called "Paris" version is sometimes used. It was presented in Vienna in 1875 for the first time but due to the date of its staging it bears the features of a different composition style of Wagner. Tichatscheck performed Tannhäuser fifty times in total during his career. He also engaged in the title role of Lohengrin, which he performed 19 times [16].

Figure 3: Tichatscheck as Tannhäuser [17]

4. Tichatscheck's Involvement and Legacy

It was already during the time when the singer was at the peak of his artistic skills, being well known and revered, that he constantly incorporated Wagner's oeuvre into his repertoire, including the initially less-favoured Tannhäuser [18]. The world premiere of Wagner's opera as well as the multitude of performances outside Dresden show that Tichatscheck was not just an average singer. He could be seen on stages in Berlin, Frankfurt, Prague, Magdeburg, Leipzig, Hamburg, Hannover, Mannheim or Riga in 1850-1862 [19]. In the times when the artist's career was at its highest the native of Teplice also sang often outside Germany, e.g. in Austria, England, Denmark and Sweden. In 1869 Tichatscheck concluded his career as an artist [20]. As Richard Wagner said himself, Tichatscheck was loyal to him all his life and strived to promote the composer's music. After having celebrated 40 years of working in the theatre he received a congratulory telegram from Wagner on 6 January 1870:

„Forty years of trusty singing,
humble winner of garlands,
timid as a quail – brisk as a whip – boldly go,
ye terror of tenors – I celebrate thee –
this is my Tichatscheck. [21]

Figure 4: A casting of Tichatscheck's portrait located in Dresden (Semperoper Dresden) [22]

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FACTOR ANALYSIS OF SELECTED TOOLS FOR ASSESSMENT OF THE SOCIAL RISK OF FAMILIES

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Abstract: *Tools for assessing the social risk of families are instrumental for assessors in understanding the context, processes, system structure and indicators for the assessment of such risks. This paper assists in the search for the possibilities and limits of selected assessment tools, the reasons for assessors' decisions to not use standardized tools and the factor analysis of indicators in the assessment of the social risk of families of the assessment tools as one of the methods used in the analysis of qualitative data of the conducted research. The paper is financially supported by UK Grant UK/486/2016. "Assessment of the Social Risk of Families".This report is also supported by research project VEGA 1/0487/14 "Crucial concepts of selected systems theories for assessing social risk rate of families under the terms of child protection". In phase I, the main objective of this research project has been to identify the key concepts of selected system theories which comprise the framework for the assessment of the social risk of families and subsequently to assess the extent of the concordance and difference of key terms in system theories in the process of assessing the social risk of families. This article presents partial results of research that was carried out by using semi-structured interviews with assessors at the department of social and legal protection of children and social guardianship as well as assessors from selected bodies accredited to do family social work. This paper focuses on selected assessment tools and the identification of assessed family areas and an analysis of the indicators for social risk assessment.*

Keywords: *social risk assessment, system theories, assessment tools, family, child*

1. Assessment of the Social Risk of Families

Assessing the social risk of families within the intentions of the social legal protection of children is oriented on acute risks faced by a child as a result of the socially risky functioning of the family system. The conceptual framework of this research is based on family system theories and clinical research related to the assessment of dysfunctional family systems. Many tools and the assessment scales based on them indicate the great interest of experts to conduct research on the assessment of the social risk of families and to formulate a new quality of understanding. Family diagnostics is difficult and methodologically different from the diagnostics of individuals, their personalities and their relationship to the social environment. Since individual diagnostics methods cannot be used for the family system, it is impossible to transfer them to family diagnostics. [1] The identification of assessment tools, their orientation on aspects of family functioning and the ability of assessors to become acquainted with the spectrum of socially risky factors could improve the quality of their decision-making strategies when assessing the extent of the risk for a child in relation to the assessment of the specific area of family functioning.

Many assessment instruments and scales for the assessment of the social risk of families evaluate acute social risks for individual family members which arise from dysfunctional family environments. This paper is oriented on meta-analysis based on the comparison of assessment tools with the aim to identify essential areas of family functioning and their relationship to the extent of their social risk.

We have selected the following assessment tools which constitute theoretical baselines for establishing indicators for the assessment of the risk of families: the McMaster model, the Beavers system model and the Olson circumplex model. All three models are oriented on the knowledge relevant to structural, dynamic, organization, cohesive qualities and relationship and communication processes in families. In order to identify the assessed areas of families we included the following assessment tools: The Darlington Family Assessment System (DFAS) and the North Carolina Family Assessment Scale (NCFAS). [2]

2. Reluctance of Assessors to Use Standardized Tools

One of the goals of this paper's is to describe the reasons for which assessors prefer to use their own judgment rather than assessment tools when evaluating the social risk of families and the extent of risks for children. (1) Assessment tools are not sufficiently sensitive for measuring family progress which takes place over time. The detection of the presence of social pathology in a family during the initial examination may not be sufficiently sensitive for measuring changes in the family system. (2) Assessment tools cover a wide range of factors from tangible evidence related to child neglect up to factors related to the internal qualities of the family system structure, the distribution of power, relationship aspects, self-respect, communication, parental skills and atmosphere. The use of intuitive procedures in assessment may be related to the more technical-rational nature of assessment tools which are oriented on internal processes taking place in the family rather than the social environment which may be the source or a crucial factor in

the persistence of the dysfunctional nature of the family environment. At first sight, the assessor the may not be able to identify the areas of family life that the specific tool evaluates and the extent to which there is an accord with the expectations of the agency concerning the outputs and objectives of the assessment process. (3) Assessment tools and the completion and evaluation of psychometric scales represent a time-consuming process which due to time constraints should be as prompt as possible. The quality of the assessment of the social risk of the family should not be at the expense of effectiveness, which however may not always be in compliance with the expectations of the agency and the work load of the assessors. (4) Most of the assessment tools were validated on an English-speaking Europoid sample. There are cross-cultural studies which confirm the reliability of certain assessment tools, but the multicultural aspects and geopolitical and social issues concerning the assessed families must still be taken into consideration. (5) The choice of assessment tool should be based on an evaluation of its possibilities and limits. Sometimes an assessment focuses on an evaluation of meeting of the child's needs, and threats to his/her interests, life and health; at other times, the focus is on riskiness of the social environment of the family, parental skills or the presence of socio-pathological phenomena. Certain assessment tools have been developed for trained assessors in a specific approach; they distinguish between ordinary assessors and experts from social assistance professions. Limitations may also arise during the methodologically correct use of tools with child-clients and clients with mental disabilities. (6) Assessment tools are not universally consistent; indeed they may even be of a contradictory nature in clarifying the indicators for the assessment of the social risk of a family, especially in terms of family adaptability and cohesion. (7) Most assessment tools of psychological discourse are based on the statistical analysis of risk factors arising from many case studies. The assessment of the social risks of a family should reflect the functioning of and ties to the social environment. Due to the multilayered nature of social reality, it is not always possible to design a standardized assessment tool. A similar situation can be found in the field of family theories where "the social reality in which social assistance professionals function is so complex that it is impossible to imagine one universally applicable scientific theory" [2] (8) Most assessment tools were created in a clinical research environment and do not provide the necessary guidelines and clinically relevant norms for their practical application. Furthermore, they do not always adequately and simultaneously underpin all aspects of family functioning. [3] (9) Assessment tools use self-reporting instruments and thus provide a unique view of the family life and a reliable method for evaluating measurable utterances and standpoints of individual family members. Self-reporting scales through which individual family members assess the functioning of the family system are a subjective method for establishing functional/dysfunctional nature of family environment; however they are not sufficient for evaluating the functional nature of the family system as a whole. The benefit of family theories based on system theories lies in the rejection of studies of isolated phenomena in therapy in favour of the study of the processes which take place among them. The variability of the responses of the family members and their perspective on the performance of family functions may be used to evaluate subjective satisfaction or to establish the extent of the risk which may vary from one family member to another. (10) It is difficult for assessors and researchers to establish a sufficient differentiation between assessment tools which should be able to distinguish between clinically functional and dysfunctional families

Absence of definition of functional and dysfunctional family functioning adds up to the lack of theoretical basis for assessing the social risk rate of the family system. Opinions of the assessors are divergent in terms of selection of dimensions of family functioning and key processes that should be included in the assessment process of families. If there was a consensus in these fields. (11) As for conditions of the assessment of the social risk of families in Slovak Republic, the assessment process is carried out by the social and legal protection of children and social guardianship department workers, who mostly attained education in the social work major. Based on the Maslow's hierarchy of needs, which symbolically demonstrates the succession of satisfying human needs ranging from the physiological through social, psychological, axiological needs to the need of developing one's self-actualisation potential, there comes up a disputable question of the assessors' competence in terms of practical skills, as well as theoretical knowledge. Education of social workers has been assuming transdisciplinary character in the last few years, as it integrates social and current scientific knowledge about the state of society and character of sociopathological phenomenons from the reference and bordering scientific disciplines. Prevailing, however, is the evident focus of the social workers' academic education on the area of sociology, economy and law, over the area of psychology. As an interdisciplinary scientific discipline researching social phenomenons, subjects and processes at the given time, social work affects the first two levels of the Maslow's hierarchy of needs.

3. Conceptual framework of the research

Theoretical outlets for the research are based on the systemic theories of family and clinical research concerning family therapy. Unlike classical approaches that are based on the clinical point of view of medicine when describing the client's symptoms, systemic theories bring entirely new terminology into the work with family. Family therapy pioneers started drawing from Bertalanffy's general system theory, cybernetics and communication theory, which we already focused on in the historical context of formation of systemic theories. [4] It is important to mention, however, that it wasn't always like that, and in the early phase of the development of systemic theories there was a visible effort to apply elements of the traditional psychodynamic therapy of the individual on the family. Family therapy pioneers were inspired by the work

"General system theory" by Karl Ludwig von Bertalanffy from the 1940's. [5] This distinguished biologist came with an idea of connecting the individual parts into the whole - an idea which transcended borders of the atomistic understanding of the world at the time and very quickly started penetrating other scientific disciplines as well. [6] From the work of the Austrian biologist Ludwig von Bertalanffy, family therapy adopted the term system, defined as "the interconnection of individual elements, mutual reciprocity and identifiable boundaries which form the complex, or the unity of the whole." [7] Authors Gjuričová and Kubička comment that, besides the term "system", family therapy adopted nothing else from the work of Bertalanffy. "Nevertheless, the term 'system' was very important, as it made it possible to focus on family and other superindividual systems as something equally real (or constructed in the same way) as the individual with their consciousness, unconsciousness, emotions..etc." [8] As for the systemic theories as we know them today, more beneficial than Bertalanffy's general system theory for their development was the science of conducting technical machines - cybernetics. Author Pecháčková writes that cybernetics was developed in the US approximately in 1940's following the impuls of the conferences focused on control and management of the automatised and living systems. The centre of attention of the therapists becomes the family - cybernetic system that overcame limits of causal thinking, the traps of which were being pointed out by Gregory Bateson in the last decade of his life, e.g. "the conviction of objectivity, ignoring the circularity of the system, belief in the possibility of one-sided control" [9]
In our research objectives we included mainly the assessment tools such as McMaster model, Beavers systems model and Olson's circumplex model among the selected models. All three models are to a various degree oriented on the knowledge relevant to structural, dynamic, organization, cohesive qualities and relationship and communication processes in families. On the representative level, selected assessment tools present systemic models, based on which it is possible to describe objects of reality. Using the precise shaping of the statistical analysis of the risk factors in families, the assessors are enabled to explain complicated phenomenons such as social and sociopathological phenomenons in the social, psychological and physical context. Psychometric tools found in the above-mentioned models of evaluating family functioning, are based on statistical analysis of the risk factors, coming from a great number of case studies, and they analyse level and quality of the processes and relationships in families. The benefit of the models of evaluating family functioning for the process of assessing families is visible in visualising indicators of assessing the social risk rates of family system. Models of evaluating family functioning are used as schemes when assessing various aspects of family functioning. These models, aimed at the functionality - dysfunctionality of family system, provide a strong terminological basis to the evaluation process and, according to T. Jacobs they present several functions: "descriptive, diagnostic, predictive and prescriptive." [10]

4. Methods, proceedings and objectives of conducted research

The aim of the research was (1) to identify and to describe indicators of assessment of the social risk of families in the context of systemic theories (2) to identify and to describe indicators of assessment of the social risk of families in the process of assessing (3) to assess the extent of the concordance and difference of the indicators of assessment of the social risk of families in the context of systemic theories indicators of assessment of the social risk of families in the process of assessing. In order to clarify the crucial theoretical concepts and indicators of assessment of the social risk of families in terms of social and legal protection of children, we compiled basic research questions to find out what the assessors find to be the family at the social risk, how they assess the risk of families and family environment, what signs are in their opinion the indicators of the increased risk of families, what they notice throughout the process and what ways they use to find it out. Other questions of the qualitative research that the respondents in the interview were asked, were aimed at clarifying the questions such as what proceedings, methods, tools and techniques do the assessors use for detection of the social risk of families, who they cooperate with, respectively, who else enters the assessment process and how they try to ensure the objectivity of the assessment process. Qualitative research was carried out using the method of semi-structured interviews with assessors at the department of social and legal protection of children and social guardianship and the assessors of accredited subjects, who in accordance with the Act No. 305/Coll. on Social and Legal Protection of Children and on Changing and Amending of other Acts, as amended, carry out the measures of the department of social and legal protection of children and social guardianship

5. Analysis of the research data in the spirit of hermeneutical and fenomenological tradition

In the hereby presented article, indicators of assessment of the social risk rate of families are formulated and interpreted on the foundation of hermeneutical circle, which is based on interpretation of acquired data in the qualitative research with assessors and is backwardly interlinked with formulation of the indicators of assessment of the social risk rate of families in the particular tools of assessment. Hermeneutical circle is being closed by returning repeatedly to primary data of the qualitative research, which constitute the background for more detailed analysis of the indicators of assessment of the social risk rate of families and creation of the outputs of the method of anchored theory. Holistic approach to the understanding of social risk rate of families in theory and in practice is the selected method for determining intersections and differences of these two levels and for formulation of redundant indicators of assessment. [11] Many tools of assessment originate in clinical environment and are oriented on the particular manifestations of sociopathlogical phenomenons in the family; risk factors on the side of parents as well as children and insufficient

environmental sources contributing to maintaining social problems are assessed. The paper is based on the philosophical tradition of hermeneutic exegesis and interpretation of qualitative data as a part of creative process. Choosing hermeneutical and phenomenological intellectual tradition in factor analysis of selected assessment tools of the social risk of families is related to the effort to avoid reductionism when ustilising technical-rational assessment tools that do not take into account specific differences between families, geographical and multicultural aspects that are tied to the family members and enter with them each and every area of assessing any particular risky manifestation. Entering the process of assessing the social risk of families is also the subjective and often highly intuitive factor of the assessor as a person, who, when interpreting the objects of reality, must be able to view its construction through the prism of the family in its historical, social and cultural context. The effort to exclude the aspect of subjectivity from the assessment process is not possible and, in the context of the undesirable reductionism of the assessment tools to mechanistic implementation of interpretations of the observed objects of reality, neither it is desirable. The development of knowledge of the objects of reality in the spirit of phenomenology describes description as a process, in which deformation suffered by the examined object throughout the cognitive process can in no case be avoided. Assessor themself is a medium, whose interpretation of social reality already corresponds only to the reflection of the examined object that is being changed in the cognitive process. Determination of the extent of deformation of described objects of reality is not even measurable with regards to the phenomenological understanding of cognition in human consciousness. To make it possible we would have to get on the position outside consciousness, from which we could compare the object and its reflection in the mind of a person, in our case, of the assessor. This paper assists in the search for the possibilities and limits of selected assessment tools, the reasons for assessors' decisions to not use standardized tools and the indispensable factor analysis as a method used in the analysis of qualitative data. [12]

6. Factor analysis of selected assessment tools

In order to simplify the comparation of indicators of assessment of the social risk of families in theory and in practice,we chose the method of reducing the qualitative data acquired from the semi-structured interviews with assessors by narrowing down the area of family functioning that should be evaluated in the assessment process. The dimensions of family functioning established in advance made it easier for us to search for terms and relevant sources of scholarly literature and research focused on assessment of the social risk of families. The table presents the dimensions of family functioning and their level of saturation of indicators of assessment of the social risk of families.

Indicators of the social risk rate of parents or persons, to whom the children are entrusted into custody, are assessed by:

- parent or caregiver's disciplinary practices for the children
- understanding of child development and emotional needs of children
- current habitability of housing and age-appropriate safety concerns in the home
- Patterns of social interaction
- Relationships within the family and with peers and others
- the nature of contact and involvement with others, the presence or absence of social support networks and relationships
- physical, intellectual and cognitive disabilities
- the degree of visibility of the children
- Problems in Access to Basic Necessities
- financial management skills of the caregivers,
- income, employment, adequate housing,
- The degree to which food and nutritional needs of the children are met.
- The degree to which personal hygiene needs are met Background and History of Caregivers, including the history of abuse and neglect
- domestic violence, alcohol and drug use
- Recurrent patterns of behaviors and response to stressors
- the stability and history of the current housing situation
- mental illness, physical health,
- An understanding of the parent/caregiver's physical health, including chronic or debilitating conditions that may impede caregiving
- An understanding of the parent or caregiver's mental or emotional health, including an understanding of any current or historical conditions and how this may impede caregiving
- domestic violence, substance abuse, disabilities

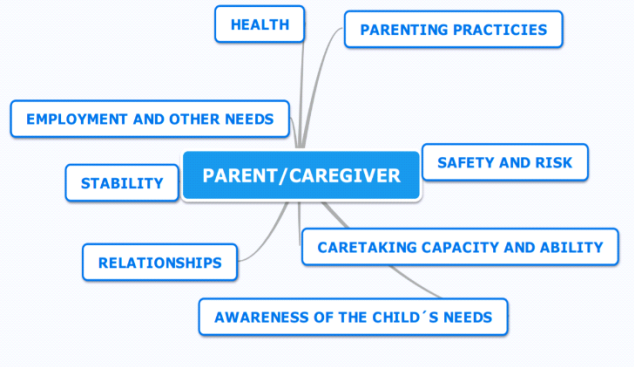

Figure 1: Assessing the social risk rate of parents
Source: comparation of assessment tools (DFAS a CFAS)

Factor analysis of indicators of assessment of the social risk rate of families on the side of parents is, from the point of view of phenomenological tradition, constituted

by theories and approaches aimed at the individual, such as psychodynamic theories, cognitive behavioural approaches, humanistic and existential theories focused on human. [13] Assessors' understanding of broader context of the history of acute risky manifestations in the parent's behaviour enables them to notice the extent of imperilment of the child and to keep the necessary distance in order to adopt an unbiased stand. Concepts related to the ambivalence and development of anxiety in people are, as seen from the perspective of pschodynamic theories, derivates of inadequate problem-solving in the early stages of the child's development. Reflection of social circumstances where the problematic behaviour has its roots, and the limited possibilities for the child to change them, enable the assessors to keep the distance from categorising law constructs identifying the agressor and the victim. We know from experience that agressor is often also a victim in their life, and vice versa. Parenting skills can be limited for various reasons, in terms of flexibility, adequacy and variability in relation to the concrete child. They reflect theoretical concepts of intuitive parenting, attachment, adolescence theory, high risk youth, condemned parent etc. Assessors realise that," *sometimes the parent themself is a peril. They will come and say they have ten children and the eldest one doesn't listen to them and is troublesome, steals and they will tell me - put him in an institution, I want to take care of the rest of the kids and this kid is a burden for me and I don't want to take care of him anymore. In my opinion that parent is the risk itself in the child's upbringing and their best development possible, in that pubescent age when they would need the maximum care and the parent fails in this.*" The dimension of assessing the category of parent's upbringing style is captured on another place in the testimony: "*Everyone has a different idea of what is normal. For some people it is normal to live in a messy house and for others it is normal that child must have stacks of clothes and what is good about having the stacks that the child really has to abide because the T-shirt is sticking out more, that is also a risk factor.*"

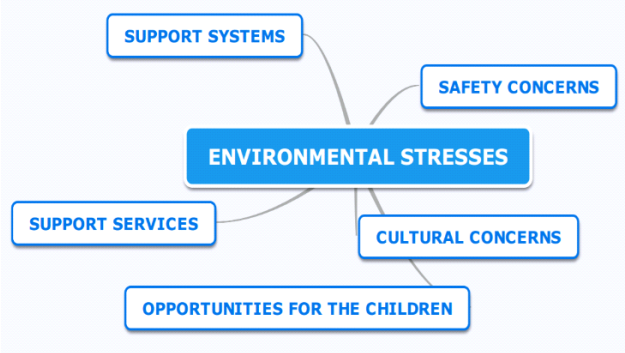

Figure 2: Assessing the social risk rate of the environment Source: comparation of assessment tools (DFAS a NCFAS)

- Strengths, needs, resources of the family and their support systems
- The developmental or enrichment opportunities for the children
- safety concerns within the community
- child care, transportation and needed services and supports, cultural concerns
- the presence or absence of social support networks and relationships

Factor analysis of indicators of assessment of the social risk of families based on the natural social environment of the family is of great interest to the assessors. Assessment methods, techniques and concepts reflect social-ecological, antioppressive, antidiscrimination, multicultural and ethnic aspects tied to the environment where the family lives, and the way in which it fulfills its functions. Theories of social and community development lead assessors to the reflection and assessing the level of development of specific localities, areas, regions, and possibilities available for the community members to achieve the corresponding life standard quality. Theories of social development are above all related to economical and social level reached by the given locality, to the access to healthcare, educational institutions, civic amenities, developed infrastructure, urbanistic sources etc. [14] Assessors operating in this field of social work performance have to take into account the transgenerational processes such as non-changing social conditions, poverty and social exclusion the population has to cope with. The reflection is captured in the testimony of an assessor, who focuses their attention on social conditions saying: "*.It's mainly the environment they live in. Now it has in fact been confirmed that we have groups of people here who live in bad living conditions. Those are pumps, but I would literally call it slums. So what is important for us are the localities, where those families reside.*" On another place the assessor reflects environmental factors of the environment risk rate that influence the opportunities for development of adults and children. "*Again it concerns a group of population, as targeted education does not exist. From our point of view it is a risk, but from theirs it is not. It is normal for them. For example when the child does not go to school, so what, they will still learn what they need. In that family they know very well they are not going anywhere. And they count on just going for social welfare benefits again, and again someone will they care of them. They know it.*" Passing on the model of behaviour in this case does not have to be assessed by the assessors as highly risky for the child by the neglect from the parents' side that is implicitly related to their parenting skills, strategies, practices etc. Social environment and human are constantly interacting and the environment with insufficient impulses does not stimulate one to adopt active approach towards their own life. Thus closes the vicious circle of transgenerational transmission of the environmental social risk factors. Assessors are aware of it in the form of long-term unemployment and unemployability of the family members. "*Similar phenomenon works in unemployment as well, there you have the third generation of people, where grandfather was unemployed, father is unemployed and the young one leaves the school and it never occurs to*

him that he should go to work somewhere because that's the behavioural model of that family" When assessing the social risk of environment where the family lives, seemingly the most visible impression is the one that the family presents outwards. Social risk factors then do not even result so much from reality as they do from the representation of the social risk rate of the environment, as constructed by external observer. Hermeneutical circle is closing in social interaction between the assessor and the family, where the family contributes to its own oppression. Assessors build on their own personal experience and their view of normality, that is a construct of the society they live in, they assume the social risk rate of the family in advance because of the environment the family lives in. "*We go to the family based on the monitorings we carry out regularly in the colonies in the families at risk. Now by the way we identified and visited all the apartments on Lunik IX. Our main goal was to observe things, with regards to the season of the year. For example, whether the children are at risk considering the season because of the cold, if they have enough clothes, if the family has got a stove or some other heating device respectively. Whether the family has got enough income, cash at disposal, two weeks after welfare benefits*" A certain shift of expectations of the assessors for the change of the exerted lifestyle is taking place on the conscious level. "*Concerning the socially excluded families we have to take into account that reality that those families are here, they live this way and it seems they will live this way in the next generations as well. So expecting some substantial changes in their life, in their goals and in their values would probably not be realistic.*" On another place assessors reflect that material conditions do not always play the prime role in assessment of the social risk of families. We evaluate the distance from postmodern construction of consumption and comercially set up lifestyle from tradition of phenomenology as attitudinal values that the assessors gained thanks to professional and ethical basis of helping professions: " *so we watch securing the meeting of those basic needs that have to be secured. We also focus on the feeling of safety, support, family functioning, of how they communicate, if that father really is for example willing to accompany his son to school in the morning because of truancy, if he takes the trouble and does it, or if he simply just states that he is a truant and what concern it is of his.* "

Indicators of the social risk rate of children:

- Absence/presence of physical abuse of the child(ren), or any history of such for the child and family
- Absence/presence of sexual abuse of the child(ren) or any history of such for the child and family
- Absence/presence of emotional abuse of the child(ren) or any history of such for the child and
- Family
- Absence/presence of neglect of child(ren) or any history of such for the child and family
- Absence/presence of domestic violence between
- Parents
- methods of discipline, patterns of supervision for the children

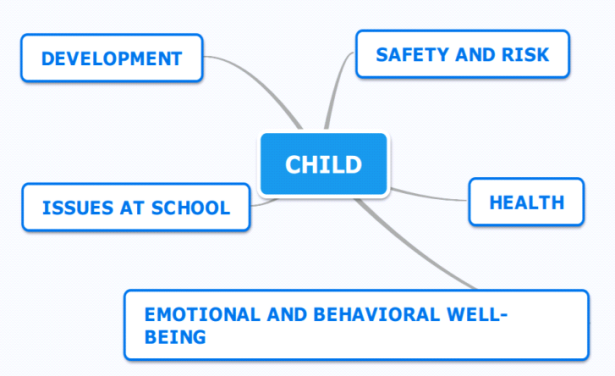

Figure 3: Assessing the social risk rate of the child Source: comparation of assessment tools (DFAS a NCFAS)

Factor analysis of indicators of assessment of the social risk of families on the side of children is, from the point of view of phenomenological tradition, constituted by the theories and approaches focused on the individual, such as psychodynamic theories, cognitive behavioural approaches, humanistic and existential theories focused on human. Psychodynamic perspectives and the recent shift in the possibilities of diagnostics of attachment bond offers relevant scientific explanation of hardhips the child endures in the case they are neglected, abused and maltreated. [15] Estimating the extent of imperilmet of the child is not simple at all and is in fact very challenging for the assessor. This is also confirmed by the testimony of an assessor from the department of social and legal protection of children and social guardianship. "*To see or to trace that potential of that family in the areas where it is hard to measure is not easy for us at all. Because you check the wardrobe and the finances, but if the mother had the risk that a child would be taken from her because she did not go to the doctor regularly, then we worked on making her realise her duties, even though she has those 7 - 8 children and is not always able to manage it, but also on the other side, to make the doctor realise that that mother really isn't doing ot on purpose that she doesn't go there. So that they are able to communicate together and for example this mother then tried to follow the scheduled appointments and if it was not possible, to send one of her sons to the doctor and let her know: 'Today I can't make it, the kid is here, the another one there, but I will come to the next session on Thursday for sure, OK?'* " To estimate the extent of the imperilment of the child is the most important task of the assessor. This is also clear to workers on the leading positions at the departments of social and legal protection of children and social guardianship when we observed the effort to create a clue that would draw the assessors' attention towards the potential aspects of the risk rate of families and their impact on the child, in our research answers: "*We worked on the standards, how to assess that risk rate from the point of view of the child because there can be various risks, but it does not necessarily have to have some heavy impact on the child.*"

7. Conclusions

The article presents partial results of research focused on the assessment of the social risk of families. It identifies assessment tools, analyses the distance of assessors from the standardised screening tools and creates the terminological constructions related to factor analysis of indicators of assessment of the social risk from the side of parents, environment and the child. It is based on hermeneutical and phenomenological tradition of scientific thinking in effort to avoid reductionism when using technical rational assessment tools and, at the same time, it assists in viewing family from the holistic point of view, as a unique subject disposing of actualisation potential for carrying out necessary changes.

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TO THE REFLECTION OF PERSONALITY WITOLD LUTOSŁAWSKI AND WARSAW AUTUMN FESTIVAL IN CONTEMPORARY PRESS BETWEEN THE YEARS 1976 – 1985

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Abstract: *This paper is based on my previous articles (ZIEGELBAUEROVÁ, Adéla. Pohledy na Varšavský podzim 1956 - 1976 v českém dobovém tisku. In Muzyka XXX: Sborník z mezinárodní konference v Rzeszowě, 2016. (v tisku); ZIEGELBAUEROVÁ, Adéla. Witold Lutosławski a Varšavský podzim v českém dobovém kontextu. In Horizonty umenia 3: Zborník Príspevkov z medzinárodnej vedeckej webovej konferencie. Banská Bystrica: Akadémia umení v Banskej Bystrici, 2015), which are focused on a reflection and reception of music composed by Witold Lutosławski and Warsaw Autumn festival in contemporary press. And thus also this paper is based on a reflection and reception of Witold Lutosławski and Warsaw Autumn in a contemporary journals, i. e. Czechoslovak Hudební rozhledy and Polish Ruch Muzyczny. These years, 1976 – 1985, were selected as they follow my previous research. The text is divided into four parts of which two main chapters reflect the festival and music and personality of Witold Lutosławski until 1980 and until 1985.*

Keywords: *Witold Lutosławski, Warsaw Autumn, Reflection, Reception, Music*

1. Introduction

Music composed by Witold Lutosławski, one of the most significant personalities of Polish music of 20th Century, includes new as well as traditional compositional tendencies. Between the years 1976 – 1985 Lutosławski developed his own compositional style mainly in the area of symphonic music. In this period, a new structural-compositional principle, consisting of several overlapping threads, inducing a feeling of chaining is evident in Lutosławski´s work. Among the most important works of this period can be found the composition Mi-Parti (1976) [1], Nouvelette (1978-1979) [2], Symphony no 3 (1981-1983) [3], Chain I (1983) [4], Chain II (1983 – 1985) [5], Chain III (1985-1986) [6].

Lutosławski had never belonged to any compositional school. As well as he had never submitted to any compositional trends, neither he did not insist on the traditional processes. In spite of this fact, it is possible to classify his work between avant-garde as well as the followers of the tradition.

2. Reflection in Press until 1980

As the music premieres themselves indicate and also the reports about Lutosławski´s music in music journals, it is possible to label his music as world famous. The popularity of Lutosławski´s music has increased also in the field of Czech concert scene. So the compositions such as for example *Livre pour orchestre* can be found also in the repertoire of e. g. Czech Philharmonic [7], in season 1976/1977 Lutosławski was performed in Brno [8] and within the framework of Bialystok Philharmonic concert in Polish cultural and information centre.

As sight of the Warsaw Autumn festival of the selected period, and especially of its reflection in contemporary press, we detect that in comparison with previous years (mainly with festival´s beginnings in the fifties) it did not caused such sparkling emotions and sensations. Both evaluations by Jaromír Havlík and Naďa Hrčková were more open and disposed to the positive acceptance of 'production' of Warsaw Autumn and so called New Music. On the pages of Ruch Muzyczny, Polish journalists devoted considerable space to the evaluation of each concert day. However, reviewers, in 1976, more positively evaluated the performance itself than the content of the festival. [9] Anna Skrzyńska added to the evaluation of the twentieth year of the festival: *„There has been less experimental works than in previous years, so the whole festival´s content could be marked by finding inspiration in the past.“* On the same topic Naďa Hrčková noted in the magazine Hudební rozhledy an interesting fact that while in the first decades of Warsaw Autumn festival listeners accepted with enthusiasm everything new, provoking, which it was often accompanied by a stormy debate and whistles, has now become a requirement of: *„compositional richness of the program and the multistratification of the composer´s testimony* (…)*“* [10] In the reviews by Skrzyńska and Hrčková, there is a consensus in assessing of the overall view on the festival and therefore there comes the regression the most modern and aggressive and progressive musical composition in favour of the compositions joined to traditional trends. After 15 years, the listeners could hear Lutosławski´s composition *Jeux Venitiens* again. According to Hrčková, despite the fact that the work was 15-year-old, the composition was: *„admirable, especially of the temperance which has just appeared in new pieces composed by contemporary composers. “*

The following festival's year (1977) Lutosławski conducted with Polish National Radio Symphony Orchestra his composition *Mi-Parti*, which most of Ruch Muzyczny´s reviewers commended. This work was, by reviewers, denoted as the composer´s best ever. According to T. Kaczynski, Witold Lutosławski again admirably responded to contemporary music events, which thrives in

avant-garde (and rather anti avant-garde). [11] Commendation to the festival´s year 1977 wrote also Jaromír Havlík. The Polish Composer´ Alliance, according to Havlík, compiled the programme of really representative works of modern music. [12]

The year 1978 reviewed Jan Vičar, according to which, this festival: *„already for twenty-second belonged to the most significant of its kind in the world, has influenced the post-war life of the Polish composers and it enjoyed good attendance for the whole time. "* [13] According to Vičar, really valuable music gets into the foreground of festival and represented entire spectrum of contemporary music. On the other hand, Krzysztof Droba noted in Ruch Muzyczny, that every single festival´s day and concert was so much different that it was not possible to evaluate the festival as a whole. However, in both articles, the reviewers agreed that the rate of the experiments presented on Warsaw Autumn was significantly reduced. Both reviewers in this step did not see a problem, on the contrary, they made a stand for the latest trends in contemporary music heading again to connection to the tradition were the right solution. Vičar added in the other article, that in the composition of the leading representatives of the most modern musical tendencies in Poland, there were a moderate the progressive means of expression in general. There has been same restrictions, in the seventies, in timbres and aleatory in favour of classical music elements – melody. [14]

Hudební rozhledy has brought, in 1979, report about the performance of Lutosławski´s composition *Livre pour orchestre* by Carlsbad Symphony Orchestra and there was also submitted an information about performing Lutosławski´s work during Prague Spring 1979. [15]

In this period, then the ideological-propagandistic view of Václav Felix to the music of the third festival of the contemporary music of the socialist countries in Kuba worked a little ridiculous. [16] He was the one who e.g. in the fifties to the compositions which were listed on Warsaw Autumn festival´s programme added, that the composers should not forget to direct their own work to the broadest popular masses. [17]

Irina Nikolska wrote on the topic of the performing Lutosławski´s composition in the USSR, in Ruch Muzyczny: *„Lutosławski´s work is for us the supreme manifestation of the rise of Polish contemporary music, which complimented in itself an authentic mastery, an artistic expressions and fullness and perfection of the form. "* [18] Although, according to Nikolska, the Moscow Philharmonic tried to do its the best, the ad libitum group playing was not such successful as in the case of playing Philharmonic in Warsaw.

A further Lutosławski´s music evaluation, in Ruch Muzyczny, added T. Kaczynski. He noted that nowhere else in the world the Lutosławski´s music was not such domestic as in London. So it is not surprising that every performing of Lutosławski´s compositions in The Proms had met with success and a great understanding. [19]

If we return to the Warsaw Autumn festival reflection, we will find a report, in Hudební rozhledy 1979, about relatively rich participation of the composers, the musicologists and the reviewers form the Czechoslovakia on festival. Vladimír Štefl added overall assessment of the festival, according to him, despite to the fact that he visited Warsaw festival in 1963, everything stayed the same. The only change was in the presentation of the most progressive compositions, within which no more symphony concerts, but the theatre had a decisive word. [20] Congruently, it is possible, from the reflection and the reception in Ruch Muzyczny and Hudební rozhledy, to conclude that festival by its programme itself, contributed again to the artistic confrontation of the compositions of both, the Eastern as well as the Western composers, and the confrontation of the compositions older and newer. [21]

3. Reflection in Press after 1980

The evaluation of the festival in 1980 outlined the problem, what kind of new values the festival actually brought. [22] The reviewers registered a significant decrease of visitors. They agreed together, that in a certain sense, the most attractive concerts of the festival were the night ones. The listeners literally searched these kind of concerts. It was proved, that visitor had been attended to concerts just of the selected artists. Reviewers described this festival as a presentation of the great artist rather than a presentation of the new modern musical achievements. Jan Vičar in Hudební rozhledy, in accordance with Polish reviewers, traced up almost disappeared of the desired scandals. However, according to Vičar, festival´s dramaturgy, at reasonable propositions, confronted the older and younger composers of the 20th Century. [23] In both cases, the Lutosławski´s work was judged positively, by Polish as well as by Czechoslovak reviewers. They agreed together, in the view of the program´s content of the festival, in the sense, that the experiments, that were basically the only reason for visiting Warsaw Autumn festival in previous years, in now days was almost destroyed. Not only in the music of the various composers but also in the music of the entire Warsaw Autumn is evident return to more traditional compositional procedures. The composers for example composed a music that was based of the classical form. It was proved, all above in compositions of the leading Polish composers, such as Lutosławski, Penderecki, Grodecki, Kotoński etc. Warsaw Autumn festival in 1980 could be marked by modesty and returning to the tradition, not only with regard to the form of compositions, but also with regard to musical-expressive language of individual composers, whether Polish or foreign.

Twenty-fifth annual of Warsaw Autumn festival commented in Hudební rozhledy Petar Zapletal. According to the Zapletal, Warsaw Autumn does not lose its fundamental task – to convey to the audience the latest and the most attractive selection of the newly formed, developing and incipient music – Its contribution, however, was compared to the fifties and the sixties greatly weakened. [24]. To compare, T. Kaczynski in Ruch Muzyczny wrote the same, that in spite of the fact that it was the twenty-fifth year of the festival, it was not dressed in a silver gown. Modesty, which had emerged from this

festival´s year was the result of a poor economic situation in which Polish People´s Republic in this time was. [25] In 1982, the festival was repealed, mainly from the economic and political reasons (declaration of the martial law) – after this step, Lutosławski dissociated himself from the public life at all. In 1983, the festival returned to the life again, although, the organizers notified more modest form of the festival.

Further, the reviewer Miloš Pokora in his evaluation of the festival in 1983 tended to the support of the traditional festival´s branch. [26], such he came into the opinion´s conflict with Andrzej Chłopecki [27], according to which the festival of the contemporary music should presented the latest and the most progressive music. The entire festival schedule should tend to experimental music, just because this kind of music provided to the festival huge fame.

In the evaluation of the Warsaw Autumn festival in 1984, we can found, again, the unprecedented agreement between the reviewers with the enthusiasm of both reviewers [28], Polish as well as Czechoslovak, in contemporary music at all.

It is not possible to deny to Poland an enormous merit for making the contemporary music accessibly for home as well as for the other countries of the Central Europe. Unquestionable is also benefit of the Polish own music production and the way they dale with the contemporary music streams and the music tendencies. It was a peculiar treatment of the impulses from the West with the humanity and the sense for tradition and the listeners in their work, as we can for example see in music composed by W. Lutosławski.

3. Conclusion

Regarding to conclusion – J. Krenz with the orchestra of National Philharmonic conducted the Lutosławski´s well known work *Livre pour orchestre* during the Warsaw Autumn in 1985. This year was not evaluated in Hudební rozhledy. Regarding to Warsaw Autumn, T. Kaczynski in Ruch Muzyczny noted: *„pieces of art, formulations and conceptions are changed, but the shape and form of the festival remains the same. "* [29]

In the years 1976 – 1985 Lutosławski was well known as a world famous composer. His work was not only the regular part of the Warsaw Autumn´s festival, but it was also performed on foreign stages, where all his compositions, composed in 1976 – 1985, were premiered. In his work, within this period, he reached new compositional meanings and thanks to them he received his well-deserved recognition.

Now day, Witold Lutosławski is perceived as a giant, who was beside Fryderyk Chopin and Karol Szymanowski the greatest Polish composer. Within his life he received appreciation, which is proved by 18th honorary doctorates from Polish as well as foreign Universities and continuously rising monographies. [30]

From the articles of the music journals, it was obvious, that he gave a lot of lessens about his compositional speeches. As Witold Lutosławski was a strong believer, he cherished his gift – in the form of talent – very carefully and he strongly respected it, this is the source of Lutosławski´s unusual discipline and orderliness of this compositions.

Lutosławski´s promotion abroad was supported by cooperation with famous artists – M. Rostropovich, P. Sacher, G. Solti, Esa-Pekka Salonen, A. Mutter, K. Zimerman, Chicago Philharmonic Orchestra, and Los Angeles Philharmonic. [31]

In chosen period Witold Lutosławski and Warsaw Autumn festival were positively and in plenty reflected. In comparison to the first years there were not so many different conflicts among individual evaluations. In spite of the permanently conservative attitudes, Czechoslovakia had been opening to Warsaw Autumn´s music. The amount of information about foreign events mostly in music area became more and more approachable, not only from the view of contemporary music interpretation, but also from the view of knowledge of the basis of various compositional principles, which were developed by individual composers afterwards.

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TINKERING IN SLOVAK BIBLIOGRAPHY AND HISTORICAL STUDIES

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Abstract: *Tinkering has an interesting and variegated past. Its evolution has gone through many periods and vital transitions. People used wire even in prehistoric times, however, the specific way of its processing was introduced by Slovak tinkers approximately 200 years ago. They created a peculiar branch of folk making that was gradually perfected and reached the level of artistic craft and which deployed into a manufactory and factory production. The objective of the paper is to summarise the theme of tinkering in Slovak specialized texts and historical studies.*

Keywords: *tinkering, historical studies, specialized texts*

1. Introduction

Wire has accompanied mankind since prehistoric times, primarily for its universal usage. Small copper, bronze and exceptionally silver and golden steel wool was fabricated as early as the Bronze Age. Even if their exact utilisation is often unknown, numerous fragments of simple and ornate wires were found in burial-mounds in the Bronze Age, mainly in the Central and Southwestern territories of Bohemia. One of the oldest findings of copper wire in Bohemia is from Úholičky in the Central Bohemian Region of the Czech Republic and dates back to 1900 B.C. In the Iron Age, various wires were made of iron, approximately from 700 B.C.

2. Tinkering – Slovak cultural phenomenon

"Tinkering that originated as a complementary craft of men from the Upper Váh Region had its peculiarities, marked differences from other handicrafts from the very beginnings, which caused its manifold definitions, falsification both conscious and unconscious. It is typical that even in the time of its upswing, when it became so to say an undisputed economic miracle for the one time Drotária (500 towns and settlements), it did not have its chronicler at home" [Guleja, 1992]. However, after the First World War the entire tinkering branch lapsed into a recession and its survival depended on some individuals who sustained the knowledge of the technique in Slovakia and on museum workers who documented them for many decades to come. Only at the end of the 20th century, firstly in Slovakia, subsequently in Bohemia and Moravia, the interest in tinkering awoke once again and immediately on several levels – artistic, craft and amateur. Everyone who starts working with wire realises the advantages of the material and technique itself. Wire is well shapable and with mastering the technique, one can prepare firm, light and enduring articles. Moreover, wire can be combined with numerous further materials such as ceramics, glass or the most diverse of natural substances [Vondrušková, 2002].

3. Tinkering in bibliography

Tinkering as a craft gained its biggest boom in Slovakia and without exaggeration we can say that itinerant tinker was one of the symbols of Slovakia. There are no exact written records as to when tinkering expanded into a manufacturing branch but obviously it was on the turn of the 18th and 19th centuries [Janečková, 2013].

"Ján Čaplovič (1780 Príbelce-1847 Vienna), Slovak ethnographer and publicist, presents a brief description of tinkering in his handwritten work Ethnography of Slovakia in the Kingdom of Hungary in 1837. In the chapter on crafts, Čaplovič explains the origins, purpose and location of tinkers'occurrence. The most interesting stories are the ones the author intercepted from the period press" [Adamusová, 2012, p. 67].

Rudolf Bednárik, university professor and ethnographer analyses the origins of tinkering, habits of tinkers at home and when leaving home in his study titled *Spiritual and material culture of the Slovak Folk*. He also pays attention to the description of tinker workshop established abroad and the assortment of their produce. The author in his study mentions exclusively those tinkers who came from the village Veľké Rovné. In the conclusion, he recalls that tinkers were also from the vicinity of Spišská Magura and settlements in Kysuce Region.

In 1956 Rudolf Žatko's *Tinkers from Kolárovice as disseminators of Slovak folk drama traditions in Moravia and Bohemia* was published, in which he tries to explain how and when the Slovak type of the nativity play got to Moravia. He writes about tinkers from the village of Kolárovice, who in the past were disseminators and bearers of Slovak folk drama art and folk traditions in Moravia and Bohemia. In his study Žatko lists the authors dealing with tinkers and also analyses written sources that refer to nativity plays.

The paper *Tinkering of Trencsén and the Czechs' relations to it* by Andrej Polonec, Slovak museologist and ethnographer was published in Rožnově pod Radhoštěm. Polonec points out manuscripts and studies about tinkering he managed to come across during his own research. He analyses social, cultural and national relationships of the Czech people towards Slovak tinkers and also indicates

that it was the tinkers who played an important role in the wakening of Czech-Slovak fellowship. The author informs about the influence of Silesia on the origins and development of tinkering, pays attention to manufacturing procedures and products of craftsmen in certain parts of Europe. He presents the works of fine-art and literary artists, whose theme was the tinker. In the conclusion, he explains the causes of cessation of tinkering craft and its contemporary status [Adamusová, 2012]. Pavel Ondruš, research fellow and linguist of the Faculty of Art of Comenius University in Bratislava published an interesting study with the title *Secret language of itinerant craftsmen in the former Trencsén County*. *"Based on the research into the dialectical terminology of evanescent crafts in Slovakia, carried out by the Department of Slovak Language of Comenius University in the beginning of the 1960s, the author approaches the issue of secret language (argot) among itinerant tinkers of Zákopčie and Kolárovice"* [Adamusová, 2012, p. 74]. Ondruš found out by research that tinkers' special tongue originated due to the influence of different languages during their staying abroad.

Viera Praženicová ethnographer in her paper *House and farm of Štefan Hunčík, tinker and businessman* presents Štefan Hunčík's residence who owned a prosperous workshop in Moscow. The author presents a joint of knowledge on the example of his house that she acquired in the world of local folk tradition from the field of architecture.

Alojz Kontrík's paper surely deserves our attention, too. Its title is *Documents of tinkers of Kysuce essential to execute tinkering in the interwar period*, in which author intended to work out the issue of official documents used by tinkers. Since this theme has not been elaborated in its complexity so far, this contribution becomes a very valuable and precious source of information about the history of our phenomenon – tinkering [Adamusová, 2012].

4. Historical studies

Due to these sources we get to know under what conditions and causes tinkering originated, how it spread in the neighbouring European countries and later overseas. We get an overview on manufacturing and itinerant form of the craft, assortment of produce on offer and at the end we ascertain the causes of its cessation.

The paper *Tinkering in the Spiš Region* by Ján Koma ethnographer is published in the volume New Horizon (Nové obzory). *"The article advances conditions of the origin of tinkering in the Spiš Region, economic, social and agricultural relationships in the area, inhabitants' employment as well as a list of tinkering settlements and places of the activity of tinkers from the Spiš Region. Price list of tinkering works in respective periods or townships where tinkers have their workshops might also be of interest as well as the assortment of their produce and the relationships in these workshops"* [Adamusová, 2012, p. 77]. In the conclusion of the paper, the author also lists several folk songs collected directly from tinkers' villages.

Alojz Pavlík, college pedagogue and historian published a study under the title *Evolution of tinkering in the North-western part of Slovakia till the First World War*. Similarly, here he documents the evolution of tinkering craft from its beginnings, describes working method of craftsmen, their produce and tools, mode of apparel, superstitions and habits by which a tinker was ushered out when leaving his native village. We also get to know how difficult the position of džarkovia – tinker apprentices was, what wages tinkers got, the effect of their wages on their and their family's standard of living. He notices the problem of alcoholism and in the conclusion elucidates the edifying-cultural importance of this craft.

In her publication *Folk manufacturing in Slovakia*, Jarmila Paličková-Patková draws a shorter historical overview on tinkering.

Study *Tradition today?* by Ivana Kontríková-Šusteková is also interesting in which the villages of itinerant trade tinkers is mapped in the Kysuce Region. *"The author clarifies economic and social factors that prompted the origin, evolution and cessation of this craft. It approaches the profile of itinerant peddler, his social and property relationships, the way of goods transportation, amount of earnings, way of life during his journey as well as his habits and morals"* [Adamusová, 2012, p. 79].

5. Conclusions

In the past, tinkering was a craft that was well-known all over the world due to the Slovaks and provided daily bread for a great number of people living in the Kysuce and Spiš Region. Although the number of bibliographies dealing with this theme is comparatively large, the number of living tinkers is few. In this writing we have mentioned where a contemporary may come across with tinkering. The objective of this work is to bring this forgotten craft back into memory and provide the reader with a compact file of bibliographies dealing with this issue.

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