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Table of contents

Intraclass correlation coefficient as an indicator for solving the inherent structuredness of data in business research

Martin Cenek

Abstract

The paper addresses the problem of the inherent structuring of business economics' data, where the use of hierarchical linear modelling (HLM) with validation of the application based on the intraclass correlation coefficient (ICC) seems appropriate. The essence of the paper is to provide a basic introduction to the specific case of regression model in the form of HLM and to develop a methodological procedure for calculating the ICC as an indicator of the suitability of HLM application. The application of the ICC is defined in terms of mathematical apparatus and illustrated by a practical application in the SPSS package (version 23) on data from the PISA Database with a related implication of use within the field of business economics, in which highly structured data at different hierarchical levels (employee, department, company, market, sector etc.) are commonly dealt with. The proposed procedure using the aforementioned statistical tools allows to draw the correct inductive inference based on non-isolated analysis and to structure inferences that specifically identify multi-level relationships so inherent in the structure of data in business economics research.

Key words

Corporate economy, research methodology, linear regression, multilevel analysis, hierarchical linear modelling, intraclass correlation coefficient, inductive inference, hierarchical levels of data structuring, quantitative research methods.

Introduction

A business entity carries the inherent characteristic of the hierarchical nature of data, consisting of nested entities. A person acting as an elementary element of a company at the level of a work unit is nested in work groups, work groups are nested in departments, departments are nested in organisational structure, organisational structures are nested in the various and complex structures of the external business environment, etc. (Hofmann, 1997, p. 723-744).

This raises the question of which method to use so that economic research on companies is not distorted by influences at particular levels of structuring, which in the case of business entities can take on a considerable degree of complexity in terms of internal and external linkages (e.g. specific influences determining companies within sectoral structuring, institutional control, etc.). The answer to the question on the application of the method is directed towards the implementation of tools that have been proven in practice, where hierarchical linear modelling

is currently considered one of the most appropriate research solutions, given the hierarchical nature of the organisations concerned (Hofmann et al. 2000).

The subject of this article is the use of the intraclass correlation coefficient (ICC) as an indicator of the suitability of the application of hierarchical linear modelling (HLM). The aim is to present the methodological procedure of using the ICC calculation as one of the starting points for assessing the suitability of the application of HLM in the context of solving business economics cases. The article explains the methodological basis, procedures and explanatory value of hierarchical linear modelling, which is not yet widespread in national settings and can be said to be a 'novelty' in the market of statistical tools, the popularisation of which is mainly due to Dr Petr Soukup, whose course from Acrea (2023, online) became the impetus for the creation of this article with the intention of broadening the awareness of business economics researchers about hierarchical linear modelling and presenting the possibilities of its application.

The article continues the tradition of methodologically (tutorial) oriented papers that deal with practical procedures for applying narrowly focused methods, techniques and tools suitable for use in the context of social science disciplines, e.g. Woltman et al. (2012, p. 52-69)[1], Huta (2014, p. 13-28) or Hofmann et al. (2000). The appropriateness of this type of article and the issue it addresses is supported by the fact that HLM is increasingly used in social science research (Man, 2022, p. 330-355), and furthermore by Landers' (2023) observation of the position of ICC among researchers as one of the most commonly misused indicators.

1 Hierarchical linear modelling

In the context of business research, regression modelling is now a common and frequently used (Roback, Legler, 2021) statistical algorithm procedure to find a relationship between one or more predictors (Maulud, Abdulazees, 2020, p. 140-147). However, when linear regression is used, the coefficient of determination (R2) can be distorted by the presence of the outlined nature of the scaling effects of the level regression (Worthington, West, 2001), implying a potentially significant problem in the context of corporate data.

As explanatory variables can be measured at different points of aggregation, it is often important to structure inferences that specifically identify multi-level relationships. If there are differential effects depending on the level, then the interpretation of the coefficients may be erroneous if the levels are ignored[2]. Hierarchical models take the standard specification of a linear model and eliminate the constraint that the estimated coefficients are constant in all cases by identifying the levels of additional effects to be estimated. (Gill, 2003, p. 209-214)

[1] This paper can be recommended for further study of the application of hierarchical linear modelling.

[2] This problem is illustrated by Kreft and de Leeuw (1998) in the case where it is recorded that there is a probabilistic tendency for people with higher education to have higher income (a positive dependence of income on education is identified at the individual level). However, at the economy level (macro level), the relationship between income and education can be found to be negative (the example shows a typical case of a university environment with a high level of educational attainment but a low average income). If an analysis at the micro (individual) and macro (sectot) level is carried out in the context of the case presented, then diametrically different substantive findings are generated. Thus, to isolate the micro and macro levels, which are realistically closely intertwined, constitutes a fundamental researcher's error, which is addressed precisely by taking into account the hierarchical structure of the data.

Hierarchical linear modelling, also known as multilevel modelling, linear mixed-effects model, covariance component model (Matsuyama, 2020, p. 1059-1061) or random coefficient modelling, mixed-effects modelling (Raudenbush, Bryk, 2002, p. 5-6) is a statistical method used to analyse data, under the heading of a specific regression model that takes into account the hierarchical or nested structure of the data (Cao, Lee, 2022, p. 1-24). It is a method suitable for application in cases where the analysed data are arranged in multiple levels, with dependencies between the levels. The created model allows for the examination of the effects on the different hierarchical levels [in the case of a typical application to school data, e.g. pupils, classes, schools, etc., see e.g. Zhou (2022, p. 681-698) for more details], where individual effects at the lower level and group effects at the higher level can be examined to explain the variability of the data at different levels. Hierarchical linear models, in simplified terms, provide a conceptual mechanism for statistical exploration and drawing conclusions regarding the influence of phenomena at different levels of analysis[3].

According to Zhang et al. (2009, p. 695-719), multilevel testing using HLM has gained enormous popularity in recent years. HLM is useful for understanding relationships in hierarchical data structures (Sullivan, Dukes, 1999, p. 855-888) with a number of related advantages (see Osborne, 2000, for more details) and availability of solutions for common statistical problems [e.g., to cope with the multicollinearity problem – see You et al. (2015, p. 118-136)]. However, the application of HLM should not occur without supporting the adequacy with respect to the business case being addressed, which is why it is appropriate to consider the intraclass correlation coefficient.

2 Intraclass correlation coefficient

The Intraclass Correlation Coefficient (ICC) measures the proportion of between-group variability (intergroup variance) to total variability (Bujang and Baharum, 2017). The essence is the decomposition of the variance into an within-group (within a level) and between-group (between levels) component (Soukup, 2006, p. 987-1012). In HLM analysis, the ICC for each level of the hierarchy can be calculated as a measure of agreement or consistency between observations within the same group. The ICC allows the degree of agreement between groups in the data to be quantified and interpreted (Mulder, Fox, 2019, p. 521-552).

It is a method that is associated with HLM and whose development shows similar elements of initial caution with a desire to question and develop alternative approaches (Bland a Altman, 1990, p. 337-340) with a gradual evolution to a standard tool whose application possibilities are continuously pushed and given new contexts [e.g. De Raadt (2021, p. 1-25) discusses the comparison of reliability coefficients for ordinal rating scales incorporating ICC, Pearson correlation, Spearman's rho, and Kendall's tau-b to provide a thorough understanding of these coefficients, and Liljequist et al. (2019) elaborates a re-analysis of the theoretical basis of ICC with Monte Carlo simulations of ICC probability distributions].

The ICC handles a wide range of problems, including issues of reliability, reproducibility and validity (Müller and Büttner, 1994, p. 2465-2476). Many published scale validation studies determine reliability using the intraclass correlation coefficient (ICC) (Mehta, 2018, p. 2734-

[3] It should be added that HLM can accommodate any number of hierarchical levels, but the workload increases exponentially with each added level (see Woltman et al., 2012, p. 52-69 for more details).

2752). Despite the growing application, however, the claim is still more or less true, the procedures available for making inferences about ICC are not widely known (McGraw, Wong, 1996).

However, there are several versions of the ICC and the crucial importance falls to the correct and precise definition of the application of the ICC to the case at hand (Weir, 2005, p. 231-240). Koo and Li (2016, p. 155-163) list 10 forms of ICC, which involve different assumptions in their calculation and lead to different interpretations, so it is necessary to explicitly specify the form of ICC calculation used, introduce the model, type, definition of ICC and include information about the software used, which represents a legitimate set of requirements reflected in the methodology of this paper.

3 Methodology

The solution of the defined problem is based on the application of methods from the range of research, systematisation, generalisation, comparison, analysis, synthesis. In terms of the processing procedure, (i) the assumptions of HLM application are defined, (ii) the variance decomposition is applied, (iii) the mathematical decomposition of the variance decomposition expression into levels is illustrated, (iv) the procedure of applying the ICC calculation on a selected case of real data is elaborated with a follow-up (v) implication of HLM application in business research.

In terms of the application of relevant statistical software, the early development of HLM was characterized by a tendency to develop narrowly focused academic software for the specialized application of hierarchical modelling, e.g., MLn, MPlus, MIXOR, etc. (Soukup, 2006, p. 987). In recent years, the situation in the software field has simplified in the implementation of commercial HLM packages into the most commonly used "mainstream" tools of SPSS, SAS or STATA format. In this paper, the application of ICC for HLM is illustrated in the SPSS package (version 23), which is the dominant software in domestic conditions and meets the requirements for basic (mainstream) modelling applications. SPSS is also used by Landers (2023) to provide a set of practical guidelines for calculating ICC. However, it is worth mentioning the most significant limitation of the SPSS package for HLM, namely that it can work exclusively with a continuous dependent variable, which is not a complication from the point of view of the basic procedure presented. If it is necessary to work with other than dependent continuous variables, the reader can be referred to the aforementioned narrowly focused HLM software.

SPSS offers two options for dealing with the quantification of the intraclass correlation coefficient, one longer (more "clickable" option) and one shorter (less "clickable" option)[4]. The shorter option is going to be applied, as it provides a higher degree of user-friendliness while achieving the same result as the longer option. The procedure is illustrated using data from the PISA Database (2003, online), also used by the aforementioned domestic guru of hierarchical models Dr. Petr Soukup to explain hierarchical linear modelling (Acrea, 2023, online).

[4] And also the most "clickable" variant, simplistically called "CTRL+R", which uses the command line.

4 Solving inherent data structuring

Based on abovementioned facts, HLM can be seen as a potentially emerging "ultimate" solution to the problem of data structuring, which, however, brings a downside in the form of the threat of uncritical application even where the use of the tool does not make actual sense[5]. Therefore, the initial question of every researcher should be directed towards determining the suitability of the tool in relation to the problem to be solved. The application of HLM should be approached if:

- (i) multi-stage selection was implemented, thus violating the assumption of independence of observations,
- (ii) selection does not include all groups,
- (iii) the ICC (intraclass correlation coefficient) takes a certain interval.

In the first case, the multi-stage sampling itself anticipates the hierarchical nature of the data collected in waves, i.e., e.g., in a hypothetical business survey, the sector was selected first, then the set of companies, then the set of respondents, etc. Hence, the hierarchy is already explicitly readable in the data composition itself and HLM should be applied. In the second case, if not all business entities are represented in the research sample, then logically the selection of all groups is not ensured and the use of HLM is also appropriate.

In addition to fulfilling the multistage criterion of selection and representation of groups in the sample, the ICC is a quantitative assessment, based on a robust expression, of what proportion of the total variance of a variable is accounted for by differences at the superordinate level, or what the differences are in the values of variables at level 1 and at higher levels. A decomposition of the variance into its component (Soukup, 2006, p. 987-1012):

- intragroup (within one level – differences between individuals / departments / ...)
- intergroup (between levels – differences at the level of divisions / entities / ...)

ICC takes values in the interval $\langle 0;1 \rangle$. An ICC value at the extreme between 0 indicates that there is no agreement between observations in the group, while an extreme value of 1 indicates that all observations in the group are identical. To quantify the ICC value, we first need to decompose the levels: (Soukup, 2006, p. 987-1012):

$$\boldsymbol{Y_{ij} = \beta_{oj} + \varepsilon_{ij}} \text{ (initial regression model with parameter estimation } \beta_{oj})$$

$$\beta_{oj} \rightarrow \lambda_{oo} \text{ (shift } \beta_{oj} \text{ from 1st to 2nd level)}$$

$$\varepsilon_{ij} \rightarrow u_{oj} \text{ (shift } \varepsilon_{ij} \text{ from 1st to 2nd level)}$$

$$\boldsymbol{\beta_{oj} = \lambda_{oo} + u_{oj}} \text{ (estimation of the average result for individual, hierarchically superior subjects)}$$

[5] In such cases, Mintzberg's warning against modern science's obsession with numbers comes to mind.

$\boldsymbol{\sigma_{\varepsilon}^2} = variance\ at\ the\ level\ of\ individuals$ (for 1st level of the model $Y_{ij} = \beta_{oj} + \varepsilon_{ij}$)

$\boldsymbol{\sigma_{u}^2} = variance\ at\ the\ level\ of\ higher\ units$ (for 2nd level of the model $\beta_{oj} = \lambda_{oo} + u_{oj}$)

$$\boldsymbol{ICC = \frac{\sigma_u^2}{\sigma_\varepsilon^2 + \sigma_u^2}}$$

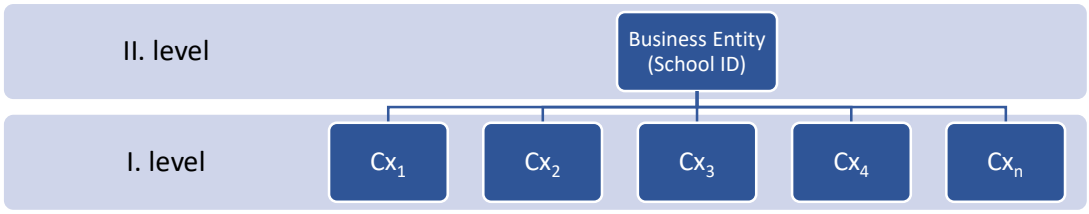
The intraclass correlation coefficient is based on the expressed level decomposition of the variance, thus analogous to the distinction between intra- and intergroup variance in the analysis of variance described above. The use of HLM is generally accepted at an ICC value just equal to or greater than 0.1. Thus, according to the ICC, a statistically significant effect of hierarchical structuring of the data occurs within a value falling within the interval ⟨0.1; 1.0⟩ indicating the appropriateness of applying HLM. Thus, for the application of HLM, the condition must be met:

$$ICC \in \langle 0\,,1 \rangle$$

$$ICC \geq 0{,}1$$

However, this condition should not be taken as absolute. If the nature of the data clearly tends to use hierarchical linear modelling, then it should be used. In the following, the ICC will be presented practically with an example with two hierarchical levels, representing individuals at level I of structuring and subjects (educational institutions) at level II of structuring (see Figure 1).

Figure 1: Hierarchical levels of a practical example

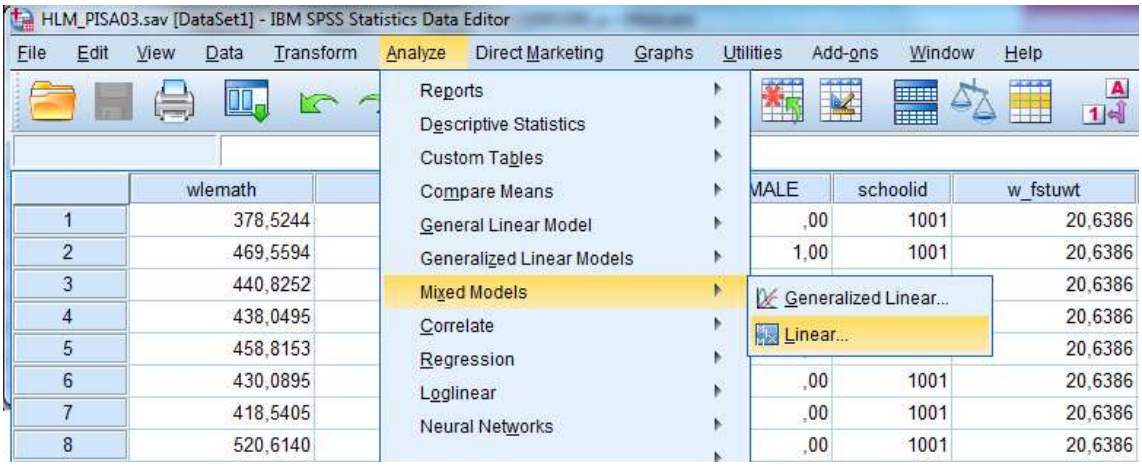


Source: author's own elaboration

From an entrepreneurial point of view, it is possible to imagine business entities in the form of private schools providing education, courses and training services (level II of the structure) to customers of these services in the role of students (level I of the structure). In doing so, this is a significant example with respect to hierarchical linear models, where one can anticipate a significant influence of a particular entity on the results obtained. The quality of services provided is measured on the outcome of competencies in acquired mathematical literacy (e.g., ability to apply HLM, econometrics, analysis of variance, etc.), whereby:

- School ID = identification of the entity (school establishment)
- Warm Estimate = the level of mathematical literacy achieved by the individual in the position of service user (data for individual students)

Figure 2: First step of ICC calculation in IBM SPSS



Source: author's own elaboration using SPSS (version 23)

After opening the dataset in SPSS and selecting the "Analyse" and "Linear..." tabs (see Figure 2), the "Linear Mixed Models" table is displayed, which consists of the "Subjects" window for cross-sectional data and the "Repeated" window for panel data (repeated measurements). However, in the case of ICC quantification, there is no need to fill in anything and simply click on "Continue" (see Figure 3, left part – "Linear Mixed Models: Specify Subjects and Repeated").

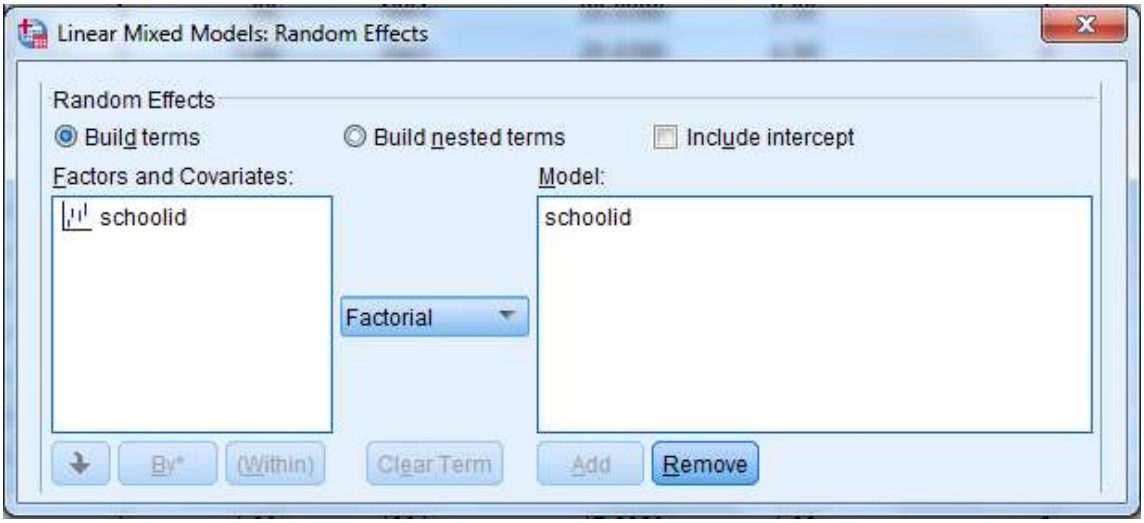
Figure 3: Model specification

Source: author's own elaboration using SPSS (version 23)

In the next window (see Figure 3, section on the right – "Linear Mixed Models"), it is necessary to specify the desired dependent variable as "Warm estimate" in the field "Dependent Variable" and the distinction of individual subjects as "School ID" in the field "Factors". The next step is to click "Random" and in the "Random Effects" table (see Figure 4) enter "School ID" as the

model (i.e. "send" by "Add" this variable to the right). Thereby, it is possible to generalise the results obtained to all subjects (random effect), not only to those participating in the sample (fixed effect). The "Random" option is used to allow the results to be generalised to all subjects, i.e. not just those in the sample. For a deeper understanding to the difference between random and fixed effects, one can refer to Field (2013, p. 732).

Figure 4: Random effect



Source: author's own elaboration using SPSS (version 23)

After entering the random effect, it is enough to confirm the choice and in the output of the analysis (in a separate window, where all related statistical outputs are summarised under the appropriate label of the performed action) the table "Covariance Parameters" will appear (in the list of outputs at the very end, see Table 1).

Table 1: Covariance Parameters

Estimates of Covariance Parameters[a]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Residual		6244,419758	112,351693	55,579	,000	6028,051940	6468,553771
Intercept [subject = schoolid]	Variance	3092,862231	385,032897	8,033	,000	2423,225403	3947,547252

a. Dependent Variable: Warm estimate in math .

Source: author's own elaboration using SPSS (version 23)

Everything needed to calculate the ICC is now available in the form of:

$$\boldsymbol{ICC} = \frac{Estimate\ Intercept}{Estimate\ Residual + Estimate\ Intercept}$$

$$\boldsymbol{ICC} = \frac{3092{,}86}{6244{,}42 + 3092{,}86} = \mathbf{0{,}3312}$$

The condition is thus fulfilled:

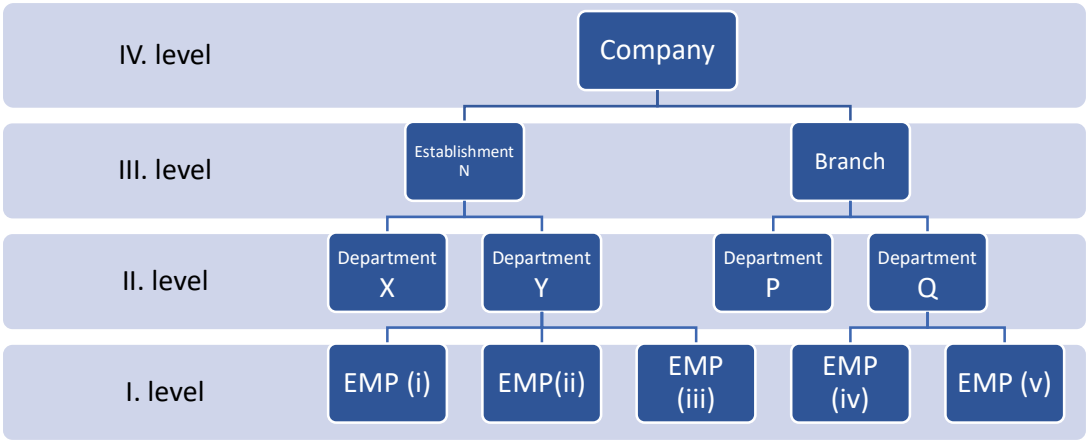
$$\boldsymbol{ICC} = \frac{\sigma_u^2}{\sigma_\varepsilon^2 + \sigma_u^2} \geq 0{,}1$$

and the use of hierarchical linear modelling is appropriate for the case with a quantitative form of reasoning, where 33.12% of the variance of the variable of interest ("Warm Estimate" – the level of mathematical literacy achieved by individual students) can be attributed to the level of higher units ("School ID" – educational institution) in the context of hierarchical relationships.

5 Implications of HLM in the corporate economy

Within the corporate economy, HLM can generally be expected to be widely used. The model can take into account influences at different levels depending on the object of study, which is most often the company, whose structure is a defining element in itself. If the hypothetical study concerns data for a set of individuals or a specific department as finite variable, then the application of the HLM can take into account the influence of belonging to a certain department that also falls under a certain establishment (branch etc.), business entity, and the company itself fits within the structuring context of the business environment (at the aggregate level of structuring in the micro-environment, meso-environment, macro-environment). All these levels, through their influences, determine to a greater or lesser extent the variable. Thus, the links to the variables vary in certain and well-defined hierarchies (see Figure 5).

Figure 5: Decomposition of the company into hierarchical subordinate levels



Source: author's own elaboration

The parent level represents a contextual (relational) variable that introduces a relationship to the data in the form of characteristics of properties at that level in relation to other entities (Field, 2013). The residuals are correlated in this way because if the set of individuals in the research sample comes from the same environment, then the influence of that environment can hardly be ruled out. The data will not be independent (e.g. intuitively one can deduce that, depending of course on the object of study, employees of one workplace will certainly have more in common than members of other workplaces and business entities[6]).

CONCLUSION

Hierarchical linear modelling can be seen as a solution to a practical problem that a researcher encounters when working with aggregated data over larger units, whereby the so-called "Robinson effect" or "Simpson's paradox" may occur, resulting from overlooking the influence of multiple levels of the phenomenon under study (see Hendl, 2004, p. 330) . In practice, this is the threat of a potential effect (paradox) consisting of erroneous inductive inference based on isolated analysis. One of the prerequisites for the valid application of regression analysis is the independence of individual observations, which can be violated if the selection of implementing levels of hierarchies that cannot be considered mutually independent is realised (the mere classification of a business entity into a certain sector shows dependence, as does, for example, data for an individual belonging to a certain subset).

The basic assumption of regression analysis can be relatively often not fulfilled and in these cases it is useful to think about how the differences between sets (classes, categories...) affect the observed variables. In this respect, hierarchical linear modelling reflects multiple levels (e.g. workplace, company, sector) and introduces them into the separate modelling of each relevant level. Modelling relationships at both the micro (units) and macro (groups) levels simultaneously provides generalisations of the conclusions to all units and groups, i.e. the whole underlying population. The adequacy of the accession to the HLM application can then be addressed by calculating the intraclass correlation coefficient in the form of a decomposition of the variance into intra- and intergroup components. The process of applying the ICC as an indication of the appropriateness of using hierarchical linear modelling is modelled and explained using a typical example of the relationship between acquired skills and the influence of the school institution conditioning individuals' outcomes (i.e. a two-level case).

The proposed procedure can be methodically applied for the needs of solving the inherent structuring of data in business research on the basis of an advanced methodology that, compared to traditional procedures based on the assumption of independence, corresponds more closely to the real conditions of the operation of business entities in the context of a complexly structured business environment at many levels.

[6] This raises the question of what determines the differences between levels, which has implications for further research.

Bibliography

ACREA. Hierachické lineární modelování. [online]. 2023. [cit. 2023-06-19]. Retrieved from: <https://kurzystatistiky.cz/kurzy/statistika-a-analyza-dat/hierarchicke-linearni-modelovani/>.

BLAND, J. M.; ALTMAN, D. G. A note on the use of the intraclass correlation coefficient in the evaluation of agreement between two methods of measurement. Computers in biology and medicine, 1990, 20.5: 337-340. DOI: 10.1016/0010-4825(90)90013-f.

BUJANG, Mohamad Adam; BAHARUM, Nurakmal. A simplified guide to determination of sample size requirements for estimating the value of intraclass correlation coefficient: a review. Archives of Orofacial Science, 2017, 12.1.

CAO, Xuan; LEE, Kyoungjae. Bayesian inference on hierarchical nonlocal priors in generalized linear models. Bayesian Analysis, 2022, 1.1: 1-24. DOI: 10.1214/22-BA1350.

DE RAADT, Alexandra, et al. A comparison of reliability coefficients for ordinal rating scales. Journal of Classification, 2021, 1-25. DOI: 10.1007/s00357-021-09386-5.

FIELD, Andy P. Discovering statistics using IBM SPSS statistics: and sex and drugs and rock 'n' roll. 4th edition. Los Angeles: Sage, 2013. ISBN 978-1-4462-4918-5.

GILL, Jeff. Hierarchical linear models. Encyclopedia of social measurement, 2003, 209-214. DOI: 10.1016/B0-12-369398-5/00166-3.

HENDL, Jan. Přehled statistických metod zpracování dat: analýza a metaanalýza dat. Praha: Portál, 2004. ISBN 80-7178-820-1.

HOFMANN, David A. An overview of the logic and rationale of hierarchical linear models. Journal of management, 1997, 23.6: 723-744. DOI: 10.1177/0149206397023006

HOFMANN, David A.; GRIFFIN, Mark A.; GAVIN, Mark B. The application of hierarchical linear modeling to organizational research. 2000.

HUTA, Veronika. When to use hierarchical linear modeling. The quantitative methods for psychology, 2014, 10.1: 13-28. DOI: 10.20982/tqmp.10.1.p013.

KOO, Terry K.; LI, Mae Y. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. Journal of chiropractic medicine, 2016, 15.2: 155-163. DOI: 10.1016/j.jcm.2016.02.012.

KREFT, Ita GG; KREFT, Ita; DE LEEUW, Jan. Introducing multilevel modeling. Sage, 1998. DOI: 10.4135/9781849209366.

LANDERS, Richard. Computing intraclass correlations (ICC) as estimates of interrater reliability in SPSS. Authorea Preprints, 2023. DOI: 10.15200/WINN.143518.81744.

LILJEQUIST, David; ELFVING, Britt; SKAVBERG ROALDSEN, Kirsti. Intraclass correlation–A discussion and demonstration of basic features. PloS one, 2019. DOI: 10.1371/journal.pone.0219854.

MAN, Kaiwen, et al. Effects of compounded nonnormality of residuals in hierarchical linear modeling. Educational and Psychological Measurement, 2022, 82.2: 330-355. DOI: 10.1177/00131644211010234.

MATSUYAMA, Yutaka. Hierarchical linear modeling (HLM). In: Encyclopedia of Behavioral Medicine. Cham: Springer International Publishing, 2020. p. 1059-1061. DOI: 10.1007/978-1-4419-1005-9_407

MAULUD, Dastan; ABDULAZEEZ, Adnan M. A review on linear regression comprehensive in machine learning. Journal of Applied Science and Technology Trends, 2020, 1.4: 140-147. DOI: 10.38094/jastt1457.

MCGRAW, Kenneth O.; WONG, Seok P. Forming inferences about some intraclass correlation coefficients. Psychological methods, 1996, 1.1: 30. DOI: 10.1037/1082-989X.1.1.30.

MEHTA, Shraddha, et al. Performance of intraclass correlation coefficient (ICC) as a reliability index under various distributions in scale reliability studies. Statistics in medicine, 2018, 37.18: 2734-2752. DOI: 10.1002/sim.7679.

MULDER, Joris; FOX, Jean-Paul. Bayes factor testing of multiple intraclass correlations. 2019. Bayesian Anal. 14 (2) 521 – 552. DOI: 10.1214/18-BA1115.

MÜLLER, Reinhold; BÜTTNER, Petra. A critical discussion of intraclass correlation coefficients. Statistics in medicine, 1994, 13.23-24: 2465-2476. DOI: 10.1002/sim.4780132310.

OSBORNE, Jason W. Advantages of hierarchical linear modeling. Practical Assessment, Research, and Evaluation, 2000, 7.1: 1. DOI: 10.7275/pmgn-zx89.

PISA Database. [online]. 2003. Praha: OECD. [cit. 2023-06-19]. Retrieved from: <https://web.archive.org/web/20150915112501/http://pisa2003.acer.edu.au/index.php>.

RAUDENBUSH, Stephen W.; BRYK, Anthony S. Hierarchical linear models: Applications and data analysis methods. University of Chicago, USA, sage, 2002. ISBN: 9780761919049.

ROBACK, Paul; LEGLER, Julie. Beyond multiple linear regression: applied generalized linear models and multilevel models in R. CRC Press, 2021. ISBN: 9781439885383.

SOUKUP, Petr, et al. Proč užívat hierarchické lineární modely?. Sociologický časopis/Czech Sociological Review, 2006, 42.05: 987-1012. DOI: 10.13060/00380288.2006.42.5.08.

SULLIVAN, Lisa M.; DUKES, Kimberly A.; LOSINA, Elena. An introduction to hierarchical linear modelling. Statistics in medicine, 1999, 18.7: 855-888. DOI: 10.1002/(SICI)1097-0258.

WEIR, Joseph P. Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. The Journal of Strength & Conditioning Research, 2005, 19.1: 231-240. DOI: 10.1519/15184.1.

WOLTMAN, Heather, et al. An introduction to hierarchical linear modeling. Tutorials in quantitative methods for psychology, 2012, 8.1: 52-69. DOI: 10.20982/tqmp.08.1.p052.

WORTHINGTON, Andrew C.; WEST, Tracey. Economic value-added: a review of the theoretical and empirical literature. Asian Review of Accounting, 2001. DOI: 10.1108/eb060736.

YU, Han; JIANG, Shanhe; LAND, Kenneth C. Multicollinearity in hierarchical linear models. Social science research, 2015, 53: 118-136. DOI: 10.1016/j.ssresearch.2015.04.008.

ZHANG, Zhen; ZYPHUR, Michael J.; PREACHER, Kristopher J. Testing multilevel mediation using hierarchical linear models: Problems and solutions. Organizational Research Methods, 2009, 12.4: 695-719. DOI: 10.1177/1094428108327450.

ZHOU, Lili. Optimisation design of distance education resource recommendation system based on hierarchical linear model. International Journal of Continuing Engineering Education and Life Long Learning, 2022, 32.6: 681-698. DOI: 10.1177/1094428108327450.

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The impact of institutional control on firm profitability

Petr Novák, Dagmar Palatová

Abstract

The paper addresses the issue of institutional control in the context of foreign and domestic ownership with implications for profitability indicators of business entities operating on the domestic market according to the CZ-NACE sectoral classification. The results obtained from the analysis for domestic companies suggest that foreign-controlled companies perform better in terms of return on total assets, return on equity and return on sales. The largest impact of institutional control on performance occurs within CZ-NACE categories: sector C (manufacturing), F (construction) and G (wholesale and retail trade; repair and maintenance of motor vehicles). Simultaneously, the highest level of impact is reported on the profitability of total assets.

Key words

Profitability, Institutional Control, Czech Republic, CZ-NACE, Return of Assets, Return on Equity, Return on Sale

Introduction

From the end of the 20th century to the present day, business in the Czech Republic has undergone a long evolution, with 1989 being a turning point, representing a change in the political system from socialist to democratic. Concurrently with the change of the political system, the centrally controlled economy was transformed into a market-oriented one.

Modern entrepreneurship in the market conditions of the Czech Republic is the constant search for ways of further development for business entities, primarily aimed at achieving long-term, sustainable profit. Each business entity handles core issues of key areas related to the search for paths toward success. These include, in particular, the globalisation of business, the increasing level of competitive conflicts and competitive rivalry in terms of ever-increasing surplus of supply over demand, the rapid development of new technologies combined with artificial intelligence, the increasing volatility of the business environment with greater sensitivity to endogenous and exogenous influences, the limited amount of accessible financial or material resources, the availability of qualified human capital and, in recent years, the global geopolitical situation (the above list does not, of course, represent a comprehensive listing, only an outline of the current situation on which the article is based).

Business entities therefore seek to exploit any advantage within these areas, even if the opportunities are limited (however more stimulating to the creative entrepreneurial spirit). Opportunities to achieve long-term sustainable profits are generally seen (especially, but not

exclusively) in (i) reducing production costs in the context of more efficient use of scarce resources; (ii) improvement of processes, procedures and technologies; (iii) the use of multi-business cooperation, taking into account their potential comparative advantages; (iv) the use of high-quality human capital.

Institutional control seems to boost many factors operating as the outlined determinants of long-term sustainable profit. Based on prior published empirical studies on the impact of foreign investment and institutional control on the performance of business entities (ex. Jurajda and Stačík, 2012; Bobenič Hintošová, Kerbčárová and Kubíková, 2015; Bobenič Hintošová and Kubíková, 2016; Hanousek and Kočenda, 2017) we decided to investigate the impact of ownership on the profitability indicators of companies in the Czech Republic. The findings are intended to provide the basis for the preparation of extensive empirical research aimed at improving the performance of Czech business entities in the context of long-term sustainability.

1 Profitability in the context of domestic and foreign control of business entities

The question of measuring company performance becomes very challenging in practical terms due to the need to consider the many different consequences that arise from the specific conditions of the business entity (Neumaier, Neumaierová, 2002, p. 80). Achieved financial performance may not correspond to the ability to create value (Steigenberger, 2014, p. 46-65), financial results reported by companies may not reflect actual performance (Eugster, Wagner, 2020), accounting information may not adequately reflect the key strategic decisions that underpin company performance (Wall, Greiling, 2011, p. 91-135) etc. For these reasons, it should be noted that this article focuses solely on the performance of business entities, so traditional profitability tools are applied as a performance indicator.

Profitability, as a key indicator of the financial performance of business entities, plays a crucial role in management and economics in evaluating the success of a business. Higgins (1997, p. 52) even states that, in extreme cases, the careers of top executives may depend directly on the profitability ratios achieved (in "bang per buck" terms). Suchánek (2007, p. 273) explicitly defines profitability as the performance measurement tool that is almost the most appropriate of the available options (economic value added, discounted cash flow methods, market value added and others, see e.g. Knápková, Pavelková, Chodúr, 2011).

Profitability offers a comprehensive and holistic view of business performance, taking into account resource efficiency, different stakeholder perspectives and comparability between companies (Kubíčková, Jindřichovská, 2015, p. 120-129). Although added value and other metrics can also be useful for certain analyses, profitability remains one of the most widely used and informative indicators of company financial performance.

The three major profitability indicators are return on equity (ROE – Return on Equity), return on total assets (ROA – Return on Assets) and sales profitability (ROS – Return on Sales). ROE ROE measures the effectiveness of using equity capital to generate profits for the owners of the company. ROA shows how efficiently a company uses its total assets to generate profit, while ROS expresses the ratio of profit to sales, which indicates the efficiency of generating profit from the revenue generated (Kalouda, 2017, p. 72-73):

$$ROA\ (Return\ of\ Assets) = \frac{Zisk}{Celková\ aktiva}$$

$$ROE\ (Return\ on\ Equity) = \frac{Čistý\ zisk}{Vložený\ kapitál}$$

$$ROS\ (Return\ on\ Sale) = \frac{Čistý\ zisk}{Tržby}$$

The significance of these ratios is considerable as they provide information on various aspects of the company financial performance. Return on equity capital focuses on the return to owners and can help to assess whether an investment in the company is efficient in terms of equity appreciation (see, for example, Easton and Monahan, 2016 for a closer look). The return on total assets shows how well the company uses its assets and is useful for making comparisons between companies with different amounts of assets. Return on sales provides an insight into the profitability of a company core business and can reveal how well company manages its costs (Růčková, 2019, p. 60-66).

2 Institutional control

Institutional control represents an important dimension of the distinction between domestic and foreign ownership of a company. Domestic ownership means that the company is controlled and managed by domestic (internal) entities, while foreign ownership represents control from foreign sources. Ownership can influence strategic decisions, investments and the efficiency of a business, which can further affect its profitability. In this regard, the search for a link between company performance and institutional control is challenging in terms of methodological approach, as the nature of working with complex business systems risks many distortions in the assessments made (for more details, see Cenek, 2023, p. 17-28).

Regarding the differences in performance between domestic and foreign-controlled business entities in the Czech Republic, Jurajda and Stačík (2012) focused on empirical verification of the positive impact of an increase in company performance indicators. This effect was confirmed for manufacturing business entities, assuming they operate in a market with less foreign competition. In contrast, Hanousek and Kočenda (2017) in their research on the impact of foreign ownership of business entities in the Czech Republic came to the opposite conclusion. Namely, that the greatest impact on the higher efficiency of a business entity comes not from those controlled by foreign owners, but those that are under the minority control of foreign owners.

A similar issue in the context of the impact of domestic and foreign ownership of business entities on economic indicators in the Slovak Republic is addressed by Bobenič Hintošová, Kerbčárová and Kubíková (2015), who conclude that performance measured by the return on sales is worse for foreign-controlled companies than for domestic-controlled companies. The results were obtained for the business entities in the industrial sector. Subsequently, Bobenič Hintošová and Kubíková (2016) having examined the impact of foreign, domestic and joint ownership on performance indicators, found that the performance of each indicator of business entities increases with the ownership share of foreign owners up to a level in the range of 61-65% and then decreases. However, the effect of increasing foreign ownership was not

demonstrated in the case of return on sales. Temoury, Driffield and Añón Higón (2008) addressed the impact of multinational corporations on productivity and higher performance in Germany. They acknowledge the superior performance of foreign-owned business entities compared to domestic ones, but the difference is not significant and may vary by location in East or West Germany.

Barbosa and Loury (2005) compared the impact of foreign and domestic ownership on the performance of business entities in Greece and Portugal. The results showed no positive effect of foreign ownership on the business performance in both countries, except for the upper quantile of gross profit for entities in Greece. Pacheco and Pedrinho (2022) through their research on a sample of small and medium-sized business entities in Portugal also demonstrated that the impact of foreign ownership with its capital has no significant effect on profitability compared to domestic ownership of business entities.

Regarding the impact of institutional control on financial metrics, interesting results emerged when examining the trade deficit, pointing to the different approach of foreign- and domestic-controlled companies to payment morality based on the relationship between the turnover time of receivables and the turnover time of payables (Cenek and Štěrba, 2019, p. 14-23).

The results above thus indicate that the impact of institutional control on various financial and non-financial metrics is often highly significant (in particular performance as a kind of umbrella indicator, see e.g. Lindemanis, Loze, and Pajuste, 2022, p.101341 for more details).

3 Research objectives and methods

The aim of this paper is to assess the impact of institutional control of domestic business entities in distinguishing domestic and foreign owners with potential impact on profitability indicators (chosen as quantifiers of company performance). The obtained quantitative results will be used as a partial argumentation for the development of a qualitative study aimed at identifying the factors (not) affecting the creation of economic added value of domestic business entities with a distinction between owners (foreign/domestic).

Three research questions were posed: (i) Do return on equity, return on total assets and return on sales differ for foreign-controlled or domestic-controlled business entities? (ii) Do the differences in profitability for companies under domestic or foreign control differ by industry (CZ-NACE)? (iii) Which, of the three applied profitability ratios ROA, ROE, ROS, shows the greatest impact of institutional control?

The study used data from the Czech Statistical Office and the Ministry of Industry and Trade of the Czech Republic from 2009-2015. The methodology of the Czech Statistical Office (CZSO, 2022) was used to determine ownership. The surveyed business entities are divided according to the classification of institutional sectors and subsectors – CZ-NACE (CZSO, 2023) – see Table 1.

Total original dataset contained data for 8 262 business entities. Due to the research focus on differences in achieved profitability, public companies (221 entities) and government institutions (1 entity), for which objectives other than higher profitability may predominate, were excluded from the study set. In addition, entities for which the ownership structure was

not identified were excluded (755 entities). The study focuses on the differences between domestic private companies (4 552 entities) and foreign private companies (2 733 entities).

Table 1: Number of business entities by the CZ-NACE classification

Sectors by CZ-NACE	Non-financial companies private national	Non-financial private companies under foreign control	Non-financial public companies	not detected	Total
A	277	27	8	18	**330**
B	20	13	2	3	**38**
C	1972	1514	12	219	**3717**
D	31	23	36	6	**96**
E	45	62	51	6	**164**
F	412	65	7	41	**525**
G	577	385	0	146	**1108**
H	309	136	27	60	**532**
I	129	62	0	39	**230**
J	143	118	9	36	**306**
L	26	13	8	10	**57**
M	187	159	13	48	**407**
N	379	146	30	117	**672**
R	45	10	18	6	**80**
Total	**4552**	**2733**	**221**	**755**	**8262**

Source: authors' own elaboration

The sample therefore included a total of 7 285 companies, 62% of which were under domestic and 38% under foreign control. For some entities, some data are not available for the studied periods, thus the number of data varies from year to year.

To evaluate the data, descriptive statistics methods were applied according to Hendel (2009), Hindls et al. (2007) and Řezanková (2010) with the following metrics: arithmetic mean, median, percentiles, minimum, maximum, sum, standard deviation and range. The processing was carried out using MS Excel and IBM SPSS Statistics 23 software.

4 Results

The results for 2009 are presented first. Detailed output is shown in Table 2, where the data for return on equity (ROE), return on total assets (ROA) and return on sales (ROS) are divided into domestic- and foreign-controlled companies. The first two rows show the number of business entities with available and missing data. Next, the arithmetic mean is shown. The resulting values show a relatively high standard deviation – e.g. for ROE in 2009 the average is -37.86

for companies under domestic control and the standard deviation is 2,045.27. This proceeds from the wide range of values – ROE in 2009 for entities under domestic control is 123,733, with a minimum of -114,733 and a maximum of 9,000. Most outliers are in the top and bottom 10 percentile. The profitability values for total assets and sales, under domestic and foreign control, are similarly distributed. Hence, the arithmetic mean value was considered unreliable for profitability comparison, and for further comparison a different mean – the median – was used.

Table 2: ROE, ROA and ROS in 2009

		ROE		ROA		ROS	
		Companies under domestic control	**Companies under foreign control**	**Companies under domestic control**	**Companies under foreign control**	**Companies under domestic control**	**Companies under foreign control**
N	Valid	3375	2027	3490	2150	3145	2021
	Missing	1177	706	1062	583	1407	712
Mean		-37,86	-4,12	-8,00	1,14	10,53	-4,56
Median		7,86	8,37	3,13	3,38	2,02	2,42
Std. Deviation		2 045,27	163,13	555,60	57,61	408,06	216,17
Variance		4 183 116,32	26 611,06	308 695,60	3 319,00	166 511,29	46 727,94
Range		123 733,33	4 711,95	32 435,64	2 640,05	23 327,64	11 468,31
Minimum		-114 733,33	-3 585,22	-32 350,00	-1 856,93	-927,64	-7 800,00
Maximum		9 000,00	1 126,73	85,64	783,12	22 400,00	3 668,31
Sum		-127 768,67	-8 348,44	-27 910,64	2 458,24	33 116,88	-9 224,12
Percentiles	1	-256,61	-422,55	-58,25	-73,64	-42,57	-86,72
	5	-38,48	-77,41	-14,46	-22,64	-12,83	-22,16
	10	-13,82	-31,66	-6,18	-13,02	-5,02	-10,55
	25	0,67	-1,22	0,17	-1,44	0,15	-0,92
	50	7,86	8,37	3,13	3,38	2,02	2,42
	75	20,35	21,90	8,78	9,76	5,98	6,84
	90	39,32	45,35	16,62	18,61	11,99	12,81
	95	60,04	67,30	22,69	26,59	17,07	18,10
	99	101,59	133,70	38,58	46,67	33,47	36,09

Source: authors' own elaboration

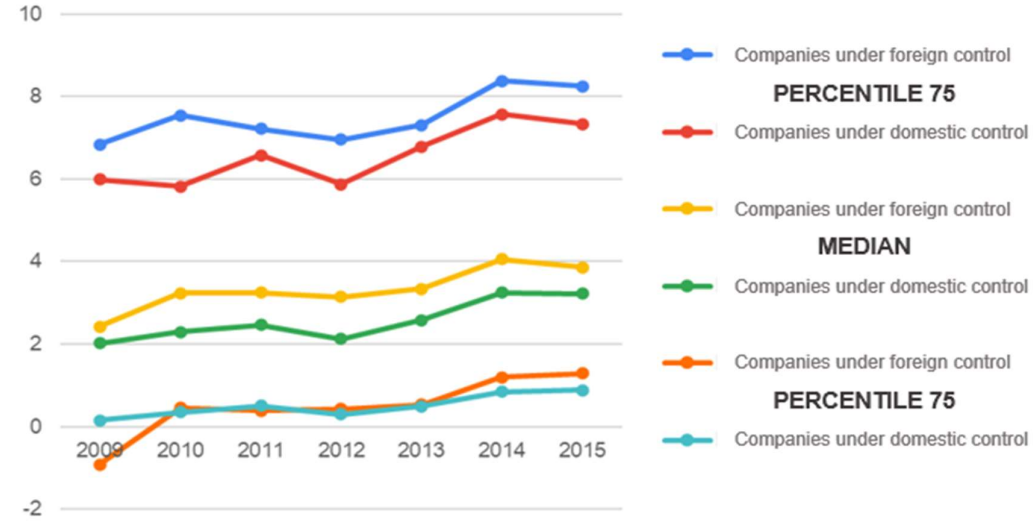
Table 3 shows the median and quartile values of ROE for the period 2009-2015, divided into domestic- and foreign-controlled business entities. It is noticeable that in all years, foreign-controlled companies achieved higher values than domestic-controlled ones. The value differences are largest at the 75th percentile – this indicates that **foreign companies are more often among the entities with higher resulting return on equity**. The results are illustrated in Figure 1.

Table 3: Return on Equity

	2009	2010	2011	2012	2013	2014	2015
MEDIAN							
Companies under domestic control	7,86	8,47	9,01	7,53	8,86	10,46	10,33
Companies under foreign control	8,37	11,22	11,68	10,39	11,48	14,19	13,77
PERCENTILE 25							
Companies under domestic control	0,67	1,41	2,19	1,37	2,20	3,62	3,30
Companies under foreign control	-1,22	1,61	1,78	2,10	2,95	4,86	4,72
PERCENTILE 75							
Companies under domestic control	20,35	20,34	20,27	17,36	19,27	21,88	21,62
Companies under foreign control	21,90	24,68	24,56	22,86	23,97	27,46	26,63

Source: authors' own elaboration

Figure 1: Evolution of median and quartiles of ROE for the period 2009-2015



Source: authors' own elaboration

The results of the median and quartile analysis of ROA for the period 2009-2015 are presented below, again broken down by domestic- and foreign-controlled business entities – see Table 4. It is visible here as well that **in all years, foreign-controlled companies were achieving higher values than the companies under domestic control.**

Table 4: Return on Assets

	2009	2010	2011	2012	2013	2014	2015
MEDIAN							
Companies under domestic control	3,13	3,49	3,76	3,15	3,81	4,86	4,82
Companies under foreign control	3,38	4,72	4,84	4,64	5,07	6,18	6,27
PERCENTILE 25							
Companies under domestic control	0,17	0,49	0,74	0,44	0,76	1,35	1,40
Companies under foreign control	-1,44	0,51	0,47	0,58	0,84	1,75	1,91
PERCENTILE 75							
Companies under domestic control	8,78	9,03	9,16	7,87	8,86	10,05	10,63
Companies under foreign control	9,76	11,24	11,37	10,55	11,14	12,94	12,44

Source: authors' own elaboration

The only exceptions are the profitability values at the 25th percentile in 2009 and 2011. The differences in values are again greatest at the 75th percentile. **Although the results for the ROA values achieved are very similar, the differences in values between foreign-controlled and domestic-controlled entities are smaller than for ROE**. If one starts with the Du Pont decomposition of ROE (for a closer look at the Du Pont decomposition, see e.g. Baciu and Petre, 2018), this implies that foreign-controlled companies make better use of cheaper foreign resources.

Table 5: Return on Sales

	2009	2010	2011	2012	2013	2014	2015
MEDIAN							
Companies under domestic control	2,02	2,29	2,46	2,12	2,58	3,25	3,22
Companies under foreign control	2,42	3,23	3,24	3,14	3,34	4,06	3,86
PERCENTIL 25							
Companies under domestic control	0,15	0,35	0,50	0,29	0,49	0,85	0,88
Companies under foreign control	-0,92	0,45	0,39	0,42	0,53	1,19	1,28
PERCENTIL 75							
Companies under domestic control	5,98	5,82	6,57	5,87	6,78	7,57	7,33
Companies under foreign control	6,84	7,54	7,21	6,95	7,31	8,38	8,24

Source: authors' own elaboration

The last profitability examined was the return of sales – see Table 5. Again, the same results can be seen here – **foreign-controlled companies achieve better ROS results than domestic-controlled ones. However, the differences in the achieved return on sales are lower than for ROA and ROE**. Looking at this fact again from the perspective of Du Pont's decomposition, shows that foreign-controlled companies achieve better ROA mainly due to better asset turnover.

For the comparison of individual profitability (ROE, ROA, ROS) among business entities under domestic and foreign control according to the CZ-NACE classification, year 2015 was chosen – see Table 6. It is assumed that in that year the effects of the 2008-2009 global financial and economic crisis have already been minimised (see e.g. Dubská, 2010).

Table 6: Achieved profitability in 2015 by CZ-NACE

CZ-NACE sector	ROE		ROA		ROS	
	Companies under domestic control	Companies under foreign control	Companies under domestic control	Companies under foreign control	Companies under domestic control	Companies under foreign control
A	4,28	5,64	2,89	2,72	4,57	3,39
B	7,64	13,24	5,33	7,63	4,68	10,80
C	10,11	12,55	5,29	6,33	3,67	4,20
D	7,95	7,94	3,48	3,54	2,95	5,44
E	7,48	17,54	4,39	9,94	2,97	7,31
F	10,40	12,51	4,53	4,72	2,61	3,06
G	11,15	13,97	4,22	5,23	1,70	2,12
H	15,21	20,47	5,67	9,10	3,59	3,51
I	6,20	4,39	2,56	3,07	2,57	4,46
J	13,69	15,86	7,65	8,27	5,88	4,12
L	13,01	6,21	4,83	7,08	4,67	9,03
M	12,75	16,48	6,78	8,36	5,16	5,01
N	19,39	16,13	7,88	5,29	3,12	2,79
R	6,94	19,13	3,79	17,37	2,07	13,55

Source: authors' own elaboration

Due to the uneven distribution of business entities within individual sectors according to CZ-NACE (see the numbers of business entities listed in Table 1), the results cannot be reliably generalised. The largest differences in profitability were found in sector R (Cultural, entertainment and recreational activities), where foreign-controlled business entities achieved significantly higher ROE (12,19), ROA (13,58) and ROS (11,49) compared to domestic-controlled ones. The values can be significantly affected by the representation of only 45 entities under domestic and 10 entities under foreign control.

Similar results were obtained in sectors B (Mining and quarrying) and E (Water supply; sewage, waste and remediation activities), where significantly better results are always achieved by business entities under foreign control compared to those under domestic control, but again the frequency of the surveyed entities is low. For sectors C (Manufacturing), F (Construction) and G (Wholesale and retail trade; repair and maintenance of motor vehicles), the profitability results are always better for foreign-controlled business entities compared to those domestic-controlled, in sectors C and G in particular, where the results have significant predictive value given the higher frequency of business entities surveyed.

Within sector N (Administrative and support activities), business entities under domestic control have always achieved higher profitability than those under foreign control.

For industries A (Agriculture, forestry, fishing), D (Production and distribution of electricity, gas, heat and air conditioning), H (Transport and storage), I (Accommodation, catering and gastronomy), J (Information and communication activities), L (Real estate activities) and M (Professional, scientific and technical activities) the obtained results did not show dominant values for any profitability neither for domestic- nor for foreign-controlled companies, regardless of the entities' number studied in the sectors.

CONCLUSION

Using the dataset for business entities from 2009-2015, the difference in the achieved return on equity, return on total assets and return on sales between foreign-controlled and domestic-controlled companies was demonstrated. Companies with foreign ownership were performing better (see specific data presented in Chapter 4).

When analysing the results by the CZ-NACE classification, it turned out that in order to identify differences more clearly, it would be necessary to expand the research sample and obtain data from more business entities (some CZ-NACE categories were underrepresented).

The results suggest that foreign-controlled companies tend to achieve higher performance as measured by traditional profitability indicators (ROA, ROE, ROS). These results are most convincing in sectors C (Manufacturing), F (Construction), G (Wholesale and retail trade; repair and maintenance of motor vehicles).

Of the three applied profitability indicators ROA, ROE, ROS, the results show the greatest impact of institutional control on ROE, i.e. return on equity (see details presented in Chapter 4).

The findings support the conclusions of Jurajda and Stančík (2012) within the manufacturing sector. In comparison with empirical results from the Slovak Republic (Bobenič Hintošová, Kerbčárová and Kubíková, 2015; Bobenič Hintošová and Kubíková, 2016), Germany (Temoury, Driffield and Aňón Higón, 2008) or Portugal (Barbosa and Loury, 2005; Pacheco and Pedrinho, 2022) it can be concluded that there is no clear methodology by which the results can be reliably compared across countries. A suitable methodological approach has already been pointed out by Cenek (2023).

Based on the results obtained, it can be implied that further research focusing on a more comprehensive analysis of the relationship between performance and institutional control is

appropriate, and that the identification of the causes of higher performance based on qualitative analysis can be considered crucial for enriching business practice.

In accordance with the presented findings, it can be concluded that the paper has contributed to the solution of the fundamentally important topic of differences in achieving profitability in business entities under domestic or foreign control.

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Bibliography

BACIU, Rodica a Brezeanu PETRE, 2018. Impact of financial structure on return on equity: evidence from wholesale of motor vehicle parts and accessories industry. *Eurasian Journal of Economics and Finance*. 6(4), 38-47.

BARBOSA, Natália a Helen LOURI, 2005. Corporate Performance: Does Ownership Matter? A Comparison of Foreign- and Domestic-Owned Firms in Greece and Portugal. Review of Industrial Organization [online]. 27(1), 73-102 [cit. 2023-07-07]. ISSN 0889-938X. Dostupné z: doi:10.1007/s11151-005-4920-y

BOBENIČ HINTOŠOVÁ, Aneta, Daniela KERBČÁROVÁ a Zuzana KUBÍKOVÁ, 2015. Corporate performance of firms operating in Slovakia: does ownership matter? *Investment Management and Financial Innovations*. (12(4), 134-142.

BOBENIČ HINTOŠOVÁ, Aneta a Zuzana KUBÍKOVÁ, 2016. The effect of the degree of foreign ownership on firms' performance. *Review of Economic Perspectives* [online]. 2016-3-1, 16(1), 29-44 [cit. 2023-07-07]. ISSN 1804-1663. Dostupné z: doi:10.1515/revecp-2016-0003

CENEK, Martin, 2023. Strategy Development: Ignoratio Elenchi Problem. In *European Forum of Entrepreneurship 2023*. Praha: NEWTON College, p. 17-28, 336 p. ISBN 978-80-87325-68-1.

CENEK, Martin a Martin ŠTĚRBA, 2019. Cooperative Strategy with Regard to Business Deficit in Companies under Domestic and Foreign Control. In: *MIKUŠ, Petr (Ed.) Proceedings of the International Scientific Conference of Business Economics, Management and Marketing 2019*. Brno: Ekonomicko-správní fakulta MU, p. 14-23. ISBN 978-80-210-9565-6.

ČSÚ, 2022. Klasifikace institucionálních sektorů a subsektorů (CZ-CISS) dle ESA 2010 [online]. [cit. 2023-07-17]. Dostupné z: https://www.czso.cz/csu/czso/klasifikace-institucionalnich-sektoru-a-subsektoru-cz-ciss.

ČSÚ, 2023. Klasifikace ekonomických činností (CZ-NACE) [online]. [cit. 2023-07-17]. Dostupné z: https://www.czso.cz/csu/czso/klasifikace_ekonomickych_cinnosti_cz_nace.

DUBSKÁ, Drahomíra, 2010. Dopady světové finanční a hospodářské krize na ekonomiku České republiky. Praha: Český statistický úřad, 13 p. Souborné informace. ISBN 978-80-250-2076-0. Dostupné také z: https://www.czso.cz/csu/czso/dopady-svetove-financni-a-hospodarske-krize-na-ekonomiku-ceske-republiky-n-rlar44vims

EASTON, Peter D. a Steven J. MONAHAN, 2016. Review of recent research on improving earnings forecasts and evaluating accounting-based estimates of the expected rate of return on equity capital. *Abacus.* 52(1), 35-58.

EUGSTER, Florian a Alexander F. WAGNER, 2020. Value reporting and firm performance. *Journal of International Accounting, Auditing and Taxation*. 40. ISSN 10619518.

HANOUSEK, Jan a Evžen KOČENDA, 2017. Impact of Ownership Type, Firm Characteristics and Crisis on Efficiency of the Czech Firms. Politická ekonomie [online]. 2017-2-1, 65(1), 3-25 [cit. 2023-07-07]. ISSN 00323233. Dostupné z: doi:10.18267/j.polek.1124

HENDL, Jan, 2009. *Přehled statistických metod: analýza a metaanalýza dat*. 3. přeprac. vyd. Praha: Portál. 696 p. ISBN 978-80-7367-482-3.

HIGGINS, Robert C., 1997. *Analýza pro finanční management*. Praha: Grada. ISBN 80-7169-404-5.

HINDLS, Richard, et *al*., 2007. *Statistika pro ekonomy*. 8. vyd. Praha: Professional publishing. 415 p. ISBN 9788086946436.

JURAJDA, Štěpán a Juraj STANČÍK, 2012. Foreign Ownership and Corporate Performance: The Czech Republic at EU Entry. *Czech Journal of Economics and Finance: Finance a úvěr*. 62(4), 306-324.

KALOUDA, František, 2017. *Finanční analýza a řízení podniku*. 3. roz. vyd. Plzeň: Vydavatelství a nakladatelství Aleš Čeněk. ISBN 978-80-7380-646-0.

KNÁPKOVÁ, Adriana, Drahomíra PAVELKOVÁ a Miroslav CHODÚR, 2011. *Měření a řízení výkonnosti podniku*. Praha: Linde. ISBN 978-80-7201-882-6.

KUBÍČKOVÁ, Dana a Irena JINDŘICHOVSKÁ, 2015. *Finanční analýza a hodnocení výkonnosti firmy*. Praha: C.H. Beck. Beckova edice ekonomie. ISBN 978-80-7400-538-1.

LINDEMANIS, Mārtiņš, Artūrs LOZE and Anete PAJUSTE, 2022. The effect of domestic to foreign ownership change on firm performance in Europe. *International Review of Financial Analysis*, 81, p.101341.

NEUMAIER, Ivan a Inka NEUMAIEROVÁ, 2002. *Výkonnost a tržní hodnota firmy*. Praha: Grada. ISBN 80-247-0125-1.

PACHECO, Luis a Bruno PEDRINHO, 2022. As determinantes do desempenho econômico-financeiro das PME: o papel do capital estrangeiro. *Estudios Gerenciales* [online]. 2022-09-01, 38(164), 334-346 [cit. 2023-07-07]. ISSN 2665-6744. Dostupné z: doi:10.18046/j.estger.2022.164.5104

RŮČKOVÁ, Petra, 2019. *Finanční analýza: metody, ukazatele, využití v praxi*. 6. akt. vyd. Praha: Grada Publishing. Finanční řízení. ISBN 978-80-271-2028-4.

ŘEZANKOVÁ, Hana, 2010. *Analýza dat z dotazníkových šetření*. 2. vyd. Praha: Professional Publishing, 217 p. ISBN 978-80-7431-019-5.

STEIGENBERGER, Norbert, 2014. Only a matter of chance? How firm performance measurement impacts study results. *European Management Journal*, 32(1), p.46-65.

SUCHÁNEK, Petr, 2007. Hodnocení konkurenceschopnosti. In *Vývojové tendence podniků III: specifický výzkum katedry podnikového hospodářství*. Brno: Masarykova univerzita, p. 13-20. ISBN 978-80-210-4466-1.

TEMOURI, Yama, Nigel L. DRIFFIELD a Dolores AÑÓN HIGÓN, 2008. Analysis of Productivity Differences among Foreign and Domestic Firms: Evidence from Germany. *Review of World Economics* [online]. 144(1), 32-54 [cit. 2023-07-07]. ISSN 1610-2878. Dostupné z: doi:10.1007/s10290-008-0136-1

WALL, Friederike and Dorothea GREILING, 2011. Accounting Information for Managerial Decision-Making in Shareholder Management Versus Stakeholder Management. In. *Review of Managerial Science*. July 2011, Volume 5, Issue 2, p. 91 – 135.

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Are there any perceptual barriers of consumers for adopting battery electric vehicles?

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Abstract

Sustainability awareness is on the rise among Czech consumers. One of the ways to promote sustainable consumer behavior is the adoption of alternative transportation options, incl. individual transportation. In Europe, battery electric vehicles (BEVs) in particular are seen as the key way forward. The aim of this paper is to analyze perceptions, purchasing motivations, and perceptual barriers of Czech consumers for adoption of BEVs and other new energy vehicles. The paper builds upon a representative sample of 1,000 active car drivers. Key perceptual barriers identified in the research include especially limited experience with new energy vehicles, higher asking price, easy and availability of charging, whereas perceived environmental footprint was found to be the main element possibly contributing to adoption of BEVs. It remains a question, how perceptual barriers evolve over time.

Key words

Electromobility, consumer perceptions, sustainability, battery electric vehicle, adoption, Czech Republic

Introduction

Climate change and environmental concerns are leading European society to discuss more frequently the level of threat not only to future generations. How everyone can contribute to protecting the environment is an increasingly topical question. The European Union is working toward a revision of the Green Deal for Europe in the first months of 2023. This agreement is intended to transform the European Union's economy into a modern, competitive, and resource-efficient economy. The aim is to achieve zero net greenhouse gas emissions by 2050, decoupling economic growth from resource use, without leaving any individual or region behind. The European Commission's set of proposals on how to achieve these touches on various themes. From clean air and water, renovated and energy-efficient buildings, healthy and affordable food, a dense public transport network, clean energy and cutting-edge clean technological innovation, longer-lasting products that can be repaired, recycled, and reused, modern jobs and training leading to the skills that will be needed for the transformation, to a globally competitive and resilient industry (European Commission, 2023).

In the field of transport, the European Commission's intentions are based on the Sustainable and Smart Mobility Strategy 2020. This strategy highlights the importance of this sector. Transport and mobility is the second-largest area of expenditure for European households,

while accounting for 5% of Europe's GDP and employing 10 million workers. The 2020 transport and mobility strategy aims to reduce greenhouse gases by 90% by 2050. Actions to reduce dependence on fossil fuels, among other things, aim to achieve this goal. Car manufacturers will face a challenge of delivering 30 million zero-emission cars and 80 000 zero-emission trucks in operation by 2030 (European Commission, 2020).

However, this ambitious target does not go hand in hand with the trends in the automotive market in the Czech Republic at present. Only a mere 3,892 battery electric vehicles (2.03%) and 3,561 hybrid cars were newly registered in 2022, while a total accounts for 192,087 passenger vehicles (SDA, 2023a). Out of these, 66.45% were gasoline and 24.72% diesel cars.

The number of electric cars sold in the Czech Republic in the first quarter of 2023 is slightly higher but still reaches only 2.34% of all registered cars (SDA, 2023b). This small increment has been falling behind the target set by the European Commission's projection. The question, which this paper seeks to address, remain: Are Czech consumer ready to adopt electric vehicles (EVs)? We will highlight the main limitations of increasing EV adoption in the Czech Republic.

1 Sustainable Car Market in the Czech Republic

Sustainability is entering all sectors as an important phenomenon. Fuller (1999) describes sustainability as "the process of planning, implementing, and controlling the development, pricing, promotion, and distribution of products in a way that satisfies the following three criteria: customer needs are met; organizational goals are achieved; and the process is compatible with ecosystems". All these criteria are taken into account for long-term planning, but also in the day-to-day decision-making processes of managers in all sectors.

Environmental pollution is caused to a large extent by transportation, in addition to the growing population and industrialization (Nakamura et al., 2004). Therefore, automotive companies not only try to eliminate pollution in industrial production, but also follow sustainable transportation trends. Sustainable transportation meets the requirements of the present without creating problems for future transportation systems (Black, 1996), a definition similar to the general definition of sustainability. Sustainability in transport can be ensured by the same or lower pollution generation rate than the time required for the absorption and complete decay of pollution in the environment (Gurtu, 2014). CO_2 emissions are the most important criterion for a sustainable transport system (Singh et al., 2021). CO_2 is recognized as a one of the most influential greenhouse gases (Kondratyev and Varotsos, 1995, Adamenko et al., 1999). The transport sector accounts for approximately 25% of global CO_2 emissions (Van den Berg and De Langen, 2017).

Promoting the transition to alternative fuels in passenger cars is an important solution (Krzywonos et al., 2015, Katinas et al., 2018, Capros et al., 2019). The electric car, due to its possibly zero emissions at use (Cansino et al. 2018, Ahmadi, 2019) is one of the solutions towards reducing carbon footprint from transport (Santini, 2019, Chakraborty, 2019). Electric cars will play an important role in achieving a sustainable energy economy, together with appropriate choice of energy sources and management of electricity distribution (Tucki et al., 2020).

While foreign ownership of automakers in the Czech automotive industry is setting the course for electrification, new challenges in the transition to new information technologies, new costs and risks are emerging. These include rising prices (especially for cars, energy and raw materials), as well as tax costs for infrastructure and electric vehicles (European Investment Bank, 2022). Another milestone is believed to be availability and local production facilities for batteries on the European continent.

The electrification readiness of car companies is one side of the coin, the other one customer attituded towards electromobility. While the Czech B2B market has been known for its demand for EVs since the entry of EVs into the Czech market, individual consumers are only cautiously finding their pathway to electromobility. In addition to demographic, situational or contextual influences on EV consumption behavior, psychological factors are also important. These include attitudes, emotions, social influence, but also experience. In the case of EVs, these are product-related experiences and practical knowledge about the specific product (Singh et al., 2020). However, the requirement of product knowledge cannot be satisfied by a mere test drive, but it is necessary to find out whether the travel requirements of EVs will be satisfied or not (Lie et al., 2017). Due to the very low familiarity of the Czech population with electromobility, experience seems to be a significant barrier to the adoption of electromobility by Czech consumers. Bryla et al. (2023) summarize the determinants of consumer preferences in their study. These include trialability and willingness to pay for EV adoption. Price and affordability also play a role for consumers, especially in mid- or low-income markets.

2 Methodology

An online survey was conducted in February 2022 in collaboration with a market research agency. The aim was to find out about attitudes of Czech consumers towards electromobility. Respondents were approached based on a quota selection to ensure representativeness. A total of 1,000 complete responses were included in the evaluation. From a methodological point of view, the panel of respondents (n = 1,000) is sufficient to obtain information that can be generalized to the population of the Czech Republic. The survey compared individual vehicles with each other, but also within sub-categories, i.e. individual features that may be important to consumers.

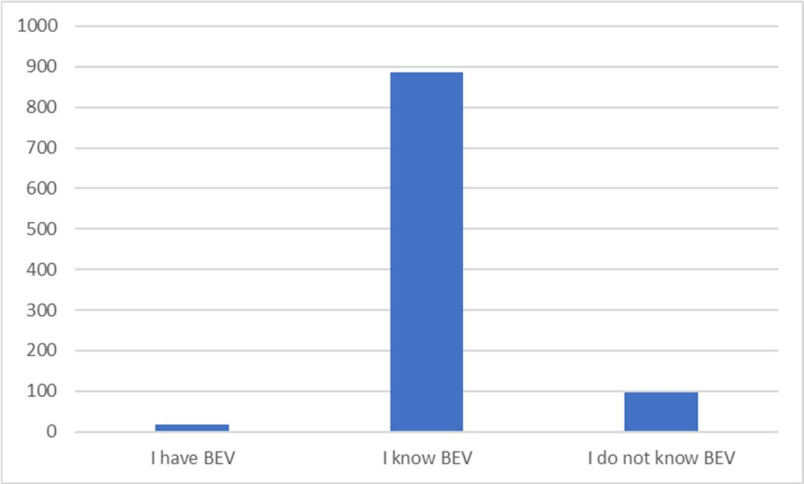
The key questions focused on the assessment of the vehicles (combustion engine, BEV, PHEV, MEV) in terms of economic, environmental and user criteria. In addition, respondents answered questions on their knowledge of the vehicles, or their experience with them, and the overall attractiveness of the vehicle variants. Attitudes and level of agreement were monitored using a Likert-type scale. However, this scale offers not only an assessment of attitude towards the defined issue, but also its strength. Therefore, it was possible to work with the results as a numerical quantity. The scales were polarized from disagreement to agreement, always with an odd number of items.

The data was analyzed using standardized statistical software. Pearson's key test of goodness-of-fit was used to reveal underlying relationships and correlations at the descriptive statistics level (significance at 0.05 or less).

3 Results and discussion

The experience with electric vehicles (BEV, PHEV, MHEV) is very modest in the Czech Republic. Most Czechs drive cars with internal combustion engines as well as most respondents in the sample (728 usually, only 158 do not). In contrast, less than 1% of respondents drive EVs.

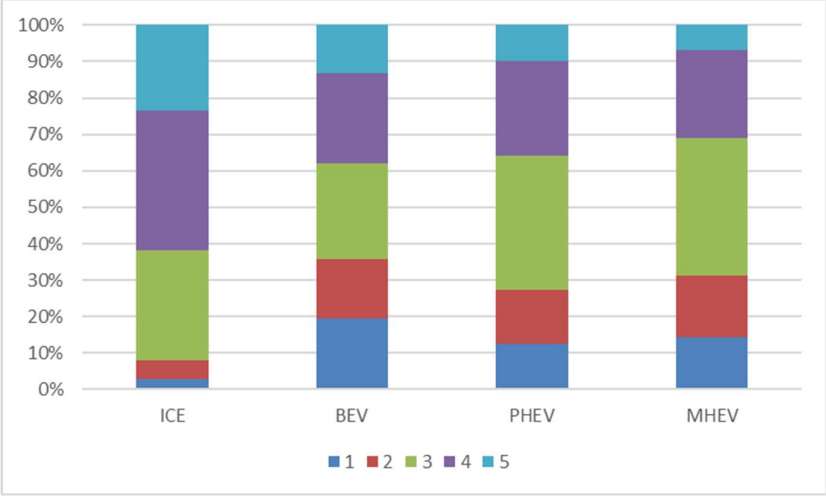
Figure 1: Awareness About Battery Electric Vehicles



Source: Own processing based on survey data

BEVs cars or hybrids are becoming increasingly attractive to Czech consumers. However, cars with internal combustion engines (ICE) are still at the top of the list. ICEs are unattractive for less than 10% and 617 respondents out of 1,000 consider them rather attractive or very attractive. BEVs are the least attractive, with over 35% of respondents rating them on a scale with 1 or 2 (as unattractive). Many respondents chose an average attractiveness rating for all car variants. This reinforces the premise of potentially increasing attractiveness of EVs in the future.

Figure 2: Perceived Attractiveness of Various Powertrains



Source: Own processing based on survey data

Subsequently, the dependence of the overall attractiveness of a BEV on its familiarity was assessed. This dependence was confirmed by Chi-square test. The value is less than 0.05. Therefore, it can be predicted that if Czechs use EV´s, the attractiveness of EVs in the Czech population will increase.

Table 1: Awareness of BEVs

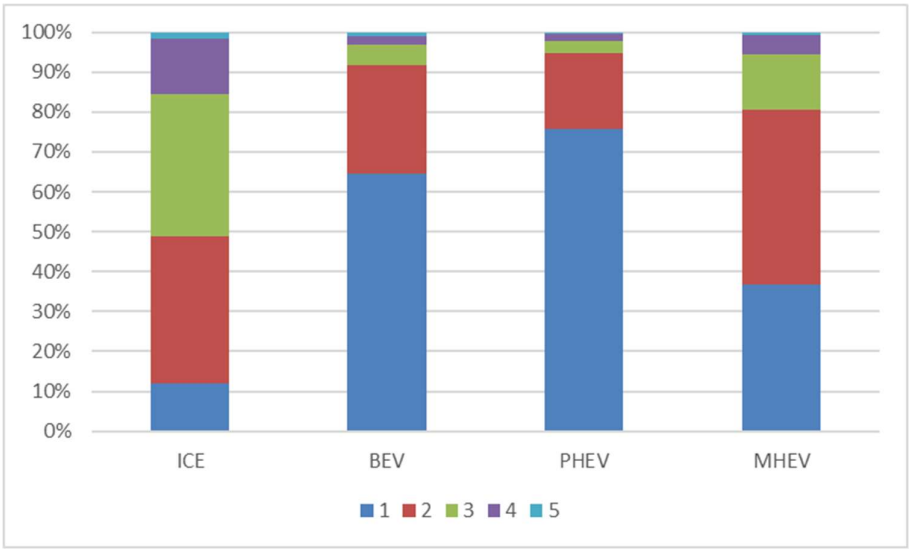
	1	*2*	*3*	*4*	*5*	*Row Total*
I have a BEV	2	2	2	4	8	18
	0,20%	0,20%	0,20%	0,40%	0,80%	1,80%
I know (of) a BEV	174	142	224	228	118	886
	17,40%	14,20%	22,40%	22,80%	11,80%	88,60%
I do not know (of) a BEV	20	17	36	17	6	96
	2,00%	1,70%	3,60%	1,70%	0,60%	9,60%
Column Total	196	161	262	249	132	1000
	19,60%	16,10%	26,20%	24,90%	13,20%	100,00%

Source: Own processing based on survey data

Test	Statistic	Df	P-Value
Chi-Square	26,828	8	0,0008

A major problem affecting the attractiveness of electromobility in the Czech Republic is the asking price of vehicles (Jaderná et al., 2019). The popularity of used cars in the Czech Republic lowers the threshold of an acceptable purchase price. Considering the current very low prevalence of sales of used electric cars, this problem is not negligible. The purchase price of BEVs and PHEVs is rated significantly negatively on a scale of 1 to 5, as indicated in the following graph.

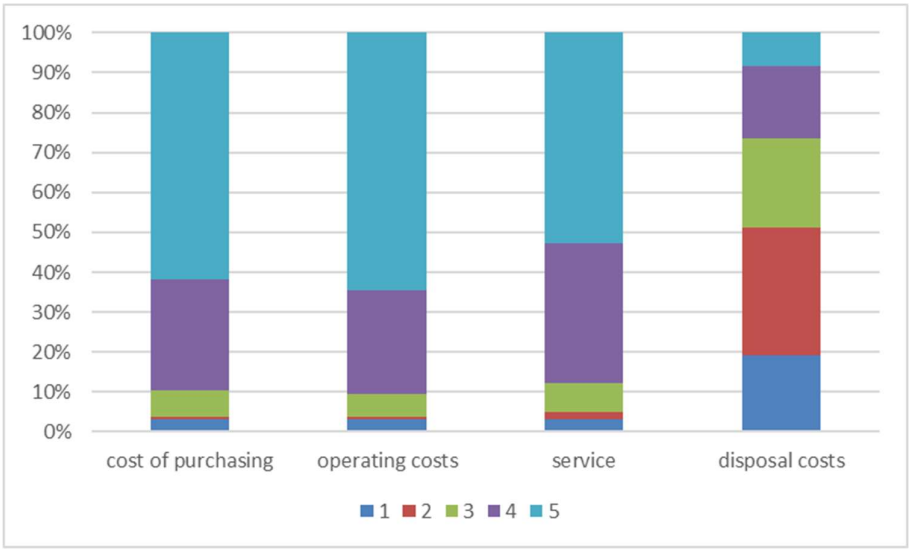
Figure 3: Purchase Price Perception of Various Powertrains



Source: Own processing based on survey data

In addition, nearly 90% of respondents consider the purchase price to be a crucial aspect of buying a car, as well as the cost of running and servicing. In recent years, however, the prices of new internal combustion engine cars and electric cars have come noticeably closer.

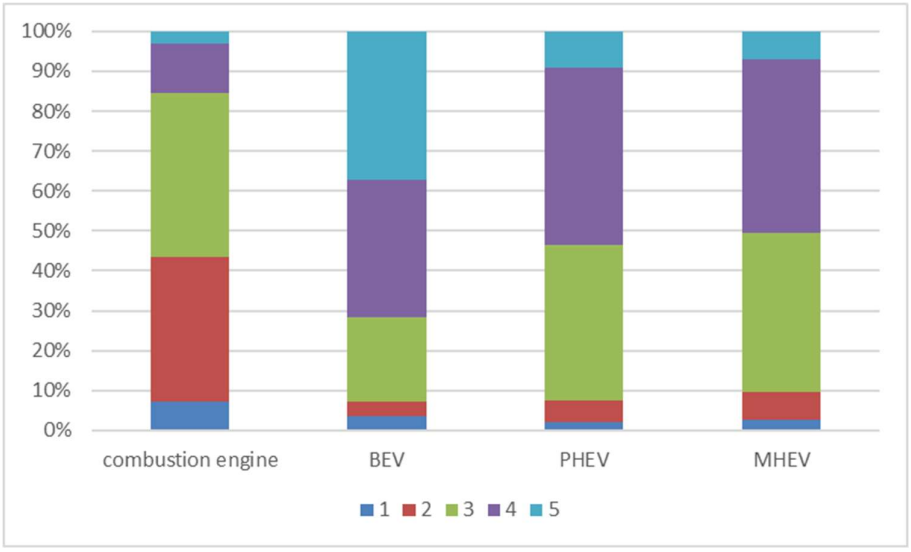
Figure 4: Perception of Various Cost Elements



Source: Own processing based on survey data

On the other hand, the emissions aspect of using a car may still be more crucial for the Czech consumer. 716 out of 1,000 respondents gave BEVs a rating of 4, 5, with 5 being the best possible. In contrast, more than 40% of respondents consider internal combustion engine cars to be a burden on the environment in terms of emissions.

Figure 5: Perceived Emissions of Various Powertrains



Source: Own processing based on survey data

The Pearson Chi-square test conducted shows that the assessment of the attractiveness of a pure electric car is dependent on the assessment of emissions during operation. There is a tendency to perceive electric cars as a green mobility option as promoted not only by car manufacturers. People who buy electric cars perceive a positive environmental impact. The increasing pressure for emission-free mobility, but also for a low-emission lifestyle, is thus helping to increase the attractiveness of EVs.

Table 2: Perception of Emissions by Attractiveness of BEVs

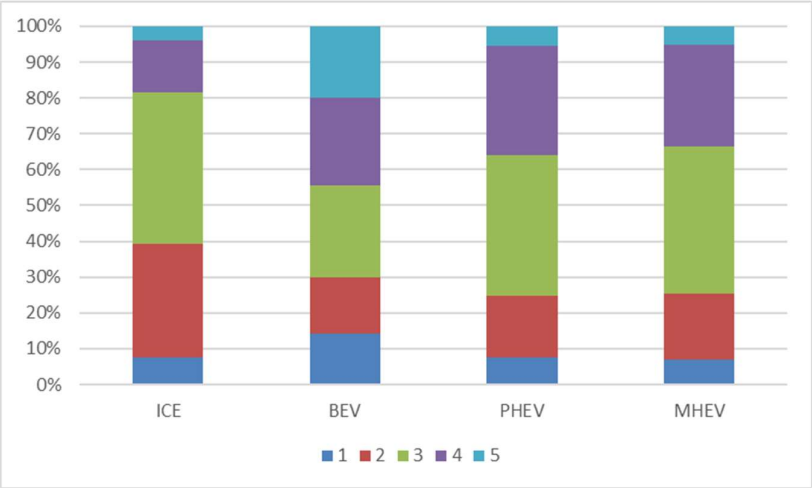
	1	*2*	*3*	*4*	*5*
1	29	12	20	9	15
	2,90%	1,20%	2,00%	0,90%	1,50%
2	44	20	20	24	9
	4,40%	2,00%	2,00%	2,40%	0,90%
3	45	45	72	42	26
	4,50%	4,50%	7,19%	4,20%	2,60%
4	62	52	89	100	43
	6,19%	5,19%	8,89%	9,99%	4,30%
5	16	32	61	74	39
	1,60%	3,20%	6,09%	7,39%	3,90%
envir_dul/emise_provoz	0	0	0	0	0
	0,00%	0,00%	0,00%	0,00%	0,00%
Column Total	196	161	262	249	132
	19,58%	16,08%	26,17%	24,88%	13,19%

Source: Own processing based on survey data

Test	Statistic	Df	P-Value
Chi-Square	1084,984	25	0

The overall environmental footpring of various types of vehicles was again assessed by Czech consumers rather negatively for cars with internal combustion engines (almost 40% of respondents gave a score of 1, 2). Compared to the question on emissions in use, the ecoprint of electric vehicles were assessed more negatively. Nevertheless, the highest score was given to pure electric cars (445 out of 1000 respondents gave a score of 4, 5).

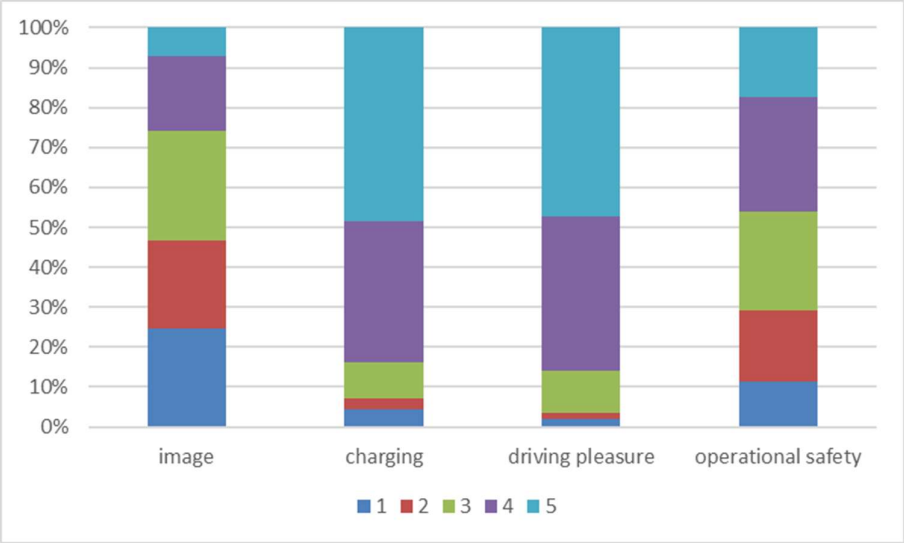
Figure 6: Perceived Environmental Footprint of Various Powertrains



Source: Own processing based on survey data

The research also focused on user experience, specifically image, charging, driving pleasure, and operational safety. Respondents rated the importance of these aspects on a scale of 1 to 5. For more than 80% of respondents, charging and driving pleasure are important or very important. On the other hand, image is the least important (72 respondents gave a rating of 5) and operational safety is very important for 173 respondents.

Figure 7: Importance of User Experience of Various Powertrains



Source: Own processing based on survey data

CONCLUSION

Major obstacles to increasing attractiveness of electric vehicles in the Czech Republic are mainly the high purchase price and the lack of knowledge or experience with electric vehicles. The results confirm the continued importance of the purchase price aspect of cars. In 2018, a survey was organized which showed, among other things, that 356 respondents out of 1,000 would buy an electric car at a comparable price and only 94 respondents would buy an electric car at a price higher than that of an ICE. At that time, the price of an electric car was nearly twice as high as that of an internal combustion engine car. The market situation has changed, and combustion engine cars are gradually catching up with electric cars in terms of a purchase price. However, the used car market is still significant for the Czech Republic and is dominated by ICE cars.

A deep-rooted limitation to greater adoption of BEVs, PHEVs and MHEVs seems to be relatively low level of experience of Czech consumers with electric cars. Czech drivers' preconceptions can perhaps be erased by a higher level of experience with electric cars. Anything unfamiliar may appear as a deterrent. Questions about range, availability of charging stations or safety in use are important for the Czech consumer and are yet to be sufficiently answered.

Environmental aspects may also play an important role. Already a survey in 2018 showed that Czech consumers consider electric vehicles to be more environmentally friendly. BEVs were identified as the most eco-friendly option before trains, buses, hybrid cars or CNG cars (Jaderná

et. al, 2018). It is also clear from the results of this 2022 survey that electromobility is perceived as an eco-friendly mobility option. Customers who consider BEVs as the most emission-friendly perceive BEVs to be attractive the most.

Educating customers, providing ample opportunities for test drives or short-term rentals (aka car-sharing) of BEVs is therefore necessary for the Czechs to become more acquainted with electromobility. Experiencing driving characteristics of BEVs, learning about charging possibilities and adjustment of mobility habits could assist in lifting some of the perceived concerns. Offsetting the higher purchase price by introducing the entire operating cost formula of BEVs to Czech customers could also provide a solution to greater and speedier adoption of new energy vehicles. The promotion, adoption, and acceptance of electric vehicles by Czech drivers is likely to remain a topic for a few years to come.

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Bibliography

ADAMENKO, V.V., KONDRATYEV, K.Y. & VAROTSOS, C.A. (1999). Climate Change in the Arctic and its Empirical Diagnostics. Energy Environ, Vol. 10, 469–482.

AHMADI, P. (2019). Environmental impacts and behavioral drivers of deep decarbonization for transportation through electric vehicles. J. Clean. Prod. Vol. 225, 1209–1219. doi: 10.1016/j.jclepro.2019.03.334.

BCG (2022). Czech Automotive Industry in Transition, available at: https://www.europeum.org/data/articles/20220523-e-mobility-report-czech-rep-full-results-vupdated.pdf

BLACK, W.R. (1996). Sustainable transportation: a US perspective. Journal of Transport Geography, Vol. 4, 151-159.

BRYŁA, P., CHATTERJEE, S. & CIABIADA-BRYŁA, B. (2023). Consumer Adoption of Electric Vehicles: A Systematic Literature Review. Energies, Vol. 16(1), 205.

CANSINO, J.M., SÁNCHEZ-BRAZA, A. & SANZ-DÍAZ, T. (2018). Policy Instruments to Promote Electro-Mobility in the EU28: A Comprehensive Review. Sustainability, Vol. 10, 2507.

CHAKRABORTY, D., BUNCH, D.S., LEE, J.H. & TAL, G. (2019). Demand drivers for charging infrastructure-charging behavior of plug-in electric vehicle commuters. Trans. Res. Part D Trans. Environ. Vol. 76, 255–272.

EUROPEAN COMMISSION (2020). The transport and mobility sector, available at: https://ec.europa.eu/commission/presscorner/detail/en/fs_20_2350

EUROPEAN COMMISSION (2023). Zelená dohoda pro Evropu, available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_cz

EUROPEAN INVESTMENT BANK (2023). Recharging the batteries: How the electric vehicle revolution is affecting Central, Eastern and South-Eastern Europe. March 2023.

FULLER, D. A. (1999). Sustainable marketing: managerial-ecological issues. Thousand Oaks, Calif.: Sage Publications, 395 p. ISBN 07-619-1219-3.

GURTU, A. (2014). A Framework for Reducing Greenhouse Gas (GHG) Emissions through Carbon Pricing for Offshore Outsourcing, Ph.D., Ryerson University, Toronto, available at: http://digital.library.ryerson.ca/islandora/object/RULA%3A3388.

KATINAS, V., GAIGALIS, V., SAVICKAS, J. & MARCIUKAITIS, M. (2018). Analysis of sustainable liquid fuel production and usage in Lithuania in compliance with the National Energy Strategy and EU policy. Renew. Sustain. Energy Rev. Vol. 82, 271–280.

KONDRATYEV, K.Y. & VAROTSOS, C. (1995). Atmospheric greenhouse effect in the context of global climate change. Il Nuovo Cimento, Vol. 18, 123–151.

KRZYWONOS, M., SKUDLARSKI, J., KUPCZYK, A., WOJDALSKI, J. & TUCKI, K. (2015). Forecast for transport biofuels in Poland in 2020–2030. Przem. Chem. Vol. 94, 2218–2222.

LI, W., LONG, R., CHEN, H. & GENG, J. (2017). A review of factors in fl uencing consumer intentions to adopt battery electric vehicles. Renew. Sustain. Energy Rev. Vol. 78, 318–328. doi:10.1016/j.rser.2017.04.076.

NAKAMURA, H., HAYASHI, Y. & MAY, A.D. (2004). Urban transport and the environment—an international perspective. World Conference on Transportation Research Society and Institute for Transport Policy Studies, Elsevier, Amsterdam.

PAVLÍNEK, P. (2022). Transition of the automotive industry towards electric vehicle production in the east European integrated periphery. Empirica. Vol. 50. 35-73. Available at: https://link.springer.com/article/10.1007/s10663-022-09554-9.

PŘIKRYLOVÁ, J., JADERNÁ, E., JOPPA, A. (2019). Czech Green Consumer. Marketing Identity: Offline is the New Online. Trnava, Slovakia: Faculty of Mass Media Communication, University of SS. Cyril and Methodius in Trnava, Slovakia, 75-86. ISBN 978-80-572-0038-3.

SANTINI, D. J. (2019). Electric Vehicle Waves of History: Lessons Learned about Market Deployment of Electric Vehicles. Available at: http://Cdn.intechweb.org/pdfs/18663.pdf.

SDA – CAR IMPORTERS ASSOCIATION (2023a). Registrace nových OA v ČR 12/2022, available at: https://portal.sda-cia.cz/stat.php?p#rok=2022&mesic=12&kat=OA&vyb=cel&upr=&obd=m&jine=false&lang=CZ&str=nova.

SDA – CAR IMPORTERS ASSOCIATION (2023b). Grafy a tabulky ke statistice vozidel registrovaných v ČR v období 1-3/2023, available at: https://portal.sda-cia.cz/clanky/download/2023_04_tiskovka-2023-3.pdf.

SINGH, A., GURTU, A., SINGH, R. K. (2021). Selection of sustainable transport system: a case study. Management of Environmental Quality. Vol. 32(1), 100-113. doi:10.1108/MEQ-03-2020-0059.

SINGH, V., SINGH, VEDANT, VAIBHAV, S. (2020). A review and simple meta-analysis of factors influencing adoption of electric vehicles. Transportation Research Part D: Transport and Environment. Vol. 86, 102436.

TUCKI, K., ORYNYCZ, O. & MITORAJ-WOJTANEK, M. (2020). Perspectives for Mitigation of CO2 Emission due to Development of Electromobility in Several Countries. Energies. Vol 13(16), 4127. doi:10.3390/en13164127

VAN DEN BERG, R. & DE LANGEN, P.W. (2017). Environmental sustainability in container transport:the attitudes of shippers and forwarders. International Journal of Logistics Research and Applications. Vol. 20(2). 146-162.

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The war in Ukraine, the economy, inflation and price developments in the Russian Federation, Ukraine, and Slovakia

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Abstract

The difficult fight against the disease Covid 19 meant a significant expenditure of human resources, material, and financial resources. Millions of victims of human lives, declarations of emergency situations - states of danger increased in 2022, at the time when the Russian Federation recognized the self-proclaimed republics of Donetsk and Luhansk as sovereign states. Subsequently, on February 24, the troops of the Russian Federation began a special military operation against Ukraine with the aim of denazification and demilitarization of this country. Despite the assumptions of a quick occupation of Kyiv and the establishment of a pro-Russian puppet regime, after 19 months of merciless war conflict, we are witnessing certain successes of the Ukrainians in the gradual, albeit small, liberation of their own territory. Since considerable resources are needed to wage war, they must be created or taken from somewhere. The aim of the contribution is to analyse the impact of the war in Ukraine on the economic situation in the Russian Federation, Ukraine, and Slovakia and to express opinions on the perspective of its development from Slovakia's point of view.

Key words

War, economy, inflation, increasing prices, development

Introduction

The war conflict between Russia and Ukraine also affects Slovakia, many Ukrainians have been living and working in our country for a long time, trying to help their families, and we can also expect an influx of refugees. (MYREGIONY.SK, 2023) According to experts, the war will also affect Slovakia in the form of higher prices for fuel, basic commodities, and services. The whole situation is colourfully described to us by various sources of information that we read or hear practically every day. Information widely describes the development of the situation in places of war conflicts, sanctions, and their impact on sanctioned countries and individuals from those states. There also exists strong impact of sanction on countries who declared them on Russia Federation and its supporters. Based on several experts the credibility of the information content is often debatable. On the one hand, we learn that the war is destroying the Russian economy. Waging war means higher demands on state revenues. The Russian Federation's attack on Ukraine is causing Russia international isolation, which in the future should manifest itself in the way that the Western world is cut off from Russian fossil fuels. Since it is a logistically very demanding process, the EU is still buying Russian mineral raw materials and, paradoxically by this, is also financing the war against Ukraine. This is also why Russia still has enough money

to wage war. (ENGINEERING.SK, 2023) Economic factors will not force Russia to end the war even in 2023. Sanctions against Russia are working, but they are starting gradually. Just recently Russia's Federation both chambers of parliament passed the highest state budget in history with military spending higher the social spending in history. The lower house of Russia's parliament, the State Duma, approved a federal budget Friday Nov 17, 2023, that increases spending by around 25% in 2024 and devotes a record amount to defense. The budget for 2024-2026 was developed specifically to fund the Russian military and to mitigate the impact of "17,500 sanctions" on Russia, State Duma Chairman Vyacheslav Volodin said. The development comes as the Kremlin is eager to shore up support for President Vladimir Putin before a March presidential election. Record low unemployment, higher wages and targeted social spending should help the Kremlin ride out the domestic impact of pivoting the economy to a war footing but could pose a problem in the long term, analysts say. The budget "is about getting the war sorted in Ukraine and about being ready for a military confrontation with the West in perpetuity," (Burrows, 2023)

The serious fact is that Ukraine is worse off than the aggressor. The war unleashed by Russia should mean a 35 percent drop in the Ukrainian economy. The estimated rate of inflation reached 30 percent in 2022 and should remain elevated in the current and next year. It should reach twenty and ten percent, respectively. Huge military expenditures for the country's defence will also push up the deficit of the state budget, which was estimated at about 23 percent of GDP last year, this year it may be five percentage points less. It is assumed that in 2022 and next year, Ukraine will already achieve economic growth at the level of three to four percent. We must consider that the calculation is based on low levels under the influence of the sharp decline from 2022, which has shifted the overall level of economic performance fundamentally downwards. (ENGINEERING.SK, 2023) According to the British intelligence service, Russia's withdrawal from the Black Sea grain agreement caused a drop in Ukrainian exports. Experts behind the termination of the agreement see an obvious attempt by the Russians to degrade the Ukrainian economy and its ability to support military efforts. Alternative grain exports by river, rail and truck transport cannot replace the sea transport of grain from Ukraine. The grain agreement from last year reduced the food price index by 23 percent, which mainly benefited developing countries.

1 Changing situation in economies of mentioned countries

Russia's full-scale invasion of Ukraine in 2022 changed a lot: European countries belatedly took real steps to wean themselves off dependence on Russian energy exports. Russia lost access to around half its currency reserves, held in foreign banks. Dozens of international firms — not just McDonald's — pulled out of Russia. Novel export controls were imposed to cut off Russia's access to vital technology for its war effort.

But not everything changed. Russia has resisted the effort to move to a full war economy, or even the North Korea-style autarky called for by Yevgeniy Prigozhin, the Wagner Group mercenary leader who died in August 2022.

And as widespread and hard-hitting as international sanctions have been, the U.S. and its allies have avoided totally cutting Russia off from the global economy. This has been shown most dramatically by the complex and novel "price cap" the G-7 has imposed that allows Russia to

continue exporting oil at a discount. (Hess, 2023). Hess notes that this would risk “prompting a crisis akin to that experienced by the global economy following the 1973 Arab Oil Embargo, when Arab producers cut off countries that supported Israel in the Yom Kippur War.” There’s a parallel here between economic and military strategy. Just as Western countries have held off on providing certain weapons to Ukraine, and imposed conditions for how those weapons are used, to avoid escalation that could lead to direct conflict between nuclear powers, they have also refrained from economic “nuclear options” that could do untold damage to the global economy, including to the countries imposing the sanctions. (Hess, 2023).Russia, with a dose of foresight, refers to itself as a "weaponized gas station", so any future decline in revenues from the sale of oil and gas will mean a significant problem for Russia. The Russian Minister of Energy, Alexander Novak, announced that in 2023, 80 percent of Russia's exports will go to friendly, primarily BRIX countries.

This confirms that exports still bring enough money to Russia. In 2022, the sanctions imposed on Russia did not result in a decrease in revenue from the sale of mineral raw materials, quite the opposite. This is due to the increase in their price and the still high volumes that Russia exports. For example, between January and November 2022, Russia received 164.2 billion dollars from the sale of oil and natural gas, which is almost thirty percent more year-on-year. In 2022, Russia was able to increase the volume of oil exports itself. Last year, it rose by 7.6 percent to 242 million tons. Gas exports rose by two percent to 535.2 million tons.

Since the beginning of the war, according to the Centre for Research on Energy and Air Purity, Russia has received approximately 296 billion euros from the export of mineral raw materials, almost 140 billion euros come from the EU. However, the sanctions began to have a slight effect on the decline in exports in December 2022. Russian oil exports fell by 200,000 barrels per day to 7.8 million barrels per day. This follows from the data of the International Energy Agency. The reason was precisely the sanctions. In December, the price ceiling entered into force, which meant that EU countries would pay a maximum of $60 per barrel for oil from Russia. Data on how much oil Russia exports varies, but nevertheless, it can be seen from these data that the sanctions imposed so far have not had a significant impact on the volumes of oil, natural gas and other mineral resources exported. In January 2023, the volume of Russian oil exports decreased, but it was reduced to only 9.85 million barrels of oil per day. In February 2022, when Russia attacked Ukraine, it was 10.11 million barrels per day.

2 Research objectives and methods

The main goal of this paper is to analyse the current state of the economy in selected countries, which bear the consequences of a war conflict lasting hundreds of days from February 24, 2022. The Russian Federation has unleashed a war that is the 2nd largest after World War II. We used primarily analysed actual economic information as well as open sources of prestigious think tanks and agencies. We worked with important method – the comparison of trustful information from examined countries. We concluded the paper by conclusions from results and tried to write the reasonable proposals for coming days.

3 Results

The short-term impacts on the Russian economy may seem subtle, but the adopted restrictions are mainly long-term in nature. The country is gradually cut off from the supply of the most important technologically advanced Western components and technologies, which may cause the Russian Federation to lag in labour productivity and competitiveness on the world market for a long time if the sanctions are maintained.

Figure 1: Price of 1 barrel oil (159 l) development in US dollars

Green line Urals; Red line Brent

Source: Pravda.sk 27.02.2023. (2023)

The impact of the sanctions on the Russian economy was not fully manifested precisely because the prices of oil and gas rose during 2022 and provided additional resources to the regime of Vladimir Putin. It seems, that Russia will look for other markets, but in the short term it will still have problems. Although Russian energy products find other customers on the world market, capacities are significantly limited, as Russia has the most important gas and oil pipeline connections with Europe. Building new infrastructure will take several years, even Russia almost doubled its export mainly to BRIX countries and strongly reinforces its cooperation with China, India, and North Korea.

Russia's spending is skyrocketing. Even though the main source of income for President Putin's aggressive regime has not dried up, Russia probably cannot afford war for a long time. Although Russia has officially planned a surplus budget for 2022, the war is significantly draining the entire country. Thus, according to official preliminary data, Russia shows a budget deficit of approximately 3.35 trillion rubles for the entire year 2022, which is approximately 42 billion euros. The short-term impacts on the Russian economy may seem subtle, but the adopted restrictions are mainly long-term in nature. The country is gradually cut off from the supply of the most important technologically advanced Western components and technologies.

In 2022 the country achieved revenues of approximately 27.83 trillion rubles, which is 11.1 percent above the original plan. However, the country's expenses soared to 31.13 trillion rubles (390 billion euros), which is 30 percent more than the Kremlin calculated in the original budget. However, the Russian regime is essentially artificially inflating the budget revenues by imposing a higher tax on Gazprom, a company where the majority is owned by the state. The state received further additional revenues to the budget thanks to the National Wealth Fund. The American Jamestown Foundation estimates that Russia increased its budget revenues by 2.77 trillion rubles in this way. So, it is money that the economy did not generate through its own functioning. The Russian economy can be helped with its financial situation, for example, by the National Wealth Fund, which the country is gradually dissolving. As of January 1, 2023, there were more than 184 billion dollars in it in various forms. Year-on-year, it is about 38 billion less, as Russia also covers the budget with the help of this money.

It is not entirely clear how much money Russia has been able to spend on the military so far. Estimates by the Jamestown Foundation say that until November 2022, Vladimir Putin's regime spent roughly 8.3 trillion rubles, i.e., more than one hundred billion euros, on expenses directly related to the invasion of Ukraine.

But considering how much money Russia has available, for example, in the National Wealth Fund, a costly war may not affect the social situation of Russians even in the coming years. Thus, the sanctions do not yet have the power to immediately increase Russian citizens' dissatisfaction with the Kremlin regime. Roughly eight out of ten Russians still support Putin.

Demarais (2022) acknowledges that sanctions can get results when the demands are specific and limited and the time frame is short. When the Trump administration-imposed sanctions on Turkey over the imprisonment of the American pastor Andrew Brunson in 2018, Brunson was released from jail within a couple of months. But too often they take forms like Trump’s “maximum pressure” campaign against Iran, which imposed conditions Tehran was so unlikely to agree to that it essentially amounted to a demand for a regime change. (In an unfortunate omission, Demarais doesn’t engage with the most frequently cited example of a successful “regime change” pushed along by sanctions: the global pressure campaign against apartheid South Africa.)

Worries that sanctions had become an all-purpose crutch with diminishing returns are not new. As far back as 1998, President Bill Clinton worried that the U.S. had become “sanctions happy.” But Demarais takes the normal critique further, arguing that sanctions have become largely ineffective and encourage behaviour that runs counter to U.S. interests.

Most famously, the embargo against Cuba that President Dwight D. Eisenhower first imposed in 1960 not only failed to dislodge the country’s communist government, but also likely led Cuba to deepen its economic ties with Russia in the early years and with China — now its largest trading partner. In other words, Russia and China might be the main beneficiaries of this ostensibly anti-communist policy.

Big problems are not yet visible, but they will come

Significant weakening of the Russian economy is not yet visible in the numbers. "The expected contraction of the Russian economy in the past year ranges from -2.2 percent, that is the estimate of the International Monetary Fund, to -3.5 percent of GDP, that is the estimate of the World Bank. The World Bank expects continued contraction at -3.3 percent of GDP, the International

Monetary Fund predicts a soft 0.3 percent growth, but this performance is largely driven by massive military spending.

Russia's macroeconomic figures do not show the war. According to data from the Russian Central Bank, nominal wages in 2022 were expected to increase by 12.4 percent, prices increased by 11.9 percent. Even in the coming years, according to the current estimates of the local central bank, nominal wage growth should exceed inflation. The central bank itself expects a decline in exports, but neither the unemployment rate nor the price level will significantly increase. According to current expectations, price growth should remain at a level of around four percent in the coming years.

However, this does not mean that Russia is not destroying its own economy. "About 100,000 IT specialists left Russia, production in some sectors, such as the production of automobiles and pharmaceuticals, fell by half, and about 275 billion dollars of capital left the country. The country will miss this money especially at a time when the economy is not driven by military spending. The balance sheet of foreign direct investments shows that the country's economy is losing money. Billions have been leaving the country every quarter since the war broke out. In addition, the country is losing resources from which its future growth could flow. Russia's growth potential is currently estimated at 1.5 percent per year. Long-term growth is limited by unfavourable demographic trends, low level of investment and low productivity of the economy. In addition, Russia worsens the demographic structure by the fact that the war brings victims, people with permanent handicaps, mobilization, and emigration from the country.

The war can be felt, for example, in the volume of imported goods. In 2021, its value was at the level of 380 billion dollars, in 2022 it was 346 billion dollars. The decline in imports combined with the growth in the value of exports caused Russia to reach a record trade surplus of $227 billion in 2022. A significant surplus of the trade balance can also be interpreted as a sign of the strength of the economy, but this is not the case in Russia. Russia achieved such a result also because Western countries also paid more for energy.

Ukraine will need many years to return its economy to pre-war levels, and forecasts during the intense fighting will inevitably remain uncertain. However, after 20 months of war, a sense of stability and relative stability has emerged, increasing confidence among consumers and investors, according to The New York Times. There are significant challenges ahead, including the costly reconstruction of the country's devastated cities, a growing state deficit as the war drags on, and a shortage of working-age labour caused by many refugees and citizen mobilization. (DANISHEVSKA, 2023).

Ukraine’s economy is adapting to the war. People have shifted from a "savings mode" to a situation where they feel more relaxed and start to spend more. According to the World Bank's estimates, private consumption in Ukraine will grow by 5% this year after a quarter of contraction last year. In cities like Kyiv and Dnipro, which are far from the combat zone but still under the threat of Russian airstrikes, customers are returning to reopened restaurants and resuming their purchases.

Ukraine Economic growth forecasts

Higher-than-expected spending has led financial institutions to revise their economic forecasts. The International Monetary Fund projected that the country's GDP would grow by 2% this year,

which is slightly less optimistic than the World Bank's forecast but significantly higher than the initial prediction of a 3% decline.

Although Ukraine's GDP is still significantly smaller than before the war (the economy contracted by 29.1% after Russia's full-scale invasion last year), it is expected to grow by approximately 3.5% this year, according to the World Bank. This growth is driven by increased domestic spending and supported by a steady flow of foreign financial aid.

However, growth rates can be a poor indicator of a country's economic health during wartime, as production volumes are often inflated due to government orders for military production. The Ukrainian government has allocated a significant portion of its budget to pay for the army and support the arms industry.

Factors of Ukrainian Economy Growth

The serious fact is that Ukraine is worse off than the aggressor. The war unleashed by Russia should mean a 35 percent drop in the Ukrainian economy. The estimated rate of inflation reached 30 percent in 2022 and should remain elevated in the current and next year. It should reach twenty and ten percent, respectively. Huge military expenditures for the country's defence will also push up the deficit of the state budget, which was estimated at about 23 percent of GDP last year, this year it may be five percentage points less. It is assumed that in 2022 and next year, Ukraine will already achieve economic growth at the level of three to four percent. We must consider that the calculation is based on low levels under the influence of the sharp decline from 2022, which has shifted the overall level of economic performance fundamentally downwards. (ENGINEERING.SK, 2023) According to the British intelligence service, Russia's withdrawal from the Black Sea grain agreement caused a drop in Ukrainian exports. Experts behind the termination of the agreement see an obvious attempt by the Russians to degrade the Ukrainian economy and its ability to support military efforts. Alternative grain exports by river, rail and truck transport cannot replace the sea transport of grain from Ukraine. The grain agreement from last year reduced the food price index by 23 percent, which mainly benefited developing countries. Ukraine's ability to adapt to the various challenges of wartime, such as maintaining electricity supply despite Moscow's winter campaign against its energy infrastructure, has helped stabilize the economy. New trade routes bypassing Moscow's attempts to block the Black Sea has also contributed to the recovery of agricultural exports, which made up a significant part of Ukraine's pre-war income. According to the World Bank's estimates, Ukraine's total export volume will continue to shrink this year, but then it will increase by 15% next year and by 30% in 2025, which is a potential lifeline for the economy if the war drags on.

Ukraine's economy is increasingly cantered around the war. More than half of the government's expenditures next year, approximately $46 billion, will be directed toward defence. However, due to the low tax revenues needed to finance this spending, Ukraine's budget deficit next year is projected to reach 21% of the country's total production volume, as stated by Prime Minister Denys Shmyhal. The government would need financial assistance of $42 billion to cover this deficit.

Slovakia’s Economic and social consequences of Russia’s invasion of Ukraine

Several economic problems in Slovakia are related to energy. At the extraordinary meeting of the government on 16.01.2023, a regulation was approved, by which the prices of the regulated

supply of electricity and gas for small entrepreneurs were capped. These were business entities that consume electricity up to 30 MWh per year and gas up to 100 MWh per year. In 2023, these entrepreneurs will pay a maximum of 199 euros/1 megawatt hour (without VAT) for electricity and 99 euros/1 megawatt hour (without VAT) for gas. If we notice price ceilings for small companies - the state will pay 100% of the price difference. Compared to the plan announced by the government in October of last year, there has been a fundamental change in the amount of compensation for the difference between supplier prices and capped amounts. While according to the plan the state was supposed to reimburse 80% of the difference, in the end it will reimburse the entire 100% of the difference, which means that entrepreneurs will not pay more than the mentioned prices for 1 MWh. Compensations will be paid directly by the energy supplier, so consumers (entrepreneurs) will see already adjusted (lower) amounts for electricity and gas on their invoices, which they will subsequently pay. Companies with unregulated energy prices will also receive help. For those companies that are affected by unregulated electricity and gas prices, i.e., they buy commodities on the short-term market, the aid scheme that was implemented in December 2022 will continue. compensated payments that they will cover for utilities. The call will therefore be conditional on the issuance of tax documents on energy payments, which will be paired with supplier data. (PODNIKANIE.SK, 2023). The highly open Slovak economy is back to the pre-pandemic level in terms of gross domestic product, but prospects for 2023 are moderate. Slovakia is among the countries with the highest share of exporting firms. Its manufacturing sector is its growth engine which renders it vulnerable to external shocks due to its high level of integration in global value chains. Moreover, due to higher prices of commodities and fast growth of unit labour costs, Slovakia’s cost competitiveness has declined. Likewise, fast-growing household debt associated with elevated house prices contribute to macroeconomic vulnerabilities in Slovakia. (European Commission, 2023) Slovakia has slowed down in its efforts to catch up with the EU average, although further growth opportunities exist in the green and digital economy. In the last decade, Slovakia has fallen behind substantially in its attempts to catch up the EU average on labour productivity and stands at 74% (measured in PPS per employee for 2021), unlike the direct peers. The country’s export-driven growth model, based on low labour costs in industrial production, faces challenges as its significant car manufacturing sector faces structural change in automation, continued component shortages and the transformation towards electromobility. This underscores the need to speed up preparations for the green and digital transition.

The effects of Russia’s military aggression against Ukraine constrained economic growth in Slovakia. The recovery of industrial exports slowed down due to increased energy prices and lower growth in Slovakia’s main export markets, amid an overall weakening of global demand. Energy prices in Slovakia increased by 18.8% in 2022, one of the lowest increases recorded among the EU Member States. Despite an increase in nominal compensation of about 7.7%, real wages (and real minimum wages) fell in 2022 because of elevated inflation. The inflow of Ukrainian workers may help strengthen Slovakia’s workforce across the skills spectrum. An analysis by the Ministry of Labour, Social and Family Affairs confirmed that Slovakia has a high number of job vacancies (81 000 in January 2023, with about 35% concentrated in the Bratislava region). It further shows that around 32 000 vacancies do not require specific skills and are suitable for workers with language barriers, including people from Ukraine.

Slovakia adopted various support measures to cushion the impact of energy price driven inflation on households and businesses. For 2023, their gross budgetary costs are projected in

the Commission 2023 spring forecast to amount to 2.0 % of GDP. Most measures preserve the price signal, although they do not target the most vulnerable households. To mitigate the social impacts of energy inflation, energy prices have been capped for companies and businesses at EUR 199 per MWh for electricity and EUR 99 per MWh for natural gas. The State reimburses 100% of what is above the cap for small companies regulated by the national regulator (ÚRSO) and 80% of what is above the caps for unregulated companies. This state support is limited to a maximum monthly subsidy per company of EUR 200 000. In 2023, households will have a guaranteed final price of electricity at the level of 2022, the final price of gas increased by 15% compared to 2022. The limit for the price of heat supply in 2023 cannot exceed the single-component value of the maximum price of heat last approved or determined by ÚRSO for 2022 by more than 20 euros, up to a maximum of 199 euros per MWh. Price caps have also been introduced for energy producers, which will be taxed at 90% if the caps exceed: EUR 100 per MWh for garbage plants; EUR 120 for solar power plants; EUR 180 for nuclear, wind, hydro, geothermal power plants; EUR 230 for lignite-fired power plants; and EUR 240 for biomass and biogas power plants.

CONCLUSION

Slovakia’s recovery and resilience must address a series of structural challenges through:

- improving the availability of early childhood education and care; increasing the quality, inclusiveness, and digitalisation of schools; improving governance, quality and relevance of higher education; and pursuing desegregation of Roma pupils throughout the education system,

- making investments into building renovation, modernisation of railways, decarbonisation of industry, deploying renewable energy sources, strengthening nature and biodiversity protection and boosting the circular economy,

- digitalising the public and private sector and reforming R&I governance as well as funding;
- introducing reforms to improve the efficiency of the public administration and the effectiveness of the judicial system in line with European standard,

- improving the resilience and cost-effectiveness of the healthcare system and the optimisation of the healthcare network. Slovakia should maintain the momentum in the steady implementation of the recovery and resilience plan and swiftly finalise the addendum, including the REPowerEU chapter, with a view to rapidly initiating its implementation.

Beyond the reforms and investments in the RRP, Slovakia would benefit from:

- reforming property taxation and increasing the supply of affordable housing to reduce concerns about the housing market and household indebtedness.

- strengthening the capacity of the public administration to deliver the reforms and investments and to continue to strengthen the tax compliance and digitisation of tax administration.

- supporting competitiveness and growth of labour productivity by addressing skills mismatches and investing in green and digital skills.

• enhancing social inclusion, in particular of Roma people, by addressing regional disparities in the access to social services and essential infrastructure, and inclusion in education; • reducing fossil fuel dependence through reforms and investments that enable the uptake of renewable energy, including those that augment grid capacity, and lead to energy savings and energy efficiency, as well as continue to diversify energy imports, especially gas, away from Russia while ensuring security of supply;

• expanding the share of revenue from environmental taxation in total tax revenue, especially in transport-related greenhouse gas and pollutant emissions.

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Bibliography

BURROWS, E. (2023) Russian lawmakers approve a budget with a record amount devoted (to defense spending. Online [Cited 2023-01-22]. San Diego Union Tribune Retrieved from: https://www.msn.com/en-us/news/world/russian-parliament-passes-record-budget-boosting-defense-spending-and-shoring-up-support-for-putin/ar-AA1k4R2J

DANISHEVSKA Kateryna, 2023. Ukrainian economy begins to recover as it adapts to war, NYT. RBC Ukraine. Online [Cited 2023-01-22]. Retrieved from: https://www.msn.com/en-us/money/markets/ukrainian-economy-begins-to-recover-as-it-adapts-to-war-nyt/ar-AA1izaJl

DEMARAIS, Agathe, 2022. Backfire: Sanctions Reshape the World Against U.S. Interests. Columbia University Press. ISBN: 9780231199902. 304 pp.

ENGINEERING.SK, 2023. Hospodárstvo: Ruská ekonomika v roku 2023 opäť klesne, tvrdí Scope Ratings. online [Cited 2023-09-12] Retrieved from: https://www.engineering.sk/aktuality/33594-hospodarstvo-ruska-ekonomika-v-roku-2023-opat-klesne-tvrdi-scope-ratings-2023-06-20 in Slovak

EUROPEAN COMMISSION. 2023. Country Report Slovakia EUROPEAN ECONOMYseries. INSTITUTIONAL PAPER 249. JUNE 2023. [Cited 2023-01-22]. Retrieved from: https://economy-finance.ec.europa.eu/system/files/2023-06/ip249_en.pdf

HESS, Maximilian, 2023, Economic War: Ukraine and the Global Conflict Between Russia and the West. London, Hurst Publishers. ISBN: 9781787389564. 280pp.

MYREGIONY.SK, 2023. Vplyv vojny na Ukrajine na Slovensko a regióny. online [Cited 2023-09-11] Retrieved from: https://regiony.sme.sk/t/9085/vojna-na-ukrajine-a-jej-vplyv-na-slovensko in Slovak

PODNIKANIE.SK, 2023 REMOVČÍKOVÁ, L. Zastropovanie cien elektriny a plynu pre malé firmy v roku 2023. online [Cited 2023-09-11] Retrieved from: https://www.podnikajte.sk/financny-manazment/zastropovanie-cien-elektriny-a-plynu-pre-male-firmy-v-roku-2023 in Slovak

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Hybrid threats in modern armed conflicts

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Abstract

Hybrid threats and disinformation are not a new concept, nor an achievement of the 21st century or the current information society. Current means of mass communication have already been used as a tool for hybrid threats. The Internet has become a platform for electronic communication. It helped more effective and faster cooperation in business. Social network users connect interactively in their groups, create statuses, count followers, etc. The wide spectrum of benefits is negatively affected by their abuse. The presence of people on social networks has also contributed to the abuse of this powerful tool of communication. The authors' intention is to present a historical view of hybrid threats with an emphasis on armed conflicts and to draw conclusions about hybrid threats and their impact on their course. These are mainly conflicts at the end of the 20th century and in the 21st century, which were and are being unleashed by the Russian Federation, with the aim of restoring the status and influence of the former Soviet Union, with the ambition of restoring or increasing its spheres of influence and vital interests.

Key words

Hybrid threat, Internet, armed conflict, hybrid war, social networks, economy

Introduction

The international security environment is constantly changing and evolving. Hybrid threats are also associated with this. The concept of security is not clearly defined and is constantly evolving. During the Cold War, security consisted mainly of military aspects, armaments and their impact on the economy of the countries of the bipolar world. From its end, it is appropriate to perceive security from a broader perspective (Baldwin 1997), including different dimensions and levels (e.g., individual, family, society, state, organizations, international system, environment, whole society). Different countries and regions perceive the concept of security differently, and therefore the perception of threats is also different.

According to Hoffman (2007), who is often associated by the professional public with the creation of the concept of hybrid war, the formulation of security is based on several historical strategic schools dealing with this concept. There are many other terms that describe forms of conflict and misinformation, e.g., "grey zone activity", "attack", "competition without conflict", "non-linear war", "asymmetric war", "ambiguous war", "political war", "information war" or

"cyber war". They all have a lot in common - interventions and operations directed against states and institutions and individuals by multiple means.

Hybrid threats are carried out by both state and non-state entities to cause harm by influencing decision-making at the local, regional, state or institutional level. Hybrid activities can work even without a formal declaration of war. The tools of hybrid activities include, for example, disinformation, cyber and industrial espionage, abuse of procedures, but also subversive activities or unconventional methods. A hybrid way of fighting can include massive disinformation campaigns and the use of social media for propaganda or radicalization, recruitment, and direct control of supporters.

A thorough analysis of this area of inquiry shows that understanding hybrid threats means drawing on the lessons of the past. As a solid conceptual foundation is still lacking, it prevents relevant stakeholders from making progress in understanding the impact of hybrid threats. It is a complex of effective measures both at the national and international level.

1 Internet paradigm

Before we deal with social networks and their current abuse, we will point out the fact that the conflicts unleashed in the 1990s were supported by considerable disinformation using traditional means of communication and the media. In this period, the Internet began to be used "bombastically" and it was a matter of a short time that it began to serve individuals, interest groups, but also agencies of international organizations and governments. Unfortunately, the positive side of a powerful information and communication tool soon became the subject of abuse and damage. Sophisticated hacking attacks, cyber bullying and cyber terrorism are all too common. Cyberbullying or cyberbullying is bullying that takes place on digital devices such as mobile phones, computers, tablets, etc. Sometimes this bullying is also referred to as cyberbullying, cyberbullying, e-bullying or online bullying (ŠIKANA.sk. 2023). Cyberbullying is bullying that takes place in the online world, in the online space. The US Federal Bureau of Investigation defines cyberterrorism as a premeditated attack against a computer system, computer data, programs, and other information with the sole purpose of violence against secret agents and subnational groups. The main goal of cyber terrorism is to cause harm and destruction. (Stephens. 2023). The Internet created a platform for the founders of social networks. Their creators certainly assumed the honest and truthful expression of the users - participants. The positives are undeniable. On the other hand, the spread of half-truths and lies is growing, frauds are piling up, and finally, social networks have become a space for military-political and ideological action. The Internet has become a powerful tool, which, unfortunately, is often misused to spread false and misleading information or as a tool of fraudsters. The year 2020 was special, due to the coronavirus pandemic, even more people took refuge in the online world than before. As a result, such a situation was abused by many conspirators, hoaxers, mis informers and fraudsters who wanted to prey on the trustworthiness of the Slovaks. Hoaxes and scams have grown faster than mushrooms in the online world during 2020. It was often difficult for the police and people on social networks, who try to fight against such actions and false information, to refute such many lies (Mitro, 2020).

The creators of social networks assumed honest and truthful expression of users - participants. The positives are undeniable. On the other hand, the spread of half-truths and lies is growing,

frauds are piling up, and finally, social networks have become a space for military-political and ideological action. Specialists in the field of information technology, experts in mass information operations, psychologists, political scientists, sociologists, but also experts in other professions are unofficially employees of intelligence services. The consequences of their actions in the online space and therefore also on social networks are unfathomably negative.

2 Hybrid threats in modern military conflicts

We have examined conflicts from several point of views. Each of them had/has different size, number of casualties and particular involvement of international organizations.

During the First Chechen War, which was an armed conflict between the Russian Federation and the Chechen region then known as the Chechen Republic of Ichkeria, social networks were not yet available. The conflict took place from December 1994 to August 1996. According to official data, it claimed over 5,500 dead on the side of the Russian forces and probably 3,000 to 15,000 dead on the side of the Chechen rebels (Biblioteka.sk., 1995). This is where the first attempts to use the internet space to spread misinformation appeared.

Although the Chechen Republic of Ichkéria after the first Chechen war in In 1996, it became de facto independent, but it was not a stable state. The official government of Chechnya, led at the time by President Aslan Maskhadov, had only weak control over the country. Outside the capital Grozny, large areas were ruled by self-proclaimed rebel commanders (such as Salman Raduyev, the son-in-law of the dead Dzhokhar Dudayev), many of whom were also hostile to the central government. Law enforcement was minimized, crime increased significantly, and kidnapping for ransom became a common practice in Chechnya. The influence of Islamic extremist groups, which came into frequent conflicts with the official Chechen security forces, also grew significantly, which in 1998 resulted in the declaration of a state of emergency.

The Second Chechen War is an armed conflict in which Russian forces re-established federal control over the separatist region of Chechnya. The main combat actions took place from August 1999 to May 2000, but Russian troops operated in the area as part of anti-terrorist activities until April 16, 2009. According to various estimates, this war claimed from 25,000 to 50,000 victims, most of them civilians. According to official data, the losses of Russian troops amounted to 5,200 men, but according to unofficial claims, they reached up to 11,000 dead (Wikiwand.com.sk., 2010). The then level of development and use of the Internet already allowed its abuse. Harmful propaganda was perfected and made more significant use of the online space even before Vladimir Putin came to power. The Russian Federation declared itself a peace-making force not only in Chechnya, but also in other countries of the former Soviet Union. In some cases, even with a UN mandate.

The tension between Armenia and Azerbaijan in the region of Nagorno-Karabakh caused the outbreak of one of Europe's "frozen conflicts". Nagorno-Karabakh is internationally recognized as Azerbaijan's territory, but it has a predominantly Armenian population that has resisted Azerbaijani rule for more than a century. In 1991, this region declared independence and since then (with Armenian support) is the unrecognized Republic of Artsakh. Nagorno-Karabakh, a mountainous landlocked region bordering Azerbaijan, has been a source of contention since before the creation of the Soviet Union. Tensions were suppressed when both Armenia and Azerbaijan were Soviet states but resurfaced after the end of the Cold War and the dissolution

of Communist Party control over the bloc. The war between Armenian and Azerbaijani forces ended with a ceasefire in 1994, with Armenia in full control of Nagorno-Karabakh and other smaller enclaves of Azerbaijani territory. In Azerbaijan, the majority population is Muslim, and in Armenia, Christians. Some elements on both sides seek to blame the conflict on religious differences, but analysts say this point of view is unfounded (Azerbaijan, for example, maintains strong defense ties with Israel). The Armenian revolution of 2018 brought in a new generation of leadership and raised hopes that the conflict in Nagorno-Karabakh could be moving towards a resolution. Even after a ceasefire was agreed in 1994, Azerbaijan and Armenia have from time to time accused each other of attacks directly in Nagorno-Karabakh and along the separate Asian-Armenian border. In the summer of 2020, another 16 people died in clashes. The July clashes followed Armenia's announcement that it was starting a joint air defense system exercise with Russia. A week later, Azerbaijan also started a series of military exercises, which continued in August and early September with the participation of Turkey. At that time, Armenians already participated in training in the south of Russia, in Armenia, but also in the self-proclaimed republics of Abkhazia and South Ossetia (Yar, L. 2020). The six-week war from the fall of 2020, also called the second Nagorno-Karabakh war, claimed more than 6,600 lives. Based on the ceasefire agreement, the observance of which is overseen by about 2,000 Russian soldiers, Azerbaijan has regained large areas in Karabakh and its neighborhood, which it lost in the war 30 years ago. During EU-brokered talks in Brussels in April and May, Azerbaijani President Ilham Aliyev and Armenian Prime Minister Nikol Pashinyan agreed to support discussions on a future peace deal. Members of the Russian armed forces, on the one hand, supervise the ceasefire in the conquered territory, but on the other hand, the Russian Federation supplies Armenia with weapons.

Heavy border fighting broke out again in September 2022 between Azerbaijan and Armenia. The Ministry of Defense in Yerevan, cited by Russian news agencies, said that Azerbaijani forces attacked three Armenian positions with artillery and large-caliber weapons and reportedly used drones. The Ministry of Defense in Baku, in turn, claimed that the fighting was triggered by a large-scale sabotage attempt by Armenia, which it accused of "large-scale subversive acts" near the districts of Dashkasan, Kalbajar and the city of Lachin, located on the edge of the disputed Nagorno-Karabakh region. The situation between the two countries is a topic on social networks of ordinary users, unfortunately also of official representatives of both countries. The Russian Federation itself is making considerable efforts on social networks to moderate the situation in its own way. The Russian Federation's announcement of a long-planned joint exercise of US and Armenian troops on its territory became a direct trigger for hoaxes and the management of a hybrid threat. (Pravda.sk. 11.09.2023). On Monday, Armenia and the United States began joint military exercises called Eagle Partner 2023. The maneuvers, which caused the displeasure of Russia, are taking place near the Armenian capital of Yerevan and will last until September 20. According to the AFP agency, the spokesperson of the American army informed about it.

The South Ossetian War (also known as the Russo-Georgian War) was a military conflict between Georgia on the one hand and Russia, South Ossetia and Abkhazia on the other. It began on the night of August 7-8, 2008, with heavy fighting between Georgian army forces and South Ossetian troops who were trying to break away (secession) from the Georgian Autonomous Republic of South Ossetia. It, like Abkhazia, unilaterally declared independence in 1991, which was not recognized by Georgia or any other state until the end of this war. In September 2009,

the results of an independent EU commission of inquiry were announced, according to which Georgia had provoked the war, and Russia had contributed to the escalation of the conflict. Based on the 1992 agreement, Russian, Georgian, South Ossetian and North Ossetian peacekeeping units were stationed in South Ossetia. Although the war ended and the situation calmed down, the problem was only postponed. The people of South Ossetia, in the vast majority, did not care about the reintegration of their region into Georgia, and in 1992 and 2006 they held referendums where they voted for independence. Georgia, on the other hand, tried to restore control over the breakaway areas. When Saakashvili came to power in Georgia, he restored control over Adjara in 2004 after special elections. Of the original three breakaway regions, only Abkhazia and South Ossetia retained their de facto independence. Russia has watched Georgia's efforts to restore territorial sovereignty with concern. Georgia has traditionally been considered a near foreign country, and in addition, an oil pipeline from Azerbaijan passes through it. On the night of August 8, 2004, Georgian artillery began bombarding Ossetian villages, and the Georgian army began a military operation to capture the capital of South Ossetia, Tskhinvali. During the attack, the Georgian army used BM-21 Grad rocket launchers and large-caliber guns to shell the city center. During the attack, however, the base of the Russian peacekeeping forces was also attacked, which resulted in dead and wounded. Russia responded with several airstrikes on Georgian military targets, while neighboring civilian objects were also hit, according to Georgian sources. On the afternoon of August 8, Russia sent its artillery and tank ground forces through the Rok Tunnel across the main Caucasian ridge to Tskhinvali. According to the Russian president at the time, Dmitry Medvedev, Russia intended to protect the residents of South Ossetia, who had Russian citizenship (more than 90%) and who had already asked for Russian help. Georgian President Mikheil Saakashvili compared the invasion of Russian military forces in South Ossetia to the Soviet invasion of Czechoslovakia in 1968. Dmitry Medvedev called the bombing of the city of Tskhinvali a genocide of the civilian population. After the end of the war in Chechnya under the rule of Vladimir Putin, Russia strengthened its influence in the region. Saakashvili oriented Georgia significantly pro-Western, he tried to direct the country to the EU and especially to NATO. The "West" supplied Georgia with weapons. Russia, on the other hand, supported the breakaway regions economically, politically and militarily, as the majority of their inhabitants held Russian passports. The place and role of social networks in this process was extremely significant. The pretext for greater involvement in the region was given to Russia by the recognition of Kosovo's independence, where most NATO and EU countries recognized the independence of the province that was broken off against the will of the mother country and in violation of UN Security Council Resolution no. 1244.

3 Results

The war also manifested itself on the Internet. The website of the National Bank of Georgia was hacked and replaced with an overview of dictators of the 20th century. One of the Georgian news portals and the website of the Georgian Ministry of Defense were also attacked. The attacks were carried out using similar techniques to cyberattacks in Estonia in 2007, at the time of the conflict over a monument to Russian soldiers in the country. Cyber attackers also replaced the pages of the Georgian Ministry of Foreign Affairs with photo collages of Saakashvili and Hitler. However, attacks were also conducted on Russian servers, when it was impossible to reach the domain ".ru" in Georgia. According to The New York Times, Georgian websites were

systematically attacked from August 8. In response to cyber attacks, the Office of the Polish President offered the Georgian government help with Internet access. According to Internet security experts, the transfer of war to cyberspace was predictable. They saw the main reason in the fact that Russia, along with China and Brazil, is one of the leaders in Internet crime.

The complicated situation with the promotion of the imperial interests of the Russian Federation led by Vladimir Putin was generated by the annexation of the Crimean Peninsula. In 2014, the use of social networks was at a developed level. Widespread propaganda and misinformation spread through all channels preceded the holding of the referendum on the annexation of Crimea to the Russian Federation. Social media has played a significant disinformation role here. The "green men" sent to Crimea by the Russian Federation at the time of chaos and bad governance in Ukraine did not meet with more significant resistance during the annexation of Crimea. Social networks certainly played a certain role in this process. In general, the EU countries, NATO, as well as the UN did not expect such an unprecedented step by Russia. The First Minsk Agreement, also known as Minsk I and the Minsk Protocol or the First Minsk Peace Agreement, was an agreement by Ukraine, the Russian Federation, the Donetsk People's Republic and the Luhansk People's Republic to withdraw the participating countries from the ongoing war in Donbas. It was signed after intensive negotiations by diplomats on September 5, 2014, in the Belarusian capital of Minsk under the auspices of the Organization for Security and Cooperation in Europe (OSCE). This agreement failed in its mission to stop the war in eastern Ukraine, therefore a new agreement was created on February 12, 2015, for the same purpose, concluded at a higher level, referred to as Minsk II, in which France and Germany were also participants. Nine years later, the world witnessed one of the most tragic events after World War II. After visiting the separatist leaders of Luhansk and Donetsk, President Vladimir Putin signed decrees recognizing the independence of the Donetsk People's Republic and the Luhansk People's Republic. Subsequently, on February 24, 2022, using the territory of Belarus as a starting point in the direction of Kiev, he launched a Special Military Operation at the same time as attacking the eastern territories of Ukraine.

Its preparation and progress are carried out with the full use of social networks from the soldier on the front line, through residents, local governments, humanitarian organizations on the side of Ukraine as well as on the side of the aggressor. The main goal of the aggressor's hybrid threats is to undermine public trust and democratic institutions, create polarization in society, and ultimately hinder the ability of democratic institutions to make correct decisions. Despite significant efforts on social networks, Russia has failed to undermine Ukrainians' belief in defending themselves against a powerful enemy. Disinformation is just one tool. The hybrid war itself can consist of infrastructural, energy or economic dependence, the use of nationalism and various cultural-ethical struggles in society. In Ukraine, the hybrid war has already crossed over into the physical one.

The big change in hybrid threats, which have been around for many years, is how quickly they spread today, especially thanks to social media. "Ukraine is a prime example of how incredibly successful hybrid threats are. Ukraine has been and is exposed to Russian narratives for many years, including the information that Ukraine is an extremely corrupt country on the verge of collapse. Russian propaganda knows that this is a very important issue for the Western countries of the EU. This is a narrative anchored in the minds of EU bureaucratic elites to this day, and that is also why there was some resistance when the European Commission recommended

Ukraine as a candidate country. Delegitimization narratives, in which they tried to show Ukraine as a disintegrating state, were dominant for a long time, even from the point of view of the data. Narratives that fascists rule in Ukraine were gradually added to these, with which propaganda used the still strong anti-fascist sentiment among the people in Slovakia as well. Gradually, we saw narratives that tried to limit the "Slovak" determination to help Ukraine, and that the conflict does not concern us or that the conflict is between the USA and Russia. There is often excessive criticism of sanctions as the cause of inflation or recession.

CONCLUSION

In November 2022, the former Minister of Foreign Affairs, Rastislav Káčer, told the Pravda newspaper in the context of hybrid threats that content that could result in damage or threat to the security, foreign policy or economic interests of Slovakia and is a form of hybrid threat could be blocked by the court, because social networks are very difficult to break through to make them more transparent or responsible. (Pravda. 2022)

It should be noted that hybrid threats are a coordinated set of activities of their actors. The European Commission (2016) warned against their tool of massive disinformation campaigns and the use of social media for disinformation and direct control of social network users.

Seriously, half of our population believes misinformation. Research in this context points to the fact that up to two thirds of EU citizens report that they encounter fake news at least once a week (Flash Eurobarometer 464, 2018). More than 80% of EU citizens say they see fake news as a problem for their countries and for democracy in general. Half of EU citizens aged 15-30 say they need critical thinking and information skills to help them fight fake news and extremism in society (Flash Eurobarometer 455, 2018). But it is important to prevent our children from believing them. For our children, we especially need education reform so that we can build critical thinking and media literacy - something that has been undersized in the Slovak Republic for a long time. Public institutions did not communicate with the public for a long time, there was no tradition of strategic communication. If people are provided with information, they know how to behave in crisis situations - for example during a pandemic - and do not look for it on disinformation portals.

According to Hybrid CoE (2018) and Mila (2018), hybrid threats are methods and activities aimed at the vulnerabilities of social network users. Vulnerabilities can be created by many things, including historical memory, legislation, old practices, geostrategic factors, strong polarization of society, technological disadvantages or ideological differences. If the interests and goals of the one using hybrid methods are not achieved, the situation can result in a war, where the role of the military and violence increases considerably.

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Bibliography

BALDWIN, David A., 1985. Economic Statecraft. Princeton: Princeton University Press. 1997. “The Concept of Security.” Review of International Studies 23 (1): 5–26. Retrieved from: https://doi.org/10.1017/S026021059700005 3.

BIBLIOTEKA.SK., 1995. Prvá vojna v Čečensku. Online [Cit. 2023-03-29]. Retrieved from: https://biblioteka.sk/encyklopedia/?pojem=Prv%C3%A1_vojna_v_%C4%8Ce%C4%8Densku&veda=33208 in Slovak

FLASH EUROBAROMETER 464, 2018. Retrieved from: https://europa.eu/eurobarometer/surveys/detail/2163 in Slovak

FLASH EUROBAROMETER 455, 2018. Retrieved from: https://europa.eu/eurobarometer/surveys/detail/2163 in Slovak

HOFFMAN, Frank, G., 2007. Conflict in the 21st Century: The Rise of Hybrid Wars. [Online.] Potomac Insttute for Policy Studies, 2007. Retrieved from: http://www.potomacinstitute.org/images/stories/publications/potomac_hybridwar_0108.pdf

YAR, Lucia, 2020. Náhorný Karabach: Zamrznutý konflikt eskaloval, v oblasti sa opäť bojuje. Online [Cit. 2023-09-09]. Retrieved from: https://euractiv.sk/section/vonkajsie-vztahy/news/nahorny-karabach-zamrznuty-konflikt-eskaloval-v-oblasti-sa-opat-bojuje/ in Slovak

MITRO, Matúš, 2020. Historický a plný extrému: Toto boli najväčšie hoaxy a podvody na Slovensku v roku 2020. Online [Cit. 2023-09-09]. Retrieved from: https://fontech.startitup.sk/historicky-a-plny-extremu-toto-boli-najvacsie-hoaxy-a-podvody-na-slovensku-v-roku-2020/ in Slovak

PRAVDA.SK, 2022. https://spravy.pravda.sk/domace/clanok/645690-narodny-bezpecnostny-urad-by-mal-mat-opat-moznost-blokovat-skodlivy-obsah/ in Slovak

PRAVDA.SK, 11.09.2023. USA a Arménsko odštartovali spoločné vojenské cvičenia. Online [Cited 2023-09-11] Retrieved from: https://spravy.pravda.sk/svet/clanok/681039-usa-a-armensko-odstartovali-spolocne-vojenske-cvicenia/ in Slovak

STEPHENS, John, 2023. Kyberterorismus. Online [Cit. 2023-09-09]. Retrieved from: https://sk1.continuousdev.com/6712-cyberterrorism-3088

ŠIKANA.SK. 2023. Kyberšikanovanie: Čo by ste mali vedieť? Online [Cit. 2023-09-09]. Retrieved from: https://www.sikana.sk/kybersikanovanie-co-by-ste-mali-vediet/ in Slovak

WIKIWAND.COM.SK. 2010. Druhá čečenská vojna. Online [Cit. 2023-09-08]. Retrieved from: https://www.wikiwand.com/sk/Druh%C3%A1_%C4%8De%C4%8Densk%C3%A1_vojna. In Slovak

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Skills of high school and university graduates in the implementation of digital transformation processes

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Abstract

This article provides evaluation of gained responses from manufacturing companies during conduction of survey. Survey was conducted from late May 2022 till early November 2022 in three EU countries: Slovakia, Estonia and Greece. In total 31 enterprises of industrial production participated in this survey. Our focus was to examine the perspective of future skills of new workers and the status of implementation of digital transformation and concept Industry 4.0 in participating companies. In this article we present the results regarding the skills of high school and university graduates in implementing digital transformation processes in the company. The aim of this article is to point out the identified missing skills of high school and university graduates in the implementation of digital transformation processes in the companies participated in survey and to identify how universities can improve this situation from the perspective of companies involved in our survey. Based on results gained we can say that three main skills which young employees are missing from perspective of industrial manufacturing companies are following: self-management, critical thinking and analysis and management and communication activities.

Key words

Industry 4.0, digital transformation, manufacturing companies, skills, university, education

Introduction

Relevant overall employee skills and digital transformation processes are probably the two biggest challenges facing the manufacturing industry. To verify this, we decided to conduct a questionnaire survey. Our focus was to examine the perspective of future skills of new workers and the status of implementation of digital transformation and concept Industry 4.0 in participating companies. In this article we present the results regarding the skills of high school and university graduates in implementing digital transformation processes in the companies.

The aim of this article is to point out the identified missing skills of high school and university graduates in the implementation of digital transformation processes in the companies participated in survey and to identify how universities can improve this situation from the perspective of companies involved in our survey.

1 Digital transformation as a challenge for universities

Digital transformation processes and relevant skills overall and are probably two biggest challenges to which manufacturing industry is facing. We can say that digital transformation means the introduction of new procedures and technologies in the company, in an effort to automate and simplify routine processes. The company can thus use existing employees more meaningfully and also achieve the same or even better results at lower costs.

However, digital transformation itself is a fragmented field due to the different perspectives we encounter in the literature when looking at it. This fact has been handled very well by the authors Ubiparipović et al. (2023), who identified 19 distinct key activities of digital transformation through a systematic literature review. According to Štaka et al. (2022), digital transformation can be understood as the connective tissue of the global economic system and is an essential element in the improvement process in both developed and underdeveloped countries. According to these authors (Štaka et al., 2022), a digitization was the initiator of digital transformation and relied exclusively on the introduction of digital technologies, but digital transformation is understood as much broader and requires a special set of skills and competencies.

In connection with the implementation of digital transformation processes, several surveys were carried out (Cuenca-Enrique et al., 2022; Plattfaut and Borghoff, 2022; Maletič et al., 2023), while it was proven that many of the companies, especially small and medium-sized enterprises, lack the corresponding individual skills (often lack of digital skills of managers and employees), as well as the organizational abilities to implement digital process innovations due to the limited capital availability of small and medium-sized enterprises and abilities to change the corresponding organizational procedures.

Universities also have an important role in the period of digital transformation of the economy. Universities should produce enough qualified personnel with the necessary competences for the development, implementation, and use of digital technologies. Several researches have also been carried out in this area, which confirm this fact, for example a study in the field of digital skills of professional accountants (Karcioglu and Binici, 2023), a study dealing with the new educational needs of students, highlighting innovative pedagogical technologies and methods that allow to take into account trends and follow modern requirements for the digital transformation of education (Morze et al., 2019).

2 Research objectives and methods

We decided to run small research to find out which skills are needed in relation to the implementation of digital transformation processes and also to find out the extent of digital transformation directly in industrial companies and the implementation of digital transformation and Industry 4.0 concepts in these companies. We wanted to get in touch with manufacturing to support innovation capacity and raising awareness on EIT Manufacturing support programs for future.

Our questionnaire survey was conducted from late May 2022 till early November 2022 in three EU countries: Slovakia, Estonia and Greece. All these countries are part of regional innovation scheme, scheme including countries with limited/lower innovation performance. In total 31

industrial manufacturing companies participated in this survey. In terms of company size majority of companies were midsize companies.

The questionnaire included a total of 21 questions and was divided into two parts. The first part was devoted to the questions related to the skills that are necessary in connection with the introduction of digital transformation processes and also cooperation with universities in the preparation of students (potential new employees), and the second part was devoted to implementation of digital transformation and concept Industry 4.0, to the degree of digital transformation in manufacturing companies that participated in survey. The results obtained by it can serve to adapt educational programs for students and teachers (university teachers).

In this article we present the results regarding the skills of high school and university graduates in implementing digital transformation processes in the companies.

3 Results

3.1 Characteristics of the research sample

According to our own processing based on a questionnaire survey a total of 31 enterprises were involved in our research, 13 enterprises from Slovakia, 11 enterprises from Estonia and 7 companies form Greece. From the point of view of the field in which the involved companies operate, the representation of companies was diverse from various branches of industrial production, for example mechanical engineering, chemical industry, food industry, metallurgy, research and development in the field of high-precision bearing reducers and actuators (for the Slovak Republic), engineering, automotive industry, electronics industry, research and development activities in the field of other natural and technical sciences (for Estonia), while companies for Greece did not indicate their field of activity in the questionnaire.

The representation of companies in the survey according to the number of employees is presented in the Table 1.

Table 1: Representation of enterprises according to the number of employees

Enterprise	Size structure	Slovakia	Estonia	Greece	Total
Micro	1 to 9	0	1	2	3
Small	10 to 49	1	1	4	6
Medium	50 to 249	9	6	0	15
Large	250 and over	3	3	1	7
Total	**x**	**13**	**11**	**7**	**31**

Source: Own processing based on a questionnaire survey

From the point of view of the size structure (where the number of employees was the criterion for inclusion), medium-sized enterprises (with 50 to 249 employees) had the largest representation in the survey, a total of 15 enterprises, which represented 48 % of the total number of enterprises participating in the survey. The second largest representation was of large enterprises (with the number of employees 250 and more), in the number of 7 enterprises, which represented 23 % of the total number of enterprises participating in the survey, followed by small enterprises (with the number of employees 10 to 49) and that in the number of 6 enterprises, which represented 19 % of the enterprises represented in the survey. The last rank

was held by micro enterprises (with the number of employees from 1 to 9), which were involved in the survey in the number of 3 enterprises, which represented 10 % of the total number of enterprises participating in the survey.

Based on the conducted questionnaire survey, we found out that a predominantly young team works in the companies involved in the survey. Employees over the age of 50 were represented in most companies by only a small share, as a general rule, their share in the total number of employees ranged up to 24.99 % in 15 companies out of 31 companies involved in the survey, or their share in the total number of employees ranged from 25 % to 49.99 % in 13 companies out of 31 involved in the survey.

Table 2: The number of enterprises according to the percentage of employees over 50 years of age

	Structure	Slovakia	Estonia	Greece	Total
the percentage of employees over 50 years of age	0 to 24,99 %	5	4	6	15
	25 % to 49,99 %	6	7	0	13
	50 % to 74,99 %	2	0	0	2
	75 % and more	0	0	1	1
Total	**x**	**13**	**11**	**7**	**31**

Source: Own processing based on a questionnaire survey

3.2 Survey regarding to the future manufacturing skills perspectives

During analysis of results, we found out that the most frequent answers of companies regarding future skills were not strictly associated with technical disciplines. Companies lack mostly skills like self-management, management and communication activities, critical thinking and analysis. It is followed by problem solving and then on the fifth place there is the first of technology skills – collaborative robotics. It was quite surprising fact but based on our experience it quite well reflects situation in manufacturing. This research activity was corner stone for future cooperation with at least some manufacturing companies which can support knowledge innovation triangle integration.

Seven separate questions were used for this research part of our questionnaire survey. In the following section, we summarize the main findings.

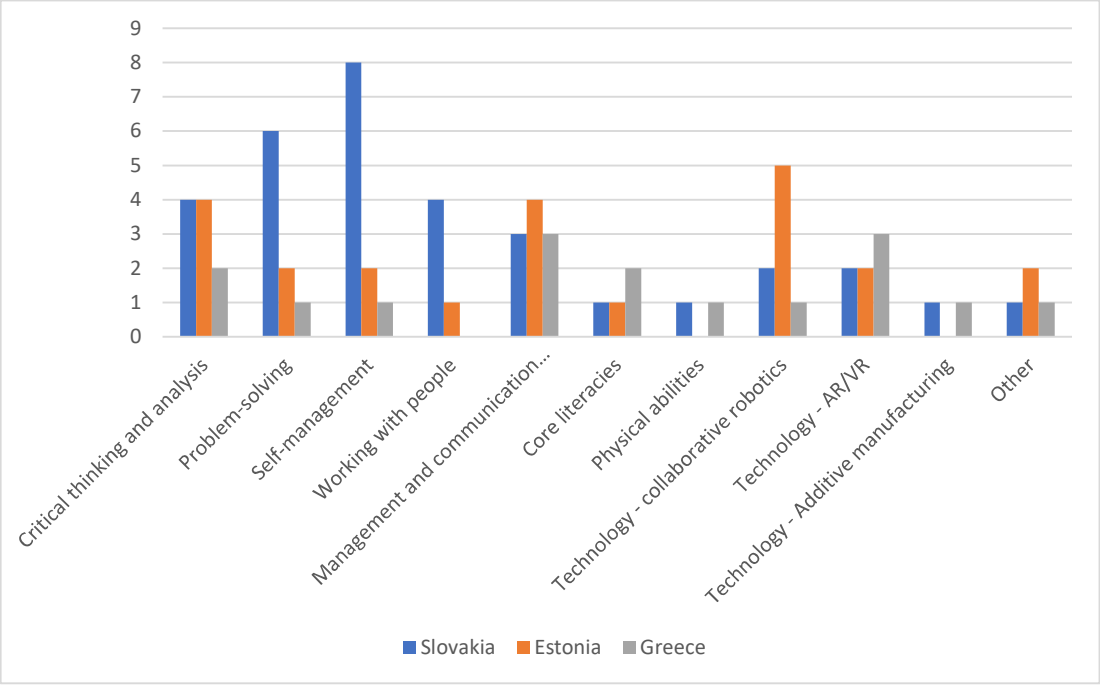
3.2.1 Skills that employees most often lack when implementing digital transformation processes

The companies involved in the questionnaire survey were asked to indicate which skills, according to them, their employees most often lack when implementing digital transformation processes. The most frequently missing skills of employees when implementing digital transformation processes are self-management (self-motivation), critical thinking and analysis, and management and communication of activities. As part of the answer to the question in the other option, for example in Greece one company stated that the employees do not care (are not interested) in this issue because of their low salaries and unfortunately the company cannot raise these salaries. For Slovakia, it was stated that it is also the reluctance of employees to do something extra (reluctance to save something somewhere). In Estonia, 2 companies had difficulty identifying what other deficiencies could be.

3.2.2 Skills that high school and university graduates most often lack when introducing digital transformation in the company

According to the interviewed companies, the most lacking skill among graduates when implementing digital transformation processes is self-management, critical thinking and analysis, the inability to solve problems, teamwork etc. Detailed results for the examined countries are shown in the Figure 1 and in the Table 3.

Figure 1: Most lacking skills among high school and university graduates



Source: Own processing based on a questionnaire survey

Table 3: The most lacking skills among graduates for individual countries and overall

Most lacking skills	Slovakia	Estonia	Greece	Total
Critical thinking and analysis	4	4	2	10
Problem-solving	6	2	1	9
Self-management	8	2	1	11
Working with people	4	1	0	5
Management and communication activities	3	4	3	10
Core literacies	1	1	2	4
Physical abilities	1	0	1	2
Technology - collaborative robotics	2	5	1	8
Technology - AR/VR	2	2	3	7
Technology - Additive manufacturing	1	0	1	2
Other	1	2	1	4

Source: Own processing based on a questionnaire survey

3.2.3 Cooperation possibilities between company and universities

The most common form of possible cooperation between the company and the university was internships for students, excursions, implementation of joint projects, preparation of final theses or training for students.

3.2.4 The biggest skills gap a company has to deal with when hiring graduates

In relation to this question, the most common answers were ignorance of the practical operation of processes in the company, ignorance of the software used in practice, inability to work in a team and lack of reliability. The answer option “Other” was also used, where the companies stated: low technical training (measurements, methods etc.) from the universities, low self-confidence, and mediocrity, low knowledge level of graduates, motivation through money.

3.2.5 Forms of training used to introduce Industry 4.0 innovations to employees

This question was answered only by those companies that in question “Are you familiar with Industry 4.0 concepts?” answered "yes" and at the same time they also answered "yes" in question “Do you introduce innovations of Industry 4.0 to your employees?”. Their answers were as follows: training, practical briefing, workshop connected with practical instruction, online course, and webinar.

3.2.6 Skills associated with the implementation of the Industry 4.0 concept, which are/will be most used and required by workers with secondary education

This question was answered only by those companies that in question “Are you familiar with Industry 4.0 concepts?” answered "yes". Their answers were as follows: critical thinking and analysis, problem solving, teamwork, basic literacy, management and communication of activities, Technology - Additive Manufacturing, Technology - AR/VR, Technology - collaborative robotics, self-management. One company answered, that: We have employees with higher education rather, so they cannot choose any answer.

3.2.7 Skills associated with the implementation of the Industry 4.0 concept, which are/will be most used and required by employees with a university degree

Also, this question was answered only by those companies that in question “Are you familiar with Industry 4.0 concepts?” answered "yes". The answer options were the same as in the previous question and the answers chosen by companies were also very similar to the previous question. However, the difference was in the frequency of individual responses. By employees with a university degree most used and required skills associated with the implementation of the Industry 4.0 concept according by companies were critical thinking and analysis, problem solving and knowledge of technology.

3.3 How universities can improve situation from the perspective of companies involved in our survey

Regarding the answers to the question of how universities can help in this sphere from the point of view of companies, the answer appeared more than once is cooperation on company projects, as well as on digital transformation projects. Also, companies would expect universities to be able to prepare a graduate to be able to implement digital transformation processes after joining the company.

The fact that employers face the challenges of digital transformation also creates a challenge for the university to really prepare students capable of implementing digital transformation processes. It applies to all areas, both the area of industry and production, as well as the area of law and management. For example, to increase the competitiveness of its graduates, the university has introduced advanced training programs related to digital technologies and law (Kharitonova and Sannikova, 2022). We believe that a similar approach could be introduced in other areas as well.

CONCLUSION

This article provides evaluation of gained responses and inputs from manufacturing companies during conduction of our questionnaire survey. Our survey was conducted from May 2022 till November 2022 in three EU countries: Slovakia, Estonia and Greece. In total 31 manufacturing companies participated in this survey. In terms of company size majority of companies were midsize companies.

Overall, we can say that this questionnaire was about the future of technical and social education and the introduction of Industry 4.0 concepts into practice in industrial production enterprises. The results obtained by it can serve to adapt educational programs for students and teachers (university teachers).

Our questionnaire survey was divided into two parts. The first part was devoted to the questions related to the skills that are necessary in connection with the introduction of digital transformation processes and also cooperation with universities in the preparation of students (potential new employees), and the second part was devoted to implementation of digital transformation and concept Industry 4.0, to the degree of digital transformation in manufacturing companies that participated in survey.

In this article, we present the results related to the first part of the questionnaire survey dedicated to the skills of high school and university graduates in the implementation of digital transformation processes in companies.

Based on results gained we can say that three main skills which young employees are missing from perspective of manufacturing companies are following: self-management, critical thinking and analysis and management and communication activities. Although we cannot consider results of this research as representative, lack these skills was confirmed during informal talks with companies working in Slovakia.

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Bibliography

CUENCA-ENRIQUE, Carlos, DEL-RÍO-CARAZO, Laura, ACQUILA-NATALE, Emiliano and Camilo MACARRÓN, 2022. "Semi-automatic document processing and text-recognition

for digital transformation of low-resources organizations,". In: 2022 17th Iberian Conference on Information Systems and Technologies (CISTI), Madrid, Spain, 2022. pp. 1-7, doi: 10.23919/CISTI54924.2022.9820135.

INMAS, 2023. About the project. [online]. [cit. 2023-07-28]. Available from: https://www.manufacturing4schools.eu/about-the-project/

KARCIOGLU, Resat and Fatih Omur BINICI, 2023. "Developing a maturity model to identify digital skills and abilities of accounting professionals: evidence from Turkey,". In: Access Journal, Access Press Publishing House, vol. 4(2). pp. 221-247, March.

KHARITONOVA, Yuliya and Larisa SANNIKOVA, 2022. "Digital Transformation Of Legal Education. Medicine,". In: Law & Society, 2022, 15(1). pp. 47-72, doi: 10.18690/mls.15.1.47-72.2022.

MALETIČ, Damjan, GRABOWSKA, Marta and Matjaž MALETIČ, 2023. "Drivers and Barriers of Digital Transformation in Asset Management,". In: Management and Production Engineering Review, 2023, 14.

MORZE, Nataliia, SMYRNOVA-TRYBULSKA, Eugenia and Mariia BOIKO, 2019. "The Impact of Educational Trends on the Digital Competence of Students in Ukraine and Poland,". In: E.Smyrnova-Trybulska (Ed.) E-Learning and STEM Education, „E-Learning“, 11. pp. 365-379. Katowice-Cieszyn: Studio Noa for University of Silesia.

PLATTFAUT, Ralf and Vincent BORGHOFF, 2022. "Capabilities for Digital Process Innovation: Results of an Ongoing Action Research Study,". In: Marrella, A., Weber, B. (eds) Business Process Management Workshops. BPM 2021. Lecture Notes in Business Information Processing, vol 436. Springer, Cham. doi: 10.1007/978-3-030-94343-1_18.

ŠTAKA, Zorana, VUKOVIĆ, Milica and Vladimir VUJOVIĆ, 2022. "The Role of Digital Competencies in the Process of Digital Transformation,". In: 2022 21st International Symposium INFOTEH-JAHORINA (INFOTEH), East Sarajevo, Bosnia and Herzegovina, 2022. pp. 1-6, doi: 10.1109/INFOTEH53737.2022.9751285.

UBIPARIPOVIĆ, Bogdan, MATKOVIĆ, Predrag and Veselin PAVLIĆEVIĆ, 2023. "Key activities of digital business transformation process,". In: Strategic Management-International Journal of Strategic Management and Decision Support Systems in Strategic Management, 2023, 28.1, doi: 10.5937/StraMan2200016U.

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Analysis of introduced measures in EU institutions to support the working environment during the COVID-19 pandemic

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Abstract

The article analyses the measures put in place to support the working environment during the COVID-19 pandemic in selected European Union institutions. Specifically, we focus on the measures in place in the following institutions: the European Parliament, the European Council, the European Commission, and the Court of Justice of the European Union. We briefly discussed the COVID-19 pandemic, which broke out in 2019 in China and affected all countries of the world. In selected European Union institutions, we compared the work activities carried out in 2019 and 2020 to see the impact of the COVID-19 pandemic on the number of work activities. We then looked at what measures the selected EU institutions have put in place to support the working environment for their employees.

Key words

European Union, the COVID-19 pandemic, working activities, work environment

Introduction

The article focuses on the follow-up of the measures put in place in the EU institutions to support the working environment during the COVID-19 pandemic, which started in the European Union in January 2020. We compared work activities in four European Union institutions before the COVID-19 pandemic in 2019 and at the time of the COVID-19 pandemic outbreak in 2020, e.g., number of meetings held, number of meetings, number of acts adopted, hearings organized, actions tabled, closed and in progress. In the selection of measures, we focused on how these EU institutions supported the working environment in 2020-2021, when the COVID-19 pandemic broke out and persisted. We analysed whether the surveyed EU institutions, as employers, additionally provided IT equipment to their employees, whether the working environment was retrofitted with new office furniture, whether financial allowances were provided to employees, whether communication costs were reimbursed and, as a final measure, whether employees were allowed to work remotely, away from the place of work.

1 Outbreak of the COVID-19 pandemic and selected EU institutions

Iman Rahimi, Frank Chen, and Amir H. Gandomi (2021) report that in December 2019, the Chinese government informed the rest of the world that severe acute respiratory syndrome-related novel coronavirus 2 (COVOD-19) had rapidly infiltrated many other countries. The

United States Centres for Disease Control and Prevention has identified a seafood market in Wuhan as the epicentre of the outbreak. In January 2020, the World Health Organization reported a case in Thailand and Japan.

In Europe, the first case of COVID-19 was reported in January 2020, and within weeks the disease had spread throughout the European Union. In Slovakia, the first case of the disease was reported on 6 March 2020. It was during this period that most European Union Member States put in place measures to try to slow the spread of the outbreak of COVID-19. The European Union institutions played an important role here, trying to manage their actions quickly and efficiently.

„*The EU institutions have been mobilized to react to the social and economic consequences of the COVID-19 crisis. In the areas of particular interest to Eurofound's mandate, the European Council adopted the activation of the general escape clause of the Stability and Growth Pact, indicating that it is timely, temporary, and targeted, allowing Member States to take all necessary measures to support their health and social protection systems and to protect their economies* “ (Eurofound, 2020, p. 6).

In the article, we focus on the following four institutions of the European Union:

The European Parliament is an important forum for political debate and decision-making at the European Union level. The Members of the European Parliament are directly elected by voters in all Member States to represent people's interests about European Union law-making and to make sure other EU institutions are working democratically. (European Parliament, 2023). The European Parliament has 705 members and 27 committees The President is elected for a renewable two and a half years, meaning half a Parliamentary term.

The European Council defines the European Union overall political direction and priorities and sets the European Union policy agenda. It usually adopts conclusions during European Council meetings which identify issues of concern and actions to take. It does not negotiate or adopt European Union laws. The members of the European Council are the heads of state or government of the 27 European Union member states and the Presidents of the European Council and of the European Commission (European Council, 2023).

The European Commission's work is steered by a College of Commissioners and led by its European Commission President. The Commissioners work on specific policy priorities that are set out by the European Commission President. Staff working for the European Commission are part of the European civil service. Around 32,000 permanent and contract employees work in the European Commission, who these include policy officers, researchers, lawyers, and translators (Eurpean Commission, 2023).

Court of Justice of the European Union to ensure that the law is observed, in the interpretation and application of the Treaties, reviews the legality of the acts of the institutions of the EU, ensures that the Member States comply with obligations under the Treaties, and interprets EU law at the request of the national courts and tribunals (Court of Justice of the EU, 2023).

2 Research objectives and methods

The aim of our research was to perform a comparison of established measures to support the working environment in selected European Union institutions during the COVID-19 pandemic. We focused on established measures for our employees in the following European Union institutions:

- European Parliament
- European Council
- European Commission
- Court of Justice of the European Union.

We carried out a comparison of the work activities carried out in the above-mentioned European Union institutions in the period of 2019 and 2020. The choice of years was deliberate, as we wanted to find out what effect the COVID-19 pandemic had in 2020 on the number of work activities in the European Parliament, the European Council, in the European Commission and the Court of Justice of the European Union.

In the selection of measures, we focused on how the mentioned European Union institutions supported the working environment in the years 2020 to 2021, when the COVID-19 pandemic broke out and persisted. We analysed whether the examined European Union institutions from the position of the employer additionally provided information technology equipment to their employees, or whether the working environment was additionally equipped with new office furniture. Another investigated measure concerned the provision of a financial contribution for employees, or the reimbursement of communication costs, which were increased during the COVID-19 pandemic. As a last measure, we determined whether employees were allowed to work remotely, outside the place of work.

3 Supporting the working environment in European Union institutions during the COVID-19 pandemic

3.1 Comparison of work activities carried out in the EU institutions

In selected European Union institutions, we analysed the comparison of activities carried out in 2019 and 2020 to see the impact of the COVID-19 pandemic on the number of work tasks. In the European Parliament we looked at the number of meetings held, in the European Council we focused on the number of meetings, and in the European Commission we compared the total number of acts adopted. We have considered the work activities of the Court of Justice of the European Union and the General Court, where they belong: cases referred, hearings organised, cases closed and cases pending.

The European Parliament held 16 plenary and additional sittings in 2019. In 2020, there were 17 sittings, which means that the European Parliament held one more sitting in 2020 (pandemic COVID-19).

The European Council's activities consisted of meetings, which totalled 3 983 in 2019, and in 2020 (COVID-19 pandemic) the European Council met 3 086 times, 897 fewer than in the

previous period. Meetings during the COVID-19 pandemic in 2020 were held in a face-to-face and online format.

The European Commission worked more in 2020 than in 2019, as we can see from the total number of acts adopted, which totalled 9 255 in 2019 and 9 706 in 2020 (pandemic COVID-19), which is 451 times more.

When analysing the work activities of the Court of Justice of the European Union, we have considered both the activities carried out by the Court of Justice and those carried out by the General Court. Summarising the data, we note that in 2020 (COVID-19 pandemic) there were fewer staff working in 2020 than in 2019, as there were 8 408 activities recorded in 2019 and a total of 7 588 in 2020, which is 820 fewer work actions.

We have summarised the number of work activities undertaken and the difference in numbers in Table 1 below, focusing on 2019 when there was no COVID-19 pandemic and 2020 when the COVID-19 pandemic started.

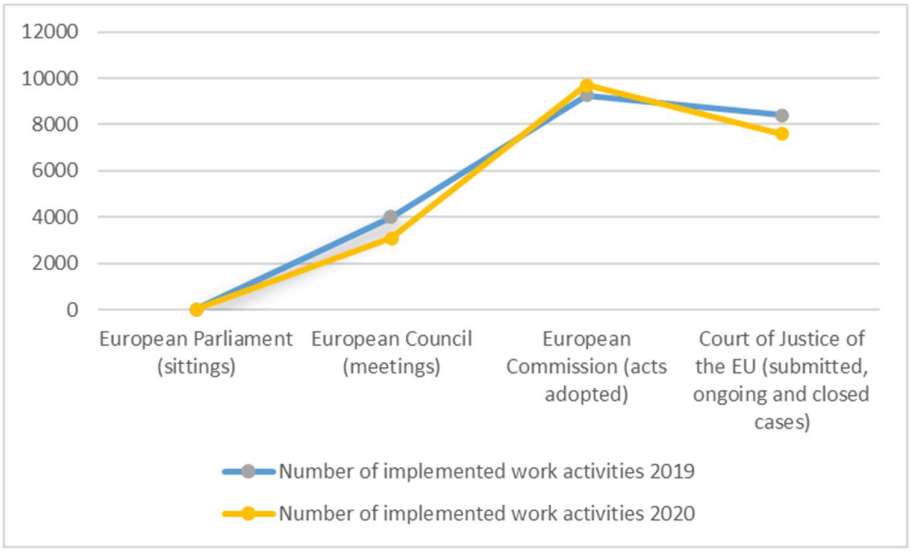
Table 1: Number of work activities in the EU institutions in 2019 and 2020

Name of EU institution and type of work activity	**Number of activities implemented in 2019 - 2020**		
	2019	**2020**	**the difference between 2019-2020**
European Parliament (sittings)	16	17	-1
European Council (meetings)	3983	3086	897
European Commission (acts adopted)	9255	9706	-451
Court of Justice of the EU (submitted, ongoing and closed cases)	8408	7588	820

Source: Data analysed according to European Court of Auditors (2022)

A comparison of the number of work activities carried out in 2019 and 2020 are summarised in Figure 1 below.

Figure 1: Comparison of work activities in EU institutions



Source: Data analysed according to European Court of Auditors *(2022)*

3.2 Measures in place to support the working environment in the EU institutions

The main aspects of the functioning of the EU institutions affected by the COVID-19 crisis are governance and policy, workforce, IT, and buildings. The detailed characteristics of these aspects are summarised in Table 2.

Table 2: Analysis of aspects of the functioning of EU institutions affected by the COVID-19 pandemic

Aspect name	Description
Governance and policy	- decision-making processes to ensure continuity of operation, and update of work programmes to reflect the reassessment of priorities
Workforce	- alternative solutions to physical work presence and changes in HR policies to ensure the continued performance of staff
IT	- availability of laptops and other teleworking solutions, enabling remote decision-making, ensuring confidentiality of information and data protection;
Buildings	- maintaining buildings in operational mode, ensuring physical security and management of access to premises

Source: Data analysed according to European Court of Auditors (2022, p. 6)

We analysed the implementation of 4 measures in selected EU institutions (European Parliament, European Council, European Commission, Court of Justice of the European Union) to improve the working environment. Specifically, these measures are (European Court of Auditors, 2022):

Measure 1: Additional IT equipment.

Measure 2: Additional equipment - furniture.

Measure 3: Payment of communication costs.

Measure 4: Telework from outside the place of employment.

In accordance with Action 1, the European Parliament provided 2 326 monitors, 2 069 keyboards and 1 968 PC mice for its staff. Measure 2 was implemented by retrofitting ergonomic chairs and measure 3 were also implemented as the European Parliament reimbursed communication costs of €40 per month. The last measure, measure 4, was applied until 31.12.2021 in duly justified cases as a part-time measure with suspension of the expatriation allowance.

Under measure 1, the European Council provided staff with a home Office package including a monitor, keyboard and docking station. Action 2 and Action 3 were not implemented. Measure 4 was implemented provided it was authorised by management and compatible with the interests of the service.

The European Commission implemented measure 1 in 2020 by reimbursing monitors to its staff up to €150 and in 2021 by providing IT packages to staff which included docking stations, keyboards, and mice. In line with measure 2, chairs were reimbursed to staff up to €200. Measure 3 was not implemented and measure 4 was applied in duly justified cases involving family and health.

In accordance with measure 1, the Court of Justice of the European Union provided approximately 1 000 IT packages in 2021, which included a monitor, a keyboard, a docking station. Measure 2 was implemented in 2021 with the distribution of approximately 600 office

chairs. Measure 3 was not implemented and the last measure 4 was implemented in duly justified cases and only in duly justified circumstances in 2021.

The analysis showed that all four measures were applied and implemented only in the European Parliament, the European Council applied only the first and fourth measures, the European Commission and the Court of Justice of the European Union did not apply the third measure, and the other measures were fully implemented in these EU institutions. The results are shown in Table 3.

Table 3: Implementation of measures put in place in the institutions of the European Union

EU institutions	Measure 1	Measure 2	Measure 3	Measure 4
European Parliament	YES	YES	YES	YES
European Council	YES	NO	NO	YES
European Commission	YES	YES	NO	YES
Court of Justice of the European Union	YES	YES	NO	YES

Source: Data analysed according to European Court of Auditors (2022)

CONCLUSION

In conclusion, all four institutions have additionally provided IT equipment to their staff and additional office equipment for staff has been provided by the European Parliament, the European Commission, and the Court of Justice of the EU through the purchase of office chairs. Only one institution, the European Parliament, took the measure to reimburse the costs of 40 € for communication. All four EU institutions have introduced the possibility for their staff to work from home, away from the place of work, in duly justified cases.

Bibliography

COURT OF JUSTICE OF THE EUROPEAN UNION, 2023. The Institution. [online]. [cit. 2023-04-08]. Available from: https://curia.europa.eu/jcms/jcms/Jo2_6999/en/

EUROFOUND, 2020. Programming document 2021–2024: Towards recovery and resilience, Dublin. [online]. Luxembourg: Publications Office of the European Union [cit. 2023-05-07]. ISBN 978-92-897-2148-6. Available from: https://www.eurofound.europa.eu/system/files/2021-02/ef20029en.pdf

EUROPEAN COMMISSION, 2023. About the European Commission. [online]. [cit. 2023-04-08]. Available from: https://commission.europa.eu/about-european-commission_en

EUROPEAN COMMISSION, 2023. Commission staff. [online]. [cit. 2023-06-15]. Available from: https://commission.europa.eu/about-european-commission/organisational-structure/commission-staff_en

EUROPEAN COUNCIL, 2023. How the European Council works. [online]. [cit. 2023-05-07]. Available from: https://www.consilium.europa.eu/sk/european-council/how-the-european-council-works/

EUROPEAN COURT OF AUDITORS. 2022. Special Report 18/2022: EU institutions and COVID-19 – Responded rapidly, challenges still ahead to make the best of the crisis-led innovation and flexibility [online]. [cit. 2023-05-05]. Available from: https://www.eca.europa.eu/en/publications?did=61688

EUROPEAN PARLIAMENT. 2023. About Parliament [online]. [cit. 2023-07-07]. Available from: https://www.europarl.europa.eu/about-parliament/en

RAHIMI Iman, CHEN Fang, GANDOMI Amir H., 2021. A review on COVID-19 forecasting models. Neural Computing and Applications. [online]. [cit. 2023-04-08]. Available from: https://doi.org/10.1007/s00521-020-05626-8.

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The effects of the COVID-19 pandemic on youth unemployment in EU27

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Abstract

Youth unemployment is a problem with serious consequences. Young people thus miss opportunities for gaining work experience and developing professional skills. The aim of the article will be to analyse and compare the development of unemployment of young people aged 15 to 29 in EU member countries, focusing also on the unemployed according to the level of education achieved, with an emphasis on the effects of the COVID-19 pandemic in the monitored area. The number of job vacancies corresponding to one young unemployed person will serve as an additional indicator.

Key words

Youth unemployment, education, job vacancies

Introduction

Youth unemployment is not the problem in European Union but also a global problem with different levels of severity in individual countries. The difference between youth and adult unemployment may be based on the high labour mobility caused by the globalization process, as well as the higher possibility of passivity among the younger generation (Pkhakadze, 2022). The causes of youth unemployment vary from country to country; therefore, the solutions to this problem also differ. Given the long-term risks of prolonged periods of unemployment, the importance of addressing youth unemployment can hardly be overstated.

Youth represent the potential and future of the country. Governments with a long-term vision of prosperity and development in their countries are looking for the best ways to integrate young people into the workforce. The group of young adults is exposed to a particularly high risk, as the long-term unemployment rate of this group has increased in many countries (Görlich, Stepanok, Al-Hussami, 2013). This topic is paying attention in the media and is being discussed in many forums.

Therefore, the aim of the article will be to analyse and compare the development of unemployment of young people aged 15 to 29 in EU member countries, focusing also on the unemployed according to the level of education achieved, with an emphasis on the effects of the COVID-19 pandemic in the monitored area.

1 Theoretical framework

Unemployment, in which the generation of young people has a significant share, is generally a serious social and economic problem. The global financial crisis (in 2008/2009) particularly affected young people, who were severely affected by discrepancy in the labour market caused by a lack of skills, limited geographic mobility or inadequate wage conditions. They were exposed to a higher risk of ending up in precarious employment or without work at all.

Some regions in Europe have proved more resilient to youth unemployment than others, with relatively few job losses or rapid labour market restoration from downturns. These differences raise the question of the factors that contribute to different regional outcomes in the fight against youth unemployment (Pop et al., 2020). The impact of the global crisis on youth unemployment was also discussed by Kang (2021). According to him, the findings of the high youth unemployment rate should not be attributed exclusively to the economic crisis, but he points to opportunities for improvement by proposing a more effective youth work policy.

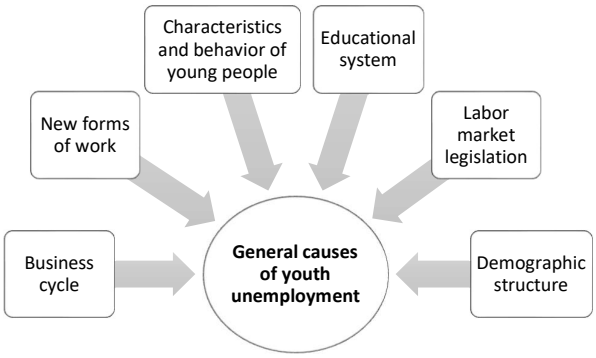
In the European Union, the situation with the employment of young people is not favourable for a long time, and their integration in the labour market is one of the main political issues. It places great emphasis on solving this problem through specific programs aimed exclusively at young people with the aim of achieving their entry into the labour market and increasing their employment rate (Lambovska et al., 2021). Therefore, the European Commission implemented the so-called "Youth Opportunities Initiative" to support unemployed youth. The aim was to provide funding for apprenticeship and entrepreneurship programs and to provide guidance to young people with business ideas (Görlich, Stepanok, Al-Hussami, 2013).

The crisis caused by the COVID-19 pandemic contributed even more to the deepening of the problem related to youth unemployment. Several authors have dealt with the analysis of its impacts on the monitored area (Gontkovičová et al., 2015; Inanc, 2020; Lambovska et al., 2021; Bucevska, Kozheski, 2022; Simionescu, Cifuentes-Faura, 2022; Gontkovičová, Korauš, 2022). A high number of young people without work can also negatively affect economic growth. If the youth unemployment indicator is not controlled, it can have serious social consequences because unemployed youth tend to feel excluded. It is leading to social exclusion, distress, and lack of hope for the future (Mercy Corps, 2022).

One of the factors affecting the rate of youth unemployment is, for example, discrepancy in the labour market, leading to difficulties in filling job vacancies caused by insufficient or inadequate skills, limited mobility, and unattractive employment conditions, structural or cyclical lack of jobs or future uncertainty (Pop et al., 2020). Jallade (1987) stated that the most obvious causes of youth unemployment may be economic, demographic, attitudinal and educational factors. The lack of skills due to insufficient education considered to be the main reason for their unemployment.

Although the causes of youth unemployment vary from country to country, the main general causes can be specified (Figure 1). As stated by Pop et al. (2020) and Behun et al. (2018), the business cycle is a key factor in explaining (un)employment in general and young people in particular.

Figure 1: General causes of youth unemployment



Source: own processing according to Pop et al., 2020

Youth unemployment reacts to changes in the economic cycle more sensitively than adult unemployment. Many young people act as a "buffer" in the labour market, absorbing macroeconomic shocks through larger fluctuations in their employment or unemployment. In terms of the demographic structure, the proportion of young people is expected to decline in most European countries (Eurostat, 2023a), which could have a positive impact on their future job prospects as they will be more requested. The education system includes general and vocational education and training systems, apprenticeships, and work experience for young people. Education systems linked to the labour market result in lower youth unemployment (Hvastová, 2022). The most intense connection between education and work is realized by the "dual" system. Certain personality characteristics are associated with success and failure on the labour market (Bol et al., 2019). Social class, which is objectively related to chances of success, can influence an experience of young people on labour market through access to resources, encouragement and perception of aspirations and opportunities.

According to Görlich, Stepanok, and Al-Hussami (2013), behavioural patterns established at a young age tend to persist. Unemployment in the first stage of young people's life has persistent negative consequences for their later lives and careers, as it damages their productive potential and future employment opportunities (Ryan, 2001). From the draft conclusions of the Council of the European Union (2019) follows, that new forms of work (as one of the causes of youth unemployment) are increasingly diverse, which is reflected in new contractual arrangements and atypical forms of employment. They can facilitate access to the labour market for several groups, including those who are traditionally the furthest away from the labour market and thus contribute to social inclusion.

All the mentioned reasons contribute to the need to solve this problem at higher levels and therefore the issue of youth unemployment is an essential part of several development strategies. The Europe 2020 strategy pointed to the need to increase the employment rate in the member countries of the European Union through two initiatives, namely "Youth on the move" and "Program for new skills and jobs: the European contribution to full employment" with the aim of improving employability and job opportunities for young people (European Commission, 2010). The currently valid Agenda 2030 for sustainable development points to

the fact that young people play a significant role in the implementation of sustainable development efforts at all levels (United Nations, 2018).

2 Data and methodology

We applied priority criteria of availability, comparability, and relevance for data selection. Therefore, the analysis and as follows results is based on the data from Eurostat, mainly from the European Union Labour Force Survey (EU LFS). Due to the availability factor and in an effort to highlight the effects of the pandemic in the monitored area, we worked with the latest available data for 2023-Q1 and data for 2019-Q4.

Surveyed indicators refer to the age group 15-29 to cover the transition from formal education to labor market. The time of transition to the labour market can vary due to personal preferences in relation to education and work or differently set educational systems (different age of graduates).

Specifically, the following indicators were used:

- Unemployment rate as Percentage of population in the labour force for age groups 15-29 and 15-74 years,
- Unemployment in Thousand persons for age group 15-29 years,
- Job vacancy statistics in Number of job vacancies and
- Youth unemployment by educational attainment level for age group 15-29 years (The ISCED 11 classification is used as basic approach to education levels).

When we compare total stocks of free job vacancies (V) with stocks of young unemployed (YUE) for selected European countries, we obtain a Vacancies-Youth Unemployed Ratio (VYUER), i.e. a number of job vacancies corresponding to one young unemployed person.

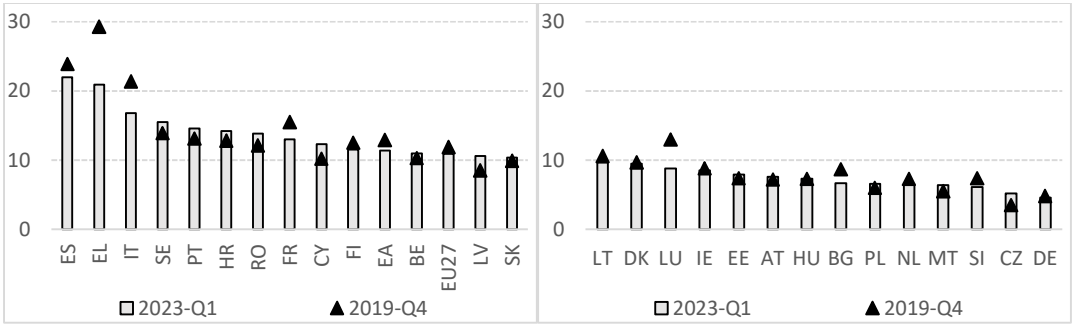
$$VYEUR = V / YUE \tag{1}$$

Boxplots as type of chart often used in explanatory data analysis is used for the year-to-year comparison (2019-Q4, 2023-Q1) of unemployment and youth unemployment rate.

3 Results

Unemployment, which is a significant part of the generation of young people, is generally a serious social and economic problem. Figure 2 confirms this. First graph showed the EU member countries with more than 10% youth unemployment rate. Second graph include countries under this value.

Figure 2: Youth unemployment rate in EU



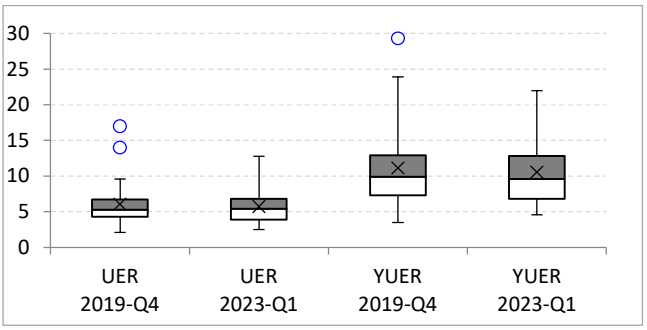
Source: Own processing based on Eurostat, 2023

The labour market situation and opportunities for many young people were already precarious and insecure before pandemic COVID-19. The most significant increase in youth unemployment by 2 p.p. was recorded in Latvia and Cyprus. On the other hand, we observe the decrease at the level of 8.4 p.p. in Greece. The latest OECD Economic Survey of Greece says Greece has rebounded well from the COVID-19 crisis and generating strong employment growth. Key factors behind the country's robust post-pandemic recovery are continued policy reforms over recent years transformed into the increasing investments and exports, the government support measures, the implementation of the Greece 2.0 Recovery and Resilience Package (OECD, 2023). The decrease in youth unemployment rate by more than 4.0% also was reached in Italy and Luxembourg.

In addition, it is interesting that the average indicator of the Eurozone shows higher youth unemployment compared to the EU average. The lowest youth unemployment is in Germany and the Czech Republic. Generally, the youth unemployment issue is the most distinctive in case of the Southern European Countries.

Figure 3 allows us to compare total employment and youth unemployment rates in EU member states in two reference periods.

Figure 3: Unemployment and youth unemployment rate comparison



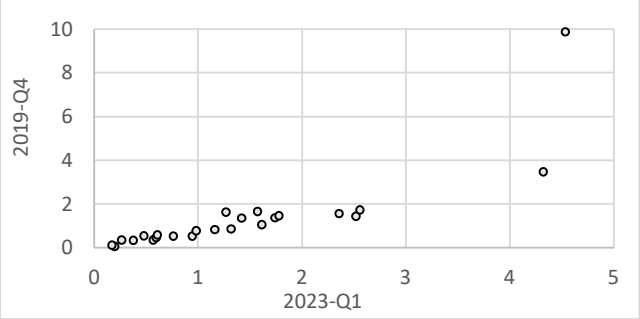
Source: Own processing based on Eurostat, 2023

When comparing them, we can see that the variance range has increased in the case of total unemployment and, conversely, has decreased in the case of youth unemployment. However, average values decreased in both indicators. The youth unemployment rate was almost twice as high as the total unemployment rate. In comparison of two periods, the differences between the observed indicators have deepened. While in 2019-Q4 five member states have ratio between youth unemployment and total unemployment higher than 2.0, in 2023-Q1 it is already nine countries. The highest ratio between these two rates is recorded Romania and Poland (2.5 or 2.4 times as high).

Outliers were identified in 2019-Q4. In the case of total unemployment, outliers were values for Greece and Spain and as for youth unemployment, outlier was also Greece. Based on the pointed-out differences in youth unemployment rates, it is also interesting to focus on the employment possibilities for surveyed countries.

The ratio indicator Vacancies-Youth Unemployed Ratio (VYUER) express the number of job vacancies corresponding to one young unemployed person. Figure 4 points out the changes in VYUER. During the surveyed period. The value under one indicates the situation when less than the one job vacancy corresponding to one young unemployed person.

Figure 4: Vacancies-Youth Unemployed Ratio



Source: Own processing based on Eurostat, 2023

We can positively assess the situation in Lithuania and Finland, where the indicator increased above the value of 1 in compared periods. Despite the fact, that the second lowest rate of youth unemployment is reported in the Czech Republic, the value of VYEUR decreased most significantly from almost 10 job vacancies per 1 young unemployed person to 4.5. When comparing the period, the greatest progress in the indicator was recorded by Slovenia (+1.09 VYEUR).

As Nelson Mandela said, “Education is the most powerful weapon you can use to change the world”. Education is the key to eliminating gender inequality, reducing poverty, creating a sustainable planet, preventing unnecessary death and disease, and promoting peace. And in the knowledge economy, education is the new currency by which nations maintain economic competitiveness and global prosperity (Duncan, 2013). For the above reason, we focused on the youth unemployment rate according to the level of achieved education. Table 1 points to significant differences between the member states in 2019 and 2022. The Czech Republic achieves the best results in case of Secondary and Tertiary education levels in both years. In

2019, the Netherlands had the lowest youth unemployment rate with primary education, in 2022 it was Germany.

Table 1: Youth unemployment by educational level

	2019			2022		
	Primary education (levels 0-2)	*Secondary education (levels 3-4)*	*Tertiary education (levels 5-8)*	*Primary education (levels 0-2)*	*Secondary education (levels 3-4)*	*Tertiary education (levels 5-8)*
Mean	21.193	10.400	7.581	21.830	10.707	6.826
Median	17.6	9.2	5.6	20.5	9.9	5.5
Std. Dev.	9.683	6.253	5.325	9.458	5.44	4.19
Range	36.3	26.8	23.2	44.8	22.9	17.9
Max	45.2	20.4	16.8	35.3	26.1	14.5
	SK	IT	IT	EL	EL	ES
Min	8.9	2.8	1.9	8.6	3.2	1.9
	NL	CZ	CZ	DE	CZ	CZ
Outliers	None	29.6 – 25.0	25.1	53.4	None	19.8
		EL - ES	EL	SK		EL

Source: Own processing based on Eurostat, 2023

Contrary, Slovakia achieved the highest youth unemployment rate. Even, 53.4 % of young people with primary education were unemployed in 2022. Which points to the fact that the country has a long-term and serious problem with the unemployment of people with a lower level of education. In case of secondary and tertiary education level, the similar problems has the Greece. Despite the fact, that the Southern countries of the EU have the biggest problem with youth unemployment, Greece and Italy show a positive trend of decreasing youth unemployment in all three levels of education, despite to the impact of the pandemic. Based on the available data and analysis, we can conclude that the pandemic had the greatest impact on young unemployed people with primary education, which was expressed by an increase in the indicator by more than 7 p.p. in Romania (10 p.p.), Cyprus (8.9 p.p.), Slovakia (8.2 p.p.), Portugal (7.4 p.p.) and Estonia (7.1 p.p.). In the case of other levels of education, such significant differences were not observed.

CONCLUSION

Young people have to constantly face with risks and an uncertain future, as well as changing the nature of labour markets (Juznik Rotar, 2022). Due to lower working capital, skills and general and specific work experience, young people find it difficult to find a suitable job. If they fail to find employment on the labour market shortly after graduation, this leads to long-term unemployment, unstable and low-quality jobs, and even social exclusion, poor health, low standard of living and a decrease in satisfaction due to professional achievements (Bell, Blanchflower, 2011).

The results point to the different development of the monitored indicator in EU member countries and to the fact that the effects of the pandemic on youth unemployment are not evident. When comparing the youth unemployment rate before the COVID-19 pandemic (2019-Q4) with the current period (2023 Q1), there was an increase in 13 countries, while in another 13 countries there was a decrease, and in Hungary the value of the indicator did not change at

all. We assessed the potential to achieve positive changes in the area of youth unemployment based on the VYUER indicator. In 11 countries, its value was less than 1, which means that there is neither one job vacancy on the relevant labour market for one young unemployed person aged 15-29. This group includes the countries that show the biggest problem with youth unemployment (EU Southern Countries and Slovakia).

Even education is not a guarantee of employment, because having a tertiary level of education is not even longer a sufficient prerequisite for getting a good job. An example of this is Cyprus, Spain, Greece, and Portugal, where the share of young people with completed tertiary education is 20 or more, and at the same time, these countries show the highest unemployment rates of young people with tertiary education.

In practice, requirement of work experience constitutes an obstacle for many young people, because they are unable to obtain work experience and simultaneously, they cannot find a job because of lack of work experience (Gontkovičová et al., 2015). Therefore, the intensive cooperation between practice, i.e. employers and companies, with educational institutions that prepare young people for the labour market is desirable.

Acknowledgement

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Bibliography

BEHUN, Martin et al., 2018. “The impact of the manufacturing industry on the economic cycle of European Union countries,”. In: Journal of Competitiveness, 10(1), 2018. pp. 23-39.

BELL, David, N. F. and David BLANCHFLOWER, 2011. “Young people and the Great Recession,”. In: Oxford Review of Economic Policy, 27(2), 2011. pp. 241-267.

BOL, Thijs et al., 2019. “School-to-work linkages, educational mismatches, and labor market outcomes,”. In: American Sociological Review, 84(2), 2019. pp. 275-307.

BUCEVSKA, Vesna and Kristian KOZHESKI, 2022. “Determinants of youth unemployment in SEE countries,”. In: Management research and practice, 14(4), 2022. pp. 62-74.

COUNCIL OF THE EUROPEAN UNION, 2019. Council Conclusions on Young People and the Future of Work (2019/C 189/05). Official Journal of the European Union, C189/28.

DUNCAN, Arne, 2013. Education: The Most Powerful Weapon for Changing the World. Retrieved from: https://blog.usaid.gov/2013/04/education-the-most-powerful-weapon/ [accessed: 17 May 2023].

EUROPEAN COMMISSION, 2010. EUROPE 2020. A strategy for smart, sustainable and inclusive growth. Retrieved from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF [accessed: 07 June 2023].

EUROSTAT, 2023a. EU's population projected to drop by 6% by 2100. Retrieved from: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/DDN-20230330-1 [accessed: 19 June 2023].

EUROSTAT, 2023b. Database. Retrieved from: https://ec.europa.eu/eurostat/web/main/data/database [accessed: 15 June 2023].

GONTKOVIČOVÁ, Barbora and Antonín KORAUŠ, 2022. "Youth Unemployment in EU Member States and Impact of the Covid-19 Pandemic,". In: RELIK 2022: Reproduction of Human Capital - mutual links and connections, 2022. pp. 177-186.

GONTKOVIČOVÁ, Barbora, MIHALČOVÁ, Bohuslava and Michal PRUŽINSKÝ, 2015. "Youth unemployment–Current trend in the labour market?". In: Procedia Economics and Finance, 23. pp. 1680-1685.

GÖRLICH, Dennis, STEPANOK, Ignat and Fares AL-HUSSAMI, 2013. Research Report Youth unemployment in Europe and the world: Causes, consequences and solutions Retrieved from: https://www.econstor.eu/bitstream/10419/70102/1/735082359.pdf [accessed: 10 June 2023].

HVASTOVÁ, Jozefína, 2022. "Problematika nezamestnanosti mladých ľudí v krajinách V4,". In: Európska únia a stratégia Európa 2020 v zrkadle priorít a výziev cieľov Agendy 2030 II., pp. 27-39.

JALLADE, Jean-Pierre, 1987. "Youth Unemployment and Education. Economics of Education," In: Research and Studies, 1987. pp. 166-172.

JUZNIK ROTAR, Laura, 2022. "Effectiveness of Active Labour Market Policies in the EU Countries for the Young Unemployed People and Implications for the Post-pandemic Period,". In: Inzinerine Ekonomika - Engineering Economics, 33(3). pp. 326–337.

INANC, Hande, 2020. Breaking down the numbers: What does COVID-19 mean for youth unemployment? Cambridge, MA: Mathematica, June 2020.

KANG, Yoo-Duck, 2021. "Determinants of youth unemployment: Empirical analysis of OECD and EU Member Countries in 2000-2017,". In: Journal of economic development. 46(3), 2021. pp. 111-133.

LAMBOVSKA, Maya, SARDINHA, Boguslawa and Jaroslav BELAS, Jr., 2021. "Impact of the Covid-19 pandemic on youth unemployment in the European union,". In: Ekonomicko-manazerske spectrum, 15(1), 2021. pp. 55-63

MERCY CORPS, 2022. Youth unemployment: a global crisis. Retrieved from: https://www.mercycorps.org/blog/youth-unemployment-global-crisis [accessed: 14 June 2023].

OECD, 2023. OECD Economic Surveys. Greece. Executive Summary. Retrieved from: https://issuu.com/oecd.publishing/docs/greece-2023-oecd-economic-survey_brochure/8 [accessed: 03 June 2023].

POP, Andreea et al., 2020. "YUTRENDS – Youth unemployment: Territorial trends and regional resilience,". In: Applied Research. Final Report. ESPON, 72.

PKHAKADZE, Tamar, 2022. “Youth unemployment in the European Union and transition period - from education to the labour market,”. In: Technium Social Sciences Journal. A new decade for social changes, 32, 2022. pp. 532-540.

RYAN, Paul, 2001. “The School-to-Work Transition: A Cross-National Perspective,”. In: Journal of Economic Literature, 39(1), 2001. pp. 34-92.

SIMIONESCU, Mihaela and Javier CIFUENTES-FAURA, 2022. “Forecasting National and Regional Youth Unemployment in Spain Using Google Trends,”. In: Social indicators research, 164(3), 2022. pp. 1187-1216.

UNITED NATIONS, 2018. World Youth Report. Youth and the 2030 Agenda for Sustainable Development. New York, 2018. 236 p.

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The impact of the COVID-19 pandemic on the goals of sustainable development

Vplyv pandémie COVID-19 na ciele udržateľného rozvoja

Martin Bosák, Jaroslav Dugas

Abstrakt

Celosvetová pandémia covid-19 v rokoch 2020-2022 ovplyvnila život na celom svete po zdravotnej a spoločenskej stránke. Jej manažovanie v jednotlivých štátoch bolo rôzne a boli aj rôzne výsledky. Slovensko sa viackrát ocitlo na nelichotivom prvom v mieste (nadúmrtnosť), preto je potrebné vyhodnotiť a urobiť analýzu získaných dát a z pandémie sa poučiť a vyhnúť sa tak prípadným budúcim krízam.

Kľúčové slová

Covid-19, pandémia, nadúmrtnosť, udržateľný rozvoj

Úvod

Medzi ciele UR Agendy 2030 patri aj zabezpečenie zdravého života a kvalitné vzdelávanie pre všetkých. To veľkým vplyvom obmedzila pandémia covid-19, ktorá v dramaticky krátkom čase spôsobila globálne spoločenské a ekonomické narušenie života spoločnosti, zmenila život i spôsob myslenia takmer celého ľudstva. Zdravotnícke zariadenia v priebehu krátkeho času v dôsledku zahltenia prešli na telemedicínu a množstvo plánovaných operácií boli posunuté na neurčito, čo spôsobilo množstvo nevynútených úmrtí. Zároveň viedla k odloženiu alebo zrušeniu väčšiny športových, náboženských, politických a kultúrnych udalostí, rozsiahlych nedostatkov potravín zapríčinených panickým nakupovaním. Vzdelávacie inštitúcie boli čiastočne alebo úplne zatvorené a mnohé z nich prešli na online vzdelávanie. Úrady na celom svete zareagovali implementáciou cestovných obmedzení, výluk, kontrolou bezpečnosti na pracovisku a zatvorením prevádzok. Ako jediné pozitívum je možné evidovať zníženie emisií znečisťujúcich látok a skleníkových plynov. [Bosák a kol. 2018, www.health.gov.sk]

1 Začiatok pandémie covid-19

Pandémia covid-19 zásadným spôsobom ovplyvnila život na celom svete predovšetkým cez mnohé obmedzenia, ale hlavne cez veľké straty na ľudských životoch. Vôbec prvým zaznamenaným človekom na svete s vírusom SARS-CoV-2, ktorý spôsobuje ochorenie covid-19, bol 55-ročný muž z čínskej provincie Chu-pej, ktorý sa nakazil už 17. novembra 2019. Práve z metropoly tejto provincie Wu-chan sa smrteľný koronavírus postupne rozšíril do celého

sveta a spôsobil pandémiu. Svetová zdravotnícka organizácia vyhlásila globálny stav núdze verejného zdravia 30. januára 2020 a 11. marca 2020 šírenie vírusu začala označovať ako pandémiu. [www.who.int]

Podľa údajov Svetovej zdravotníckej organizácie (WHO) si vírus na celom svete vyžiadal takmer 7 miliónov obetí. Infekcia bola potvrdená ku koncu augusta 2023 u 700 miliónov ľudí vo viac ako 190 krajinách alebo regiónoch sveta, u ďalších to bolo s ľahkým priebehom, bezpríznakových alebo mimo dostupnosti zdravotnej starostlivosti. Najviac postihnuté pandémiou boli USA, India, Francúzsko, Brazília a Nemecko. [www.worldometers.info]

Na Slovensku sa potvrdil prvý prípad nákazy koronavírusom dňa 6. marca 2020 u 52-ročného muža z Kostolišťa pri Malackách. O mesiac neskôr, 6. apríla 2020, minister zdravotníctva Marek Krajčí informoval, že Slovensko má potvrdené prvé dve úmrtia na ochorenie covid-19. Odvtedy pripravil covid-19 na Slovensku o život cca 30.000 ľudí, ďalšie tisíce pacientov zomreli pre obmedzenú bielu medicínu. Z tohto dôvodu bol na Slovensku od tohto roku 2023 prijatý zákonom nový pamätný deň 6. marec (deň, keď bol potvrdený prvý prípad nákazy) „Deň obetí pandémie covid -19“. [www.health.gov.sk]

2 Nadúmrtnosť na covid-19

Zvýšenú nadúmrtnosť (dočasný nárast úmrtnosti obyvateľstva v porovnaní s očakávanou) na covid-19 zaznamenali všetky štáty EÚ, podrobnejšie porovnanie za obdobie 3/2020-2/2022 ukazuje, že situácia na Slovensku bola obzvlášť nepriaznivá. Pri pohľade na vývoj nadúmrtnosti v SR možno manažment pandémie prehlásiť za nezvládnutý s výnimkou priebehu prvej vlny pandémie v období marec-máj 2020. V druhej a potom aj v tretej vlne Slovensko zaznamenalo vysoký počet infikovaných aj mŕtvych.

Tabuľka 1: Vlny covid-19 na Slovensku

Vlna covidu-19	Obdobie
prvá	03/2020 – 05/2020
druhá	09/2020 – 05/2021
tretia	09/2021 – 05/2022

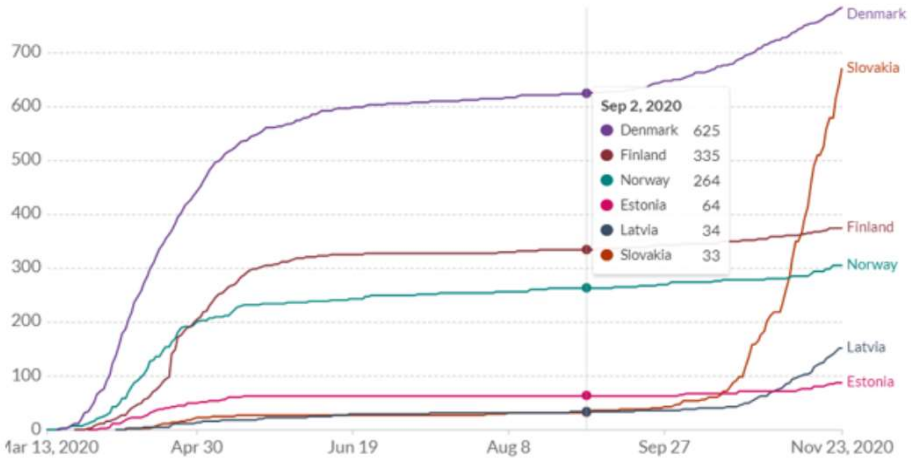
Zdroj: vlastné spracovanie

Na vrchole druhej vlny Slovensko zaznamenalo až 70% nadúmrtnosť, čím sme získali nelichotivé prvenstvo na svete. Bolo to v období krátko po celoplošnom testovaní obyvateľov Slovenska, ktoré sa uskutočnilo v dňoch 31. októbra a 1. novembra 2020. O týždeň neskôr v dňoch 7. – 8. novembra 2020 prebehlo druhé kolo celoplošného testovania v tých okresoch, v ktorých sa v prvom kole potvrdilo viac ako 0,7 % pozitívne testovaných na koronavírus. Tretie kolo celoplošného testovania v dňoch 21. – 22. novembra 2020 prebiehalo v obciach, kde bolo po druhom kole viac ako 1 % pozitívne testovaných.

Je potrebné uviesť, že vláda prezentovala celoplošné testovanie ako „úplne dobrovoľné“, ale tí, ktorí sa ho nezúčastnili boli potrestaní nútenou karanténou a ďalšími obmedzeniami. Hoci sa vtedajší premiér následne ospravedlnil („*Prepáčte mi, že sme vás donútili ísť na test*"), je

zaujímavé vidieť v grafoch radikálny nárast úmrtí a nadúmrtí tesne po celoplošnom testovaní v jeseni 2020. Z dnešného pohľadu je dobré, že ďalšie plánované celoplošné testovania neboli vládou schválené.

Obrázok 1: Nárast úmrtí v roku 2020



Zdroj: www.ourworldindata.org

Tabuľka 2: Nárast úmrtí v roku 2020

Štát	Počet obyv.	Počet úmrtí 2.9.2020	Počet úmrtí 23.11.2020	Nárast v %
Dánsko	5,93 mil.	625	782	25
Fínsko	5,53 mil.	335	389	16
Nórsko	5,48 mil.	264	306	16
Estónsko	1,33 mil.	64	95	48
Lotyšsko	1,90 mil.	34	160	370
Slovensko	5,43 mil.	33	686	**1 979**

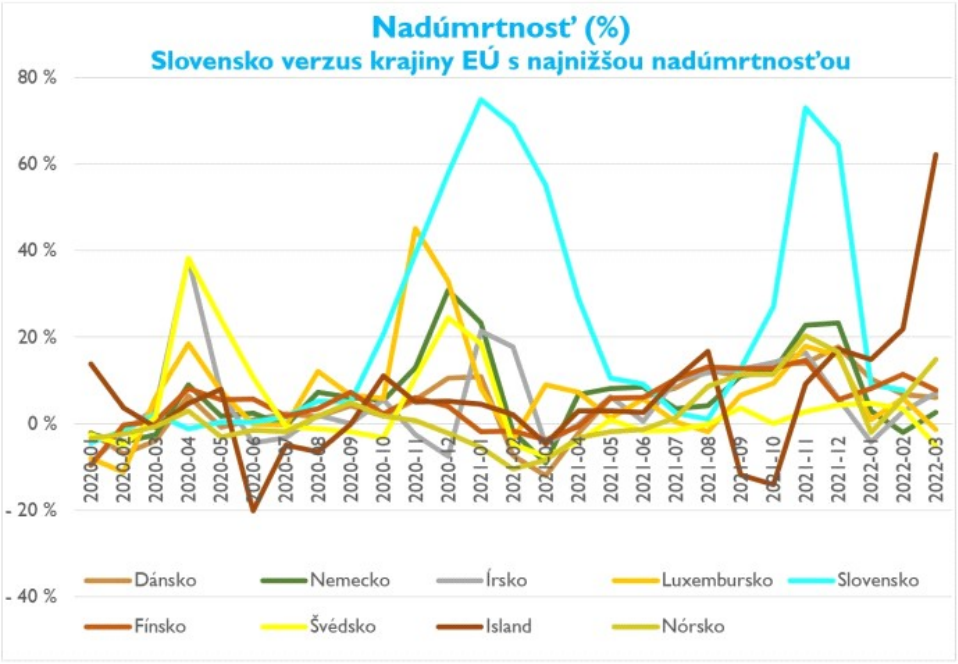
Zdroj: vlastné spracovanie

Ak porovnáme úmrtnosť na covid na Slovensku a v Nórsku a Fínsku (približne rovnaký počet obyvateľov), tak vidíme, že až do októbra 2020 zomieralo na Slovensku na covid približne rovnaký počet ľudí ako v týchto dvoch krajinách. Potom na Slovensku bolo celoplošné testovanie a počet úmrtí na covid v priebehu jesene a zimy 2020/21 stúpol z 10 na milión obyvateľov až na viac ako 2 000 na milión obyvateľov v roku 2021.

Štúdia „Nadúmrtnosť na COVID-19 v kontexte rozhodnutí zdravotnej politiky (roky 2020 – 2022)“ uvádza, že počas pandémie (3/2020 – 2/2022) bolo na Slovensku celkovo zaznamenaných 26 786 nadúmrtí. Zároveň je tam hypoteticky kvantifikovaný počet životov,

ktoré mohli byť potenciálne zachránené, ak by sa na Slovensku zaviedli protipandemické opatrenia rovnaké ako vo vybraných krajinách EÚ. [www.healthcareconsulting.sk]

Obrázok 2: Nadúmrtnosť vo vybraných krajinách



Zdroj: www.healthcareconsulting.sk

Tabuľka 3: Počet stratených životov, ktoré mohli byť zachránené

Porovnanie	Počet stratených životov navyše
Slovensko – Dánsko	21 308
Slovensko – Nemecko	18 476
Slovensko – Portugalsko	14 483
Slovensko – Estónsko	12 391
Slovensko – Česko	3 582

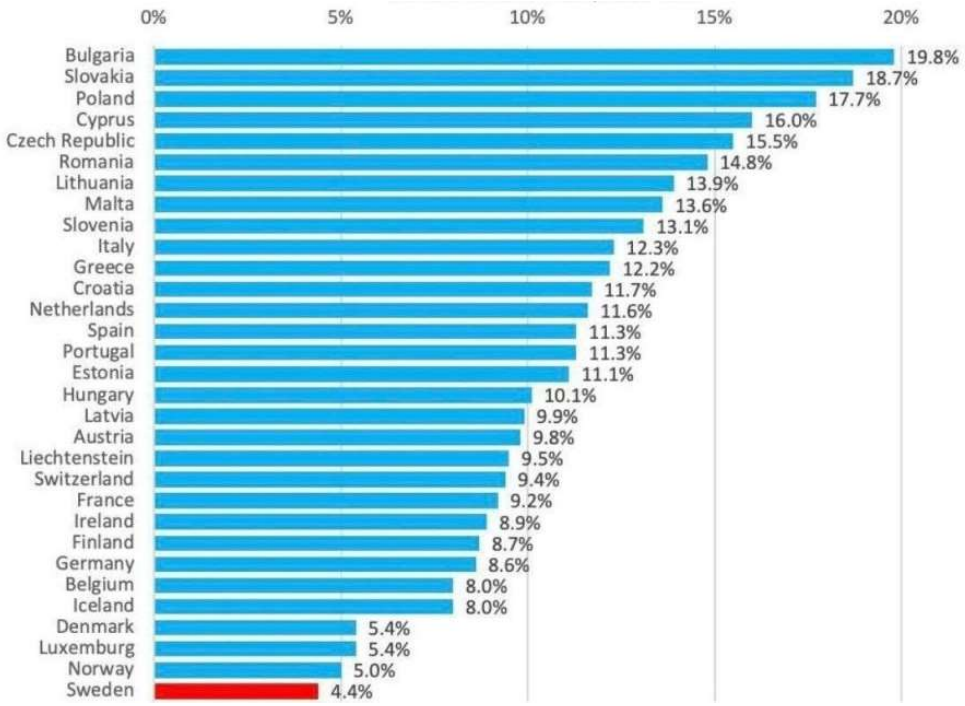
Zdroj: vlastné spracovanie

Slovensko dosiahlo 70-percentnú nadúmrtnosť oproti predpandemickému obdobiu. Ak by Slovensko zaviedlo opatrenia, ako napríklad Dánsko, podľa štúdie sa mohlo potenciálne zachrániť až 21 000 životov. Aj pri ďalších uvedených štátoch sú to vysoké čísla, ktoré mohli zabezpečiť zníženie úmrtí.

Z údajov štatistickej organizácie EÚ Eurostat, vyplýva, že švédska metóda boja proti covid-19 bola podľa miery úmrtnosti najúčinnejšia v Európe. Švédsko odmietlo karanténu a iné núdzové opatrenia, za čo boli v tom čase ostro kritizovaní, ale nakoniec im však čas dal za pravdu. V

rokoch 2020 – 2022 malo Švédsko najnižšiu “nadúmrtnosť”. Inými slovami, Švédsko prežilo covid s najmenšími stratami na životoch v porovnaní so zvyškom Európy. Najvyššie ľudské straty zaznamenalo Bulharsko a druhé najväčšie Slovensko. Nasledovali Poľsko, Cyprus a Česká republika. [www.ourworldindata.org]

Obrázok 3: Nadúmrtnosť na covid v rokoch 2020-2022



Zdroj: www.ourworldindata.org

Podľa Schöley J. a kol. (2022) stredná dĺžka života, vyjadrujúca stav zdravia populácie na Slovensku poklesla až o 33 mesiacov v roku 2021 s porovnaním s rokom 2019. Z 29 skúmaných krajín sa stredná dĺžka života najviac skrátila v Bulharsku (43 mesiacov) a Slovensko je hneď druhé.

ZÁVER

Zvýšenú nadúmrtnosť zaznamenali všetky štáty EÚ, detailnejšie porovnanie ukázalo, že situácia na Slovensku bola obzvlášť nepriaznivá. Stratené životy už nikto nezachráni, no práve analýzou dát sa dá z pandémie poučiť a vyhnúť sa tak prípadným budúcim krízam. Na vysokú nadúmrtnosť počas pandémie covid-19 mali vplyv rozhodnutia politikov a ak by Slovensko robilo tie opatrenia, ktoré robili najúspešnejšie krajiny, tak sa mohlo zachrániť množstvo ľudských životov.

Príslušnosť k projektu

Tento príspevok je súčasťou projektu KEGA č. 035EU-4/2022: „Dosahovanie cieľov Agendy 2030 udržateľného rozvoja pod vplyvom celosvetovej pandémie COVID-19“.

Bibliografia

BOSÁK, M. a kol. 2018. Udržateľný rozvoj - rozvojové koncepty. Košice: Gamajun. 194 s. ISBN 978-80-973219-1-8.

SCHÖLEY, J. a kol. 2022. Life expectancy losses and bounce-backs during the COVID-19 pandemic, Nature Human Behaviour, volume 6, pp. 1613–1614.

www.health.gov.sk

www.healthcareconsulting.sk

www.ourworldindata.org

www.who.int

www.worldometers.info/coronavirus

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Comparison of the business environment in Slovakia and V4 countries under the influence of the COVID-19 pandemic

Porovnanie podnikateľského prostredia na Slovensku a v krajinách V4 pod vplyvom COVID-19

Mária Ria Janošková, Katarína Čulková

Abstrakt

Pre zabezpečenie rozvoja podnikania, životnej úrovne obyvateľstva a udržateľnej výkonnosti ekonomiky je potrebné kontinuálne zodpovedne pristupovať k zvyšovaniu kvality podnikateľského prostredia. Pandémia Covid-19 a následná kríza ovplyvnili aj podnikateľské prostredie vo všetkých krajinách na celom svete. Príspevok opisuje pokračujúci výskum z pohľadu porovnania kvality podnikateľského prostredia s cieľom zistiť, či sú tendencie a trendy rovnaké ako v predchádzajúcich štúdiách, alebo sa situácia zmenila v dôsledku pandemickej situácie. Cieľom nášho výskumu bolo zhodnotiť a porovnať kvalitu podnikateľského prostredia Slovenska a ostatných krajín V4 na základe vybraných indexov. Hodnotenie sme zamerali na vybrané roky 2019 a 2020 na základe dvoch medzinárodne uznávaných indexov, a to Doing Business Index a Index vnímania korupcie. Zistili sme, že súčasná situácia poukazuje na pokles kvality podnikateľského prostredia v tomto regióne. Príspevok prináša tiež pohľad na hodnotenie podnikateľského prostredia na Slovensku podľa IPP. Výsledky môžu byť podnetom na zlepšovanie podmienok podnikania v krajinách V4 a ich ekonomikách, v záujme zvyšovania životnej úrovne ich obyvateľov.

Kľúčové slová

Podnikateľské prostredie, ekonomický rozvoj, makroekonomické ukazovatele, rozvoj podnikania, DBI, CPI, IPP

Úvod

Podnikateľské prostredie krajiny odráža kvalitu jej predpokladov a podmienok pre ekonomickú činnosť podnikateľských subjektov. Pre zabezpečenie dlhodobého rozvoja podnikania, zvyšovania životnej úrovne obyvateľstva a udržateľnej výkonnosti ekonomiky je potrebné zodpovedne pristupovať k zvyšovaniu kvality podnikateľského prostredia. Vývoj jednotlivých indikátorov odzrkadľuje okrem iného aj kvalitu podmienok, v ktorých podnikatelia vykonávajú svoju podnikateľskú činnosť. Medzi priority každej vlády v krajine by mal patriť rozvoj podnikania z dlhodobého hľadiska, v záujme rozvoja ekonomiky. Je preto potrebné

monitorovať a objektívne analyzovať podnikateľské prostredie, pričom existujúce štúdie poukazujú na rozdielnu úroveň rozvoja jednotlivých regiónov.

Napriek spolupráci krajín V4 si v súčasnej globalizovanej dobe bezpochyby konkurujú, preto musia na svojom území vytvárať kvalitné a stabilné podnikateľské prostredie. Malé otvorené ekonomiky, akou je aj Slovensko, sa musia prispôsobiť a vytvárať národné stratégie tak, aby sa mohli premietnuť do stratégií investorov v reakcii na meniace sa podmienky pre alokáciu zahraničných investícií. Jedným z dôvodov zlepšovania kvality podnikateľského prostredia je prilákať zahraničných investorov. Hodnotenie podnikateľského prostredia viacerých krajín umožňujú medzinárodne uznávané indexy zamerané na ich konkurencieschopnosť. Primárnym cieľom príspevku je podľa uvedeného komparovať kvalitu podnikateľského prostredia jednotlivých krajín V4.

1 Prehľad štúdií o podnikateľskom prostredí

Kvalita podnikateľského prostredia je základným predpokladom pre udržateľný rast a dlhodobú konkurencieschopnosť každej globálnej trhovej ekonomiky (Buno a kol., 2015). Okrem toho vytvára podmienky pre dlhodobo udržateľné dosahovanie ekonomického rastu, je základom rozvoja podnikania a napredovania konkurencieschopnosti. Na druhej strane podnikateľské prostredie odráža kvalitu ekonomických podmienok a ekonomických aktivít v krajine (Kubica a Tóth, 2015), a to prevažne z dlhodobého hľadiska.

Štúdiom kvality podnikateľského prostredia sa zaoberajú výskumníci v rôznych krajinách a regiónoch, napr. podľa štúdie He a Yao (2022) v Číne v období 2008-2019 je zlepšenie podnikateľského prostredia ovplyvnené ekonomickým rozvojom a líši sa v rôznych regiónoch. Ahmedova (2015) ukázala na prípade Bulharska, že konkurencia je určujúca pre rozvoj podnikania, najmä v oblasti konkurencieschopnosti malých a stredných podnikov. Keďže krajiny V4 sú aj bývalými postkomunistickými krajinami, podobne ako Bulharsko, situácia môže byť porovnateľná.

Podnikateľské prostredie na Slovensku, aj v regióne V4 skúmalo v minulosti už viacero autorov. Napr. Bruothová a Hurný (2016) sústredili svoju analýzu na jednoduchosť podnikania vytvorenú skupinou Svetovej banky, Index globálnej konkurencieschopnosti, Index ekonomickej slobody, hodnotenie z ročenky svetovej konkurencieschopnosti a Index krehkého štátu, ktoré sú spojené s makroekonomickými ukazovateľmi (hrubý domáci produkt, miera nezamestnanosti a miera inflácie). Štúdia naznačuje, že vzťah medzi rôznymi indexmi kvality podnikateľského prostredia a vybranými makroekonomickými ukazovateľmi alebo úverovým ratingom krajiny je špecifický pre danú krajinu. Analýza bola za obdobie rokov 2005-2014, takže v súčasnosti je vhodné urobiť podobnú štúdiu.

Dobrovič a kol. (2018) skúmali súčasný stav konkurencieschopnosti spolu s ďalšími ekonomickými problémami vo viacerých krajinách EÚ s dôrazom na ekonomiku Slovenska. Analyzovali vzťahy, ktoré existujú medzi inováciami a konkurencieschopnosťou, s prihliadnutím na výsledky modelov hodnotenia výkonnosti v rámci vybraných krajín.

V inom výskume Čepel a kol. (2018) definovali a kvantifikovali významné faktory na Slovensku a v Českej republike, ktoré formujú kvalitu podnikateľského prostredia malých a stredných podnikov. Čepel a kol. (2020) vypracovali novú štúdiu o kvalite podnikateľského prostredia v podmienkach Slovenska a zistili, že ekonomické, politické, sociálne a

technologické faktory majú značný vplyv na jeho rozvoj. Virglerová a kol. (2017) nadviazali na hodnotenie kvality podnikateľského prostredia v Českej republike z roku 2015, pričom okrem iných makroekonomických ukazovateľov zistili pozitívny vplyv bankového sektora a finančného trhu na kvalitu podnikateľského prostredia. Česko a Slovensko skúmali aj Belas a kol. (2015), rozdiely našli najmä z pohľadu podmienok na začiatku podnikania. Kým na Slovensku sú motiváciou peniaze, v Česku je motivátorom práca. V roku 2017 sa podľa Kroslákovej a kol. (2017) podnikateľské prostredie na Slovensku mierne stabilizovalo, čo korešponduje s pozitívnym hodnotením ekonomických ukazovateľov. Štúdia zistila najzávažnejšie hrozby pre konkurencieschopnosť slovenských podnikov, akými sú korupcia, nízka vymožiteľnosť práva, odliv kvalifikovanej pracovnej sily do zahraničia, nestabilný a neprehľadný daňový a odvodový systém (vrátane zvyšovania daní) a nedostatočne rozvinutá infraštruktúra (Juríčková a Kačírková, 2006).

2 Metodológia

Príspevok je čiastkovým výstupom výskumu, zameraný na krajiny V4 v záujme zistiť, či sú tendencie a trendy rovnaké ako v predchádzajúcich štúdiách, alebo sa situácia zmenila najmä v dôsledku situácie pandémie Covid-19, v rokoch 2019 a 2020. Cieľom je hodnotenie a porovnanie kvality podnikateľského prostredia krajín V4, na základe vybraných medzinárodne uznávaných indexov. Vyšehradská štvorka je neformálne zoskupenie štyroch stredoeurópskych štátov, a to Slovenskej republiky, Českej republiky, Maďarskej republiky a Poľskej republiky. Toto spoločenstvo bolo založené v roku 1991 v záujme spolupráce vo viacerých oblastiach spoločenského života v rámci európskej integrácie, a to 13 rokov pred vstupom týchto krajín do Európskej únie. Zakladajúce krajiny majú podobné historické korene, podobnú postkomunistickú minulosť, takmer rovnaké kultúrne a intelektuálne hodnoty. Od prechodu na trhové hospodárstvo zameriavajú svoje ekonomické aktivity na posilňovanie stability v stredoeurópskom regióne. Cieľom V4 je povzbudzovať optimálnu spoluprácu so všetkými krajinami a najvyšším záujmom je demokratický rozvoj všetkých častí Európy.

Podnikateľské prostredie je komplexným súborom veličín a premenných viacerých oblastí hospodárskeho života. Meranie úrovne a kvality podnikateľského prostredia musí byť objektívne, aby bolo možné kvantitatívne ho porovnávať na národnej, aj na medzinárodnej úrovni. Kvalita podnikateľského prostredia je pritom považovaná za kľúčovú podmienku v konkurencieschopnosti rastu trhovej ekonomiky (Janošková a kol., 2018).

Kvalitu podnikateľského prostredia merajú indexy s rôznou konštrukciou, ktoré využívajú informácie z rôznych zdrojov s rôznymi premennými veličinami. Pre účely nášho výskumu sme vybrali dva medzinárodne uznávané indexy, a to DBI-Doing Business Index a CPI-Corruption Perception Index. Pri hodnotení sme sa zamerali na roky 2019 a 2020, podľa dostupnosti dát. Podkladom pre spracovanie boli analýzy, ako aj správy a dáta z verejne dostupných zdrojov, napr. správa Doing Business, Svetovej banky ai. (www.worldbank.org). Správa Doing Business meria reguláciu ovplyvňujúcu samotnú podnikateľskú činnosť, ako aj podmienky začatia a ukončenia podnikania. Príspevok prináša tiež pohľad na hodnotenie podnikateľského prostredia na Slovensku podľa Indexu podnikateľského prostredia / IPP, ktorý od r. 2001 sleduje názory podnikateľov na podmienky vytvárané pre podnikanie na Slovensku (www.alianciapas.sk).

V príspevku sme porovnávali podnikateľské prostredie krajín V4 pomocou analýz a dedukcie. Komparácia vychádza zo všeobecne rešpektovaných ukazovateľov kvality podnikateľského prostredia. Použili sme už uvedené indexy:

1. Index jednoduchosti podnikania / DBI
vyjadruje jednoduchosť podnikania, ktorý tvorila Svetová banka v období rokov 2004 až 2020. Základom indexu je hodnotenie jednotlivých krajín z pohľadu podnikateľských podmienok, pričom index je orientovaný na pozitívne podmienky podnikania, reguláciu podnikania, vlastnícke práva, atraktívnosť pre zahraničných investorov a konkurencieschopnosť (Haidar, 2012). Jednoduchosť DBI je hodnotená v rôznych oblastiach podnikania od jeho začatia až po ukončenie, vrátane registrácie majetku a platenia daní. V posledných rokoch spoločnosť Doing Business zaviedla vylepšenie všetkých skupín indikátorov. V DBI 2015 rozšírili existujúce opatrenia o možnosti získania úveru, ochranu menšinových investorov, ako aj riešenie platobnej neschopnosti. V DBI 2016 zaviedli podmienky pre vybavenie stavebného povolenia, získavanie elektriny, vymáhanie zmlúv, tiež pre obchodovanie cez hranice a zvýšenie ekonomickej relevantnosti. V DBI 2017 pribudli nové opatrenia administratívnych procesov po podaní žiadostí. Od roku 2022 implementuje na každoročné hodnotenie podnikateľského a investičného prostredia na celom svete Svetová banka nový index Business Ready (B-READY), ktorý má vylepšiť a nahradiť DBI. Napriek tomu že táto správa mení svoju podobu, v príspevku sme využili dáta z posledného uverejneného dokumentu za rok 2020.

2. Index vnímania korupcie / CPI
vytvára Transparency International, ktoré pôsobí na celom svete, vo viac ako 100 krajinách. CPI hodnotí krajiny už od 1995, v súčasnosti je to až 180 krajín sveta podľa vnímanej úrovne korupcie vo verejnom sektore. Index usporiadava krajiny podľa úrovne korupcie vo verejnom sektore, hodnotí korupciu podľa rebríčka (kde 0 znamená vysokú mieru korupcie; 100 znamená krajinu bez korupcie (www.transparency.org). Pri hodnotení korupcie sme sa zamerali najmä na jej fungovanie v právnom štáte. Žiaľ, korupcia je už dlho považovaná za jeden z hlavných problémov modernej spoločnosti. Túto myšlienku potvrdzujú aj medzinárodné analýzy, ktoré naznačujú, že jej miera je na Slovensku pomerne vysoká. Jej následkom je negatívny dopad na fungovanie sociálno-ekonomických vzťahov (Šikula, 2008).

3. Index podnikateľského prostredia na Slovensku / IPP
Ide o unikátny index názorov podnikateľov pôsobiacich na území SR na vznikajúce zmeny v podnikateľskom prostredí v čase. Slovensko patrí medzi krajiny, kde sú ciele politikov odkláňané od zámerov ekonomicky aktívneho obyvateľstva, ktoré vytvára bohatstvo krajiny. Podnikateľská Aliancia Slovenska / PAS má vytvorenú vlastnú metodiku hodnotenia, založenú na pravidelnom štvrťročnom monitorovaní podnikateľského prostredia. Hodnotenie sa sústreďuje na tri kategórie, každá z nich hodnotí desať položiek. Sú to: 1. Monitorovanie a vývoj legislatívneho a regulačného prostredia. 2. Vplyv vonkajších makroekonomických faktorov na podnikateľské prostredie. 3. Mikrofaktory, názory manažérov podnikov na rozvoj podnikateľského prostredia (www.alianciapas.sk).

3 Výsledky

Výskumy využívajú rôzne dáta, niektoré indexy sú založené viac na objektívnych, iné aj na subjektívnych informáciách. Podmienky sa často menia, preto je vhodné porovnávanie vývoja

robiť pravidelne, v intervale nie viac ako tri roky. Podľa uvedeného sme výskum obmedzili na komparáciu zmien v období rokov 2019 a 2020.

Index jednoduchosti podnikania / DBI - Doing Business Index

Tabuľka 1 ilustruje hodnoty indexu v Európskej únii (27). Každá krajina má index z intervalu 1-190 (190 krajín zahrnutých do výskumu). Hodnoty sú v rokoch 2019 a 2020 spolu s výpočtom ročnej zmeny a zmenou v rebríčku.

Tabuľka 1: Index jednoduchosti podnikania / DBI v krajinách EU 27

EU 27	Krajina	DBI 2019	DBI 2020	Zmena 2020/2019	Hodnota 2019 (1-100 b)	Hodnota 2020 (1-100 b)	Zmena 2020/2019
1	Dánsko	3.	4.	-1	84,64	85,30	0,66
2	Švédsko	12.	8.	4	81,27	82,00	0,73
3	Lotyšsko	14.	10.	4	80,83	81,60	0,77
4	Estónsko	16.	11.	5	80,50	80,60	0,10
5	Litva	19.	18.	1	79,59	80,30	0,71
6	Fínsko	17.	19.	-2	80,35	80,20	-0,15
7	Nemecko	24.	22.	2	78,90	79,70	0,80
8	Írsko	23.	24.	-1	78,91	79,60	0,69
9	Rakúsko	26.	27.	-1	78,57	78,70	0,13
10	Španielsko	30.	30.	0	77,68	77,90	0,22
11	Francúzsko	32.	32.	0	77,29	76,80	-0,49
12	Slovinsko	40.	37.	3	75,61	76,50	0,89
13	Portugalsko	34.	39.	-5	76,95	76,50	-0,45
14	Poľsko	33.	40.	-7	76,95	76,40	-0,55
15	Česká republika	35.	41.	-6	76,10	76,30	0,20
16	Holandsko	36.	42.	-6	76,04	76,10	0,06
17	Slovensko	42.	45.	-3	75,17	75,60	0,43
18	Belgicko	45.	46.	-1	73,95	75,00	1,05
19	Chorvátsko	58.	51.	7	71,40	73,60	2,20
20	Maďarsko	53.	52.	1	72,28	73,40	1,12
21	Cyprus	57.	54.	3	71,71	73,40	1,69
22	Rumunsko	52.	55.	-3	72,30	73,30	1,00
23	Taliansko	51.	58.	-7	72,56	72,90	0,34
24	Bulharsko	59.	61.	-2	71,24	72,00	0,76
25	Luxembursko	66.	72.	-6	69,01	69,60	0,59
26	Grécko	72.	79.	-7	68,08	68,40	0,32
27	Malta	84.	88.	-4	65,43	66,10	0,67
	Priemer			**-1,19**	**75,68**	**76,21**	**0,54**

Zdroj: vlastné spracovanie (www.doingbusiness.org)

Podľa hodnôt uvedených v tab. 1 konštatujeme, že v oboch analyzovaných rokoch je na tom z krajín V4 najlepšie Poľsko a za ním nasleduje Česká republika. Poľsko sa v roku 2020 prepadlo o 7 pozícií, a Česká republika o 6 pozícií, pritom Česká republika zlepšila svoje postavenie o 0,20 bodu. Slovensko počas jedného roka stratilo tri pozície, zlepšila sa však situácia o 0,43 bodu. Maďarsko vylepšilo svoju pozíciu o jednu priečku v rebríčku a zlepšilo hodnotu o 1,12 bodu. V hodnotení Doing Business bolo Slovensko ešte v roku 2016 na 29.

mieste, v roku 2020 sa však umiestnilo až na 45. mieste. Napriek značnému neúspechu to nemusí znamenať výrazné zhoršenie podmienok podnikania, pokles možno vysvetliť aj tým, že iné krajiny rýchlejšie zlepšili podmienky pre podnikanie. Situáciu na Slovensku však nemôžeme hodnotiť ako priaznivú (www.worldbank.org).

V prípade Slovenska správa Doing Business podľa bodového hodnotenia poukazuje na zlepšenia s cieľom uľahčiť začatie podnikania, napr. skrátením času potrebného na registráciu na okresnom súde, odstránením potreby a poplatku za overovanie podpisu u notára ai. Sťažil sa však začiatok podnikania zavedením nového postupu pri zakladaní spoločnosti s ručením obmedzeným, stále je nízkou dostupnosť úverov, ochrana investorov a vymožiteľnosť zmlúv.

Česká republika sa umiestnila na 41. mieste zo 190 krajín. Medzi silné stránky jej ekonomiky patrí napr. riešenie platobnej neschopnosti, keď má najlepšie hodnotenie spomedzi krajín V4. Ďalšími zlepšením je lacnejšie rozbehnutie podnikania zavedením nižších poplatkov za jednoduché poistenie spoločnosti s ručením obmedzeným, ako aj výrazným znížením minimálnej kapitálovej požiadavky. Slabou stránkou je celková náročnosť získania stavebného povolenia v Česku.

Poľsko sa umiestnilo v rebríčku DBI na 40. mieste, je najlepšie hodnotenou krajinou medzi krajinami V4. Ich silnou stránkou je platobná schopnosť a možnosť získať úver, vyniká aj z pohľadu ochrany investorov a vybavovania stavebných povolení. Poľsko uľahčilo začatie podnikania odstránením požiadavky na registráciu novej spoločnosti na Národnom inšpektoráte práce a Národnom inšpektoráte hygieny. Prijatím nového zákona o evidencii majetku však Poľsko kleslo v hodnotení tejto kategórie až o 51 pozícií a spôsobilo prepad aj v celkovom hodnotení správy Doing Business, v porovnaní s predchádzajúcim obdobím.

Maďarsko sa umiestnilo v hodnotení DBI v roku 2020 na 52. mieste. Najlepšie hodnoteným indexom pri začatí podnikania je vymožiteľnosť základných zmlúv, možnosť získať úver a tiež získanie stavebného povolenia. Najslabšou stránkou je v Maďarsku prístup k elektrickej energii, keď výrazne zaostáva za ostatnými krajinami V4.

Index vnímania korupcie / CPI - Corruption Perception Index

Krajiny umiestnené na najvyšších priečkach rebríčka vynikajú najnižšou mierou korupcie a úplatkárstva, majú lepšie záruky proti sprenevere verejných financií a väčšiu zodpovednosť za vládnu korupciu. Žiaľ, žiadna krajina nemá dokonalé skóre a korupcia v najlepšie hodnotených krajinách má zvyčajne menej nápadné formy. Rovnováha medzi politikou a podnikaním je často veľmi nejasná. Ide o nedostatočné kontroly politických financií, lobovanie a zmeny medzi odvetviami a ich regulátormi sú často až príliš bežné aj v krajinách s najlepšími výsledkami.

Globálna pandémia COVID-19 sa v mnohých krajinách využíva aj ako zámienka na obmedzovanie základných slobôd a obchádzanie dôležitých bŕzd a protiváh. Hoci má korupcia v jednotlivých krajinách veľmi odlišné formy, výsledky odhaľujú, že všetky regióny sveta stoja na mŕtvom bode, pokiaľ ide o boj proti korupcii vo verejnom sektore.

Krajiny v západnej Európe a Európskej únii umiestnené na vrchole rebríčka CPI naďalej zápasia s transparentnosťou a zodpovednosťou v reakcii na COVID-19, čo ohrozuje čistý imidž regiónu. Analýza podľa Transparency International ukazuje, že v regióne EÚ sa vytvára znepokojujúci nový normál, až v 12 krajinách je uvedená najnižšia hodnota cca 55 bodov (Tabuľka 2). Patria tu aj všetky krajiny V4 (Poľsko 53,99; Česká republika 51,89; Slovensko

48,69 a Maďarsko 40,86). Opatrenia týkajúce sa zodpovednosti a transparentnosti zanedbávané počas pandémie COVID-19 zostávajú neobnovené a dôvera verejnosti klesá v dôsledku škandálov s obstarávaním výsledkami. (www.transparency.org).

Tabuľka 2: Index vnímania korupcie / CPI v krajinách EU 27

	Krajina	CPI skóre 2021	Poradie	Najnižšia hodnota	Najvyššia hodnota
1	Dánsko	88	1.	84,96	91,04
2	Fínsko	88	1.	85,95	90,05
3	Švédsko	85	4.	82,96	87,04
4	Holandsko	82	8.	79,76	84,24
5	Luxembursko	81	9.	79,42	82,58
6	Nemecko	80	10.	77,10	82,90
7	Írsko	74	13.	72,88	75,12
8	Estónsko	74	13.	72,48	75,52
9	Rakúsko	74	13.	72,63	75,37
10	Belgicko	73	18.	70,64	75,36
11	Francúzsko	71	22.	68,86	73,14
12	Portugalsko	62	32.	58,97	65,03
13	Litva	61	34.	59,06	62,94
14	Španielsko	61	34.	57,25	64,75
15	Lotyšsko	59	36.	56,82	61,18
16	Slovinsko	57	41.	55,29	58,71
17	Taliansko	56	42.	53,60	58,40
18	Poľsko	56	42.	53,99	58,01
19	Česká republika	54	49.	51,89	56,11
20	Malta	54	49.	51,15	56,85
21	Cyprus	53	52.	48,73	57,27
22	Slovensko	52	56.	48,69	55,31
23	Grécko	49	58.	46,32	51,68
24	Chorvátsko	47	63.	44,43	49,57
25	Rumunsko	45	66.	43,36	46,64
26	Maďarsko	43	73.	40,86	45,14
27	Bulharsko	42	78.	40,06	43,94

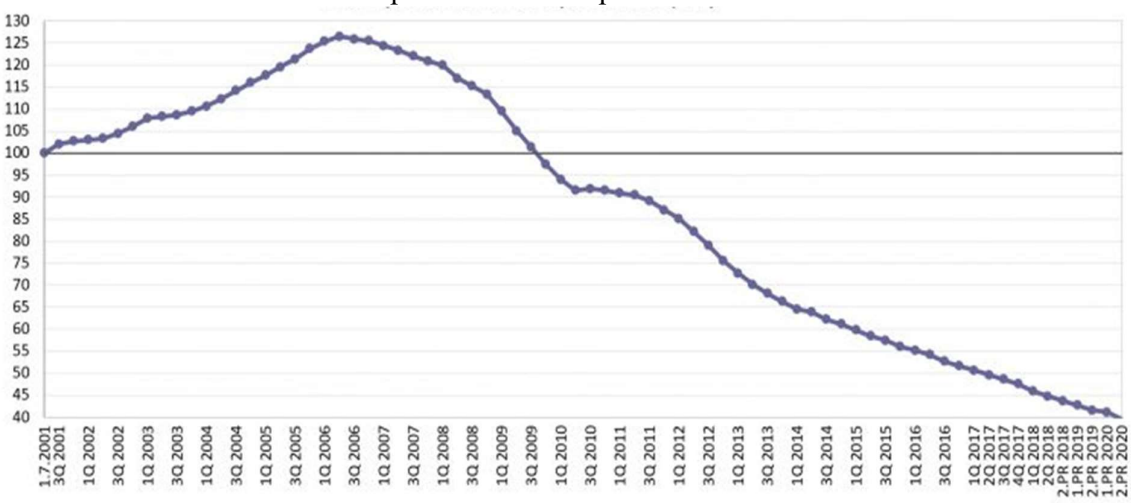
Zdroj: vlastné spracovanie (www.transparency.org)

Podľa CPI sa v roku 2021 všetky krajiny V4 umiestnili až v druhej polovici tabuľky 2, v porovnaní s ostatnými krajinami EÚ (18., 19., 22. a 26.miesto). Najlepšie umiestnenie medzi krajinami V4 dosiahlo Poľsko, ktoré dosiahlo skóre 56 bodov a 42. miesto spomedzi všetkých hodnotených krajín; o dva body menej získala Česká republika, ktorá obsadila 49. miesto. Slovensko skončilo s 52 bodmi na 56. mieste v rebríčku CPI a posledné sa umiestnilo Maďarsko, ktoré sa medzi krajinami EÚ ocitlo na 73. mieste, predposlednom v EU pred Bulharskom, získalo 43 bodov. Krajiny V4 by sa mali viac zamerať na boj proti korupcii a nezanedbávať túto oblasť. Príkladom by mli byť krajiny Dánsko a Fínsko, ktoré sa ocitli na vrchole rebríčka s najnižšou mierou korupcie. Korupcia je dôležitým faktorom pre vytváranie kvalitného a úspešného podnikateľského prostredia, je to jeden z jeho kľúčových faktorov (www.transparency.org).

Index podnikateľského prostredia na Slovensku / IPP

Index má tri hodnotiace kategórie sledujúce: 1. vývoj ako legislatívneho a regulačného rámca; 2. vplyv vonkajších makroekonomických faktorov na fungovanie podnikov; 3.zohľadnené názory manažérov podnikov na rozvoj podnikateľského prostredia. IPP prezentuje vážený aritmetický priemer jednotlivých zmien v položkách indexu (www.alianciapas.sk).

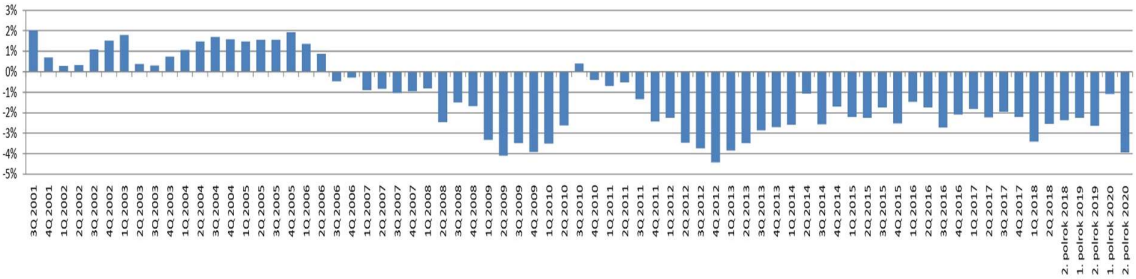
Obrázok 1: Index podnikateľského prostredia na Slovensku / IPP



Zdroj: www.alianciapas.sk

Graf na obrázku 1 znázorňuje vývoj indexu od roku 2001 až po rok 2020. Ako je vidieť, na Slovensku sa od roka 2005 neustále prehlbuje negatívny pohľad podnikateľov na kvalitu podnikateľského prostredia. Za zvýšenie nespokojnosti môže aj pandémia koronavírusu, keď záporné hodnotenie sa prehĺbilo z -1,08 % v prvom polroku 2020 na -3,93 % v druhom polroku. Negatívny pohľad podnikateľov je za druhý polrok 2020 o 2,85 % horší, ako za prvý polrok. Celkovo ide o najhoršie vnímanie kvality podnikateľského prostredia od roku 2012.

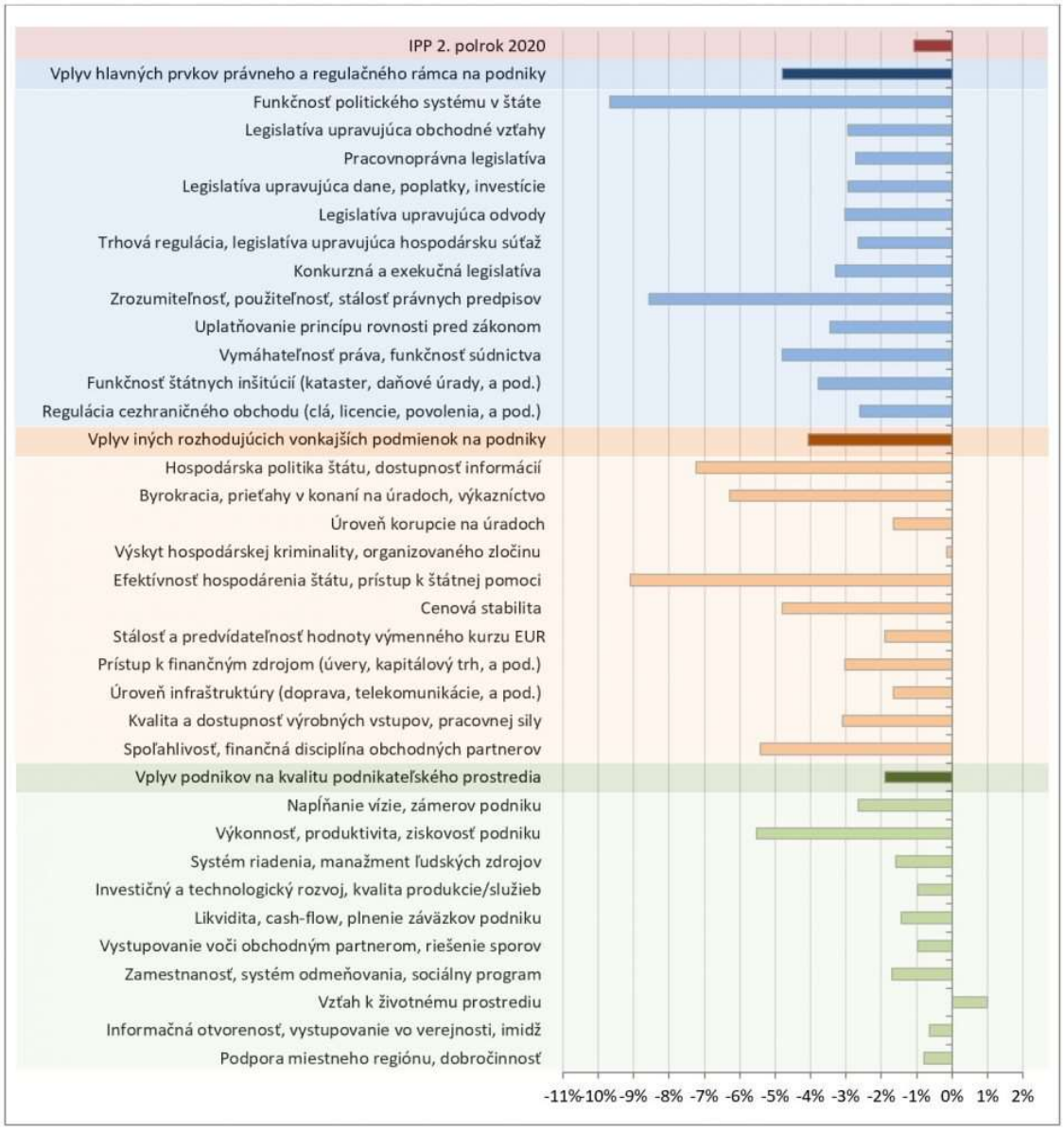
Obrázok 2: Index podnikateľského prostredia na Slovensku / IPP (zmeny v %)



Zdroj: www.alianciapas.sk

Graf na obrázku 3 znázorňuje zmeny IPP na Slovensku podľa kategórií a zisťovaných položiek (v %). Podnikatelia za top bariéry v podnikaní označili funkčnosť politického systému v štáte (-9,68 %), efektívnosť hospodárenia štátu, prístup k štátnej pomoci (-9,10 %), zrozumiteľnosť, použiteľnosť a stálosť právnych predpisov (-8,56 %), hospodársku politiku štátu a dostupnosť informácií (-7,23 %) a tiež byrokraciu, prieťahy v konaní na úradoch a výkazníctvo (-6,28 %).

Obrázok 3: IPP na Slovensku za 2.polrok 2020 podľa kategórií



Zdroj: www.alianciapas.sk

Oproti prvému polroku 2020 sa do negatívnych hodnôt dostali informačná otvorenosť, vystupovanie na verejnosti, imidž (z 1,57 % na -0,64 %), vystupovanie voči obchodným partnerom, riešenie sporov (z 1,52 % na -0,96 %), pracovnoprávna legislatíva (z 0,98 % na -2,71 %), legislatíva upravujúca obchodné vzťahy (z 0,93 % na -2,93 %), napĺňanie vízie, zámerov podniku (z 0,64 % na -2,66 %), investičný a technologický rozvoj, kvalita

produkcie/služieb (z 0,44 % na -0,96 %), podpora miestneho regiónu, dobročinnosť (z 0,39 % na -0,80 %), stálosť a predvídateľnosť hodnoty výmenného kurzu EUR (z 0,20 % na -1,91 %) a systém riadenia, manažment ľudských zdrojov (z 0,05 % na -1,60 %).

Podnikatelia vnímali v 2.polroku 2020 negatívne takmer všetky zložky indexu, okrem vzťahu k životnému prostrediu (+1,01 %).

ZÁVER

Krajiny V4 prešli za posledné tri desaťročia hospodárskou transformáciou smerom k trhovej ekonomike. Snažili sa rýchlo, ale najmä efektívne, približovať životnú úroveň obyvateľstva západným krajinám, ktoré boli pre nich vzorom. Napriek rozličnému štartu po roku 1990, môžeme konštatovať, že v súčasnosti sú pri hodnotení kvality podnikateľského prostredia všetky krajiny V4 na veľmi porovnateľnej úrovni, ako sme uviedli vo výsledkoch výskumu.

Pri analýze kvality podnikateľského prostredia sme zistili, že umiestnenie krajín V4 podľa indexov CPI a GCI je rovnaké, v poradí: Poľsko, Česká republika, Slovensko a Maďarsko, aj keď s inými hodnotami (Tabuľka 1 a 2). Pri porovnávaní hodnotenia roku 2011 z predchádzajúceho výskumu a roku 2020 sa najviac zlepšilo práve Maďarsko vo viacerých indikátoroch. Najvyššiu úroveň pri dosahovaní životnej úrovne priemeru EU však v súčasnosti dosahuje Česká republika. Zistenia ďalej ukázali, že napriek nárastu hodnôt Slovenska a Českej republiky ich umiestnenie v rebríčkoch kleslo, čo znamená, že ostatné krajiny postupujú pri zlepšovaní podnikateľského prostredia rýchlejšie. Podľa Indexu vnímania korupcie má napr. Maďarsko výrazný pokles až o 30 miest. Situácia na Slovensku vykazuje pokles kvality v dôsledku nejednoznačnej, často sa meniacej legislatívy, neadekvátnej byrokratickej záťaže, vysokého daňového zaťaženia a zlej vymožiteľnosti práva.

Pandémia COVID-19 a následná kríza zasiahla všetky oblasti života na celom svete (Erceg a kol., 2021). Neobišla ani podnikateľské prostredie v krajinách V4, rôznym spôsobom a s rôznymi dôsledkami sa prejavuje v stave sledovanej problematiky. Krajiny dosahovali pokrok v rôznych pre nich dôležitých oblastiach. Napríklad Amoah a kol. (2021) zistili, že pandémia COVID-19 nielen poškodila podnikateľské prostredie, ale viedla tiež k pozitívnym podnikateľským vyhliadkam, ako sú technológie a inovácie, inovatívny marketing, a tiež zlepšenie hygienických podmienok v podnikateľskom prostredí.

V budúcom výskume sústredíme pozornosť na zohľadnenie technologických faktorov, ako aj dostupnosť ľudského kapitálu, ktoré majú vplyv na inovácie a zvyšovanie kvality podnikateľského prostredia. Nemenej dôležité je aj zisťovanie spolupráce medzi systémom vzdelávania, súkromným a verejným sektorom.

Zistené výsledky môžu byť podnetom pri odstraňovaní prekážok podnikania v krajinách V4, podporiť vytvorenie platformy pre rozhodovacie mechanizmy umožňujúce zlepšovanie podmienok pre rozvoj podnikania, stabilitu a kvalitu podnikateľského prostredia. Kvalitné podnikateľské prostredie je základným aspektom napredovania a rozvoja podnikania v krajine, a jej konkurencieschopnosti.

Bibliografia

Ahmedova, S. (2015). Factors for Increasing the Competitiveness of Small and Medium-Sized Enterprises (SMEs) in Bulgaria. In *World conference on technology, innovation and entrepreneurship,* Istanbul, Turkey, May 28-30, 2015, pp. 1104-1112.

Amoah, J., Jibril, A.B., Owusu, V.K., Odei, M.A., & Naatu, F. (2021). Covid-19 pandemic and future business prospects: A conceptual study. In *International Conference on Economics and Social Sciences*, *Resilience and economic intelligence through digitalization and big data analytics*, Bucharest, Bulgaria, Jun 2021, pp. 223-231.

Belas, J., Demjan, V., Habanik, J., Hudakova, M., & Sipko, J. (2015). The Business Environment of Small and Medium-sized Enterprises in selected regions of the Czech Republic and Slovakia. *E & M Ekonomics and Management*, 18(1), 95-110.

Bruothová, M., & Hurný, F. (2016). Business Environment in V4 countries. In *Proceedings of the International scientific conference of Business Economics Management and Marketing (ISCOBEMM)* 2016, Brno, Czech Republic, pp. 59-66.

Buno, M., Nadanyiova, M., & Hrasková, D. (2015). The comparison of the quality of business environment in the countries of Visegrad group. *Procedia Economics and Finance*, 26(2015), 423–430.

Čepel. M., Dvorsky, J., Gregova, E., & Vrbka, J. (2020). Business environment quality model in the SME segment. *Transformations in Business and Economics*, 19(1), 262-283.

Čepel, M., Stasiukynas, A., Kotaskova, A., & Dvorsky, J. (2018). Business Environment Quality Index in the SME segment. *Journal of Competitiveness*, 10(2), 21-40.

Dobrovič, J., Gallo, P., Mihalčová, B., Štofová, L., & Szaryszová, P. (2018). Compettiveness measurement in terms of the Europe 2020 Strategy. *Journal of competitiveness*, 10(4), 21-37.

Erceg, A., Kljajic-Dervic, M., & Gulam, V. (2021). Influence of Covid-19 on business environment – Example of Croatian SME Gourmet CO2. In *Interdisciplinary Management Research (IMR 2021),* Opatija, Croatia, May 13-15, 2021, pp. 284-306.

Haidar, J.I. (2012). Impact of Business Regulatory Reforms on Economic Growth. *Journal of the Japanese and International Economies,* 26(3), 285–307.

He, S.B., & Yao, H.L. (2022). Business environment, human capital structural upgrading, and economic development quality. *Frontiers in Environmental Science*, 10, art. 964922.

Janošková, M., Čulková, K., & Csikosová, A. (2018). Position and development of Small and Medium Enterprises in European Countries. In Proceedings of the 8th Business & Management conference, Venice, Italy, September 04-07, 2018, pp. 91-103.

Juríčková, V., & Kačírková, M. (2006). *Podnikateľské prostredie a firemné stratégie*. Bratislava: Ekonomický ústav SAV.

Kroslakova, M., Kubickova, V., & Michalkova, A. (2017). Analysis of competitiveness of the Slovak business environment. In *Knowledge for market use 2017: People in economics - Decisions, Behavior and normative models,* Olomouc, Czech Republic, September 07-08, 2017, pp. 911-917.

Kubica, M., & Toth, M. (2015). Business environment index in Slovak Republic. In *Aktuálne problémy podnikovej sféry*, Modra, Slovakia, May 14-15, 2015, pp. 327-335.

PAS. 2021. Pandémia výrazne zhoršila náladu podnikateľom. [online] Dostupné na: https://www.alianciapas.sk/pandemia-vyrazne-zhorsila-naladu-podnikatelom

Šikula, M. (2008). Vplyv kvalitatívnych zmien inštitucionálneho prostredia v procese globalizácie. Bratislava: Ekonomický ústav SAV.

Virglerová, Z., Homolka, L., Smrčka, L., Lazánvi, K., & Klieštik, T. (2017). Key determinants of the quality of business environment of SMEs in the Czech Republic. *Business Administration and Management*, 20(2), 87-101.

www.doingbusiness.org

www.transparency.org

www.worldbank.org

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Retail managers – required skills

Retail manažéri – požadované zručnosti

Jozef Gajdoš

Abstrakt

Príspevok je orientovaný na problematiku manažérov v špecifickej oblasti retailu. Vychádzame z nárokov kladených na prácu retail manažérov, úloh ktoré majú plniť a zo špecifikácie súčasných požiadaviek na ich vlastnosti a zručnosti. Cieľom príspevku je poukázať na vnímanie ich napĺňania študentami jedného ročníka programu Podnikový obchod a marketing na 2. stupni vysokoškolského štúdia na Ekonomickej univerzite v Bratislave, Podnikovohospodárskej fakulte so sídlom v Košiciach. Pri spracovaní sme využili metódu autoevalvácie.

Kľúčové slová

Retail manažéri, náplň práce, zručnosti, autoevalvácia

Úvod

Manažéri majú v konkrétnych organizáciách významné poslanie, pretože majú významný vplyv ma jej činnosť a dosahované výsledky. V organizáciách sú rôzni manažéri, pričom každý z nich sa usiluje dosiahnuť určité ciele. Objektom manažérskeho pôsobenia sú hlavné zdroje organizácie. Úloha manažéra je ich vzájomne kombinovať a využívať tak, aby sa dosiahli žiaduce ciele, a to prostredníctvom vykonávania hlavných manažérskych funkcií. Preto manažéra možno definovať ako človeka, ktorého primárnymi aktivitami sú manažérske funkcie, pomocou ktorých pôsobí na objekty manažmentu (Sedlák, 2007). Manažéri si musia uvedomiť, že prostredie sa v dnešnej dobe mení spôsobom, ktorý je stále zložitejšie predvídať. Ak chcú z nového prostredia ťažiť, musia sa snažiť byť stále flexibilnejší, robustnejší a odolnejší, inak riskujú neúspech. Cieľom manažérov je teda vytvárať spoločnosti, ktoré sú flexibilné (rýchlo reagujú na externé stimuly), robustné (majú schopnosť ustáť stres alebo tlak, dokáže sa vyrovnať so zmenami s minimálnym poškodením) a odolné (so schopnosťou navrátiť sa do pôvodného postavenia, zotaviť sa), organizácie, ktoré majú schopnosť prežiť a rásť (Kotler, Caslione, 2009).

Práca manažérov v sektore obchodu a služieb obsahuje určité charakteristiky, ktoré sa odvíjajú od priestoru, v ktorom pôsobia. V príspevku sme sa pokúsili špecifikovať súčasné požiadavky na vlastnosti retail manažérov a následne poukázať na ich vnímanie a napĺňanie študentami v jednom ročníku programu Podnikový obchod a marketing na 2. stupni vysokoškolského

štúdia na Ekonomickej univerzite v Bratislave, Podnikovohospodárskej fakulte so sídlom v Košiciach.

1 Retail manažéri – náplň práce a zručnosti

Podľa portálu prospects.ac.uk sú retail manažéri zodpovední za každodenný chod predajne s cieľom maximalizovať zisk a zároveň minimalizovať náklady. Retail manažéri riadia každodenné operácie obchodu alebo zvereného úseku, pričom majú podriadených zamestnancov. Ich hlavným spolupracovníkom je oblastný manažér. Zabezpečujú, aby propagačné akcie prebiehali presne a podľa štandardov spoločnosti, a aby všetci zamestnanci pracovali na dosiahnutí cieľa dňa. Ich úlohou je tiež zabezpečiť, aby boli vždy splnené nastavené štandardy starostlivosti o zákazníkov (Prospects, 2022).

Európsky orgán práce, Generálne riaditeľstvo pre zamestnanosť, sociálne záležitosti a začlenenie uvádza kľúčové úlohy a zručnosti retail manažérov v poradí podľa významnosti (EURES, 2020):

- autonómia,
- poskytovanie služieb a pozornosť,
- kreativita a rozhodnosť,
- predaj a vplyv,
- riadenie a koordinácia,
- zhromažďovanie a vyhodnotenie informácií,
- gramotnosť,
- využívanie IKT,
- učenie, odborná príprava a koučovanie,
- rutina,
- matematická gramotnosť,
- tímová práca,
- šikovnosť,
- sila,
- používanie strojov.

Portál prospects.ac.uk uvádza 19 zručností, ktoré potrebuje zvládnuť retail manažér (Tabuľka 1). Tieto zručnosti sú uvedené bez poradia významnosti, teda s rovnakou váhou.

Tabuľka 1: Retail manažér – požadované zručnosti

Poradové číslo	Požadovaná zručnosť
1.	Riadiť a motivovať tím, aby zvýšil predaj a zabezpečil efektivitu.
2.	Riadiť stav zásob a robiť kľúčové rozhodnutia o riadení zásob.
3.	Analyzovať predajné čísla a predpovedať budúce predaje.
4.	Analyzovať a interpretovať trendy na uľahčenie plánovania.
5.	Používať informačné technológie na zaznamenávanie údajov o predaji, analýzu údajov a plánovanie.
6.	Zaoberať sa personálnymi otázkami, ako sú rozhovory s potenciálnymi zamestnancami, vykonávanie hodnotení a previerok výkonnosti.
7.	Poskytovať alebo organizovať školenia a rozvoj.
8.	Zabezpečiť, aby boli splnené štandardy kvality, služieb zákazníkom a zdravia a bezpečnosti.
9.	Vyriešiť otázky bezpečnosti a ochrany zdravia, právne a bezpečnostné otázky.
10.	Reagovať na sťažnosti a pripomienky zákazníkov.
11.	Organizovať špeciálne propagačné akcie, výstavy a podujatia.
12.	Zúčastňovať sa stretnutí a predsedať im.
13.	Informovať kolegov o výkonnosti podniku, nových iniciatívach a iných súvisiacich otázkach.
14.	Pravidelne navštevovať predajné priestory, rozprávať sa s kolegami a zákazníkmi a identifikovať alebo riešiť naliehavé problémy.
15.	Zaoberať sa predajom podľa potreby.
16.	Udržiavať povedomie o trendoch na trhu v maloobchode, porozumieť pripravovaným iniciatívam zákazníkov a monitorovať, čo robia konkurenti.
17.	Iniciovať zmeny na zlepšenie podnikania, ako je napríklad revízia otváracích hodín, aby sa zabezpečilo, že obchod môže efektívne konkurovať na miestnom trhu.
18.	Propagovať organizáciu na miestnej úrovni stykom s miestnymi novinami a komunitou vo všeobecnosti.
19.	Zaoberať sa ďalšími aspektmi podnikania, ako sú služby zákazníkom, financie, ľudské zdroje, informačné technológie, logistika alebo marketing (potreba závisí od veľkosti predajne).

Zdroj: vlastné spracovanie podľa Prospects (2022)

2 Ciele a metódy výskumu

Cieľom výskumu bolo zistiť, ako napĺňajú zručnosti požadované od retail manažérov študenti záverečného ročníka štúdia zameraného práve na retail. Na zistenie tohto stavu sme využili formuláciu zručností, ktoré sú uvedené v Tabuľke 1. Autoevalváciu vykonalo 34 študentov 2. ročníka denného štúdia 2. stupňa programu Podnikový obchod a marketing študujúcich na Ekonomickej univerzite v Bratislave, Podnikovohospodárskej fakulte so sídlom v Košiciach. Autoevalvácia sa uskutočnila na začiatku štvrtého semestra štvorsemestrálneho štúdia, počas druhej polovice mesiaca február 2023. Pri hodnotení bola použitá škála od 1 (určite nezvládnem) po 5 (určite zvládnem).

3 Výsledky

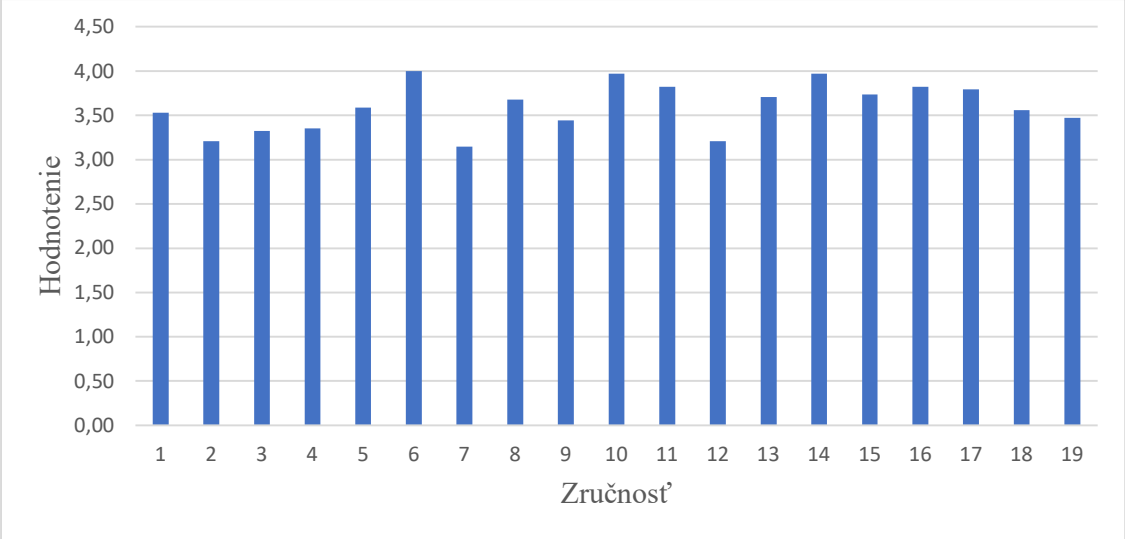
Do Tabuľky 2 sme zaznamenali spracované výsledky autoevalvácie študentov podľa jednotlivých požadovaných zručností z Tabuľky 1. Následne, pre lepšiu orientáciu, sme vytvorili Obrázok 1.

Tabuľka 2: Plnenie požadovaných zručností podľa Tab. 1 – autoevalvácia študentov

Označenie zručnosti	Priemerná hodnota (najnižšie hodnotenie/najvyššie hodnotenie)	Absolútna početnosť najvyšších hodnotení (5)	Absolútna početnosť najnižších hodnotení (1)
1.	3,53	6	1
2.	3,21	2	1
3.	3,32	3	3
4.	3,35	2	2
5.	3,59	7	2
6.	4,00	11	0
7.	3,15	6	5
8.	3,68	7	3
9.	3,44	6	1
10.	3,97	7	0
11.	3,82	10	1
12	3,21	5	3
13.	3,71	9	2
14.	3,97	15	3
15.	3,74	9	0
16.	3,82	9	2
17.	3,79	11	1
18.	3,56	5	2
19.	3,47	3	1
Priemer	**3,60**	**7,00**	**1,74**

Zdroj: vlastné spracovanie

Obrázok 1: Plnenie požadovaných zručností – autoevalvácia



Zdroj: vlastné spracovanie

Ako je vidieť z Tabuľky 2 a Obrázku 1, tak celkovo najvyššiu priemernú hodnotu (4,00) pri autoevalvácii študenti pridelili pri požadovanej zručnosti 6 - zaoberať sa personálnymi otázkami, ako sú rozhovory s potenciálnymi zamestnancami, vykonávanie hodnotení a previerok výkonnosti. Ďalej nasledovali (s rovnakou priemernou hodnotou 3,97) požadované zručnosti 10 - reagovať na sťažnosti a pripomienky zákazníkov a 14 - pravidelne navštevovať

predajné priestory, rozprávať sa s kolegami a zákazníkmi a identifikovať alebo riešiť naliehavé problémy.

Naopak celkovo najnižšiu priemernú hodnotu (3,15) pri autoevalvácii študenti pridelili pri požadovanej zručnosti 7 - poskytovať alebo organizovať školenia a rozvoj. Nasledovali zručnosti 2 - riadiť stav zásob a robiť kľúčové rozhodnutia o riadení zásob a 12 - zúčastňovať sa stretnutí a predsedať im (obe priemer 3,21).

Celkovo všetky priemerné hodnoty pri požadovaných zručnostiach boli z intervalu 3,15 až 4,00. Rozdiel medzi najvyššou priemernou hodnotou a najnižšou priemernou hodnotou bol 0,85. Najvyššie hodnotenie (5 - určite zvládnem) sa celkovo objavilo 133 krát. Najvyššia absolútna početnosť (15 krát) pri tomto hodnotení bola dosiahnutá pri zručnosti 14 - pravidelne navštevovať predajné priestory, rozprávať sa s kolegami a zákazníkmi a identifikovať alebo riešiť naliehavé problémy. Najmenej škálovou hodnotou 5 sa študenti, po dvoch, hodnotili pri zručnostiach 2 - riadiť stav zásob a robiť kľúčové rozhodnutia o riadení zásob a 4 - analyzovať a interpretovať trendy na uľahčenie plánovania. Na opačnej strane najnižšie hodnotenie (1 - určite nezvládnem) sa celkovo objavilo 33 krát. Najvyššia absolútna početnosť (5 krát) pri tomto hodnotení bola dosiahnutá pri zručnosti 7 - poskytovať alebo organizovať školenia a rozvoj. Ani raz sa hodnotenie 1 neobjavilo pri požadovaných zručnostiach 6 - zaoberať sa personálnymi otázkami, ako sú rozhovory s potenciálnymi zamestnancami, vykonávanie hodnotení a previerok výkonnosti.10 - reagovať na sťažnosti a pripomienky zákazníkov a 15 - zaoberať sa predajom podľa potreby.

Celkovo sa respondenti priemerne hodnotili v intervale medzi 2,42 až 4,42, až na tri výnimky. Jeden z respondentov sa ohodnotil priemernou hodnotou 4,74, a na opačnej strane jeden hodnotou 1,53 a jeden hodnotou 1,95.

ZÁVER

Jedným z kľúčových úspechov vo väčšine odvetví sú ľudia. V maloobchode to nie je inak. V príspevku sme sa pokúsili špecifikovať požadované zručnosti, ktoré by mali zvládnuť retail manažéri v súčasnosti. Na základe výsledkov získaných metódou autoevalvácie študentov 2. ročníka 2. stupňa programu Podnikový obchod a marketing študujúcich na Ekonomickej univerzite v Bratislave, Podnikovohospodárskej fakulte so sídlom v Košiciach, môžeme byť v tomto ohľade relatívne optimistický.

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Bibliografia

EURES, 2020. Budúcnosť práce: Manažéri v oblasti pohostinstva a maloobchodu. In: ec.europa.eu. Dostupné z: https://ec.europa.eu/eures/public/future-work-hospitality-and-retail-managers-2020-03-24_sk.

FERENCOVÁ, M. – GAJDOŠ, J. 2014. Manažéri logistiky - požiadavky a činnosti. In: Ľudský kapitál a spoločnosť 2014, medzinárodná vedecká konferencia. Ľudský kapitál a spoločnosť 2014 : zborník príspevkov z medzinárodnej vedeckej konferencie: Košice, 16. október 2014. Košice : Univerzita Pavla Jozefa Šafárika v Košiciach, 2014. s. 72-78. ISBN 978-80-8152-210-9.

GAJDOŠ, J. 2022. Retail manažéri – zručnosti a budúcnosť. In: Obchod a marketing: elektronický zborník príspevkov z vedeckého workshopu. Košice : Katedra obchodného podnikania PHF EU, 2022. s. 24 - 29. ISBN 978-80-225-4988-2.

KOTLER, P. – CASLIONE, J. A. 2009. Chaotika, řízení a marketing firmy v éře turbulencií. Brno: Computer press, 2009. 216 s. ISBN 978-80-251-2599-1.

PROSPECTS, 2022. Job profile Retail manager. In: prospect.ac.uk. Dostupné z: https://www.prospects.ac.uk/job-profiles/retail-manager.

SEDLÁK, M. 2007. Manažment. Bratislava : Vydavateľstvo Iura Editon, 2007. 360 s. ISBN 978-80-8078-133-0.

TÓTHOVÁ, L. – GAJDOŠ, J. 2010. Autoevalvačná empíria študentov v kontexte europassu. In: Podniková revue : vedecký časopis Podnikovohospodárskej fakulty Ekonomickej univerzity v Bratislave so sídlom v Košiciach. Košice : Podnikovohospodárska fakulta EU so sídlom v Košiciach, 2010. Roč. 9, č. 20, s. 75-84. ISSN 1335-9746.

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Monitoring the internal environment of the company using the VRIO method

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Abstract

Currently, many authors present various methods for monitoring the performance of individual enterprises. In addition to performance, it is also important to monitor the environment in which the company operates. To monitor the environment, the company can use methods that are presented by internal or external tools. The aim of the contribution was to bring closer the VRIO method, the implementation of which is focused on internal management tools, or the internal environment of the enterprise. Many authors point to the VRIO method critically, as the first two questions can only work based on the assumption of "non-substitutability", which means that a firm that cannot imitate a valuable and rare resource cannot implement the method itself. Another criticism of this method comes from the opinion of the authors that it is often not about adequate information and the company only wants to highlight its advantages, thereby pointing to a strong position on the market and a competitive advantage. Despite this criticism, the application of the method itself is simple for individual companies and is still often used. Therefore, the contribution provides a practical example for creating the VRIO method.

Key words

VRIO method, value, rareness, imitability, organization

Introduction

With the concept of competition ability, everyone evokes the advantage of the company on the market, but the ability to compete can be at several hierarchical positions. Competitiveness does not have to be only between companies, but can also be between states, regions, cities, industries, but also products. The OECD itself specifies competitiveness as follows: „the term competitiveness means the ability of companies of industries, regions, nations and transnational entities to generate relatively high levels of income from production factors, but also their use at a sustainable level in the current competitive environment.“ (https://www.oecd-ilibrary.org/sites/5deb3d09-sk/index.html?itemId=/content/component/5deb3d09-sk).

Overall, however, the term competition can be understood as a collection of companies that have the same or similar specialization, they are included in one industry and thus form part of the market (Hanzelková, 2013). However, every company wants to be exceptional and tries to innovate its products and services in order to impress its customers and potential customers. The current era brings a wide range of business entities that already represent the majority of

the market. Therefore, emerging business units must take care of establishing themselves on the market and monitor the competition from the very beginning.

However, an existing business must monitor the market in which it operates. The main reason for monitoring the market is to ensure a competitive advantage against other companies that offer the same or similar products and services as the company itself. Companies can monitor their position on the market in relation to the competition by implementing selected methods. The methods can thus be divided into those that monitor external management tools, but also internal management tools. Among these methods can be included, for example, the PESTLE method, which monitors the external environment of the company. It is focused on political, economic, social, technological, legislative and ecological factors. Another method that is not difficult to compile is the SWOT analysis, which monitors strengths and weaknesses, as internal tools of the company, and opportunities and threats, as external tools of the company. The method that stands out as the most important tool of the competitive environment is Porter's model of five competitive forces. The model is created from five forces, namely the risk of new competitors entering the market, rivalry between existing competitors, bargaining power of customers, bargaining power of suppliers and the possibility of a substitute product. To expand the company's awareness of its position on the market, it can also use the VRIO method. A company can relatively easily create this analysis and thus determine its competitiveness in the market. Therefore, the paper itself deals with the theoretical basis of the VRIO method. However, this method is also applied to the practical example of a restaurant that has been operating on the market for 15 years and tries to bring constant innovations to its consumers in order to attract them with its uniqueness even after 15 years.

1 The VRIO method

The VRIO method is one of the management methods that analyze the internal elements of the company. The company can directly influence internal elements and thus change its results (Grasseová, Dubec, Řehák, 2012). The method is relatively simple to implement and can bring the necessary information not only for the company, but also for competitors operating on the market. This method was created from the initial letters, English words that describe individual dimensions, namely: Value, Rareness, Imitability and Organization.

Based on this, the method uses 4 questions, namely:

- Value? – resources thus create value not only for customers but also for society.
- Rareness? – resources express the rarity and impossibility of controlling this resource by competitors.
- Imitability? – imitation could be too financially costly for competitors.
- Organization? – expresses how the company itself can effectively use individual resources (Mihalčová et al., 2019), (Simao, 2013).

2 Research objectives and methods

Barney became the author of the VRIO method. The main idea of this method was to determine the resources that express competitive advantage. Although at first glance it may seem that the VRIO method is similar to Porter's model of five competitive forces, the VRIO method shows

how it is possible to use individual internal resources of the company and use them to your advantage (Porter, 1994), (Chen, Kodono, 2014). In this way, the company gains a competitive advantage in the market. It is characteristic of the VRIO method that the individual resources are heterogeneous, which means that they cannot be created by other companies during their implementation (Chatzoglou, 2018).

Resources can represent different factors of production that enter the production process (Jones, George, 2008). The result of this method is the evaluation of not only the actual state of the company, but also allows to create a potential improvement of the company's possibilities, thereby increasing the competitiveness of the selected company (Mikoláš, 2005), (Kotler, 2000).

Several foreign authors recommend evaluating 4 basic sources, which are also specified in more detail in Table 1.

Table 1: Basic sources for VRIO analysis

Source type	**Source characteristics**
Physical resources	production area, location, technological equipment, etc.
Human resource	number and structure of employees, pro-innovation environment, social climate, etc.
Financial resources	loans, capital, retained earnings, etc.
Intangible resources	know-how, brand, information security, etc.

Source: Own processing according to Guinn (2007)

Table 1 approximates individual possible resources, which can be divided into different types, such as physical, human, financial and intangible (Cooper, Lane, 1999), (Svoboda a kol., 2006). The above-mentioned 4 questions are implemented on individual sources. These questions are answered by individual sources with yes or no answers.

The result of the VRIO analysis can be several consequences, which are characterized in more detail in Table 2.

Table 2: The company's response to competitive consequences

Source	**Value?**	**Rareness?**	**Imitability?**	**Organization?**	**Competitive implications**
1.	NO				Competitive disadvantage
2.	YES	NO			Competitive compliance
3.	YES	YES	NO		Temporary competition
4.	YES	YES	YES	NO	Untapped competition
5.	YES	YES	YES	YES	Permanent competition

Source: Mihalčová et al. (2019)

Table 2 shows how the company can react to individual competitive consequences. Based on this, the company can establish its competitive advantage and thus strengthen its position on the market.

3 Use of the VRIO method in Slovak operation

We will also use the VRIO method in practice at a Slovak company. Since the company does not want to be named in more detail, we will describe its categorization according to SK NACE. The company performs with SK NACE 56101 (finastat.sk). This subclass includes:

- restaurants,
- self-service restaurants, buffets, canteens,
- fast food establishments.

A total of 56 categorizations characterize individual restaurant activities that provide complete food as well as drinks. Individual meals and drinks are prepared for immediate consumption. This category includes, for example:

- traditional restaurants,
- self-service restaurants,
- restaurant services known as street sales,
- restaurant services with or without seating. (http://www.nace.sk/nace/56-cinnosti-restauracii-a-pohostinstiev).

Based on anti-pandemic measures in connection with the COVID-19 pandemic, the company had its operations closed. The following selected measures were taken in connection with the COVID-19 pandemic:

- 06.03. 2020 - first measures taken,
- 12.03.2020 - declared a state of emergency,
- 16.03. – 14.06.2020 - state of emergency,
- 16.03.2020 od 6:00 all retail establishments and establishments providing services are closed except, for example, stores of food, meat, bread, pastries, pharmacies, drugstores, gas stations selling fuel, newspaper shops, pet shops, telecommunication operator shops, postal service shops, bank service shops, delivery services, e-shops, etc.,
- 14.03.2022 – all restrictions on operations (mask) are canceled,
- 21.04.2022 – all measures in force until now are cancelled.

For this reason, its profits during the period of 2020 and 2021 decreased and thus it became loss. In connection with the cancellation of individual measures and restrictions, the operation was fully opened from 21.04.2022 and thus they did not have to provide their services only on the basis of deliveries of instant meals to final consumers outside of operation.

The company decided to use the VRIO method for the purpose of an overview of competitiveness on the market. The following table 3 shows the method itself.

Table 3: VRIO method in the selected enterprise

Source	Value?	Rareness?	Imitability?	Organization?	Competitive implications
Cozy atmosphere	YES	YES	NO	YES	Untapped competition
Human resource	YES	YES	YES	YES	Permanent competition
Quality of products	YES	YES	YES	YES	Permanent competition
New technological equipment	YES	YES	YES	YES	Permanent competition
Discount system	YES	YES	NO	YES	Untapped competition

Source: Own processing

Table 3 approximates the following sources.

Cozy atmosphere – **Value?** The company allows its customers to enjoy good food in a cozy atmosphere. The goal of the company is to provide individual customers with a pleasant atmosphere where they can meet their colleagues or friends. At the same time, musical tones are played in the restaurant, which are supposed to induce a good and calm feeling in consumers. At the same time, the company's walls are painted in a soft green color, which evokes a feeling of harmony and calm among consumers. **Rareness?** The company wants to create a feeling in consumers that most similar companies on the market do not have, and thus wants to create a sense of calm in consumers during their daily meals. **Imitability?** The interior itself would not be too expensive to imitate in other companies. Individual companies could copy this fact of a pleasant and cozy atmosphere. **Organization?** The company uses this resource and takes care of the good feeling of the customers in the restaurant.

Human resource - **Value?** The company has qualified and trained personnel. It thus ensures high-quality food production by specialized workers. Employees appear not only in their professionalism, but also in uniform clothing, which can create a pleasant feeling in the customer. **Rareness?** The company wants to create a feeling among consumers of the high qualifications of the employees who are from the trade. For the company, individual qualified employees are precious, as the company can rely on their professionalism in the preparation of meals. **Imitability?** Qualified staff could be too difficult to imitate in other restaurant companies, as many specialist chefs and waiters go abroad to work for higher income and sometimes better working conditions. At the same time, securing high-quality, qualified employees could also represent higher costs for most companies. Individual companies could copy this fact of qualified human resources. **Organization?** The company uses this resource and takes care of qualified staff in the restaurant.

Quality of products – **Value?** The company wants to provide its customers with tasty and high-quality products. The aim of the company is to provide customers with such a taste that it is worthwhile for them to visit the restaurant again. The company also takes care of its suppliers and ensures high-quality food on the day it is cooked. **Rareness?** The company wants to evoke a good and high-quality taste in consumers, the customers tasted the quality of the food and

liked to return to the restaurant. It wants to make the customer feel informed about the individual foods, so the menu includes the country of origin of the individual ingredients from which the ready meals served in the restaurant. The offer of individual dishes is also rare, when the company includes 3 meat dishes (each from a different type of meat), one flour dish, one gluten-free dish and one vegetarian dish in its menu. The company thus tries to go with the times and take into account all categories of diners that may occur in the restaurant. **Imitability?** The quality of the food itself would be difficult to imitate, since the restaurant itself pays particular attention to the initial quality of the raw materials that go directly into the production of ready meals. Likewise, it could be expensive for competing companies to cook 6 types of food, just like the company we mentioned. **Organization?** The company uses this resource and pays attention to the quality of the food and the wide variety of dishes offered.

New technical equipment - **Value?** The company currently has not only new technological equipment directly in the kitchen, such as ovens, convection ovens, grills, pans, etc., but also new technological equipment directly in the kitchen. With his lunch, the customer can have coffee directly from the coffee machine, which he can prepare himself at the company's expense, but also, for example, with a microwave oven or a drinking water dispenser. The aim of the company is to ensure a modern design of the restaurant and to assure the customer that his meals are produced using the latest and high-quality technology. **Rareness?** This resource is rare for the company, as it has the latest technological equipment. The company has no competition on the market that has such a large amount of new technology. **Imitability?** The new technological security itself can represent high costs for competing companies to imitate this restaurant, as the price of the selected technologies increases more and more often. **Organization?** The company uses this resource and pays attention to new and innovative technologies in the restaurant.

Discount system - **Value?** The discount system of regular customers is valuable for the company. It allows its customers to get a free lunch every 11. The goal of the company is to provide individual customers with the motivation to eat in their restaurant. At the same time, the company also has a discount system for newly arriving customers, to whom, in addition to a discount card, they will also receive a free dessert with their meal. **Rareness?** The company wants to create a feeling in consumers that most similar companies on the market do not have and thus wants to create in consumers the feeling of a family company in which individual consumers have the right to a discount. **Imitability?** The discount system itself is not expensive to imitate in other companies either. Individual companies could just as quickly and easily provide such a discount system in their operations. **Organization?** The company uses this resource and pays attention to the good feeling and discounts for individual customers in the restaurant.

Since the company only focused on the VRIO method to find out its competitive position in the market, the next contribution could approach not only the VRIO method, but also other internal methods and their interconnection, which can track the performance of the company from multiple perspectives. A significant connection of the VRIO method would also be made in the contribution with the application of individual ratio indicators. The authors Sedláčková and Buchta point to the fact that with the high-quality development of the VRIO method, a PESTLE analysis must also be developed, which determines a permanent competitive advantage.

CONCLUSION

Since the company only focused on the VRIO method to find out its competitive position in the market, the next contribution could approach not only the VRIO method, but also other internal methods and their interconnection, which can track the performance of the company from multiple perspectives. A significant connection of the VRIO method would also be made in the contribution with the application of individual ratio indicators. The authors Sedláčková and Buchta point to the fact that with the high-quality development of the VRIO method, a PESTLE analysis must also be developed, which determines a permanent competitive advantage.

Bibliography

BARNEY, Jay. 1991. Firm resources and sustained competitive advantage. Economics Meets Sociology in Strategic Management, 203–227. doi: 10.1016/s0742-3322(00)17018-4.

BERENSON, Mark L., David M. LEVINE, Kathryn A. SZABAT a David STEPHAN. 2020. Basic business statistics : concepts and applications. Fourteenth edition - Global. Harlow, England: Pearson, 2020. 838 stran. ISBN 9781292265032.

COOPER, John a Peter LANE. 1999. Marketingové plánování: praktická příručka manažera. Praha: Grada. Manažer. ISBN 8071696412

GRASSEOVÁ, Monika, Radek DUBEC a David ŘEHÁK. 2012. Analýza podniku v rukou manažera: 33 nejpoužívanějších metod strategického řízení. 2. vyd. Brno: BizBooks. ISBN 978- 80-265-0032-2.

GUINN, Alan, KRATOCHVÍL, Oldřich a HASHESH, Iveta. 2007. Strategický management. Kunovice: Evropský polytechnický institut. ISBN 978-80-7314-125-7. Dostupné také z: https://ndk.cz/uuid/uuid:a5c14de0-41b0-11ea-9231-005056827e51

HANZELKOVÁ, Alena. 2013. Business strategie: krok za krokem. V Praze: C.H. Beck. C.H. Beck pro praxi. ISBN 978-80-7400-455-1.

CHATZOGLOU, Prodromos, et al. 2018. The role of firm-specific factors in the strategy-performance relationship: Revisiting the resource-based view of the firm and the VRIO framework. Management Research Review.

CHEN, Faen; KODONO, Yukio. 2014. Fuzzy VRIO and SWOT Analysis of Chery Automobile. Journal of Advanced Computational Intelligence and Intelligent Informatics, 18.3: 429-434.

JONES, Gareth, GEORGE, Jeniffer. 2008. Contemporary Management. 5. vyd. Pennsylvania: McGraw – Hill Irwin. ISBN 9780073530222.

KAVČIČ, Klemen. 2014. Strategic Management of Outsourcing. Koper: University of Primorska. Faculty of Management. ISBN 978-961-266-159-5.

KOTLER, Philip. 2000. Marketing podle Kotlera: jak vytvářet a ovládnout nové trhy Philip Kotler. ISBN 8072610104.

MIHALČOVÁ, Bohuslava, GONTKOVIČOVÁ, Barbora, JANOŠKOVÁ, Mária Ria, STRIČIK Michal. 2019. Manažment – Teória a prax.VŠB – TU Ostrava. ISBN 978-80-248-4276-9.

MIKOLÁŠ, Zdeněk. 2005. Jak zvýšit konkurenceschopnost podniku: Konkurenční potenciál a dynamika podnikání. 1. vyd. Praha: Grada ISBN 9788024712772.

OECD. [online]. Perspectives on Global Development 2014. Available from: https://www.oecd-ilibrary.org/sites/5deb3d09-sk/index.html?itemId=/content/component/5deb3d09-sk [Accessed 20 May 2022].

PORTER, Michael E. 1994. Konkurenční strategie: Metody pro analýzu odvětví a konkurentů. Praha: Victoria Publishing. ISBN 80-85605-11-2.

ŘEPA, Václav. 2012. Procesně řízená organizace: Praha: Management v informační společnosti. Grada Publishing, a.s. ISBN 978-80-247-4128-4.

ROTHAERMEL, Frank T. 2019. Strategic Management. New York: McGraw-Hill Education. ISBN 978-1-260-0923.

SEDLÁČKOVÁ, Helena a BUCHTA, Karel. 2006. Strategická analýza, 2. přepracované a rozšířené vydání. Praha: C. H. Beck, ISBN 80-7179-367-1.

SIMÃO, João. 2013. An extended VRIO model as a framework for sustainable tourism planning: a review. Tourism as a Tool for Development, Southampton, UK: WIT Press.

SK NACE [online]. NACE Kategorizácia. Available from: http://www.nace.sk/nace/56-cinnosti-restauracii-a-pohostinstiev [Accessed 20 September 2022].

SVOBODA, Emil, Libor BITTNER a Patrik SVOBODA. 2006. Moderní přístupy v řízení podniků v novém podnikatelském prostředí. Praha: Professional publishing. ISBN 80-86946-12-6.

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Demographics of business enterprises in the Slovak Republic

Demografia obchodných podnikov v Slovenskej republike

Vanda Lieskovská, Katarína Petrovčiková, Iryna Reshetnikova

Abstrakt

Cieľom príspevku je sústrediť pozornosť na slovenský maloobchodný trh. Za úlohu sme si stanovili analyzovať vybrané demografické parametre obchodných podnikov na Slovensku v období ostatných štyroch rokov. Sledované obdobie bolo poznačené výraznými zmenami v rámci marketingového makroprostredia. Epidémia Covidu, vojnový konflikt na Ukrajine, energetická kríza, vysoká miera inflácie, nárast cien a zhoršená ekonomická situácia sa odrazila aj na demografii obchodných podnikov.

Kľúčové slová

Obchodné podniky, maloobchod, zamestnané osoby, tržby, vplyv krízy

Úvod

Maloobchod tvorí neoddeliteľnú súčasť ekonomiky v každom vyspelom štáte. Predstavuje dôležité odvetvie národného hospodárstva. Je významným reprezentantom z hľadiska podielu podnikateľských jednotiek na ich celkovom počte. Reprezentanti vnútorného obchodu významne prispievajú k tvorbe celkového, ako aj regionálneho HDP, ale aj ku tvorbe nových pracovných príležitosti. Z hľadiska dôležitosti odvetvia obchodu a vnútorného obchodu by preto bolo vhodné siahnuť do histórie, aby sme deklarovali jeho postavenie, svojbytnosť a následne zmeny.

Ukotvenie problematiky slovenského maloobchodného trhu patrilo v minulosti pod samostatné Ministerstvo obchodu a cestovného ruchu, ktoré bolo zriadené k 1. januáru 1969 pod názvom Ministerstvo obchodu SSR (Slovenskej socialistickej republiky) . V rokoch 1969 až 1992 bolo ústredným orgánom štátnej správy pre obchod a cestovný ruch. Úprava v názve bola zrealizovaná v marci 1990, kedy sa vypustil prívlastok socialistickej.

Najvýznamnejšie kompetencie ústredných orgánov štátnej správy zmenila novelizácia zákona č 347/1990 Zb. z 25. augusta 1992. Toto novelou prešla pod MH SR dovtedajšia pôsobnosť zrušeného ústredného orgánu štátnej správy - Ministerstva obchodu a cestovného ruchu SR, ktorá bola vymedzená zákonmi a inými všeobecne právnymi predpismi. Novela zákona charakterizovala MH SR ako ústredný orgán štátnej správy Slovenskej republiky, pod ktorý spadali okrem iných predchádzajúcich ministerstiev aj Ministerstvo pre obchod a cestovný ruch. Do podriadenosti MH SR pribudla aj Slovenská obchodná inšpekcia.

Od 1. januára 2002 sa zákonom č. 575/2001 Z. z. z 12. decembra 2001 o organizácii činnosti vlády a organizácii ústrednej štátnej správy doplnila dovtedajšia pôsobnosť ministerstva hospodárstva o: podporu malého podnikania a stredného podnikania a stratégiu tvorby podnikateľského prostredia a podporu podnikateľského prostredia. Uvedené aktivity sa bezprostredne dotýkali aj slovenského maloobchodného trhu.

Zákonom č. 37/2010 Z. z. z 20. januára 2010 boli s účinnosťou od 1. júla 2010 odňaté Ministerstvu hospodárstva SR kompetencie v oblasti cestovného ruchu. Prešli pod Ministerstvo kultúry a cestovného ruchu SR. Do pôsobnosti tohoto rezortu prešla aj podriadená Slovenská agentúra pre cestovný ruch. Došlo teda k definitívnemu rozdeleniu obchodu a cestného ruchu, nakoľko každá oblasť bola zaradená do inej ministerskej zložky.

V súčasnosti deklaruje MH SR určujúce oblasti: Priemyse, Energetika, Podnikateľské prostredie, Podpora podnikateľov, Inovácie a Obchod. Pod obchodom na MH sú evidované nasledujúce oblasti: Centrum pre chemické látky a prípravky, Multilaterálne obchodné vzťahy, Obchodné opatrenia-dovozné/vývozné obmedzenia, Ochrana spotrebiteľa, Obchodné vzťahy EÚ s tretími krajinami, Národný organ SR pre zákaz chemických zbraní, Bilaterálne obchodné vzťahy SR, Podpora export, E – kolok, BREXIT- informácie pre podnikateľov, Sankcie voči Ruskej federácií a Bielorusku.

Z vymenovaných kľúčových oblastí Ministerstva hospodárstva sa vnútorný obchod, ako samostatná kategória vytratila. Uvedená skutočnosť sa negatívne odráža bezprostredne aj v rámci nedostatočného zastrešenia a riadenia vnútorného obchodu. Otázne je, do akej miery sa zmena kompetencií z bývalého Ministerstva obchodu a cestovného ruchu na Ministerstvo hospodárstva SR z hľadiska jej dopadov na kvalitu slovenskej maloobchodnej praxe môže odrážať v konečnom dôsledku aj na demografii obchodných podnikov. Jedným z existujúcich dôsledkov je aj ubúdanie počtu predajní a naopak rozširovanie potravinových púšti, najmä vo vidieckych sídlach.

1 Demografia obchodných podnikov ako súčasť organizačnej štatistiky

Demografia podnikov je atraktívnou disciplínou, ktorej zatiaľ nebolo venované početné množstvo štúdií. Ako uvádza Markowitz (2014), demografické ukazovatele merajú populáciu aktívnych podnikov, ako aj akúkoľvek zmenu v ich kohorte. Zakladanie nových podnikov a zatváranie neproduktívnych podnikov sa považuje za dôležitý ukazovateľ dynamiky podnikania. Nariadením Európskeho parlamentu a Rady (ES) č. 295/2008 o štrukturálnej podnikovej štatistike, bol ustanovený spoločný rámec na zber, zasielanie a vyhodnocovanie štatistík o štruktúre, činnosti, konkurencieschopnosti a výkonnosti podnikov v spoločenstve. Ako uvádza Štatistický úrad Slovenskej republiky, organizačná štatistika poskytuje súhrnný prehľad informácií o organizačnej štruktúre ekonomiky Slovenskej republiky. Zdrojom údajov organizačnej štatistiky je register organizácií vedený Štatistickým úradom Slovenskej republiky podľa zákona NR SR č. 540/2001 Z. z. o štátnej štatistike v znení neskorších predpisov. Do registra organizácií sa zapisujú právnické osoby a fyzické osoby - podnikatelia na základe údajov, ktoré Štatistický úrad Slovenskej republiky získava podľa zákona o štátnej štatistike a podľa ďalších osobitných zákonov. Register sa využíva na štatistické účely.

2 Metódy výskumu

V príspevku sme vychádzali z viacerých uhlov pohľadu. V úvodnej časti bola realizovaná rešerš publikácií v zameraní na demografiu podnikov. Následne sme sa snažili priblížiť v historickom kontexte odvetvie vnútorného obchodu a jeho riadiace orgány, ktoré určovali vývoj a samotné aktivity týkajúce sa vnútorného obchodu v bývalom Československu, neskôr na Slovensku, až do súčasného obdobia. Údaje sme čerpali z oficiálnych zdrojov Ministerstva hospodárstva SR[1].

Ďalšie sledovanie bolo podmienené získaním informácií týkajúcich sa sledovaním počtu evidovaných ekonomických subjektov v slovenskom hospodárstve celkom. Vlastnú analýzu sme realizovali s využitím databáz Štatistického úradu SR. Údaje boli očistené a analyzované za využitia štatistického softvéru Excel. Výsledky boli prezentované prostredníctvom spracovaných tabuľkových a grafických výstupov analýz. Pozornosť sme zamerali na vývoj počtu ekonomických subjektov vo veľkoobchode, maloobchode, oprave motorových vozidiel a motocyklov podľa veľkosti. Neskôr sme zúžili pozornosť na kategóriu 47, ktorú predstavuje maloobchod okrem motorových vozidiel a motocyklov. Sledovali sme priemerný počet zamestnaných osôb v jednotlivých druhoch maloobchodu z hľadiska porovnania obdobia prvého kvartálu v roku 2019 a prvého kvartálu v roku 2023.

3 Výsledky

Napriek skutočnosti, že demografia podnikov je pomerne novým fenoménom, pri analýze realizovaných štúdií bolo zistené, že z roku 2016 pochádza publikácia venujúca sa zmenám v demografii podnikov pre 29 európskych krajín od autorov od autorov: Žmuk, Dumičič, Harmina. V roku 2018 sa venovali problematike demografie podnikov ruskí autori Sibirskaja, Oveshnikov, Savin. V roku 2019 to boli Kuzmin, Vinogradov, Gusev. Andrej, Chivu, Zaharia, ktorí v roku 2021 sústredili svoju pozornosť na 10 postsocialistických krajín. Boli to krajiny, ktoré sa stali členmi Európskej únie v období rokov 2006-2016, pričom testovali kointegráciu medzi podnikateľskou demografiou a ekonomickým rastom vyjadreným HDP na obyvateľa. Demografia podnikov sa predmetom záujmu aj slovenských autorov. V podmienkach Slovenska sa témou zaoberali autori Bolgáč, Sivašová (2015), Šoltés, Šoltésová (2016) Vojtková, Bolgáč, Hurbánková (2015), Hurbánková (2018). Zmeny v demografii vybraných podnikov v zameraní na obchod a služby rozoberali aj autori Lieskovská, Petrovčiková, Murin (2022).

Najnovšie údaje ŠÚ SR uvádzajú, že v druhom kvartáli 2023 bolo evidovaných 651 685 ekonomických subjektov v slovenskom hospodárstve celkom. Keďže sa v príspevku sústreďujeme na obchod, ktorý je zaradený do kategórie GA (veľkoobchod a maloobchod; oprava motorových vozidiel a motocyklov), budeme sa prioritne venovať tejto oblasti. Z hľadiska počtu podnikateľských subjektov s počtom 98 372 sa Veľkoobchod a maloobchod; oprava motorových vozidiel a motocyklov nachádza na druhom mieste po odvetví stavebníctva (FA), ktoré disponovalo k sledovanému dátumu počtom 126 938 subjektov. Priemyselná výroba (C) sa nachádza na treťom mieste, s počtom 85 515 evidovaných podnikateľských subjektov. Ako je možné sledovať, obchod predstavuje dôležité postavenie z hľadiska počtu

[1] https://www.mhsr.sk/vyvoj-kompetencii-mh-sr-od-jeho-vzniku

evidovaných subjektov. Umiestnil sa dokonca pred priemyselnou výrobou, napriek jej svetovému prvenstvu Slovenska vo výrobe áut v počte 184 na tisíc obyvateľov[2].

Ak sa však zameriame na vývoj počtu evidovaných podnikateľských subjektov v kategórii (GA), Veľkoobchod a maloobchod; oprava motorových vozidiel a motocyklov v čase, je badateľný ich celkový pokles vplyvom vyššie zmienených udalostí (Covid, vojna, inflácia, energetická kríza). Vznik podnikov podľa SK NACE veľkostnej kategórie a počtu zamestnancov v období rokov 2014-2020 je zachytení v nasledujúcom prehľade v tabuľke 1.

Tabuľka 1: Vznik podnikov SK NACE podľa veľkostnej kategórie a počtu zamestnancov v období rokov 2014-2020 v kategórii GA

Rok	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**
Vznik podnikov spolu	5 861	6 295	6 617	7 628	10 813	10 428	16 266
4 zamestnanci alebo menej	5 837	6 240	6 556	7 548	10 552	10 294	16 112
Od 5 do 9 zamestnancov	18	36	40	50	173	79	111
10 zamestnancov a viac	6	19	21	30	88	55	43

Zdroj: spracované podľa údajov ŠÚ SR

Ako vyplýva z uvedeného, pri sledovaní časového radu od roku 2014 je možné konštatovať, že v roku 2020 poznačenom nástupom covidovej epidémie bol zaznamenaný najnižší počet vzniknutých podnikov v kategórii (GA), Veľkoobchod a maloobchod; oprava motorových vozidiel a motocyklov. Oproti roku 2014 to predstavuje v roku 2020 iba necelých 28 percent. V prevažnej väčšine išlo o vznik podnikateľských subjektov v kategórií zamestnancov v počte štyroch a menej.

Pri snahe zachytiť počet zaniknutých podnikov v kategórií (GA) Veľkoobchod a maloobchod; oprava motorových vozidiel a motocyklov však k augustu 2023 neboli vykazované ŠU SR žiadne údaje. Predpokladáme, že až s odstupom rokov bude možné realizovať porovnanie vzniknutých a zaniknutých podnikateľských subjektov v tejto kategórií za obdobie, ktoré sme mali v pláne sledovať. Išlo prioritne o roky 2019-2023.

Následne sme sústredili pozornosť na celkové porovnanie počtu ekonomických subjektov kategórie (GA) v časovom rade rokov 2019 až 2023, pričom sme porovnávali rovnaké obdobie, t. j. druhý kvartál zmienených rokov. Výsledky sú prezentované prostredníctvom nasledujúcej tabuľky 2.

[2] Slovenský autopriemysel drží svetové prvenstvo. ČTK. IN: https://hn24.hnonline.sk/hn24/96057555-slovensky-autopriemysel-drzi-svetove-prvenstvo

Tabuľka 2: Porovnanie počtu ekonomických subjektov kategórie (GA) v časovom rade rokov 2019 až 2023

VO, MO, oprava MV a M	**2023**	**2022**	**2021**	**2020**	**2019**
Podnikateľské subjekty	2.Q.	2.Q.	2.Q.	2.Q.	2.Q.
Podniky	98 372	101 865	101 467	104 183	105 276
Fyzické os.-podnikatelia spolu	40 984	42 708	43 372	44 553	45 217
Živnostníci	57 347	59 111	58 038	59 580	60 016
Neziskové inštitúcie	5	5	4	3	3

Zdroj: spracované podľa ŠÚ SR

Z výsledkov vyplýva, že takmer vo všetkých kategóriách došlo k poklesu počtu ekonomických subjektov v porovnaní s rokom 2019. Celkom ide o pokles 6 904 ekonomických subjektov. Jedinú výnimku predstavuje kategória neziskových inštitúcií, kde došlo k nárastu z počtu troch na päť subjektov.

V globálnom pohľade dochádzame k záveru, že obdobie rokov 2020-2023 znamenalo vo sfére veľkoobchodu, maloobchodu, opravy motorových vozidiel a motocyklov (kategória GA) zníženie počtu podnikateľských subjektov. Dôvodom boli zmenené podnikateľské podmienky v negatívnom odraze dôsledkov Covidu, vojny, energetickej krízy, inflácie a zvyšovania cien.

Bolo preto zaujímavé následne zistiť, aké nastali zmeny vo vybraných ukazovateľoch. Výsledky sú uvedené v tabuľke 3.

Tabuľka 3: Vybrané ukazovatele v kategórií veľkoobchod a maloobchod

Vybrané ukazovatele	**2021**	**2020**	**2019**	**2018**
Tržby za vlastné výkony a tovar (mil. EUR, v bežných cenách)	69 719	60 643	61 554	60 307
Priemerný počet zamestnaných osôb (osoby)	288 782	298 220	309 417	314 662
Priemerná nominálna mesačná mzda (EUR)	1 023	938	889	828

Zdroj: spracované podľa údajov ŠÚ SR

Priemerný počet zamestnaných osôb za veľkoobchod a maloobchod v roku 2021 klesol oproti roku 2018 takmer o 26 tisíc, priemerná nominálna mzda narástla o 195 eur, rovnako narástli aj tržby za vlastné výkony a tovar v mil. eur v bežných cenách.

Následne sme sústredili pozornosť na zmenu v počte zamestnancov v kategórií (47) Maloobchod okrem motorových vozidiel a motocyklov. Pre lepšiu prehľadnosť ďalšieho členenia maloobchodu, uvádzame nižšie podrobnejšiu charakteristiku v zmysle vykazovania tak, ako je to uvádzané v rámci ŠÚ SR.

47 Maloobchod okrem motorových vozidiel a motocyklov
47.1 Maloobchod v nešpecializovaných predajniach
47.2 Maloobchod s potravinami, nápojmi a tabakom v špecializovaných predajniach
47.3 Maloobchod s pohonnými látkami v špecializovaných predajniach

47.4 Maloobchod so zariadeniami pre informatiku a komunikácie - IKT v špecializovaných predajniach
47.5 Maloobchod s ostatným tovarom pre domácnosť v špecializovaných predajniach
47.6 Maloobchod s tovarom pre kultúru a rekreáciu v špecializovaných predajniach
47.7 Maloobchod ostatného tovaru v špecializovaných predajniach
47.8 Maloobchod v stánkoch a na trhoch
47.9 Maloobchod mimo predajní, stánkov a trhov

Priemerný počet zamestnaných osôb v obchode, sme sledovali štvrťročne od 1 štvrťroka 2019 po 1. štvrťrok 2023. Za sledované obdobie došlo v kategórií (47) k úbytku zamestnaných osôb až o 8904. Bolo preto zaujímavé zistiť, v ktorej podkategórií došlo k akým úbytkom pracovníkov za obdobie ostatných štyroch rokov, čo je znázornené v nasledujúcom prehľade.

Tabuľka 4: Priemerný počet zamestnaných osôb v obchode za 1. štvrťrok rokov 2019-2023

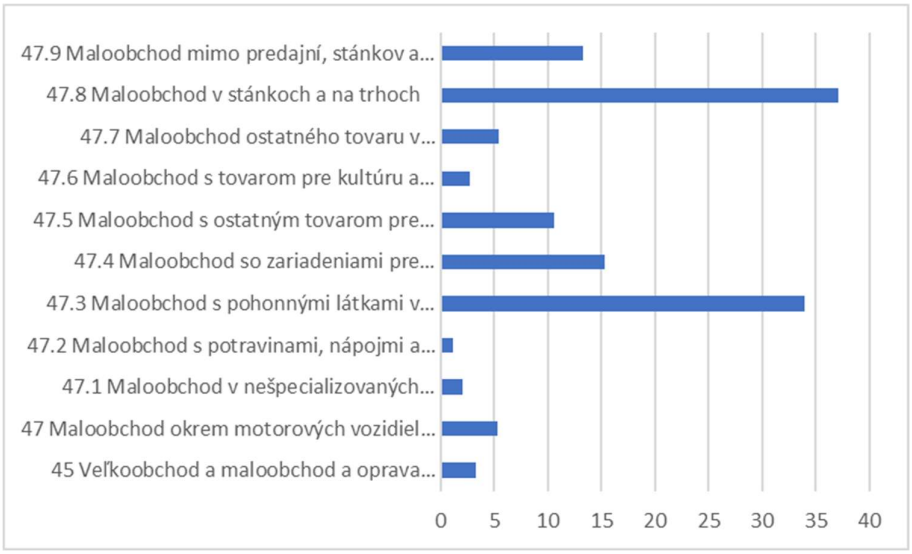
	2023	**2022**	**2021**	**2020**	**2019**
Členenie MO (SK NACE)	**1.Q.**	**1.Q.**	**1.Q.**	**1.Q.**	**1.Q.**
47	160 014	158 457	156 621	164 555	168 918
47.1	76 221	75 146	75 042	76 664	77 804
47.2	6 727	7 027	6 377	6 928	6 811
47.3	2 865	2 909	3 334	3 825	4 327
47.4	2 543	2 828	2 465	2 922	3 001
47.5	12 794	13 359	13 654	14 165	14 317
47.6	4 156	4 124	3 982	3 869	4 272
47.7	33 784	31 866	30 914	33 465	33 966
47.8	606	720	715	802	964
47.9	20 327	20 478	20 138	21 915	23 456

Zdroj: spracované podľa údajov ŠÚ SR

Z hľadiska absolútnej početnosti bol v roku 2023 najväčší odliv zamestnaných osôb oproti roku 2019 v Maloobchode mimo predajní, stánkov a trhov (47.9) Išlo o pokles 3129 ľudí. Zníženie o 1583 zamestnaných osôb bolo v Maloobchode v nešpecializovaných predajniach (47.1) a o 1523 zamestnaných osôb bolo v Maloobchode s ostatným tovarom pre domácnosť v špecializovaných predajniach (47.5).

Z hľadiska relatívnej početnosti bola zaznamenaná zmena počtu zamestnaných osôb v jednotlivých kategóriách tak, ako to ukazuje nasledujúci graf 1.

Graf 1: Percentuálna zmena počtu zamestnaných osôb v maloobchode



Zdroj: Spracované podľa ŠÚ SR

Najvýraznejší pokles bol u pracovníkov pracujúcich v stánkoch a na trhoch. Z hľadiska prijatých hygienicko-bezpečnostných a epidemiologických opatrení v období Covidu je táto zmena pochopiteľná. Obmedzovanie predaja bolo nariadené prostredníctvom Úradu verejného zdravotníctva, či už išlo o covidový automat, alebo uplatňovanie Alert systému pre monitorovanie vývoja epidémie a prijímanie protipandemických opatrení v závislosti od intenzity šírenia SARS – COV-2. Dôsledkom toho sa zamestnanci z kategórie 47.8 presunuli na iné pracovné miesta umožňujúce výkon ich pracovnej činnosti.

Z hľadiska úbytku pracovníkov skončil na druhom mieste Maloobchod s pohonnými látkami. V roku 2023 zaznamenal pokles počtu svojich pracovníkov o 34 % v porovnaní s rokom 2018. Príčiny poklesu je však možné hľadať v obmedzovaní prepravy počas Covidu a znižovaniu predaja pohonných látok. Neskôr je možné zdôvodniť znižujúci sa počet pracovníkov v maloobchode s pohonnými látkami rozširovaním pokrokovejších technológií samoobsluhy klientov na čerpacích staniciach , čím dochádzalo k vedomému odbúravaniu pracovnej sily.

Najmenšie percento poklesu pracovníkov za sledované obdobie bolo vykazované v kategórií 47.2 – maloobchod s potravinami, nápojmi a tabakom v špecializovaných predajniach.

ZÁVER

Príspevok sústredil pozornosť na problematiku vnútorného obchodu, jeho postaveniu v rámci národného hospodárstva SR. Ako vyplýva z uvedeného, novelizáciou zákona č 347/1990 Zb. z 25. augusta 1992 bol ústredný orgán štátnej správy - Ministerstvo obchodu a cestovného ruchu SR zrušené a prešlo pod správu Ministerstva hospodárstva SR. Absencia dlhodobého metodického a odborného usmerňovania aktivít v rámci vnútorného obchodu sa prejavuje žiaľ negatívne. Výsledkom sú rozhodnutia, ktoré vedú napríklad aj ku vzniku potravinových púští, nevyváženému priestorovému rozloženiu maloobchodnej siete a absentujúcej odbornosti predajného personálu.

Analýzou demografie obchodných podnikov sme získali základný prehľad o dopade negatívnych dôsledkov makroekonomických zmien na ich aktivity. Sledovali sme vybrané ukazovatele, ako napr. vývoj vzniku nových podnikov, porovnanie ich početnosti v období ostatných štyroch rokov podľa veľkostných kategórií, vybrané ukazovatele vo forme tržieb, priemerného počtu zamestnaných, ale aj priemernej nominálnej mzdy. Odraz vonkajších zmien sa prejavil aj v zmene počtu zamestnaných osôb v jednotlivých kategóriách maloobchodu, ktoré boli navzájom porovnané. Napriek tomu, že sme obmedzili svoje zisťovanie na analýzu určitých vybraných demografických ukazovateľov odvetvia maloobchodu, v ďalších etapách sa budeme usilovať o získanie a analyzovanie údajov odrážajúcich zmenu štruktúr počtu aktívnych, vzniknutých a zaniknutých podnikov v odvetví obchodu vplyvom makroekonomických súvislosti.

Príslušnosť k projektu

Príspevok je súčasťou riešenia projektu MŠ SR VEGA 1/0561/21 Vplyv krízy COVID-19 na demografiu podnikov a zamestnanosť v SR a EÚ.

Bibliografia

ANDREI, JV, CHIVU , L., GHEORGHE IG., GRUBOR, A., SEDLARSKI, T. , SIMA, V., SUBIĆ, J., VASIC, M. (2021). "Small and Medium-Sized Enterprises, Business Demography and European Socio-Economic Model: Does the Paradigm Really Converge?," JRFM, MDPI, vol. 14(2), pages 1-29, February.

BOLGÁČ, J., SIVAŠOVÁ, D. (2015). Demografia podnikov Slovenska z pohľadu právnej formy vlastníctva podnikov. Zborník vedeckých statí projektu VEGA 1/0501/14 Teoretické a praktické aspekty podniku z pohľadu demografie – nástroj hodnotenia zmien v ekonomickom raste a zamestnanosti. 1. časť. Bratislava: Ekonóm. 2015. s. 6-20.

HURBÁNKOVÁ, Ľ. (2018). Analýza vybraných ukazovateľov demografie podnikov na Slovensku v rokoch 2008-2014. In*: Ekonomika Informatika*, vol. 16, No. 2/2018. ISSN 1336-3514

KUZMIN, E. A.; VINOGRADOVA, M. V.; GUSEVA, V. E. (2019). Projection of enterprise survival rate in dynamics of regional economic sustainability: case study of Russia and the EU, Entrepreneurship and Sustainability Issues 6(4): 1602-1617. https://doi.org/10.9770/jesi.2019.6.4(4)

LIESKOVSKÁ, V., PETROVČIKOVÁ, K., MURIN,V. (2022). Changes in the Demography of Selected Enterprises in the Slovak In: *RELIK 2022* [elektronický zdroj] : reprodukce lidského kapitálu - vzájemné vazby a souvislosti : sborník příspěvků, 10. a 11. listopad 2022. - Praha : Prague University of Economics and Business, 2022. - ISBN 978-80-245-2466-5. - s. 485-495.

MARKOWICZ, I. (2014). Business demography - Statistical analysis of firm duration. Transformations in Business and Economics. 13. 801-817.

NARIADENIE EURÓPSKEHO PARLAMENTU A RADY (ES) č. 295/2008 z 11.3.2008. Úradný vestník Európskej únie. In: https://eur-lex.europa.eu/legal-content/SK/TXT/PDF/?uri=CELEX:32008R0295&from=EN

SIBIRSKAYA, E., OVESHNIKOVA, L. and SAVINA, N. (2018). Enterprises Demography and Its Role in Estimation of Entrepreneurial Activity in the Regions. 31st International-Business-Information-Management-Association Conference| INNOVATION MANAGEMENT AND EDUCATION EXCELLENCE THROUGH VISION 2020, VOLS I - XI , pp.1457-1463

ŠOLTÉS, E., ŠOLTÉSOVÁ, T. (2016). Vznik a zánik pracovných miest v dôsledku demografie podnikov v SR v rokoch 2007 až 2013. Slovenská štatistika a demografia 1/2016, str. 3-28. ISSN 1339-6854.

ŠTATISTICKÝ ÚRAD SR. In: https://slovak.statistics.sk/

VOJTKOVÁ, M., BOLGÁČ, J., HURBÁNKOVÁ, Ľ. (2015) Teoretické a praktické aspekty podniku z pohľadu demografie nástroj hodnotenia zmien v ekonomickom raste a zamestnanosti. 2. časť Bratislava: Ekonóm, 2015. 99 s. ISBN 978-80-225-4173-2.

ZÁKON 453/1992 Z.z.

https://www.hn.online

https://www.mhsr.sk/

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Artificial intelligence tools in human resource management

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Abstract

Artificial intelligence has essentially become the new normal and has permeated all areas of management, including human resource management. The aim of the article is to show the tools of artificial intelligence that are used or can be used in the area of human resource management, especially in the process of recruitment and selection of employees; the management of work performance; and networking, including a review of the digitisation of the complex human resources management system. The use of artificial intelligence should lead not only to a more efficient management of human resources, but also to an increase in the overall performance of the company. On the other hand, it is necessary to draw attention to possible risks of AI, e.g. ethical problems. However, we can assume without a doubt that the future of human resource management will be built on models of human-AI collaboration.

Key words

Artificial intelligence, machine learning, human resource management, HR processes, efficiency, effectiveness

Introduction

Artificial intelligence permeates all areas of management, including human resource management. Basically, it is already being talked about as the new normal. The aim of its use is to make work more efficient, increase performance, save resources and reduce costs. The integration of artificial intelligence with human resource management practices is changing the way HR professionals perform individual activities. Artificial intelligence makes it possible to make more accurate and faster decisions based on existing datasets and behavioural patterns, while saving managers time for more strategic and conceptual tasks. As reported by Zhou et al. (2021), the company's performance can be significantly influenced by the digitisation of human resource management, as well as the maturity of HR systems and also the deeper involvement of HR departments in the strategic management of organizations and in business processes. The aim of the article is to examine the tools of artificial intelligence that are used, or that can be used in the area of human resource management.

1 Definition of the term Artificial Intelligence

Artificial intelligence (hereinafter referred to as “AI”) originated as a concept in the 1950s. In the literature, we will come across several definitions of AI (see e.g. Kaplan – Haenlein, 2019;

Strohmeier – Piazza, 2015, Willcoks, 2020), but the essence of all of them is that it is the "capability to think, learn, and perform like humans" (Tewari – Pant, 2020). As defined by the European Parliament (2020), it is “the ability of a device to exhibit human-like abilities such as thinking, learning, planning and creativity”.

AI is based on two characteristics of intelligence:

- autonomy – the ability to independently perform tasks in complex environments without user guidance and
- adaptability – the ability to improve by learning from experience.

AI can have three levels according to the level of complexity and can be:

- Artificial Narrow/Weak Intelligence – AI focused on a narrow range of abilities, e.g. self-driving cars, spam filters, drones, Google Assistant, mobile phone operating systems and other tools, e.g. Apple's Siri;
- Generative Artificial Intelligence, which has comparable abilities to humans and refers to the ability of computer systems to imitate the cognitive functions of the human brain, an example is ChatGPT by OpenAI;
- Artificial Superintelligence, which can surpass human intelligence (more details Escott, 2017).

In relation to practical use, we can distinguish two types of artificial intelligence:

- software artificial intelligence: virtual assistants, image analysis software, text translation, search engines, face recognition systems, etc.;
- embedded artificial intelligence in material devices, e.g. robots, autonomous means of transport, drones, the Internet of Things (watches or various appliances connected to the Internet).

In terms of the technologies used, we divide AI into:

- AI in the narrower sense of technology – AI independently analyses a task, defines and obtains a dataset, and subsequently obtains the result of a task that would normally require human intelligence to complete. AI itself develops procedures, rules, and patterns necessary to obtain the result of the task, makes independent decisions, and solves problems. AI systems are designed to mimic the cognitive processes of humans and continuously improve based on experience and learning. It may not be clear how the AI arrived at the result; a person can only give feedback whether the result is correct or incorrect.
- Machine learning (abbreviated ML) is a technology based on the development of algorithms *(Note: An algorithm is a sequence of commands used to perform a task,)* based on Data Mining and using mathematical and statistical methods. The result of its use is the creation of predictions. Learning is ensured by cyclically repeating the same process. The success of machine learning greatly depends on the quality of the dataset that is entered by a human during machine learning. Machine learning is used to develop predictive models that can be used for example to predict future events such as stock prices, sales trends, customer behaviour or employee behaviour (Akash, 2023), or we see this, for example, in automatic word correction or word predictions during the writing of messages on mobile phones or emails. In the case of machine learning based

on neural networks, it is deep learning (DL for short). While ML works with one level of learning, DL works with multiple layers, i.e. the output from one level of learning is the input for another level. Because the architecture is inspired by the human brain, DL systems are called neural networks. Thus, the DL technological solution makes it possible to solve more complex tasks than machine learning.

2 Research objectives and methods

The aim of the paper is to review the available artificial intelligence tools that are used, or that can be used in individual areas of human resource management, based on the study of the literature and the review of the offer of software tools. For this purpose, standard methods of scientific work were used, with an emphasis on the use of comparison when comparing selected AI tools, and abstraction in an effort to focus on the key activities of human resource management.

3 Results

Artificial intelligence is currently entering human resources management in the form of tools that use it. According to the results of a McKinsey & Company survey in 2022 (Maslej et al., 2023), in the field of human resources, AI tools were implemented most in the healthcare, pharmaceutical and medical products industry (15%) and retail (14%). The average, for all industries, was 11%. AI tools make it possible to automate repetitive tasks and thereby save time and resources. AI tools are already commonly used in human resources management, either directly within cloud HR software or separately within digital tools, mainly for:

- automation of the process of recruitment and selection of employees (recruiting automation software) – it involves analysing job descriptions to identify the most important requirements for a specific job, writing advertisements, screening CVs, interviewing candidates, narrowing down the selection of candidates (whereas one of the advantages is also ensuring less biased hiring); and onboarding;
- performance management software – which involves career management, evaluation of work performance, but also predicting employee behaviour, employee turnover, etc. based on HR analytics;
- management of employee engagement – employee engagement platforms for conducting surveys, quizzes for data acquisition, connecting employees, etc.

AI centric human capital management systems will be increasingly used for the complex management of people, from understanding the role of culture, diversity, pay and other factors influencing particular HR activities (Bersin, 2023).

Currently, there is a huge number of specific tools and applications using AI in the field of HR available on the market, only selected ones are listed below for the sake of clarity:

- HireVue Global Online Platform – Enables talent acquisition by automating workflows and simplifying recruitment. It uses tools for the creation and analysis of texts, video interviews and allows the user to identify and analyse the tone, choice of words, body

language, communication skills and, in general, can assess whether the applicant is suitable or not for the job.

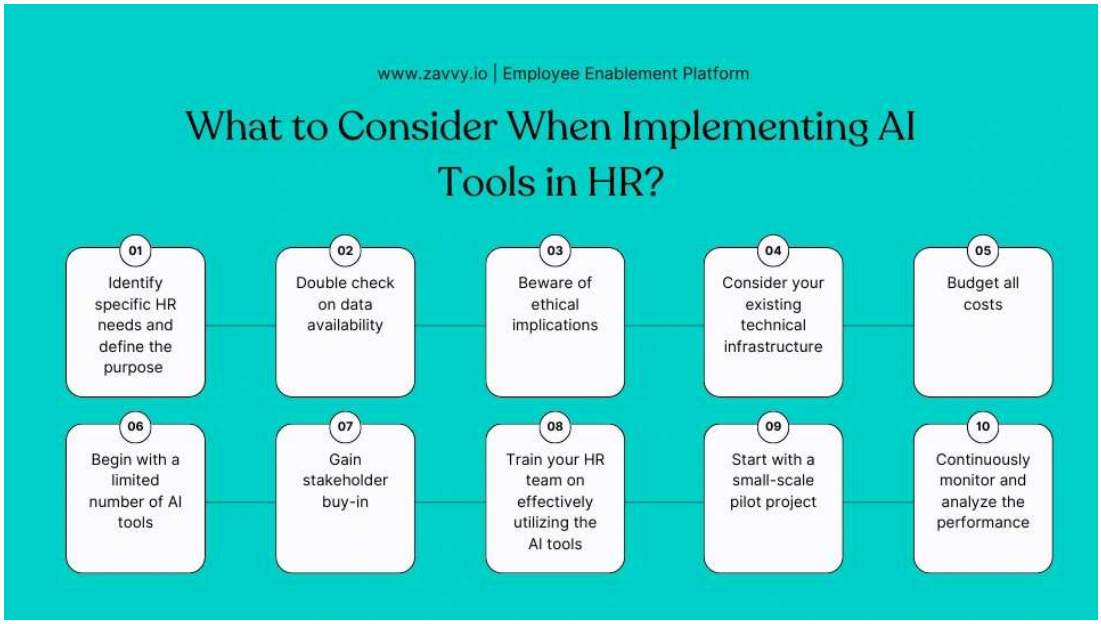
- Ycluster – video resume and video diagnostics to verify people's prerequisites for holding a job position. In addition to HR specialists, the interview is evaluated by independent psychologists, which can contribute to a more comprehensive evaluation of job applicants.
- Pymetrics – software enabling the evaluation of soft skills as part of the selection of candidates for vacant jobs, based on the use of data-based behavioural insights and evaluated with the help of AI.
- Other tools for recruiting and selecting job applicants are e.g. Talentuno – a crowdsourcing networking platform that connects companies and talent; Olivia by paradox AI – automates tasks such as responding to candidates, candidate screening, onboarding; Fetcher AI – software for recruiting job applicants allowing e.g. email automation, analytics, etc., or Workable, Oracle Recruiting, Skillate, and more.
- Effy AI – software that uses AI and covers common human resources management activities: performance management, but also onboarding, conducting surveys, pre-prepared reports and forms.
- WebHR – software based on cloud technology providing "all-in-one" solutions, i.e. complex solutions related to the life cycle of employees.
- Leena AI – corporate virtual assistant providing advice and assistance to employees.
- ChatGPT – in HR, it can be used, for example, for the:
    - preparation of questions for the interview, as well as for inspiration, what kind of questions applicants tend to ask during the interview, so that the HR person can prepare in advance for conducting an interview;
    - creative writing – writing advertisements, including stylistic instructions (e.g. writing in a style suitable for LinkedIn), or writing e-mails with responses to job applicants;
    - translation of texts;
    - text correction.

When using ChatGPT, it is necessary to enter the command clearly and precisely, or it can be corrected gradually. Other apps are also interesting, such as the ChatGPT for Sheets and Docs add-ons to make working with data easier – AI helps to use ChatGPT directly in tables; GPT Playground – created for interactive experimentation with machine learning models; ChatGPT for Google – integrates search results and specific response from ChatGPT.

Alternatives to ChatGPT are Ernie (by Baid search engine), Chatsonic (by Writesonic), Claude (by Anthropic), Jasper Chat and many others.

The procedure for introducing Ai tools into HR is presented by zavvy (2023), in Figure 1.

Figure 1: What to Consider When Implementing AI Tools in HR?



Source: zavvy (2023)

When implementing AI, not only is the installation of software emphasized, but especially the need for strategic planning, continuous monitoring and continuous improvement. Interdisciplinarity knowledge as well as the need for collaboration are also highlighted for successful AI implementation by Fountaine – McCarthy – Saleh (2019).

CONCLUSION

Digitisation, currently especially the use of AI tools, is changing the traditional way of managing human resources. According to Bersin (2023), generative AI "*is going to radically change the HR Tech landscape. Not only will systems be intelligent by design, they will have powerful conversational user interfaces, they will embed multiple AI models, and new disruptors will appear"*. The use of AI in the field of human resources management in companies should lead to:

- higher efficiency of human resources management, with the help of creating and using digital platforms for managing HR processes, reducing the administrative burden and reducing costs *(Note: Increasingly, employees perceive human resources as a portal that allows access to internal services and not as persons who perform personnel work)*;
- modernization and innovation of personnel work by using technologies to improve the implementation of individual processes of recruitment and selection of employees, training, management of work performance, communication and others;
- HR analytics, the outputs of which will provide managers with personnel indicators in real time, which will enable them to make better decisions and immediately react to current needs in the field of human resource management, as well as predict trends based on in-depth data analyses;

- networking between employees inside the organisation as well as between employees and other stakeholders outside the organisation and sharing experiences using technology.

HR professionals can make their work more efficient and provide more space for strategic tasks by using the AI tools. On the other hand, it is essential to draw attention to AI-related threats, e.g. cyber security or solving the issue of responsibility in case of errors, inaccuracies, or unintentional bias by AI. In the future, however, HR professionals' work will undoubtedly be based on the human-AI collaboration model.

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Bibliography

AKASH, S., 2023. "How Machine Learning is Different from Artificial Intelligence?" [online]. [cit. 15. August 2023]. Available at: https://www.analyticsinsight.net/how-machine-learning-is-different-from-artificial-intelligence/

BERSIN, J., 2023. "How AI Is Disrupting the HR Tech Marketplace". [online]. [cit. 15. August 2023]. Available at: https://joshbersin.com/2023/04/how-ai-is-disrupting-the-hr-tech-marketplace/

ESCOTT, E., 2017. "What are the 3 types of AI? A guide to narrow, general, and super artificial intelligence" [online]. [cit. 15. August 2023]. Available at: https://codebots.com/artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible

EURÓPSKY PARLAMENT, 2020. "Umelá inteligencia: definícia a využitie". [online]. [cit. 7. July 2023]. Available at: https://www.europarl.europa.eu/news/sk/headlines/society/20200827STO85804/umela-inteligencia-definicia-a-vyuzitie

FOUNTAINE, T., McCARTHY, B. and T. SALEH, 2019. "Building the AI-Powered Organization". In: Harvard Business Review, Vol. 97, Iss. 4, pp. 62-73.

KAPLAN A. and M. HAENLEIN, 2019. "Siri, Siri, in my hand: Who’s the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence." in. Business Horizons, vol. 62, no. 1, pp. 15-25.

MASLEJ, N., FATTORINI, L., BRYNJOLFSSON, E., ETCHEMENDY. J., LIGETT, K., LYONS, T., MANYIKA? J., Ngo, H., NIEBLES, J.C., PARLI, V., SHOHAM, Y., WALD, R., CLARK, J. and R. PERRAULT, 2023. "The AI Index 2023 Annual Report," AI Index Steering Committee, Institute for Human-Centered AI, Stanford University, Stanford, CA, April 2023.

STROHMEIER, S. and F. PIAZZA, 2015. "Artificial Intelligence Techniques in Human Resource Management - A Conceptual Exploration". In. Intelligent Techniques in Engineering Management, pp. 149-172.

TEWARI, I. and M. PANT, 2020. "Artificial Intelligence Reshaping Human Resource Management: A Review". In: IEEE International Conference on Advent Trends inMultidisciplinary Research and Innovation (ICATMRI).

WILLCOCKS, L., 2020. "Robo-Apocalypse cancelled? Reframing the automation and future of work debate". In: Journal of Information Technology, Vol. 35, iss. 4, pp. 286-302.

zavvy, 2023. AI Tools for HR Processes: Shopping Guide + 7 Tools Compared. [online]. [cit. 7. September 2023]. Available at: https://www.zavvy.io/blog/ai-tools-for-hr

ZHOU, Y., LIU, G., CHANG, X. and L. WANG, 2021. "The impact of HRM digitalization on firm performance: investigating three-way interaction". In: Asia Pacific Journal of Human Resources, Vol. 59, Iss. 1, pp. 20-43.

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Trends in marketing communication

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Abstract

The following paper gives a short insight into the new trends in marketing communication. Based on the current state of knowledge and latest contributions to various predominantly online sources it gives the overall review of the applied marketing praxes in business. First part of the paper shows some important facts about the social media usage. Attention is also aimed at the current published views from the marketers on the current trends in marketing and marketing communication as well.

Key words

Marketing, marketing communication, trends in marketing communication

Introduction

Marketing communication as the integral part of marketing mix plays maybe the most important part in the company's success. Although it would be unprofessional to forget about other marketing mix elements. Especially nowadays with the enormous rise of the social networks' importance to success so many business companies have an elaborate marketing strategy and within it the marketing communication strategy that reflects all the knowledge that the company has about its target customers. The marketing communication success stems also from the understanding of the target audience whether it is an individual consumer of soft drinks or the first-time voter in the national elections. The key is to know what defines our customer and adjust the components of marketing mix to meet the needs of the customer. The following paper introduces some facts and ideas that could inspire to make the company's marketing and marketing communication contemporary and competitive.

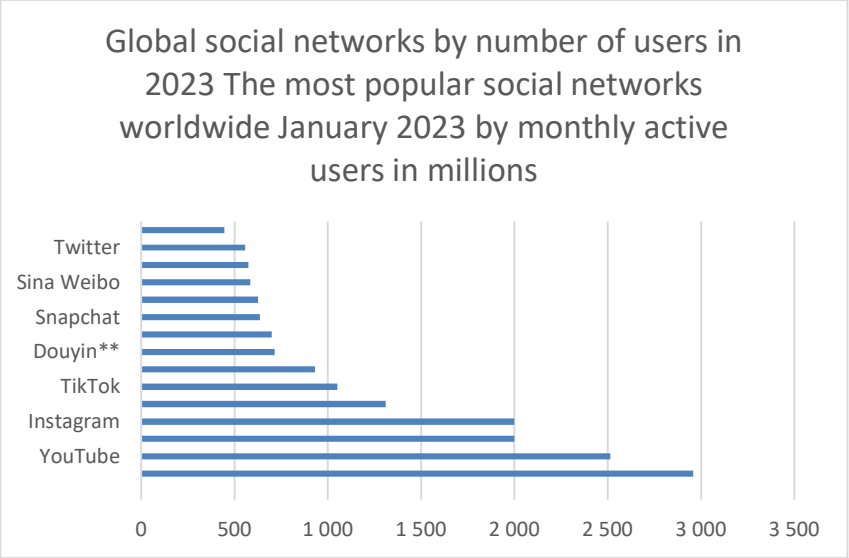
1 Insight into social networks usage

Marketing communication consists of its elements: advertisement, public relations, direct marketing, personal selling and sales support. Each of these tools has its own ways how to contribute to reach the company's goals that are reflected in marketing communication goals. To start with the introduction of trends in marketing communication for the year 2023 we will introduce you with some facts about using internet, social networks at the global level.

First, we will look at the distribution of users among the world's most used social networks. In the Figure 1 we can see that according to number of users the most popular is Youtube followed

by Instagram and we can see the rising Tik Tok. Predominantly the use of Tik Tok is much more popular among young users. The content is personalized by algorithm for each user and individual contributions are short so they support constant scrolling of the user to another video.

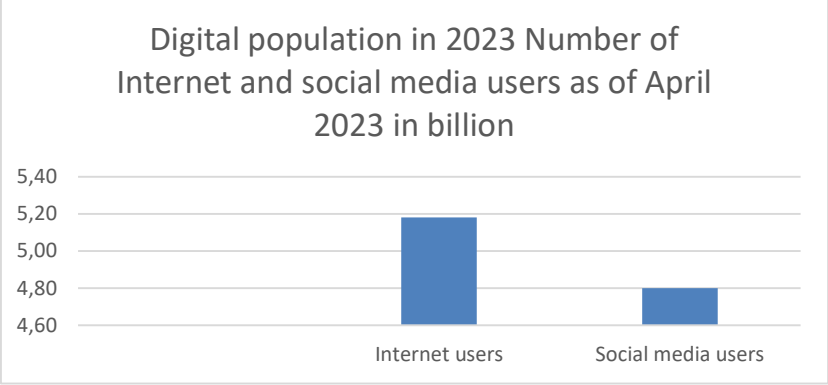
Figure 1: Global social networks by number of users in 2023



Source: www.statista.com

Figure 2 shows how many Internet users worldwide were in April 2023 and how many of them were also social media users. As the figure shows the total number of social media users reached 4,8 billion in April. This is according to using personalized marketing communication tools an important information, because it means that the traditional marketing tools need to be more and more supported by the presence of the company's marketing communication online.

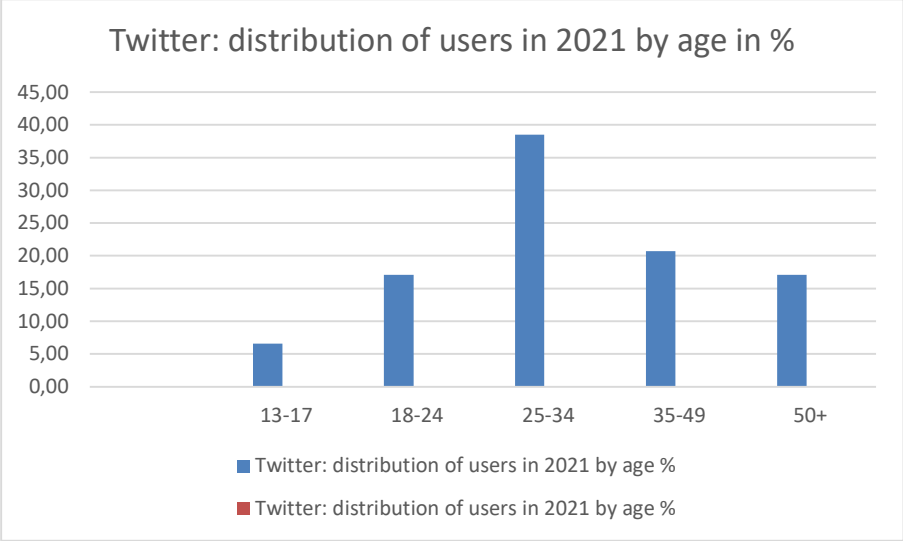
Figure 2: Digital population in 2023 Number of Internet and social media users in April 2023



Source: www.statista.com

Next Figure 3 shows the distribution of the social media Twitter users by age (now X). This distribution differs from one social network to another. It is always necessary for marketers to know the audience of the social media to better target their messages to them and to choose the most suitable social network for their campaigns or to use different channels and content according to the age distribution in different social media networks. The Figure 3 gives the potential customer the idea of the main group of users that are predominantly between the age 25 and 34.

Figure 3: Distribution of Twitter (now X) users by age



Source: www.statista.com

2 Contemporary trends in marketing communication

When we want to identify the trends in marketing communication despite it may look like an easy task the opposite is true. With the rapid changing online environment with new attributes constantly it requires from the marketers to study them, to not lose the contact with the situation on the market and to have the competition under control. In the next text we will introduce few global trends according to the well-known magazine Forbes and will introduce the opinions of some marketers in Czech and Slovak republic.

Marketing trends according to Forbes (2023):

- managing consumer expectations in the digital space: according to predictions, the customer expects the purchase process to cover all expectations in the digital space, such as reaction time to customer wishes, questions, interaction on the website,
- to be an authority in the given field of focus of business activities, which contributes to the achievement of credibility and brand position. The process by which we build our position, achieving brand acceptance in the segment targeted by the entity is a long-term issue,
- the presence and concerns of artificial intelligence: one of the biggest challenges in the B2B market will be the acceptance and perception of artificial intelligence in the B2C

market, which will naturally lead to efforts to apply it in the B2B market. Adopting the use of artificial intelligence tools will be challenging to gain trust for its use among business partners,
- artificial intelligence should be more accurate in 2023, which will ultimately lead to greater confidence in its use,
- consumers will demand maximization of impact, utility and convenience during and after purchase. Marketers, on the other hand, will need to reach potential customers where they are and with an exceptional value proposition, as consumers themselves will be significantly more selective in their decision-making process,
- acceleration of physical/digital connectivity: the physical purchase and experience will gradually change to a digital one,
- marketing strategies will use integrated videos and written content,
- in 2023, it would be strongly recommended to revise sales processes, it is very likely that it would have to be reoriented towards sales services rather than sales visuals and personnel,
- taking care of existing customers should be a priority.

According to Chacko (Chacko, 2023) artificial intelligence will have following influence on marketing:

- there are expectations that AI-enabled marketing will account for 45% of the global economy in 2030,
- trend "listening" on social media,
- content creation will become crucial,
- automation,
- segmentation and personalization,
- data analysis,
- reputation management,
- competitive intelligence,
- multilingual advantage,
- machine learning: uses statistical methods to analyze social data for highly precise insights into consumer experience, consumer sentiment, and other marketing tools. If it is trained, it offers various tools to find the chosen one.

From the Slovak perspective the internet portal www.akcnezeny.sk asked 19 top Slovak and Czech marketers to reveal their thoughts about the marketing trends and especially marketing communication trends in 2023. In the next part we will summarize their opinions. The full source for those interested will be at the end of this paper. So, trends in marketing and marketing communication for 2023 could be:

- the investment optimization on the both side: the consumer and the company, consumers try to use their money more effectively due to the current inflation situation and market uncertainty and companies will try to find the investments with the fast return of investments,
- there is also a chance of lower customers' loyalty to brand,
- the use of own organic contact despite the cookies, as google is about to stop using them that will lead to decrease options for the companies to target their customers,
- automatization of the processes,

- reels as short videos adjusted to the mobile phone screen will continue to be more and more attractive for consumers,
- in 2023 brands should be authentic,
- marketers predict not only for 2023 but for the next year dramatic growth of AI in marketing that has the potential to make many processes simpler and automatic,
- there is a prediction, that consumers will transfer from Facebook, Instagram to Tik Tok, Pinterest and Linkedin,
- in connection with the authenticity for the final consumer, there is the need to create own original content.

CONCLUSION

The paper in short described the contemporary trends in marketing communication. As shown, traditional ways of approaching final customers turns to online communication. Personalization, authenticity of the messages becomes crucial for the success among intensive competition on the market.

Bibliography

ALLAN, E.: 23 *Communication Trends for 2023 [Infographic]*, [online]. [citované 6. 9. 2023]. Dostupné z: https://www.mhcautomation.com/blog/effective-communication-trends-to-follow/ (6. 9. 2023)

CHACKO, A.: The role of artificial intelligence in marketing, [online]. [citované 6. 9. 2023]. Dostupné z: https://sproutsocial.com/insights/ai-marketing/ (6. 9. 2023)

DeVRIES, H: *10 Marketing Trends And Predictions For 2023*, [online]. [citované 6. 9. 2023]. Dostupné z: https://www.forbes.com/sites/henrydevries/2023/01/30/10-marketing-trends-and-predictions-for-2023/?sh=6a1123087f26 (6. 9. 2023)

https://akcnezeny.sk/ake-su-trendy-v-marketingu-pre-rok-2023-prezradilo-nam-19-marketerov/

www.statista.com

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Implementation of Data Discovery in a specific company

Implementácia Data Discovery v konkrétnom podniku

Jaroslav Dugas, Martin Bosák, Martin Cenek

Abstrakt

Cieľom predloženého príspevku je popísať návrh implementácie nástrojov Data Discovery v konkrétnom slovenskom podniku. Tento podnik má významné postavenie vo výrobe konkrétnych komponentov pre automobilový priemysel a aj napriek tomu že tento podnik využíva najnovšiu verziu svojho informačného systému, predsa len prostredníctvom návrhu implementácie Data Discovery môže získať ďalšie možnosti ešte relevantnejšieho využívania podnikového informačného systému. Tieto možnosti by mohli podnikovému manažmentu ešte výraznejšie pomôcť pri jeho rozhodovaní.

Kľúčové slová

Informačný systém, podnik, implementácia, Data Discovery, užívateľ

Úvod

Data Discovery – „objavovanie dát“ je prístup ku správe údajov, ktorý pozostáva zo zhromažďovania a vyhodnocovania dát z rôznych podnikových zdrojov a môže manažmentu pomôcť pochopiť trendy, smery a nachádzať príklady, zobrazované skutočnosti v podnikových dátach. Data Discovery sa realizuje v úzkom vzťahu ku Business Intelligence. Integruje viacero izolovaných, osobitých zdrojov dát, aby podnikovému manažmentu pomohlo získať prehľady z týchto dát, na základe ktorých môže tento manažment prijímať čo najrelevantnejšie rozhodnutia. Proces Data Discovery prepája viaceré zdroje dát, prípravu dát a ich spracovanie, ich následné zdieľanie a vykonávanie rôznych analýz, ktorých zámerom je získať prehľad o kompletne všetkých podnikateľských procesoch. Tesne súvisí s klasifikáciou dát, ktoré sú roztriedené podľa ich užitočnosti, citlivosti alebo potrieb užívateľov.

1 Prístupy k uskladneniu dát v dátových skladoch

V praxi existujú dva základné prístupy k uskladneniu dát v dátových skladoch. Je to normalizovaný a dimenzionálny prístup k dátam. (Inmon, 2016)

V normalizovanom prístupe samotná normalizácia znamená rozčlenenie dát so zámerom vyvarovať sa duplikáciám a nadbytku dát premiestnením opakujúcich sa skupín dát do nových tabuliek. Čiže normalizácia zvyšuje počet tabuliek, ktoré musia byť vzájomne prepojené, na

základe čoho sú redukované miesta nevyhnutné za účelom uskladňovania dát a tiež je braná do úvahy náročnosť aktualizácie podnikových dát. Pri tomto prístupe sú dáta v dátových skladoch (DW) uložené v tabuľkách v normalizovanej forme, podľa vopred zadefinovaných normalizačných pravidiel. Tabuľky sú následne zoskupovávané podľa konkrétnych oblastí (zákazníci, produkty, služby, financie). Keď je databázou využívaný model, ktorý je vysoko normalizovaný, potom dáta sa z jednej operácie často uskladňujú vo väčšom množstve tabuliek, čo umožňuje, aby boli DW veľmi efektívne. Je to preto, pretože pri prebiehajúcich transakciách je iba malá časť dát ovplyvňovaná. Primárna výhoda tohoto prístupu tkvie v jednoduchosti priameho pridávania dát do databáz a taktiež vo flexibilite v prípadoch, kedy sa zmení spôsob organizácie v podnikoch alebo sa zmení dátový model. Avšak niekedy kvôli značnému počtu tabuliek nie je jednoduché spojiť dáta z rôznych zdrojov tak, aby tieto dáta poskytli zmysluplné informácie a teda aby boli adekvátne pre tvorby analýz. Niekedy je prístup k informáciám veľmi zložitý a stáva sa, že dôjde ku neporozumeniu zdrojov dát, poprípade dátovej štruktúre DW, čo je veľkou nevýhodou.

V dimenzionálnom prístupe sú všetky dáta rozložené do faktov a dimenzií. Napríklad pri operáciách z predaja produktov fakty nám znázorňujú početnosť zákazníkmi objednaných produktov a taktiež nimi zaplatenú cenu, dimenzie nám predstavujú dátumy objednávok, meno a kontakt na zákazníka, čísla produktov, predajcov zodpovedných za vybavenie objednávok a podobne. Prednosťou tohoto prístupu je, že je jednoduchší na používanie a teda ľahšie mu porozumie väčšina užívateľov. Taktiež dáta sú ľahko prístupné, sú ľahšie analyzovateľné, spravovateľné a interpretovateľné. Nevýhodou je dlhší čas a tiež komplikovanejší spôsob nahrávania dát do systému so zámerom zachovania integrity faktov a dimenzií. Niekedy môže byť aj obmedzená flexibilita a to v prípade, keď sa zmení spôsob organizácie v podnikoch alebo sa zmenia dimenzie, čo má za následok zložitosť upravovania štruktúry DW. (Oškrdal – Doucek, 2015)

Tieto dva vyššie spomenuté prístupy sa vzájomne nevylučujú. Takisto sú známe aj iné, a to kombinované prístupy. Patria k nim napríklad dimenzionálne prístupy, ktoré zahŕňajú normalizovanie dát do určitého konkrétneho stupňa. Podľa zamerania databázy je prispôsobovaná aj jej samotná štruktúra a preto vo väčšine prípadov sú kombinované (hybridné) prístupy najvhodnejšie, ktoré sú základom pre relevantné využitie Data Discovery.

2 Proces implementácie Data Discovery

Data Discovery popisuje procesy pri pochopení dátových súborov, ktoré sú k dispozícii na integráciu a/alebo ku analýze dát. Tento krok nastáva v dizajne, úprave a mal by kombinovať, spájať technické vyhľadávanie prostredníctvom rôznych nástrojov s odbornými užívateľskými znalosťami. V procese objavovania dát je pri samotnom hodnotení dát vykonávaný náhľad na vysokej úrovni prípravy dát, alebo potreby kvality dát. Data Discovery možno rozdeliť na dva samostatné pojmy (Knight, 2020):

- *Manuálne Data Discovery* – za posledných 20 rokov, pred pokrokom v strojovom učení, pri mapovaní dát dátoví špecialisti využívali svoju mozgovú činnosť a teda svoje znalosti. Zjednodušene povedané, samotní dátoví špecialisti prostredníctvom kritického myslenia rozhodovali o tom, aké dáta potrebné k rozhodovaniu majú k dispozícii, kde sú v podstate tieto dáta uložené a prečo a či vôbec budú prípadne tieto dáta poskytnuté nejakým ďalším koncovým

užívateľom. V podnikoch boli monitorované metadáta a dátové toky so zámerom získať informácie ku kategorizácii a toku dát. Správcovia dát, obvykle sú to pracovníci oplývajúcimi sofistikovanými technickými znalosťami, majú na starosti zásady a štandardy dokumentov v dátových skladoch, a usmerňujú procesy Data Discovery. V týchto prístupoch analytici konceptualizujú a/alebo nakreslia mapu toku dát, aby pochopili všetky údaje v podniku.

- *Inteligentné Data Discovery* – prostredníctvom technologického pokroku za posledný rok – dva definícia Data Discovery zahŕňala automatizované spôsoby, metódy, postupy prezentácie dát so zámerom odhalenia hlbších ekonomicko-obchodných prehľadov. Inteligentné Data Discovery už predstavuje veľký skok dopredu prostredníctvom rozšírenej analytiky a strojového učenia. Umelá inteligencia prichystáva, konceptualizuje, integruje a taktiež prezentuje obvykle za pomoci rôznych vizuálov skryté vzory a znalosti. Rozumný manažment si uvedomuje, že výsledné porozumenie a tiež analýzy dostupných súborov dát sa nachádzajú vo veľkých počítačoch, ktoré prijímajú obrovské množstvá užívateľských dotazov, ktoré následne vykonávajú konkrétne spracovania a na záver prichádzajú s relevantnými odpoveďami.

Existuje niekoľko kľúčových častí procesu Data Discovery (Hiter, 2021):

- *Prieskum údajov* – tento samotný postup je skoro zhodný so samotným Data Discovery, ale zásadný rozdiel je v tom, že v skutočnosti funguje ako obšírnejší prístup, kým zámerom Data Discovery je získať odpovede na konkrétne otázky alebo získať správne riešenie na známe problémy s dátami pri ich vyhľadávaní. K procesom zameraných na prieskumy dát obyčajne dochádza ešte oveľa skôr, než je v skutočnosti jasné na ktoré konkrétne otázky bude potrebné, nevyhnutné odpovedať. Primárne kroky, postupy prieskumu dát užívateľom pomôžu vysledovať s čím je v podstate možné pracovať v rôznych databázach, čo poskytuje súvislosti ku kladeniu relevantných otázok počas Data Discovery.

- *Príprava dát* – predstavuje proces organizovania, pripravovania a následného posunutia množiny nespracovaných dát na objavovanie (nájdenie niečoho dosiaľ neznámeho, skrytého) a na analýzy. Tento proces je možné vykonávať aj manuálne, ale v nastaveniach Big Data môžu byť na samotnú prípravu dát na použitie využité nevyhnutné nástroje, ktoré sú určené na extrahovanie, prenos, na načítanie (ETL) a aj na skladovanie dát a prípadne aj na vizualizáciu týchto dát.

- *Inteligentné Data Discovery* – tento konkrétny typ procesu, a teda „objavovanie“, je vykonávaný vtedy, kedy umelá inteligencia prehľadáva všetky dáta, aby v nich našla nejaké vzory a aby ich vizualizovala. Veľa podnikov využíva inteligentné Data Discovery a to nielen v rámci svojho potenciálu BI, ale aj z dôvodu, že si vyžaduje oveľa menej dátových analytikov, ktorí musia mať odborné znalosti z oblasti postupov Data Discovery.

Data Discovery zahŕňa zber a vyhodnocovanie dát z rozličných zdrojov a často je využívané na porozumenie trendom a vzorcom v dátach. Predpokladá využiť postupnosť konkrétnych krokov, ktoré môže manažment podnikov využiť ako akýsi vzorec k pochopeniu svojich dát. Data Discovery obvykle v spojení s BI napomáha podávať informácie o ekonomicko-obchodných rozhodnutiach a to tým, že zlučuje nesúrodé, rôznorodé izolované zdroje dát, ktoré je potrebné analyzovávať. Vlastniť veľké množstvá dát je úplne zbytočné, ak nie sú nájdené spôsoby, metódy, postupy ako z týchto dát extrahovať potrebné poznatky. Proces Data Discovery obsahuje pripojenie, pridruženie viacerých zdrojov dát, čistenie a prípravu dát,

zdieľanie dát v celom podniku a vykonávanie analýz za účelom získania potrebných prehľadov. V súčasnosti už skoro všetky podniky získavajú a uchovávajú nesmierne množstvo dát o svojich terajších, ale aj potencionálnych zákazníkoch, trhoch na ktorých podniky pôsobia, možných a skutočných dodávateľoch, výrobných postupoch a prebiehajúcich procesoch a o ďalších iných náležitostiach, s ktorými sa podniky pri svojom podnikaní dennodenne stretávajú. Dáta prúdia ako z online, tak aj z tradičných transakčných systémov, rôznych senzorov, databáz, sociálnych médií, smart zariadení a rozličných IKT a z ďalších rozličných prameňov. Rezultátom je, že užívatelia s rozhodovacou právomocou sa síce topia v obrovskom množstve dát, ale oni očakávajú prehľady, ktoré sú v podstate v týchto dátach ukryté. (https://www.tibco.com/reference-center/what-is-data-discovery)

Data Discovery predstavuje proces, ktorý dáva možnosť podnikom zistiť skutočnosť, aké typy dát sú uložené v celopodnikových databázach a dátových skladoch a zisťuje vzory, obrazy dát, ktoré v prípade ich použitia v oblasti vymedzeného priestoru činností ohľadom zabezpečenia a ochrany osobných dát obvykle reprezentujú osobné a veľmi citlivé a teda dôverné informácie. Detekciou, odhaľovaním týchto rôznych dátových vzorov, príkladov môžu podniky následne vykonávať rozhodnutia, prostredníctvom ktorých dokážu podporiť svoje ekonomicko-obchodné predsavzatia. (Cavey, 2021)

Data Discovery je pravidelne sa opakujúci proces konsolidácie, ustálenia nespracovaných podnikových dát z rôznych zdrojov a to takým spôsobom, ktorý umožňuje podnikovým manažérom komplexne, úplne analyzovať ich dáta. Tento proces je uspôsobený k zhromažďovaniu veľkých objemov dát z rôznych podnikových oddelení a na zidentifikovanie trendov a odľahlých, často stratených hodnôt podnikovej výkonnosti. Sú to inteligentné nástroje, aplikácie ktorých zámerom je skúmanie dát a ktoré podnikom umožňujú získať interaktívne a rozložiteľné informácie o vlastnej činnosti prostredníctvom jasnejšej vizuálnej prezentácie. Všeobecne vizualizácie dát prichádzajú v podobe grafov a rôznych schém, čím je v podstate uľahčené interpretovanie celistvých, súhrnných kvantitatívnych informácií. Týmto procesom je tiež využívaná riadená pokročilá analytika, ktorá napomáha užívateľom realizovať relevantné analýzy dát prezentovaním štatistických informácií o nahromadených normách, metrikách. Prostredníctvom aplikácií určených k analýze dát môžu podnikoví užívatelia plnohodnotne využívať konkrétne funkcie, ako sú napríklad návrhy, ktoré sú založené na algoritmoch, na zlepšenie výkonu a tiež k prediktívnej analýze. Ak manažment podnikov pochopí a nájde – objaví hodnoty vo svojich dátach, dokáže prijímať relevantné rozhodnutia, ktoré mu dopomôžu k naplneniu či krátkodobých alebo aj dlhodobých cieľov, môže si vylepšiť stratégie a takto získať konkurenčnú výhodu oproti konkurentom. Prostredníctvom týchto nasledujúcich 5-tich krokov dokáže proces Data Discovery previesť zložité, neprehľadné a neštruktúrované dáta na súvisle, cenné informácie (Truong, 2020):

1. Pripojenie a zmiešanie dát – aby mohol byť začatý proces Data Discovery, musia byť nazhromaždené všetky nevyhnutné merania aj metriky, ako sú napríklad údaje o dodávateľoch, informácie o prebiehajúcich výrobných procesoch alebo o finančných náležitostiach. Efektívna analýza môže byť vykonaná až v prípade, kedy sú už všetky predtým rozptýlené dáta z rôznych databáz umiestnené spolu v jednom dátovom sklade. Takým príkladom môže byť skutočnosť, keď nejaký analytik konkrétnej maloobchodnej predajne chce vypozorovať, ako počasie dokáže ovplyvniť predaj vybraných produktov v jeho predajni. Čiže pre neho primárnym krokom bude zostaviť dáta o počasí a aký bol predaj vybraného produktu v dobe ním vymedzeného časového

úseku. Ak to takto urobí, v podstate umožní vlastníkom podniku vyhodnotiť a prepojiť informácie do jednej metriky. Niektoré vykonané prípadové štúdie dokazujú, že podnikový manažment môže tento proces ešte výraznejšie zefektívniť a to prostredníctvom integračnej aplikácie, pretože tá im umožní kompilovať zložité zoskupenia dát v reálnom čase zohľadňujúcom skutočnosť z rozličných systémov a prepojiť ich tak, aby bol umožnený úplne voľný, neohraničený tok dát. Táto technológia má normalizované formáty dát, ktoré integrujú ľubovoľné potrebné databázové zdroje údajov a to úplne bez toho, aby sa museli vyvíjať nejaké ďalšie vlastné integrácie, a tiež aby museli byť vyčlenené dodatočné finančné zdroje na údržbu, alebo aby muselo dôjsť ku komplikovanému strojovému učeniu.

2. Čisté a pripravené dáta – ak sú dáta nespracované, nie je jednoduché ich interpretovať a z tohto dôvodu si proces Data Discovery vyžaduje, aby boli úplne všetky nazhromaždené metriky vyčistené a štandardizované. Čistenie údajov tkvie v nachádzaní akýchkoľvek možných chýb, skreslení, alebo aj poškodených dát a ich následnej oprave, poprípade v odstránení všetkých chybných dát z databáz či dátových skladov. Tu by sa mal vrcholový manažment tiež postarať o to, aby všetkými súbormi dát boli používané relevantné merné jednotky, čím sa zabráni skresleniu výsledkov. K tomuto procesu prípravy dát môžeme zahrnúť aj manuálne opätovné spracovanie dát kvôli dátovým duplikátom alebo kvôli neúplným častiam dát. Výsledkom efektívneho čistenia dát sú súbory dát, ktoré sú už spoľahlivé a presné, čím sa umožní vykonávanie dôkladných analýz.

3. Zdieľanie dát – dáta by mali byť v podniku zdieľané oprávneným užívateľom. V tomto treťom kroku zdieľanie dát zabezpečí, aby boli informácie v podniku využité v plnohodnotnej miere v podstate preto, lebo rôzni jednotliví užívatelia môžu vyhodnotiť akékoľvek dáta po svojom a môžu takto predostrieť jedinečné hľadiská. Týmto zdieľaním je možné napomôcť podnikom neustále zhromažďovať rôznorodé interpretácie odlišných aspektov dát.

4. Analyzovanie a rozvíjanie prehľadov – v prípade, ak v podniku majú jednotliví manažéri a dátoví analytici prístup k distribuovaným verziám dát, dokážu vyhodnocovať, analyzovávať a identifikovávať hodnoty z informácií. Podniky, ktoré využívajú tento krok vo fáze Data Discovery, aktívne využívajú analytické prostriedky generujúce prehľady. Medzi tieto prostriedky je možné priradiť aj distribučnú analýzu, čo predstavuje proces, prostredníctvom ktorého je možné identifikovať a korelovať opakujúce sa tendencie alebo vzorce, obrazy, príklady s určitým konkrétnym významom. Napríklad majitelia logistických podnikov môžu využiť distribučné analýzy na stanovenie svojej dopravnej vyťaženosti, aby takto mohli zistiť spôsoby, postupy a teda akou metódou si naplánovať viacej vodičov na tieto najviac vyťažené časy. Manažment môže taktiež využívať aj prediktívnu analytiku, ktorá používa dáta aj štatistické algoritmy k hodnoteniu nastavajúcich výsledkov. Napríklad analýza spotrebiteľského koša umožní manažmentu uvidieť nákupné šablóny, ako môžu byť napríklad kombinácie jednotlivých položiek, ktoré si zákazníci spolu častejšie nakupujú a podobne.

5. Vizualizácia prehľadov – ak v podniku jednotlivé tímy vypracujú prehľady z dát, mali by zdieľať svoje prehľady s celým podnikom. Najužitočnejším postupom, ako by to tieto tímy mali urobiť, je použiť vizuálnu analýzu v podobe panelov, grafov a máp. Aplikovanie vizuálnych dát ako prostriedku na ďalšie zisťovanie môže uľahčiť aj zrýchliť porozumeniu metrík a ich interpretácií, keďže obvykle zvýrazňuje len podstatné myšlienky, invencie so zameraním len na tie konkrétnejšie ciele.

3 Vyhodnotenie implementácie IS prostredníctvom metódy HOS 8

Metóda HOS 8 posudzuje akýkoľvek naimplementovaný IS, podľa ôsmich zadefinovaných kľúčových oblastí. Prezentuje skutočnosť, či sú tieto konkrétne zadefinované oblasti na rovnakej, poprípade na príbuznej úrovni. Prípadná nerovnosť, odchýlky či nezhoda v jednotlivých konkrétnych častiach zvyčajne inklinuje ku neefektívnosti, neúčinnosti celého systému a náklady vynaložené na jeho činnosť bývajú vždycky vyššie ako pri systéme, ktorý je proporcionálny a teda vyvážený. Aj menej funkčnejšia zložka systému môže zreteľne znížiť, okliešťť stupeň kompletného systému. Jadrom metódy HOS 8 je vyhodnocovanie odpovedí na presne zadefinovaných 80 otázok z ôsmych oblastí, ktoré by mali čo najrelevantnejšie popísať skutočný stav IS v podniku. Na tieto zadefinované otázky odpovedalo v skúmanom podniku presne 20 manažérov a vyhodnotenie kompletných odpovedí bolo vykonané za pomoci prevodných tabuliek, ktoré sú určené pre jednotlivé konkrétne oblasti: 1. Hardware – (HW), 2. Software – (SW), 3. Orgware – (OW), 4. Peopleware – (PW), 5. Dataware – (DW), 6. Customers – (CU), 7. Supliers – (SU) a 8. Management – (MA).

Tabuľka 1: Prevodná tabuľka pre oblasť Hardware – (HW)

Pre oblasť HARDWARE					
Pre otázky: HW1, HW2, HW3, HW4, HW5, HW6, HW7, HW8					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: HW9, HW10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 2: Prevodná tabuľka pre oblasť Software – (SW)

Pre oblasť SOFTWARE					
Pre otázky: SW1, SW2, SW3, SW4, SW6, SW7, SW8, SW10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: SW5, SW9					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 3: Prevodná tabuľka pre oblasť Orgware – (OW)

Pre oblasť ORGWARE					
Pre otázky: OW1, OW2, 0W3, 0W5, 0W6, 0W7, 0W8, 0W9					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: OW4, OW10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 4: Prevodná tabuľka pre oblasť Peopleware – (PW)

Pre oblasť PEOPLEWARE					
Pre otázky: PW1, PW2, PW4, PW5, PW6, PW7, PW8, PW10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: PW3, PW9					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 5: Prevodná tabuľka pre oblasť Dataware – (DW)

Pre oblasť DATAWARE					
Pre otázky: DW1, DW2, DW5, DW6, DW7, DW8, DW9, DW10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: DW3, DW4					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 6: Prevodná tabuľka pre oblasť Customers – (CU)

Pre oblasť CUSTOMERS					
Pre otázky: CU1, CU2, CU3, CU5, CU6, CU7, CU8, CU9, CU10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: CU4					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 7: Prevodná tabuľka pre oblasť Supliers – (SU)

Pre oblasť SUPPLIERS					
Pre otázky: SU1, SU2, SU3, SU4, SU5, SU6, SU7, SU8, SU10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: SU9					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Tabuľka 8: Prevodná tabuľka pre oblasť Management – (MA)

Pre oblasť MANAGEMENT IS					
Pre otázky: MA1, MA2, MA3, MA4, MA6, MA7, MA8, MA9, MA10					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	5	4	3	2	1
Pre otázky: MA5					
Odpoveď	Áno	Skôr áno	Čiastočne	Skôr nie	Nie
Hodnota	1	2	3	4	5

Zdroj: vlastné spracovanie

Pre výpočet stavu súčasného informačného systému v podniku je nevyhnutné zadefinovať hodnoty stavu „i-tej“ oblasti. Postupované bolo podľa Kocha (2014), kde sa vylúčila najmenšia hodnota a to „1“ a zároveň aj najväčšia hodnota „5“. Po tomto vylúčení najmenšej a najväčšej hodnoty bol realizovaný výpočet jednotlivých oblastí a to podľa vzťahov, ktoré sú znázornené v nasledujúcej Tabuľke 9, ktoré sa zaokrúhlili na celé číslo.

Tabuľka 9: Vzťahy pre výpočet skúmaných oblastí

$$MAX_i = \max(u_{i1}, \dots, u_{i10})$$

$$MIN_i = \min(u_{i1}, \dots, u_{i10})$$

$$u_i = \left[\frac{\sum_{j=1}^{10} u_{ij} - MAX_i - MIN_i}{8} + 0{,}5\right]$$

Zdroj: vlastné spracovanie podľa Koch, 2014

Najsamprv bola vyhodnotená ako maximálna, tak aj minimálna hodnota jednotlivých skúmaných oblastí. Podľa získaných odpovedí sú to tieto následné hodnoty: MAXHW = 5 a MINSW = 2; MAXSW = 4 a MINSW = 1; MAXOW = 5 a MINOW = 1; MAXPW = 5 a MINPW = 2; MAXDW = 5 a MINDW = 1; MAXMA = 5 a MINMA = 2; MAXCU = 5 a MINCU = 2; MAXSU = 5 a MINSU = 2. Hneď potom boli vypočítané hodnoty „ui“, ktoré sú prezentované v nasledujúcej Tabuľke 10.

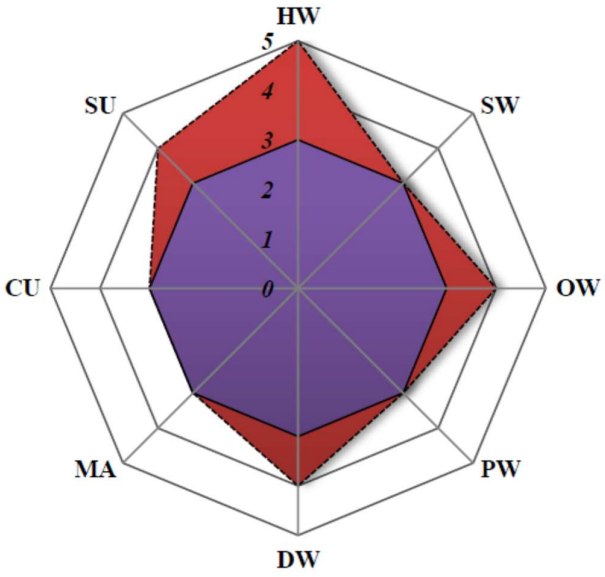
Tabuľka 10: Výsledné hodnoty skúmaných oblastí

OBLASŤ	POČET BODOV	VÝSLEDNÁ HODNOTA
Hardware – HW	5	Veľmi vysoká úroveň danej oblasti
Software – SW	3	Stredná úroveň danej oblasti
Orgware – OW	4	Vysoká úroveň danej oblasti
Peopleware – PW	3	Stredná úroveň danej oblasti
Dataware – DW	4	Vysoká úroveň danej oblasti
Management – MA	3	Stredná úroveň danej oblasti
Customers – CU	3	Stredná úroveň danej oblasti
Supliers – SU	4	Vysoká úroveň danej oblasti

Zdroj: vlastné spracovanie

Obrázok 1 nám graficky znázorňuje výsledky z vykonanej HOS 8 analýzy. Fialovou farbou znázornený pravidelný osemuholník nám prezentuje skutočnosť, kedy sa naimplementovaný IS v podniku považuje za vyvážený. Červenou farbou znázornený n-uholník na tomto obrázku nám prezentuje súčasný stav jednotlivých skúmaných oblastí v podniku, kde sa nám jasne znázornila nesúmernosť, čo znamená nevyváženosť súčasného stavu naimplementovaného IS v skúmanom podniku.

Obrázok 1: Grafické znázornenie výsledky metódy HOS 8



Zdroj: vlastné spracovanie

4 Návrh implementácie Data Discovery v skúmanom podniku

Po vykonaní analýzy naimplementovaného IS prostredníctvo metódy HOS 8 bolo zistené, že tento IS vykazuje určité nevyváženosti konkrétnych oblastí. A z tohto dôvodu bolo nevyhnutné navrhnúť konkrétne kroky, prostredníctvom ktorých by bola implementácia Data Discovery v skúmanom podniku najúčelnejšia. A aby bola implementácia Data Discovery v tomto skúmanom podniku úspešná, mala by prebiehať podľa týchto navrhnutých krokov:

1. KROK – v tejto úvodnej časti musí dôjsť k poznaniu potreby nevyhnutnosti zlepšenia súčasného nastavenia. Mali by sa zadefinovať úplne všetky slabé miesta súčasného procesu kolobehu dát v podniku a mali by byť navrhnuté a následne zrealizované zmeny v nastavení právomocí prístupov pre jednotlivých manažérov.

2. KROK – v tejto časti dochádza k zadefinovaniu všeobecných cieľov, ku stanoveniu cieľov podnikovej informatiky a akými konkrétnymi metódami bude možné tieto ciele dosiahnuť. Podrobne sa popíše súčasná situácia implementovaného IS v podniku, bude stanovený štandard a taktiež je nevyhnutné definovať mieru, dimenziu jeho implementácie, pretože ak by implementácia prebiehala dlhšie obdobie, musia byť vyhodnotené riziká z prípadných strát.

3. KROK – v tejto ďalšej časti sa musia určiť kľúčové ukazovatele výkonnosti a súčasne aj ich cieľové, reálne dosiahnuteľné hodnoty. Pritom niektoré je možné dosiahnuť jednoducho, rýchlo a niektoré zase nie a to znamená, že ciele, ktoré je možné dosiahnuť jednoducho, rýchlo, by mali mať vyššiu prioritu ako ciele dlhodobé.

4. KROK – pri tomto kroku sa už definujú praktické riešenia ku jednotlivým cieľom a sú navrhnuté konkrétne postupy, poradie zmien. Je nevyhnutné zostaviť relevantnú dokumentáciu, za pomoci ktorej je nenáročný následný proces akejkoľvek kontroly.

5. KROK – jednotlivé praktické a pritom účelné riešenia zo 4. kroku sú uvádzané v dennodennej praxi prostredníctvom použitia štandardov z 2. kroku. Vďaka tomu je prakticky ihneď viditeľný ich účinný vplyv na podnikové prostredie, kde samotný zdar závisí od odhodlania, predsavzatia a teda celkového záujmu osobitých užívateľov a hlavne od podpory vrcholového podnikového manažmentu.

6. KROK – účelom tohto kroku je zachovať každodennú funkcionalitu obmenených procesov a ich nepretržité monitorovanie. Zároveň je veľmi dôležité uvedomiť si, že nie je vhodné meniť procesy v tejto fáze, pretože by mohlo dôjsť ku zneváženiu predchádzajúcich krokov a teda ku zneisteniu predchádzajúcich rozhodnutí.

7. KROK – v tomto kroku je jednak vyhodnocovaný úspech, ale taktiež aj všetky možné slabé, nedostatočné miesta nových procesov a sú stanovené ciele pre nasledujúce, nepretržité zlepšovanie, ktoré sa bude ďalej rozvíjať v novom prvom kroku podľa cyklu PDCA.

ZÁVER

Tento predkladaný príspevok je zameraný na implementáciu nástrojov Data Discovery v konkrétnom podniku. Na samotnú implementáciu týchto nástrojov nie je potrebné vynakladať veľké finančné prostriedky. Hlavným zámerom samotnej implementácie je to, aby nám nová funkcionalita IS poskytla skutočné podnikateľské výhody v konkurenčnom prostredí. Veľa projektov implementácie IS neuspelo, pretože manažment podnikov neadekvátne, nevýstižne analyzoval svoje informačné potreby v konkrétnych oblastiach ich pôsobenia, alebo nezvládol manažovanie zmien pri zavádzaní nového IS. Niekedy v niektorých podnikoch implementovaný IS spotrebuje oproti plánu oveľa viacej času a taktiež finančných prostriedkov, poprípade novo naimplementovaný IS nepracuje úplne podľa predstáv, alebo je poruchový či nie je plnohodnotne využívaný. Na druhej strane to môže byť spôsobené aj robustnosťou samotného IS, kedy podnikový manažment nemá úplne dopodrobna preskúmané všetky jednotlivé moduly tohto systému. Spôsobené to môže byť tým, že získané informácie nie vždy zodpovedajú potrebám a požiadavkám jednotlivých manažérov na konkrétnych stupňov ich riadenia. Data Discovery a teda objavovanie dát je aspektom správy dát, ktorý je zložený zo zhromažďovania a následného vyhodnocovania dát z rôznych podnikových databáz a výrazne môže pomôcť pochopiť trendy a vzorce v podnikových dátach.

Bibliografia

CAVEY, S. 2021. What is Data Discovery? Understanding the Process, Steps, & Techniques. In Ground Labs. Dostupné na: https://www.groundlabs.com/blog/what-is-data-discovery/.

HITER, S. 2021. What is Data Discovery? In Datamation. Dostupné na: https://www.datamation.com/big-data/data-discovery/.

https://www.tibco.com/reference-center/what-is-data-discovery.

INMON, B. 2016. Data Lake Architecture. Technics Publications LLC, 2016. 166 s. ISBN 9781634621175.

KNIGHT, M. 2020. What Is Data Discovery? In Dataversity. Dostupné na: https://www.dataversity.net/what-is-data-discovery/.

KOCH, M. 2013. Posouzení efektivnosti informačního systému metodou HOS. Trendy ekonomiky a managementu. In Vysoké učení technické v Brně, Fakulta podnikatelská, VII(16). Brno, 2013. s. 49–56. Dostupné na internete: <http://hdl.handle.net/11012/24462>.

KOCH, M. 2014. Assessment of the Effectiveness of the Information System Using HOS. In Trends Economics and Management. 2014, Volume VII – Issue 16, s. 49-56. ISSN 1802-8527.

OŠKRDAL, V. – DOUCEK, P. 2015. Praktické řízení ICT projektů. Praha : Oeconomica, 2015. 256 s. ISBN 9788024520735.

TRUONG, H. 2020. Data Discovery Process – 5 Steps to Success. In AnyConnector. Dostupné na: https://anyconnector.com/data-migration/data-discovery.html.

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New trends in strategic management of the pharmaceutical industry

Nové trendy v strategickom riadení podniku farmaceutického priemyslu

Lenka Kuhnová, Radoslav Kuhn

Abstrakt

Rozvoj farmaceutického priemyslu zintenzívnil aj konkurenciu medzi podnikmi. V poslednom čase častý výskyt fúzií a akvizícií v tomto odvetví, zvyšovanie cien surovín na výrobu farmaceutických produktov a neustále zvyšovanie zdrojov investovaných do prísnej politiky dohľadu nad kvalitou zintenzívnili tlak na náklady zdravotníckych podnikov. Trh s liekmi v Číne navyše postupne obsadzujú noví zahraniční investori so silnou finančnou silou, čím sa zintenzívňuje aj konkurencia vo farmaceutickom priemysle. Riadenie výkonnosti je kľúčovou súčasťou riadenia prevádzky v spoločnosti, ktorá môže spoločnostiam pomôcť nájsť ich problémy včas, stimulovať prirodzený potenciál zamestnancov a pomôcť im lepšie dosahovať ich ciele. V súčasnosti stále existuje veľa problémov v riadení výkonnosti farmaceutického priemyslu. Aby sa farmaceutické podniky úspešne rozvíjali v tvrdej konkurencii, mali by prikladať väčší význam strategickému riadeniu výkonnosti, učiť sa od dobre rozvinutých podnikov v tomto odvetví a včas identifikovať a vyriešiť problémy s riadením výkonnosti.

Kľúčové slová

Strategické riadenie, výkonnosť, náklady, Balanced Scorecard, farmaceutický priemysel

Úvod

Stratégia rozvoja môže pomôcť podniku určiť smer dlhodobého rozvoja, stanoviť cieľ rozvoja a zabezpečiť zdravý a trvalo udržateľný rozvoj. Plánovanie výkonnosti je prvým krokom riadenia výkonnosti a základným kameňom na zabezpečenie toho, aby podniky mohli plne zohrávať úlohu riadenia výkonnosti. Preto musí byť plán výkonnosti formulovaný podľa stratégie rozvoja spoločnosti a vysoko konzistentný so strategickými cieľmi a obchodným smerovaním každej etapy. Niektorým farmaceutickým spoločnostiam sa to však nedarí. Strategické ciele niektorých podnikov nie sú dostatočne jasné a nerozumejú úplne situácii svojho rozvoja. Namiesto toho často idú s prúdom, čo spôsobuje, že zanedbávajú dôležitosť kombinácie cieľov riadenia výkonnosti a podnikových stratégií. Okrem toho, niektoré podniky pri zostavovaní plánov výkonnosti nedokážu rozložiť výkonnostné ciele do rôznych kategórií

z pohľadu strategických cieľov, čo nakoniec vedie k nesúladu medzi výkonnostnými cieľmi jednotlivých článkov organizácie v rámci spoločnosti a celkovou stratégiou rozvoja podniku.

Cieľom príspevku je navrhnúť strategický podnikateľský plán obchodnej spoločnosti, ktorá bude poskytovať lekárenskú starostlivosť vo verejnej lekárni s individuálnou prípravou liečiv. Autori sa zameriavajú na jednotlivé aspekty strategického plánovania a riadenia výkonnosti spoločnosti pre získanie konkurenčnej výhody na trhu. Osobitnú pozornosť venujeme strategickému nástroju Balanced Scorecard (BSC), ktorý bude súčasťou aj rozpracovaných výsledkov, týkajúcich sa strategického plánu nového podniku, ktorý sme následne diskutovali z pohľadu príležitostí a rizík pre ďalší rozvoj podnikania.

1 Strategické riadenie a jeho úloha v organizácii

Z dôvodu globalizácie sa farmaceutický priemysel nachádza na križovatke zmien. Strategické plánovanie presahuje rámec jednej aktivity spoločnosti. Jeho cieľom je skôr rozvíjanie rôznych väzieb a vzťahov, pričom kľúčom k úspechu je osvojenie si pohľadu zákazníka. Ide o funkciu zameranú navonok, ktorá sa snaží zodpovedať skutočným požiadavkám zákazníkov. Strategické riadenie farmaceutického priemyslu nie je výnimkou. Tanaiutchawoot (2022) zaznamenal, že trhy možno považovať za „medzery“, ktoré oddeľujú strany zainteresované na trhu. Strategické plánovanie minimalizuje tieto medzery medzi jednotlivými stranami prostredníctvom rôznych procesov aktualizácie. Ich úlohou je ovplyvňovať alebo smerovať aktivity od výrobcu až po pacienta. V podniku je úloha strategického manažéra najdôležitejšia, pretože jeho primárnou úlohou je formulovať stratégiu, ktorá môže organizácii pomôcť dosiahnuť konkurenčnú výhodu. Úlohou strategického manažéra je zároveň analyzovať organizačné prostredie tak, aby sa spoločnosť v rýchlo sa meniacom prostredí adaptovala na akékoľvek situácie (Shane, 2001). Stratégia je navyše definovaná ako rozsah a smerovanie podnikania v dlhodobom horizonte, ktoré prináša výhody pre podnikanie prostredníctvom zosúladenia požadovaných zdrojov v rámci rôzneho prostredia a spĺňa očakávania zainteresovaných strán (Porter, 2016). Podľa Perrowa (2016) je strategický manažment oficiálny a organizovaný proces, ktorým podnik otvára pozíciu strategického vodcovstva. Na vypracovanie stratégie je potrebná racionálna analýza a intuícia, skúsenosti a emócie. Serfontein (2010) pripustil, že existuje mierna neistota, pokiaľ ide o význam systematickej analýzy ako kľúčového vstupu do procesu stratégie. Postup prípravy stratégie prevažne na úrovni vrcholového manažmentu môže byť nespravodlivý, ak sa neberie do úvahy analýza (Kamali, 2015).

Za sporné otázky v teórii manažmentu môžeme pokladať, odkiaľ stratégia pochádza a ako funguje, ako to argumentujú autori. Existuje niekoľko škôl formulovania stratégie, ale iba jeden pokus kategorizovať meniace sa prístupy (Mintzberg, 2009).

V dnešnej dobe patrí zvyšovanie konkurencieschopnosti k jednému z najdôležitejších cieľov každej spoločnosti. Pokiaľ chce spoločnosť udržať svoje postavenie voči ostatným konkurentom, musí neustále zlepšovať svoju ponuku výrobkov, produktov a služieb, ponúkať čo najlepšiu kvalitu a najmä sledovať konkurenciu, a teda v čom sa ponuka spoločnosti odlišuje od ostatných, v čom je jej pridaná hodnota, prečo by zákazníci mali uprednostniť jej produkty a služby a čo ponúka navyše (Ojwang, 2015).

Strategické riadenie predstavuje vytýčenie hlavného cieľa podniku a všetkých aktivít potrebných pre dosiahnutie tohto cieľa. Iná definícia strategického manažmentu ho popisuje ako súbor podnikových rozhodnutí a činností, ktoré definujú dlhodobú realizáciu podniku. Strategické riadenie je navyše procesom okolitého výskumu (jednak interné a ale aj externé skenovanie), formulácie strategického plánovania, strategickej realizácie, hodnotenia a kontroly (Al-Zawahreh a kol., 2018).

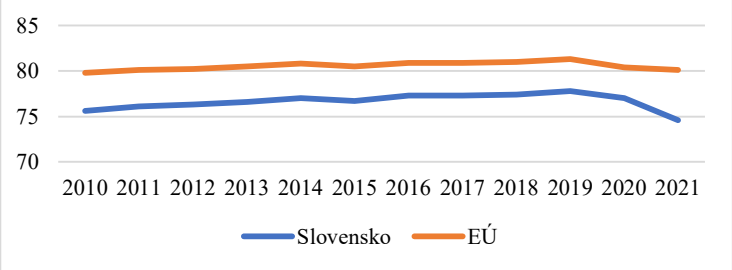
2 Metodika skúmania

Hlavným cieľom príspevku je navrhnúť strategický podnikateľský plán obchodnej spoločnosti, ktorá bude poskytovať lekárenskú starostlivosť vo verejnej lekárni s individuálnou prípravou liečiv. Účelom napĺňania cieľa je zvýšiť pochopenie toho, ako sa BSC používa v podniku farmaceutickej priemyslu.

2.1 Objekt skúmania

Potenciálny zákazník má významný vplyv na komunikáciu maloobchodných predajcov lekární a farmaceutických výrobcov. Reštrukturalizácia domáceho trhu lekární zvyšuje konkurenciu pre spotrebiteľov. Problém je, že farmaceutický trh aktívne vstupuje do sieťového biznisu, čo často prevyšuje existujúci miestny podnikateľský počet. Rozvoj medicíny, dostupnosť lekárskej starostlivosti, rozvoj farmaceutického priemyslu a mnoho ďalších faktorov má priaznivý vplyv na dĺžku života obyvateľstva. Podľa štatistík Eurostatu priemerná dĺžka života obyvateľov na Slovensku narástla z hodnoty 75,6 v roku 2010 na 77,8 v roku 2019. V roku 2020 a 2021 je badateľný pokles priemernej dĺžky života z dôvodu vysokej mortality po vypuknutí epidémie COVID-19, ktorý tento rastúci trend priemernej dĺžky života naoko zmenil.

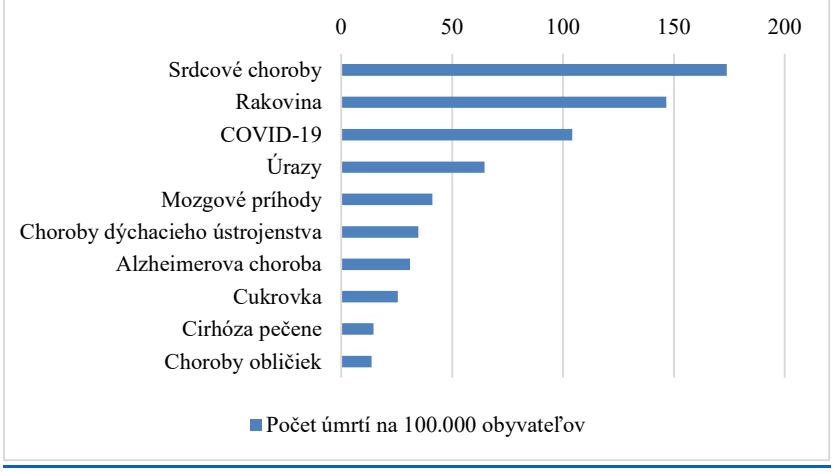
Graf 1: Priemerná dĺžka života obyvateľov Slovenska a občanov EÚ v rokoch



Zdroj: Vlastné spracovanie podľa Eurostat (2023)

Zároveň však na druhej strane s prihliadnutím na starnutie populácie, či na rozmach civilizačných chorôb, ktoré sú najčastejším dôvodom úmrtí, rastie aj dopyt po zdravotnej starostlivosti.

Graf 2: Desať najčastejších dôvodov úmrtí



Zdroj: Vlastné spracovanie podľa Jiaquan (2022)

Z uvedených dôvodov je zrejmé, že potreba lekárne vo svojej dostupnosti bola, je a aj bude v budúcnosti dôležitým faktorom ovplyvňujúcim spokojnosť obyvateľov. Navyše dopyt po službách v zdravotníctve a dopyt po zdraví je základnou potrebou človeka, ktorý nepodlieha štandardným ekonomickým cyklom (Terapie.digital. cz, 2017). Lieky sú navyše čiastočne doplácané z verejného zdravotného poistenia, a tak ich kúpa nemá až taký priamy dopad na peňaženky obyvateľov, nakoľko občania priamo uhrádzajú len čiastočnú cenu liekov, a zvyšok za nich uhrádzajú zdravotné poisťovne.

2.2 Pracovný postup

Pre spracovanie výsledkov boli vybrané údaje zo štatistickej databázy Eurostat, Štatistického úradu SR a internej dokumentácie existujúcej skúmanej spoločnosti, ktorá pôsobí na trhu ako poskytovateľ lekárenskej starostlivosti vo verejnej lekárni s individuálnou prípravou liečiv v Košiciach. Následne sme vypracovali finančný plán lekárne. Podnik bol zvolený, pretože nemá spracovaný strategický plán a aj riadeniu podniku je pristupované iba cez finančné ukazovatele. V príspevku sme sa zamerali na analýzu nákladov spoločnosti a ich vplyv na hospodársky výsledok podniku. Osobné náklady predstavujú sumu vynaloženú na cenu práce zamestnancov. Cena práce je vypočítaná ako hrubá mzda zamestnanca navýšená o odvody na sociálne zabezpečenie, teda odvody do zdravotnej poisťovne a odvody do Sociálnej poisťovne.

$$ON = 12 * CP$$

$$CP = M + SZ$$

$$SZ = M * 0{,}352$$

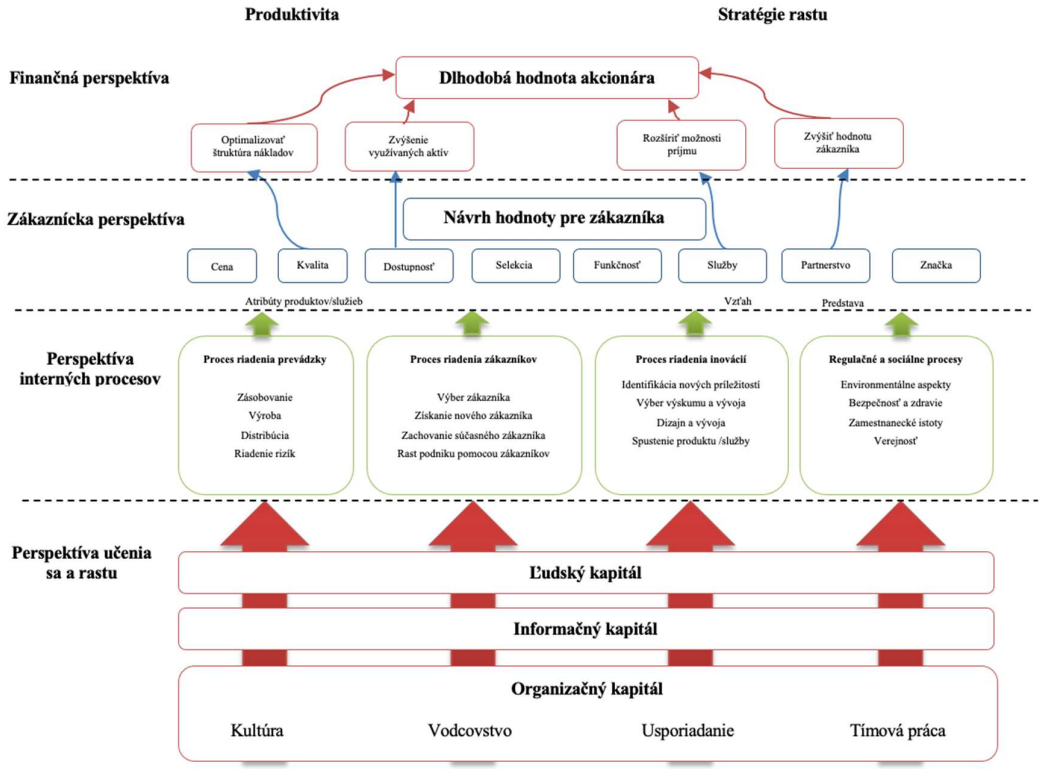
$$ON = 12 * (M + M*0{,}352)$$

Kde:

M	hrubá mzda
SZ	sociálne zabezpečenie
CP	cena práce
ON	osobné náklady

Pre výpočet obchodnej marže sme vychádzali zo Zákona č. 363/2011 Z.z. o rozsahu a podmienkach úhrady liekov, zdravotníckych pomôcok a dietetických potravín na základe verejného zdravotného poistenia. Ceny liekov ako aj maximálnu povolenú obchodnú prirážku lekárne v zmysle uvedeného zákona reguluje Ministerstvo zdravotníctva Slovenskej republiky ako priemer troch najlacnejších cien daného lieku vo všetkých krajinách Európskej únie. Na základe určenia ceny lieku je následne každý jeden liek kategorizovaný do jednej z 11 cenových hladín, pričom každá cenová hladina má pevne stanovenú obchodnú prirážku pre verejnú lekáreň. Následne bola vytvorená analýza podniku, ktorá slúžila ako podklad pre ďalšiu prácu a boli formulované strategické ciele a vypracovaný strategický plán novej lekárne, ktorý je premietnutý do jednotlivých perspektív, aby bolo možné dosahovať stanovené ciele, boli stanovené iniciatívy, ktoré vedú k naplneniu cieľov. Prepojením jednotlivých cieľov s procesmi v podniku dosiahneme transformáciu strategického plánu do jednotlivých projektov pre realizáciu a vybudovanie novej lekárne.

Obrázok 1: Konštrukcia strategickej mapy BSC v podniku



Zdroj: Vlastné spracovanie podľa Nengkun a Yongji (2019)

Pochopenie používania BSC zahŕňa zhromažďovanie poznatkov o tom, ako bol navrhnutý, implementovaný, používaný v skúmanom podniku. Pre zobrazenie vzťahov sme navrhli aj strategickú mapu projektu.

3 Výsledky

So zlepšovaním životnej úrovne ľudí a rastúcim dôrazom na ich vlastné zdravie, ako aj s každoročným zvyšovaním výdavkov na medicínu a zdravotníctvo, si rozsah farmaceutického trhu udržiava rýchly rast. V kombinácii s vývojovým stavom a charakteristikami spoločností vo farmaceutickom priemysle je preto naliehavým a závažným problémom používať vedecké a efektívne metódy hodnotenia na porovnanie a analýzu výkonnosti podnikateľského plánu spoločností vo farmaceutickom priemysle.

3.1 Plán výnosov

K zostaveniu výsledovky je potrebné vytvoriť jednotlivé dielčie rozpočty. Finančný plán predpokladá naplnenie zákazníckeho potenciálu po troch rokoch fungovania lekárne.

Tabuľka 1: Plán tržieb pre roky 2024 - 2034

Rok	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Priemerný mesačný obrat - odhad	50 000 €	80 000 €	100 000 €	103 000 €	106 090 €	109 273 €	112 551 €	115 927 €	119 405 €	122 987 €	126 677 €
Priemerný ročný obrat - odhad	600 000 €	960 000 €	1 200 000 €	1 236 000 €	1 273 080 €	1 311 272 €	1 350 611 €	1 391 129 €	1 432 863 €	1 475 849 €	1 520 124 €

Zdroj: Vlastné spracovanie

Zákazníkov v lekárni je možné rozdeliť do dvoch skupín. Prvou skupinou sú pacienti s predpísanými liekmi na receptoch od lekárov. Marža na receptových liekoch je regulovaná zákonom. Práve títo klienti sú vo väčšej miere stálymi zákazníkmi, nakoľko ide o chronických pacientov, nastavených na užívanie liekov dlhodobo. Druhou skupinou zákazníkov sú klienti na voľný predaj, kozmetiku, doplnky výživy, čaje, prípadne ďalší doplnkový tovar.

Tabuľka 2: Rozdelenie obchodnej marže v závislosti na druhu zákazníkov

Zdroj tržieb	Mesačný obrat	% obchodná marža *	Mesačná obchodná marža v Eur
Objem preskripcie lekárov	40 000 €	12,39%	4 956 €
Voľný predaj	60 000 €	30,00%	18 000 €
Spolu	**100 000 €**	**22,96%**	**22 956 €**

Zdroj: Vlastné spracovanie

*výška obchodnej prirážky je vypočítaná na základe odborného odhadu priemernej marže vzhľadom na výšku cien predpisovaných liekov podľa ustanovení zákona č. 363/2011 Z.z. o rozsahu a podmienkach úhrady liekov, zdravotníckych pomôcok a dietetických potravín na základe verejného zdravotného poistenia, tzv. degresívna marža.

3.2 Plán nákladov

Celkové náklady pozostávajú z nákladov na zariadenie lekárne, nákladov na spotrebu energií a zdravotníckeho materiálu, náklady na služby spojené s prevádzkovaním podniku a osobných nákladov na mzdy zamestnancov.

Náklady na zariadenie lekárne

Náklady na zariadenie lekárne sú jednorazové náklady, ktoré je potrebné vynaložiť na priestorové a materiálne zabezpečenie lekárne pred jej uvedením do prevádzky. Pri príprave podnikateľského plánu vychádzame z predpokladu, že priestory na zariadenie lekárne sú prenajímané, avšak je potrebné vynaložiť prostriedky na dispozičné úpravy a interiérové vybavenie lekárne.

Tabuľka 3: Predpokladané náklady na priestorové a materiálové zabezpečenie lekárne

Položka	**Suma v Eur**
Dispozičné úpravy	2 000 €
Dokončovacie práce - stierky, maľovanie a pod.	3 500 €
Interiérové vybavenie lekárne	25 000 €
Laboratórium	6 000 €
Výpočtová technika	11 000 €
Náklady rekonštrukcie celkom bez DPH	**47 500 €**

Zdroj: Vlastné spracovanie

Spotreba materiálu a energií

Vzhľadom k tomu, že ide o lekáreň, teda špecializovaný maloobchod spotreba energie a materiálu nie je priamo úmerná rastu tržieb. Náklady na energiu sú závislé výlučne na cenách energií od dodávateľov, nakoľko spotreba energie v medziročnom porovnaní je približne totožná.

Služby

Do kategórie služieb patria platby za nájom, platby za správu informačného systému, BOZP, požiarnu ochranu a pod. Taktiež tieto náklady nie sú priamo úmerné rastu tržieb a ich medziročný nárast predstavuje maximálne nárast o infláciu.

Plán osobných nákladov

Kategória osobných nákladov sa skladá z nákladov na mzdy a na sociálne zabezpečenie. Ustanovenia Zákona č. 580/2004 Z. z. o zdravotnom poistení ukladajú každému zamestnávateľovi uhrádzať za zamestnanca do príslušnej zdravotnej poisťovne odvody na verejné zdravotné poistenie. Ustanovenia Zákona č. 461/2003 Z. z. o sociálnom poistení ukladajú každému zamestnávateľovi uhrádzať za zamestnanca odvody do Sociálnej poisťovne. Aktuálna sadzba na sociálne a zdravotné poistenie, ktoré odvádza za zamestnanca zamestnávateľ je 35,20 %. Pre účely tohto príspevku vychádzame z predpokladu, že pre najbližšie roky sa sadzba meniť nebude. Nárast osobných nákladov počíta s ročným navyšovaním miezd o 5 %.

Skladba zamestnancov lekárne

Lekáreň musí mať zo zákona odborného garanta. Odborným garantom je farmaceut s aktívnou licenciou, udelenou Slovenskou lekárenskou komorou, o ktorú môže farmaceut požiadať po absolvovaní päťročnej praxe na pozícii farmaceuta, prípadne na základe špecializovaného atestačného vzdelávania. Farmaceutický laborant je pomocná sila v lekárni, ako osoba so

stredoškolským vzdelaním v odbore farmaceutický laborant. Lekáreň počíta s obsadením pozície farmaceutického laboranta z radov študentov farmácie. Daný pracovník po absolvovaní vysokoškolského štúdia bude pripravený nastúpiť na pozíciu farmaceuta. Takýto postup je v súlade s perspektívou učenia a rastu, a teda z dlhodobého hľadiska podporovať zamestnancov v profesionálnom raste. Zároveň je potrebné zamestnať aj upratovačku/sanitárku na polovičný na zabezpečenie naplnenia sanitačného poriadku v zmysle zákona o liekoch.

Tabuľka 4: Odhad ceny práce zamestnancov lekárne

Zamestnanec	Hrubá mzda	Náklady na sociálne zabezpečenie	Cena práce spolu
Zodpovedný farmaceut	1 800,00 €	633,60 €	2 433,60 €
Farmaceut	1 300,00 €	457,60 €	1 757,60 €
Farmaceut	1 300,00 €	457,60 €	1 757,60 €
Farmaceut - absolvent	1 100,00 €	387,20 €	1 487,20 €
Farmaceutický laborant	900,00 €	316,80 €	1 216,80 €
Upratovačka/ sanitárka - polovičný úväzok	350,00 €	123,20 €	473,20 €
Ekonóm - polovičný úväzok	500,00 €	176,00 €	676,00 €
Zamestnanci spolu	**7 250,00 €**	**2 552,00 €**	**9 802,00 €**

Zdroj: Vlastné spracovanie

Pre určenie hrubej mzdy jednotlivých zamestnancov sme vychádzali z inzerovaných ponúk pre dané pracovné pozície zverejnených na portáli Profesia.sk. Z vymeriavacieho základu je v treťom stĺpci vypočítaná suma odvádzaná zamestnávateľom do zdravotnej a sociálnej poisťovne. Súčet hrubej mzdy a odvodov na sociálne zabezpečenie predstavuje celkovú cenu práce.

Tabuľka 5: Plán osobných nákladov pre roky 2024 – 2033
pri medziročnom náraste mzdy o 5%

Rok	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Osobné náklady spolu	117 624 €	123 505 €	129 680 €	136 164 €	142 973 €	150 121 €	157 627 €	165 509 €	173 784 €	182 473 €

Zdroj: Vlastné spracovanie

Z tabuľky vyššie vidíme nárast osobných nákladov v budúcich rokoch vyplývajúcich z nárastu hrubej mzdy o medziročný rozdiel 5 %.

Na základe vyššie uvedených skutočností teda môžeme zostaviť plán výnosov a plán nákladov.

Tabuľka 6: Súhrnný plán výnosov a nákladov pre roky 2024-2034

Položka	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
A. Náklady na zariadenie lekárne	47 500 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
B. Náklady súvisiace s prevádzkou lekárne											
Spotreba energií	4 200 €	4 326 €	4 456 €	4 589 €	4 727 €	4 869 €	5 015 €	5 165 €	5 320 €	5 480 €	5 644 €
Spotreba kancelárskeho materiálu	3 600 €	3 708 €	3 819 €	3 934 €	4 052 €	4 173 €	4 299 €	4 428 €	4 560 €	4 697 €	4 838 €
Spotreba zdravotníckeho materiálu	7 000 €	7 210 €	7 426 €	7 649 €	7 879 €	8 115 €	8 358 €	8 609 €	8 867 €	9 133 €	9 407 €
Nájom	30 600 €	31 518 €	32 464 €	33 437 €	34 441 €	35 474 €	36 538 €	37 634 €	38 763 €	39 926 €	41 124 €
Ostatné služby - telekomunikačné, IT atď.	4 200 €	4 326 €	4 456 €	4 589 €	4 727 €	4 869 €	5 015 €	5 165 €	5 320 €	5 480 €	5 644 €
Ostatné náklady	3 000 €	3 090 €	3 183 €	3 278 €	3 377 €	3 478 €	3 582 €	3 690 €	3 800 €	3 914 €	4 032 €
Ostatné služby	1 600 €	1 648 €	1 697 €	1 748 €	1 801 €	1 855 €	1 910 €	1 968 €	2 027 €	2 088 €	2 150 €
Iné	1 000 €	1 030 €	1 061 €	1 093 €	1 126 €	1 159 €	1 194 €	1 230 €	1 267 €	1 305 €	1 344 €
C. Osobné náklady	117 624 €	123 505 €	129 680 €	136 164 €	142 973 €	150 121 €	157 627 €	165 509 €	173 784 €	182 473 €	191 597 €
Ročný plán nákladov	220 324 €	172 327 €	179 967 €	187 960 €	196 322 €	205 071 €	214 225 €	223 805 €	233 829 €	244 320 €	255 299 €
Ročný objem marže v Eur	137 739 €	220 382 €	275 477 €	283 742 €	292 254 €	301 021 €	310 052 €	319 354 €	328 934 €	338 802 €	348 966 €
Výsledok hospodárenia	-82 585 €	48 055 €	95 510 €	95 782 €	95 932 €	95 950 €	95 827 €	95 549 €	95 105 €	94 483 €	93 668 €
Daň z príjmu	0 €	10 091 €	20 057 €	20 114 €	20 146 €	20 150 €	20 124 €	20 065 €	19 972 €	19 841 €	19 670 €
Výsledok hospodárenia po zdanení	**-82 585 €**	**37 963 €**	**75 453 €**	**75 668 €**	**75 786 €**	**75 801 €**	**75 703 €**	**75 484 €**	**75 133 €**	**74 641 €**	**73 997 €**

Zdroj: Vlastné spracovanie

Z uvedenej tabuľky vyplýva, že z dôvodu nákladov na zariadenie lekárne v prvom roku fungovania lekárne budú výrazne prevyšovať náklady nad výnosmi, a lekáreň potrebuje mať k dispozícii finančný vankúš na prekonanie tohto obdobia. V ďalších rokoch fungovania lekárne už náklady pozostávajú len z prevádzkových nákladov a ich nárast je ovplyvňovaný výlučne infláciou. V treťom roku fungovania lekáreň dosiahne očakávaný naplnený potenciál zákazníkov a začne tvoriť zisk.

3.3 Implementácia Balanced Scorecard

Všetky nové projekty na seba viažu nové náklady, doposiaľ nepoznané riziká a príležitosti, ktorým bude musieť podnik čeliť a pripraviť sa na ne. Prostredníctvom kvalitatívnej a kvantitatívnej analýzy je predbežne stanovená finančná stránka implementácie nového projektu na rozšírenie pobočky lekárne.

Perspektíva učenia sa a rastu

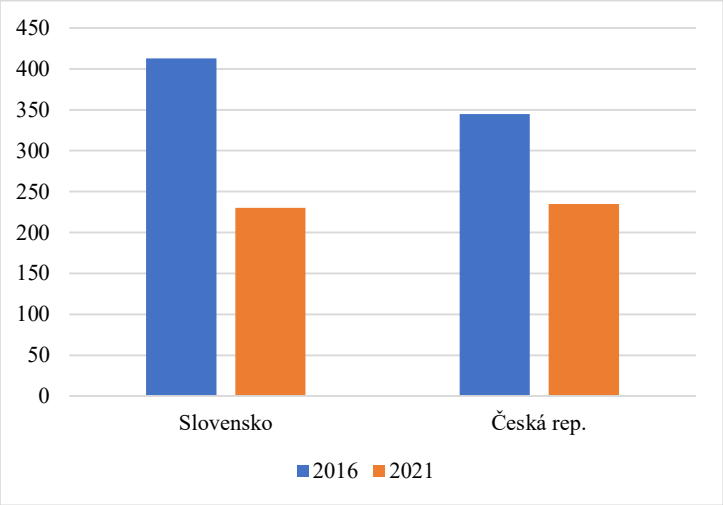
Prvou perspektívou je perspektíva učenia a rastu, ktorú nazývame aj dimenziou potenciálu, ktorej cieľom je dosahovanie vízie spoločnosti, prostredníctvom flexibility a zlepšovania.

Počet farmaceutov v Európe:

Podľa štatistických údajov Eurostatu pripadá na Slovensku 84,8 farmaceutov na 100 000 obyvateľov. Priemer Európskej únie sa pohybuje v hodnote 88,5 (Eurostat, 2021).

Z uvedeného vyplýva, že na Slovensku je podpriemerný počet farmaceutov, čo v konkurenčnom boji medzi lekárňami môže zohrať dôležitú úlohu. Nedostatok farmaceutov spôsobuje, že lekárne musia bojovať o odborných zamestnancov či už po finančnej stránke prostredníctvom pravidelného rastu miezd, prípadne ďalšími benefitmi. Zároveň na Slovensku, ale aj v Česku je výrazný pokles absolventov farmácie.

Graf 3: Pokles počtu absolventov farmácie na Slovensku a Česku medzi rokmi 2016 - 2021



Zdroj: Vlastné spracovanie, Eurostat (2022)

Prítomnosť farmaceuta v lekárni je jednou z podmienok jej riadneho fungovania. V prípade, ak lekáreň nebude schopná zabezpečiť prítomnosť farmaceuta počas otváracích hodín v priestoroch lekárne, bude musieť prijať potrebné opatrenia. Jedným z takýchto opatrení môže byť skrátenie otváracích hodín. Takéto skrátenie otváracích hodín lekárne môže mať výrazný dopad na tržby lekárne. V prípade, že z dôvodu nedostatku odborného personálu ani skrátenie otváracích hodín nebude postačovať na zabezpečenie nepretržitej prítomnosti farmaceuta v priestoroch lekárne, lekáreň nebude môcť poskytovať lekárenskú starostlivosť, čo môže mať likvidujúce dôsledky.

Zamestnancom bude lekáreň zároveň poskytovať možnosti celoživotného vzdelávania prostredníctvo školení a seminárov, potrebných pre zvyšovanie odborných schopností, pre zvyšovanie potrebnej kvalifikácie na implementáciu v budúcnosti prijatých nových legislatívnych aktov, prípadne na podporu rozvoja ich predajných zručností za účelom naplnenia cieľov ekonomického rastu vo forme zvyšovania obchodného obratu a pod.

Tabuľka 7: Perspektíva učenia sa a rastu

Ciele	Ukazovatele	Zámery	Iniciatívy
Vzdelávanie zamestnancov	úroveň odbornosti	počet odborných školení	pravidelné školenia
	úroveň predajných schopností	počet školení zameraných na predajné zručnosti	pravidelné školenia
	úroveň legislatívnych znalostí	počet školení pri zmene legislatívy	pravidelné školenia
	zvyšovanie spokojnosti zamestnancov	miera spokojnosti zamestnancov	dotazníky spokojnosti, návrhy na zlepšenie pracovného prostredia
	fluktuácia	percento fluktuácie	pravidelný nárast mzdy, zamestnanecké benefity, odmeny z predaja
	kariérny rast	prax farmaceutov	možnosť kariérneho rastu, pozícia odborného garanta v novej lekárni
	nový zamestnanci	organizovanie výberových konaní	nábor nových zamestnancov

Zdroj: Vlastné spracovanie

S rastom spoločnosti sa úmerne zvyšuje aj počet zamestnancov, ktorí pre spoločnosť pracujú. S rastúcim počtom zamestnancov však hrozí aj znižovanie odbornosti, teda ciele sú orientované na vzdelávanie.

Perspektíva interných procesov

Druhá v poradí je perspektíva interných procesov. Táto dimenzia identifikuje tie procesy, ktoré sú významné pre uspokojenie akcionárov a zákazníkov.

Tabuľka 8: Perspektíva interných procesov

Ciele	**Ukazovatele**	**Zámery**	**Iniciatívy**
Zvyšovanie kvality služieb	čas na zákazníka	znižovanie času na zákazníka	zvyšovanie odbornosti farmaceutov
	predaj na zákazníka	zvyšovanie predaja na zákazníka	zvyšovanie predajných schopností farmaceutov
Doplnkové služby	počet nových služieb	zvyšovanie počtu nových služieb	prieskum trhu
Minimalizácia chybovosti	počet chýb	podpora interných procesov	upgrade informačného systému
Znižovanie nákupných cien	výška nákupnej ceny	objavenie nových dodávateľov	vyhľadávanie nových dodávateľov

Zdroj: Vlastné spracovanie

V konkurenčnom prostredí veľkých sietí lekárni ako Dr. Max, Benu, Plus lekáreň a pod. je existencia drobných súkromných lekárni značne znevýhodnená. Ako reakcia na sieťovanie lekárni vznikajú popri distribučných spoločnostiach partnerské zväzky malých súkromných lekárni s cieľom dosiahnutia silnejšej vyjednávacej pozície. Jedným z takýchto združení je družstvo Vaša Lekáreň.

Začlenením verejnej lekárne do siete lekárni Vaša Lekáreň z ekonomického hľadiska získame dodatočné výhody, a to napr. marketingové aktivity či podpora predaja zastrešené Vašou Lekárňou a hlavne bonusy na objednanom tovare pri včasnej úhrade splatnosti faktúr.

Pri úhrade faktúr v lehote splatnosti 30 dní predstavuje tento „spätný bonus“ na dobropisoch 3,5 % hodnoty faktúr. V tabuľke nižšie je možné vidieť vývoj spätných bonusov na základe predpokladaného ročného obratu.

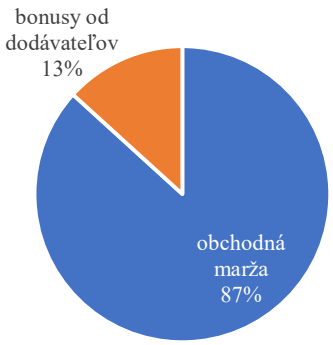
Tabuľka 9: Pridaná hodnota na spätných bonusoch pri spolupráci s družstvom Vaša Lekáreň pre roky 2024-2034

Rok	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Ročný plán tržieb lekárne	600 000 €	960 000 €	1 200 000 €	1 236 000 €	1 273 080 €	1 311 272 €	1 350 611 €	1 391 129 €	1 432 863 €	1 475 849 €	1 520 124 €
Ročný plán obchodnej marže lekárne	137 739 €	220 382 €	275 477 €	283 742 €	292 254 €	301 021 €	310 052 €	319 354 €	328 934 €	338 802 €	348 966 €
Bonusy od dodávateľov liekov tržieb	**21 000 €**	**33 600 €**	**42 000 €**	**43 260 €**	**44 558 €**	**45 895 €**	**47 271 €**	**48 690 €**	**50 150 €**	**51 655 €**	**53 204 €**
Ročný plán obchodnej marže s bonusmi	158 739 €	253 982 €	317 477 €	327 002 €	336 812 €	346 916 €	357 323 €	368 043 €	379 084 €	390 457 €	402 171 €

Zdroj: Vlastné spracovanie podľa internej dokumentácie s Vašou Lekárňou (2023)

V tabuľke vyššie vidíme prínos spolupráce s družstvom vaša Lekáreň. Okrem pridanej hodnoty vo forme marketingových aktivít zastrešených družstvom, práve spätné bonusy na objednanom tovare predstavujú 13,2 % príjmov podniku.

Graf 4: Pomer obchodnej prirážky a bonusov od dodávateľov



Zdroj: Vlastné spracovanie podľa internej dokumentácie s Vašou Lekárňou (2023)

Po identifikácii interných procesov, je dôležitá orientácia na naplnenie ich čo najvyššej úrovne. Rovnako ako ostatné dimenzie BSC musí byť v súlade s celou spoločnosťou. Vďaka komplexnému pohľadu so všetkými podnikovými cieľmi, môžeme naplniť maximálnu efektivitu. Vďaka optimálne modifikovaným procesom, nevznikajú prebytočné náklady a zvyšuje sa kvalita poskytovanej služby. Aj keď spoločnosť v posledných rokoch rastie, v tejto súvislosti dochádza aj k nárastu objemu procesov, s ktorými je nevyhnutné pracovať. Na procesy v spoločnosti sú prepojené tiež informačné a komunikačné systémy, ktoré umožnia efektívnejšie meranie a transparentnejšiu prácu.

Zákaznícka perspektíva

Ďalšou perspektívou je dimenzia orientovaná na zákazníkov. Zákaznícka perspektíva determinuje finančné ukazovatele, nakoľko finančné ukazovatele sú dosahované práve prostredníctvom zákazníkov. Snahou zákazníckej perspektívy je identifikovať relevantné vystupovanie voči zákazníkom. Ak je identifikácia správna, dôjde k dosahovaniu žiadanej vízie.

Tabuľka 10: Zákaznícka perspektíva

Ciele	Ukazovatele	Zámery	Iniciatívy
Rast zákaziek	Počet dlhodobých zákazníkov	pravidelný výber liekov na recept	Poskytovanie kvalitného poradenstva, sklad zásob, vernostné karty
	Počet nových zákazníkov	počet oslovených nových pacientov	marketingové aktivity, letákové zľavy, súťaže pre zákazníkov očkovanie v lekárni

Zdroj: Vlastné spracovanie

Základom zákazníckej perspektívy je kvalitná starostlivosť a vysoký štandard poskytovaného poradenstva nie len pre nových pacientov ale aj pre pravidelných pacientov, chronicky chorých, nastavených na dlhodobú liečbu. Zároveň je dôležité držať na sklade dostatočné množstvo liekov pre pravidelných pacientov aby sa nestávali situácie, že je potrebné lieky objednávať dodatočne.

Pre pravidelných zákazníkov by bolo vhodné vytvoriť aj vernostný program formou zákazníckej karty. S vlastníctvom predmetnej vernostnej karty by boli spojené viaceré výhody vo forme zliav na nákup produktov voľného predaja, prípadne možnosť objednania tovaru dopredu s možnosťou osobného odberu bez čakania a pod. V prípade vystavenia zákazníckej karty a jej pridelenia konkrétnemu zákazníkovi, tento prestáva vystupovať v pozícii anonymného subjektu. Naopak, vďaka zaznamenaným nákupom bude možné sledovať jeho nákupnú históriu a dátovými procesmi spracovávať dané informácie za účelom poskytovania adresnejšej reklamy a výhodnejších zliav. Zároveň sa zákazník s vernostnou kartou stáva dlhodobým zákazníkom.

Prílev nových zákazníkov a nárast objemu pacientov je potrebné podnietiť marketingovými aktivitami, prípadne aj v spolupráci s družstvom Vaša lekáreň formou marketingových aktivít siete ako sú napríklad letákové zľavy.

Finančná perspektíva

Ako bolo definované v súčasnom stave riešenej problematiky, finančná perspektíva je najvyššie situovanou perspektívou, do ktorej sa spadá hlavný strategický cieľ, ktorý v našom prípade je zvýšenie hodnoty EVA.

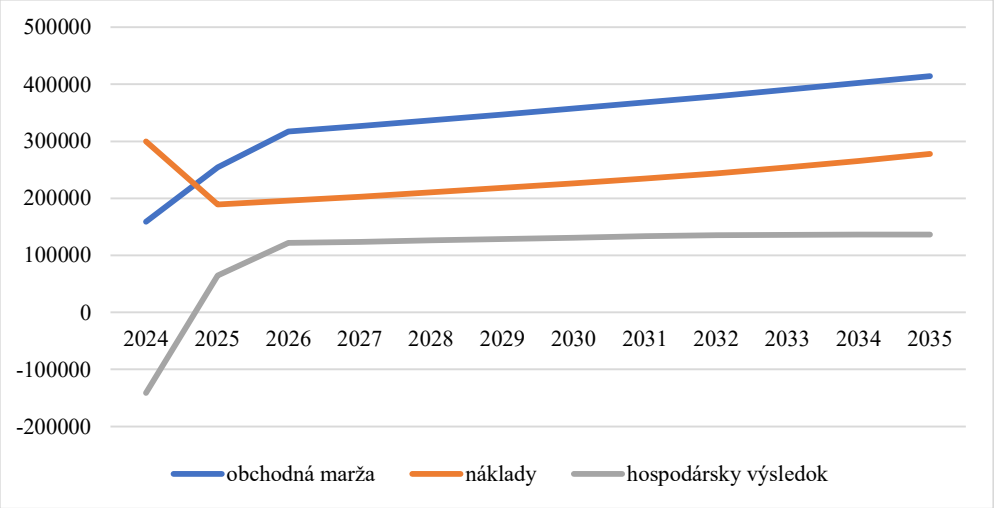
Tabuľka 11: Finančná perspektíva

Strategický cieľ	Čiastkový cieľ	Ukazovatele	Zámery	Iniciatívy
Zvýšenie hodnoty EVA	Dosahovanie minimálnej výšky ROE	čistý zisk	hrubá marža	zlepšovanie kvality služieb
			tempo rastu tržieb	zlepšovanie predajných schopností farmaceutov, predaj doplnkového sortimentu
			efektívne riadenie nákladov	veľkoobchodný nákup tovaru s rabatom
			znižovanie nákladov na prevádzku	efektívne využívanie zamestnancov
		náklady na kapitál	miera zadlženosti	optimalizácia vloženého kapitálu

Zdroj: Vlastné spracovanie

Finančná perspektíva je veľmi významná, nakoľko finančné ukazovatele definované v tejto perspektíve spájajú všetky ostatné tri perspektívy.

Graf 5: Hospodársky výsledok spoločnosti



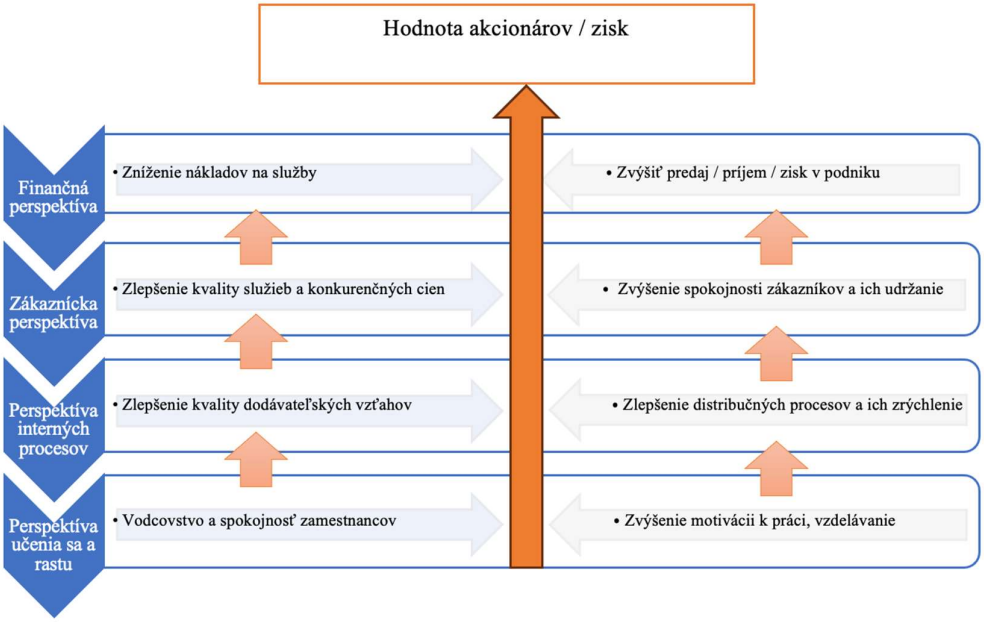
Zdroj: Vlastné spracovanie

Hlavný strategický cieľ a zároveň kľúčový a východiskový bod finančnej perspektívy je zvýšenie hodnoty EVA. Tento cieľ sa pokúsime dosiahnuť ovplyvnením a zvýšením Čistého zisku a dosiahnutím požadovanej výšky ROE a zároveň znížením nákladov na kapitál. Mierku čistého zisku budeme hodnotiť na základe hrubej marže z poskytovania služieb, tempa rastu tržieb, a efektívneho riadenia nákladov s cieľom zníženia nákladov na prevádzku lekárne. Ukazovateľ nákladov na kapitál budeme hodnotiť podľa miery zadlženosti spoločnosti, kde budeme optimalizovať objem vloženého kapitálu do podnikania.

3.4 Návrh strategickej mapy podnikateľského plánu

BSC je systém merania výkonnosti, ktorý pozostáva zo súboru opatrení, ktoré umožňujú vrcholovému manažmentu získať rýchly, ale komplexný pohľad na podnikanie. BSC zahŕňa finančné opatrenia, ktoré informujú o výsledkoch už prijatých opatrení. Okrem toho dopĺňa finančné opatrenia o prevádzkové opatrenia na spokojnosť zákazníkov, interné obchodné procesy a inovačné a zlepšovacie aktivity organizácie – prevádzkové opatrenia, ktoré sú hnacou silou budúcej finančnej výkonnosti. Strategickú vyváženú mapu skóre pre lekáreň možno dosiahnuť v roku 2024 maximalizáciou všetkých línií strategickej mapy. Cost leadership je stratégia, ktorá umožňuje spoločnosti poskytovať kvalitné služby, ale za nízku cenu v porovnaní s konkurenciou. Strategickým cieľom, ktorý chce lekáreň dosiahnuť je nákladové vodcovstvo (nízke náklady), aby mohla zvýšiť hodnotu pre akcionárov / zisk.

Obrázok 2: Strategická mapa podnikateľského plánu novej lekárne



Zdroj: Vlastné spracovanie

Podľa výsledkov analýzy vyváženého skóre podnikateľského plánu lekárne možno konštatovať, že spoločnosť sa bude musieť zamerať na každú perspektívu strategického plánovania, ktoré sú vzájomne prepojené. Výkonnosť spoločnosti, ktorá sa zameriava len na niektoré aspekty, sa stáva neefektívnou, pretože v jej riadení bude nerovnováha.

Pre získanie vyvážených výsledkov je potrebné, aby sa záväzok manažmentu pri implementácii Balanced Scorecard neustále šíril medzi všetkých zamestnancov, v tomto prípade vízia spoločnosti a poslanie musia chápať všetky zainteresované strany, aby sa implementovali dôsledne, čím sa dosiahla stabilita výkonnosti spoločnosti.

Výsledky príspevku poukazujú, že prvky modelu strategického plánovania v kombinácii s vyváženými perspektívami majú pozitívny vplyv na organizačnú výkonnosť spoločností vo farmaceutickom priemysle vrátane:

1. Klasifikácia zodpovednosti podľa stratégie.
2. Rozdelenie nákladov a výnosov.
3. Odhady rozpočtu podľa vyváženého skóre BSC.
4. Vyhodnotenie odhadov s realitou pomocou BSC.
5. Vypracovanie správy o analýze BSC.
6. Návrh pre rozširovanie spoločnosti.

Alokácia nákladov a výnosov je faktorom, ktorá má najsilnejší vplyv na organizáciu efektívnosti farmaceutických spoločností. Po integrácii BSC sa stanovené ciele/ciele lekárne premietnu do štyroch perspektív BSC, strategické ciele budú viac zamerané na dosahovanie výsledkov, a to v podobe systémových vylepšení lekárne. manažérsky systém. Štyri perspektívy vyváženého skóre poskytujú komplexnejší pohľad na strategické plánovanie, ako aj komplexnejší pohľad na možné riziká, ktoré môže vzniknúť aj možný manažment rizík s cieľom dosiahnuť ciele/ciele lekárne.

ZÁVER

Globalizácia v posledných rokoch zaznamenala zvýšené požiadavky na konkurencieschopnosť organizácií. Organizácie nezískavajú udržateľnú konkurenčnú výhodu iba vývojom novej technológie do fyzického majetku alebo zameraním sa na vynikajúce riadenie finančných ukazovateľov. Aby bola výkonnosť spoločnosti zmysluplná, mala by sa posudzovať podľa konkrétneho cieľa, aby sa zistilo, či sa cieľ dosiahol alebo nie. Bez cieľa by spoločnosť nemala žiadne kritérium na výber medzi alternatívnymi investičnými stratégiami a projektmi. Meranie výkonnosti je dôležité pre udržanie spoločnosti na ceste k dosiahnutiu jej cieľov.

Z výsledkov príspevku vyplýva, že veľký vplyv na rast hodnoty obchodnej spoločnosti majú zamestnanci a keďže podnik by bez nich nemohol existovať, je tiež dôraz usmernený na ich spokojnosť. Ich spokojnosť bude zároveň prinášať vyššiu efektivitu a lojálnosť voči podniku. Pre obchodnú spoločnosť a rozširovanie jej pôsobnosti v rámci nových lekárni sú veľmi významní súčasní zamestnanci a teda spokojnosť a ich udržanie. Ide o jeden z cieľov v perspektíve učenia sa a rastu. kvalitným informačným systémom.

Pokiaľ sa bude zvyšovať kvalita služieb, tak bude rásť aj spokojnosť zákazníkov. Ciele v perspektíve interných procesov sú nastavené v rámci spoločnosti tak, aby sa zvyšovala kvalita poskytovaných služieb, rovnako aj produktivita zamestnancov a boli rozšírené nové dodávateľské vzťahy, ktoré budú prinášať spoločnosti viac finančných prostriedkov. Základom pre stabilizáciu súčasných zákazníkov a získavanie nových je skvalitňovanie poskytovaných služieb. Rozšírenie spolupráce so zákazníkmi bude dosahované vyššou produktivitou zamestnancov, ktorí budú môcť zintenzívniť komunikáciu so zákazníkmi, prípadne identifikovať optimálne riešenie, aj napríklad poskytovaním doplnkových služieb zavedením nových predajných kanálov.

Dôsledkom troch vyššie charakterizovaných pilierov predstavuje zvyšovanie tržieb, čo je hlavným faktorom, ktorý determinuje čistý zisk, čím smerujeme do finančnej perspektívy. Vo finančnej perspektíve je významné, aby sa obchodná spoločnosť zamerala na znižovanie nákladov a rast zisku, dôsledkom čoho je nárast hodnoty EVA.

Príslušnosť k projektu

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Bibliografia

AL-ZAWAHREH, DR. A., R. MAHMOUD, A., & M. ALKHAWALDEH, DR. A. 2018. The Impact of Corporate Social Responsibility on the Performance of Pharmaceutical Companies in Jordan. International Journal of Business and Social Science, 9(12), 41–47. https://doi.org/10.30845/ijbss.v9n12p5

Eurostat. 2023. [online]. [cit. 15. 09. 2023]. Dostupné z: https://ec.europa.eu/eurostat/databrowser/view/DEMO_MLEXPEC__custom_7395790/default/table?lang=en

JIAQUAN XU, M.D., SHERRY L. MURPHY, B.S., KENNETH D. KOCHANEK, M.A., AND ELIZABETH ARIAS, PH.D. 2022. NCHS Data Brief No. 456, December 2022. https://www.cdc.gov/nchs/products/databriefs/db456.htm.

KAMALI, R. – MUSIEGA, D. – MBITHI, S. 2015. Factors Influencing Implementation of Strategic Plans at Amatsi Water Services Company in the County Government of Vihiga, Kenya. In: The International Journal of Business & Management [online]. 30.11.2015, roč. 3, č. 11. ISSN 2321–8916. Dostupné na: https://www.internationaljournalcorner.com/index.php/theijbm/article/view/128374

MINTZBERG, H. 2009. Patterns in Strategy formation. In: Management Science [online]. 1978, roč. 24, č. 9, s. 934-948. Dostupné na: https://www.researchgate.net/profile/Henry-Mintzberg/publication/227444830_Patterns_in_Strategy_Formation/links/5648b4e008ae9f9c13eb9ff8/Patterns-in-Strategy-Formation.pdf

NENGKUN Z., YU H., YONGJI Z. 2019. A Study of M&A and Innovation of Listed Chinese Pharmaceutical Companies. Science Research Management, 223:94-108.

OJWANG', E. O. 2015. Factors affecting strategy implementation among water service providers licensed by Lake Victoria North Water Services Board in Kenya. 2015. MBA Project. Nairobi University. 53 s. Dostupné na: http://erepository.uonbi.ac.ke/bitstream/handle/11295/94615/Ojwang%27_Factors%20affecting%20strategy%20implementation.pdf?sequence=1&isAllowed=y

PERROW, Ch. 2016. Economic theories of organization. In: Theory & Society [online]. 2016, roč. 15, č. 1,2, s. 11-45. Dostupné na: https://www.jstor.org/stable/657174

PORTER, T. 2016. States, markets and regimes in global finance. Prvé vydanie. London: Palgrave Macmillan. 2016. 219 s. ISBN: 978-1-349-27890-9. Dostupné na: https://link.springer.com/book/10.1007/978-1-349-27890-9

SERFONTEIN, J. J. 2010. The impact of strategic leadership on the operational strategy and performance of business organizations in South Africa. Doctoral dissertation. University of Stellenbosch, 2010. 258 s. Dostupné na: https://scholar.sun.ac.za/server/api/core/bitstreams/d25e4582-1967-4eae-8342-9e0da060a9c7/content

SHANE, R. 2001. Strategic management of pharmaceutical expenses. In: American journal of health-system pharmacy [online]. 01.03.2001, roč. 58, č. 5, s. 406-409.

Štatistický úrad SR. 2023. [online]. [cit. 15. 09. 2023]. Dostupné z: https://datacube.statistics.sk/#!/view/sk/VBD_SK_WIN/zd1002rs/v_zd1002rs_00_00_00_sk

TANAIUTCHAWOOT, N. 2022. A study of heuristics and cognitive biases affecting the decision-making of inventory management for drugstores. In 2022 International Conference on Decision Aid Sciences and Applications (DASA) (pp. 1521-1525). IEEE.

Terapie.digital. cz, 2017. [online]. [cit. 16. 09. 2023]. Dostupné z: https://terapie.digital/?authToken=null

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Improving the performance of transformation and distribution processes of electricity production in a specific enterprise

Zvyšovanie výkonnosti transformačných a distribučných procesov výroby elektrickej energie v konkrétnom podniku

Radoslav Potoma

Abstrakt

Cieľom predloženého príspevku je pomocou stochastickej metódy Monte Carlo určiť pravdepodobnosť zisku alebo straty skúmaného podniku podľa troch scenárov simulácie v oblasti nákupu elektrickej energie (ďalej len „EE“), jej transformácie z vysokého napätia na nízke napätie a následne jej distribúciu koncovým odberateľom. Úvod príspevku je venovaný deskripcii riešenej problematiky ako aj vývoju ceny EE na burze PXE. Následne sú v príspevku implementované metodiky a metódy skúmania ako aj charakteristika objektu skúmania, ktorým je podnik pôsobiaci na území Slovenskej republiky, VSS Energy, s.r.o., ktorý sa zaoberá nákupom, transformáciou a predajom EE. V predposlednej časti príspevku opisujeme výsledky práce ako aj pravdepodobnosť zisku a straty skúmaného podniku pomocou použitej stochastickej metódy Monte Carlo. Záverečná časť príspevku je zameraná najmä na formuláciu a zhrnutie dosiahnutých výsledkov skúmania za pomoci použitej metódy.

Kľúčové slová

Kvalita, Monte Carlo, elektrická energia, zisk, strata, transformačné a distribučné procesy

Úvod

V Slovenskej republike sa trh s energiami do konca druhej svetovej vojny vyvíjal rovnako ako vo vyspelých krajinách, kde popri štátnych a mestských spoločnostiach bol aj súkromný sektor. Neskôr boli všetky tieto aktivity zoštátnené a investovať do energetiky mohol iba štát. Po roku 1989 sa začalo aj toto odvetvie postupne otvárať pre liberálny trh. Najväčším zlomom pre možnosť investovať bola kupónová privatizácia a nová legislatíva, ktorá vytvorila nový rámec v tejto oblasti a stanovila pravidlá, podľa ktorých je možné v tomto sektore podnikať. Energetika je v súčasnosti hnacou silou rozvoja každej ekonomiky. Výroba a distribúcia EE ako súčasť energetického priemyslu zohráva svoju nezastupiteľnú úlohu v každej krajine. Podnik, ktorý dnes vyrába, predáva, transformuje, alebo len dodáva EE do elektrickej siete musí v súčasnosti spĺňať rôzne legislatívne, environmentálne, bezpečnostné, ale aj prísne množstevné limity jej distribúcie. Rešpektovať toto množstvo pravidiel a obmedzení a zároveň

aj vytvárať zisk pre podnik vyžaduje od všetkých relevantných procesov dosahovať čo najvyššiu výkonnosť pri dodržaní požiadaviek na kvalitu a množstvo.

1 Podnikové procesy

Podľa autorky Hromkovej (2001) je podnikový proces definovaný ako logicky a najmä sekvenčne usporiadaný súbor jednotlivých transformácií obsahujúcich spoločné ciele, pričom výstup jednej predošlej transformácie je pevne prepojený so vstupom do ďalšej nasledujúcej transformácie.

1.1 Zlepšovanie kvality jednotlivých procesov

Podniky, ktoré boli, sú alebo budú úspešné, musia neustále zlepšovať všetky procesy, ktoré sú neodmysliteľnou súčasťou prevádzky. Okrem najznámejšej metodiky reinžinieringu ešte existuje množstvo iných metodík a metód akými sú napr. Six Sigma, PDCA, Kaizen, Global 8D, CVP a mnoho ďalších, ktoré sa uskutočňujú najmä formou projektu. Projekt alebo aj projektové riadenie využíva najmä pri plnení všetkých projektových úloh a podúloh také postupy, nástroje a znalosti, ktorými dosiahnu vždy požadované výsledky, aby dosiahli svoj vopred stanovený cieľ. Podľa Heldmana (2013), ktorý je považovaný za celosvetového odborníka na projektové riadenie, poznáme 5 skupín procesov, ktoré na seba úzko nadväzujú a sú zároveň medzi sebou previazané:

1. Začatie.
2. Plánovanie.
3. Realizácia.
4. Monitorovanie a controlling.
5. Ukončenie.

1.2 Analýza nákladov, objemu a zisku

Cost – Volume – Profit v preklade analýza nákladov, objemu a zisku je metóda nákladového účtovníctva. Medzi kľúčové body v tejto metóde môžeme zaradiť:

a) analýzu nákladov, objemu a zisku, čiže spôsob zistiť ako zmeny variabilných a fixných nákladov ovplyvňujú zisk podniku,
b) spoločnosti môžu pomocou tejto metódy zistiť, koľko jednotiek potrebujú predať, aby dosiahli vyrovnanie alebo aby aspoň dosiahli určitú minimálnu ziskovú maržu,
c) táto analýza vychádza z niekoľkých predpokladov, vrátane toho, že predajná cena, fixné a variabilné náklady na jednotku sú konštantné.

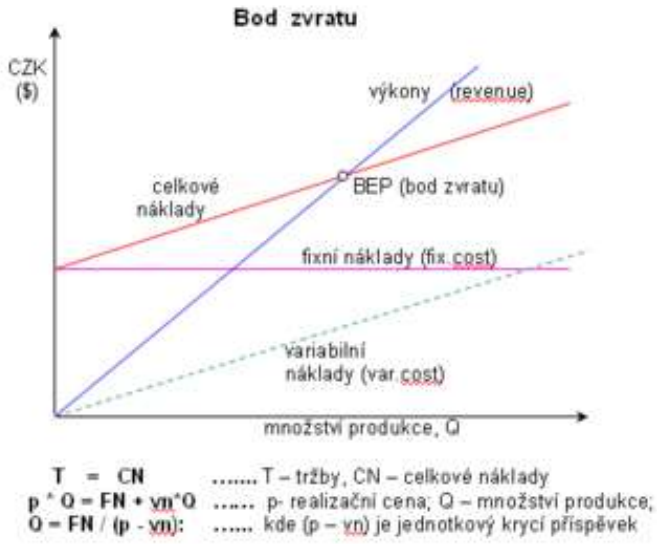
Podľa vzorca dokáže taktiež vypočítať aj bod zlomu. Zlomový objem predaja je množstvo vášho produktu, ktoré musíte vyrobiť a následne predať, aby ste pokryli celkové výrobné náklady. Vzorec zlomového objemu predaja CVP je:

$$\text{Breakeven Sales Volume} = \frac{\text{FC}}{\text{CM}}$$

kde:
FC – Fixed costs
CM – Contribution margin = Sales – Variable Costs

Ak použijeme vyššie uvedený vzorec na nájdenie cieľového objemu predaja podniku, jednoducho pridáme cieľovú sumu zisku na jednotku do zložky s fixnými nákladmi vo vzorci. To nám umožní riešiť cieľový objem na základe predpokladov použitých v modeli.

Obrázok 1: Charakteristika bodu zvratu



Zdroj: vlastné spracovanie podľa Preisinger – Dashöfer (2019)

Obrázok 1 nám popisuje charakteristiku bodu zvratu v metóde CVP, ktorá nám zobrazuje vzťahy medzi tržbami, nákladmi, objemom a ziskom v danom podniku. Príspevková marža sa používa na určenie bodu zvratu tržieb. Vydelením celkových fixných nákladov pomerom príspevkového rozpätia možno vypočítať bod zvratu tržieb z hľadiska celkových dolárov.

1.3 Transformácia elektrickej energie

Po výrobnom procese, čiže po vyrobení EE za účelom jej predaja je potrebné preniesť EE ku konečnému odberateľovi, čiže ku finálnemu spotrebiteľovi. Na tento prenos slúži tzv. sústava elektrických vedení, transformovní a ostatných obslužných zariadení, ktorá sa nazýva aj ako „distribučná sústava“. O prevádzku distribučnej sústavy ako aj o jej údržbu a rozširovanie do všetkých kútov Slovenska sa stará akciová spoločnosť Slovenská prenosová elektrizačná sústava (SEPAS) a tri regionálne distribučné spoločnosti:

a) Západoslovenská energetika – Distribúcia a.s.,
b) Stredoslovenská energetika – Distribúcia a.s.,
c) Východoslovenská distribučná a.s..

Neodmysliteľnou súčasťou Slovenskej prenosovej elektrizačnej sústavy je aj Slovenský dispečing, ktorý sa stará hlavne o reguláciu odberu EE podľa Jednotného regulačného plánu, ktorý ma vopred daný. Distribúcia EE sa na území Slovenskej republiky vykonáva najmä za pomoci elektrických vedení (Tab. 1) o obsahu prenosu EE a to:

a) 400kV,

b) 220kV,

c) 110kV,

d) 0,22kV,

e) V neposlednom rade aj za pomoci príslušných pomocných zariadení, ktoré sú uvedené v Tab. 2.

Tabuľka 1: Vonkajšie elektrické vedenia - dĺžky vedení za rok 2021

Napätie (kV)	Dĺžka trasy vedenia (km)				Rozvinutá dĺžka (km)
	jednoduché	dvojité	VSV	celkom	
400	1 373,533	472,858	18,678	1 865,069	2 356,604
220	409,686	140,188	0,000	549,874	690,062
110	0,254	21,096	18,678	40,028	79,802
Spolu	1783,473	634,142	37,356	2 454,971	3126,468

Zdroj: vlastné spracovanie podľa SEPSAS (2021)

Tabuľka 2: Elektrické stanice za rok 2021

Napätie (kV)	Počet rozvodní (ks)	Počet polí (ks)
400	20	147
220	6	37
110	1	24
Spolu	27	208

Zdroj: vlastné spracovanie podľa SEPSAS (2021)

2 Ciele a metódy výskumu

Celosvetovo známa metóda s názvom Monte Carlo je tzv. stochastická metóda určená najmä na riešenie matematických ale aj nematematických problémov, kde táto metóda využíva hlavne modelovanie náhodne vybraných veličín. V jej zárodkoch bola využívaná prevažne pri riešení problémov v oblasti fyziky, ktoré boli do istého času neriešiteľné. S istým odstupom času, kedy sa rozvoj počítačovej techniky a praktiky modelovania enormne zrýchľoval, inovoval a vyvíjal sa táto metóda začala využívať aj v oblastiach akými sú (Fabian a Kluiber, 1998):

- oblasť techniky,
- oblasť telefónnych centrál,
- oblasť riadenia dopravy,
- oblasť riešenia problémov v matematike,
- oblasť ekonómie a ekonomiky.

Táto metóda využíva pravdepodobnostné ale aj deterministické úlohy za pomoci niekoľkonásobného opakovania náhodných pokusov. Riešením metódy je zostrojenie pravdepodobnostnej úlohy, ktorá má totožné alebo prinajmenšom zhodné riešenie s pôvodnou úlohou, kde výsledok má tzv. pravdepodobnostný charakter.

Metóda Monte Carlo sa podľa postupu riešenie vzniknutých problémov delí na dve časti a to (Tichý, 2010):

- Geometrická metóda Monte Carlo,
- Metóda Monte Carlo a jej výpočet založený na odhade vopred určenej charakteristiky náhodnej veličiny.

Podľa autorov Fabiána a Kluibera poznáme dva druhy, resp. varianty tejto metódy:

1. ***Analógový model Monte Carlo*** – tento variant metódy naznačuje znalosť modelovania celej situácie na počítači alebo notebooku, čo v istom dôsledku znamená poznať všetky možné rozdelenia pravdepodobnosti skúmaných javov a premenných ako aj ich fyzikálne zákonitosti s ktorými sa radia. Uskutočnením tohto modelovania alebo inak povedané simulácie získame výsledok, resp. realizáciu akejsi náhodnej veličiny ξ. Takéto modelovanie situácie spustíme n-krát, kde za pomoci tejto simulácie získame potrebný súbor tzv. histórií od x_1 až po x_n. Tento odhad strednej hodnoty ξ určíme podľa vzorca:

$$\xi \approx \frac{1}{N}\sum_{i=1}^{N} x_i$$

a smerodajnú odchýlku podľa vzorca:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(\bar{x} - x_i)^2}{n-1}}.$$

2. ***Neanalógový model Monte Carlo*** – druhý variant metódy sa používa v takom prípade, keď sa pri výpočte nepoužíva model reálneho deja. Tento variant je využívaný najmä pre výpočet integrálov (aj viacrozmerných), kde používanie bežných metód nie je absolútne efektívne a správne.

2.2 Objekt skúmania VSS Energy, s.r.o.

Objektom skúmania príspevku je podnik s bohatou históriou a nespočetnými skúsenosťami v oblasti strojárenstva, zlievarenstva a energetiky. Podnik VSS Energy, s.r.o. je podnik s ručením obmedzeným, ktorý ešte stále pôsobí v bývalom areáli Východoslovenských strojárni akciovej spoločnosti (ďalej len VSS, a.s. Košice). V rámci celého Košického regiónu išlo dlhodobo o najväčší strojársky a zlievarenský podnik, ktorý zamestnával niekoľko tisíc ľudí ako mužov tak aj žien. Podnik VSS sa radil medzi najväčšieho zamestnávateľa na východnom Slovensku od 80. rokoch 19. storočia. Hlavným cieľom podniku je distribúcia a dodávka EE pre odberateľov v rámci miestnej distribučnej siete (bývalý areál VSS, a.s.

Košice), na základe platnej licencie a rámcových zmlúv. Prostredníctvom svojich služieb umožňuje podnik VSS Energy, s.r.o plynulý chod okolitých firiem a podnikov, ktoré túto distribúciu a dodávku EE využívajú. Kvalita ponúkaných služieb a najmä spokojnosť odberateľov je pre túto spoločnosť prioritou.

3 Výsledky

Elektrickú energiu potrebuje každý obyvateľ na našej planéte, nehovoriac o podnikoch, firmách a spoločnostiach, ktoré ju potrebujú, či už na rôzne výrobné náklady alebo po transformovaní z VNN na VN a na NN posunúť ďalej menším odberateľom s nie malou maržou, čo vo výslednej ceny EE sa môže preukázať až 25%-ným zvýšením ceny dodávky EE.

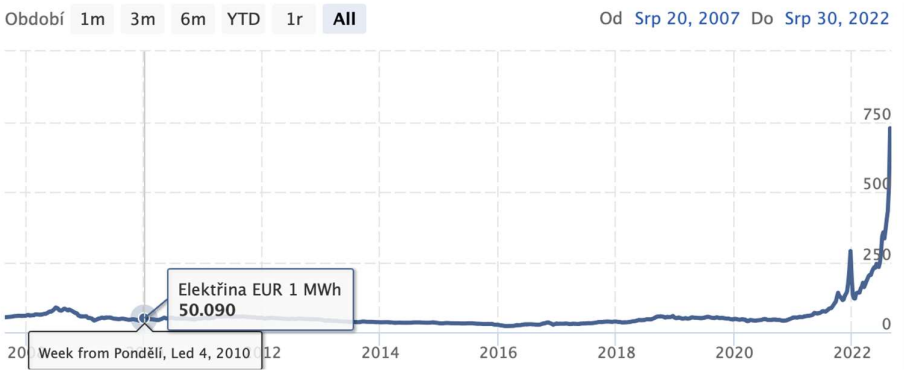
Situácia na trhoch s elektrinou a plynom je už neúnosná pre viacerých dodávateľov energií na Slovensku ale aj v celej Európe. Ako uviedlo vo svojom vyjadrení ZDE (Združenie dodávateľov energií), je čoraz ťažšie nielenže svojim zákazníkom garantovať ceny elektriny a plynu, ale aj stabilitu dodávok.

3.1 Vývoj ceny EE na burze PXE

Asi pred 15 rokmi, v roku 2007, sa začalo obchodovanie na, dnes už známej, Energetickej burze Praha. Stredoeurópska energetická burza Power Exchange Central Europe (PXE), ako sa teraz spoločnosť volá, vznikla v roku 2007 a sídli v hlavnom meste Českej republiky v Prahe. Umožňuje obchodovanie s EE s miestom dodania v Česku, na Slovensku, v Maďarsku, v Poľsku, v Rumunsku, v Srbsku, v Slovinsku a v Bulharsku. Od roku 2016 je väčšinovým vlastníkom PXE európska energetická burza European Energy Exchange (EEX), ktorá vlastní dve tretiny akcií PXE a zvyšná tretina patrí Burze cenných papierov Praha.

Začiatkom roka 2010 sa ceny EE na burzách pohybovali okolo úrovne 50 EUR za MWh. Táto cena EE je aj znázornená na nasledujúcom grafe, kde graf jasne poukazuje na to, že táto cena bola aj niekoľko rokov predtým a následne sa držala na úrovni okolo 50 EUR za MWh až po rok 2018.

Graf 1 : Vývoj ceny EE na burze PXE za obdobie 2008 až 2022



Zdroj: spracované podľa PXE (2022)

Cena EE sa v auguste roku 2022 ustálila na úrovni okolo 1000 EUR za MWh, čo je niečo nepredstaviteľné. Takéto zdražovanie EE ešte žiadna burza vo svojej histórií nezažila. Aj keď 30. augusta nastal mierny pokles ceny EE na úroveň 600 EUR za MWh, tak táto hodnota EE je neprijateľne vysoká pre všetky krajiny sveta, nehovoriac o Slovenskej republike.

Graf 2: Vývoj ceny EE na burze PXE za mesiac august 2022

Zdroj: spracované podľa PXE (2022)

3.2 Metóda priamej simulácie (Monte Carlo)

Túto metódu aplikujeme v tomto príspevku pre podnik VSS Energy, s.r.o. pre modelovanie vývoja vstupných cien ako aj pre vývoj koncových cien u koncového spotrebiteľa a predikcie vývoja cien EE na burze PXE. Môžeme uvažovať o takom prípade, kde premenná ω bude funkciou výlučne náhodného prvku ε, kde výskyt náhodného prvku budeme označovať za pomoci vhodného rozdelenia skúmanej pravdepodobnosti.

Princípom tejto metódy Monte Carlo aplikovanej na skúmaný podniku je vo vyjadrení veličiny ω, ktorá je určená kombináciou náhodných prvkov. V tomto prípade veličinu ω môžeme nahradiť cenou EE S v istom čase t, $(\omega = S_T)$ alebo aj istým vektorom cien, ktorý bude zachytávať vývoj ceny EE diskrétnou postupnosťou $(\omega = S_T, S_{T+1}, S_{T+2}, ..., S_T)$. Vzťah pre odhad ceny EE môžeme vyjadriť vzorcom:

$$S_T^{(i)} = S_0 \cdot exp[\Delta S_\tau] = S_0 \cdot exp\left[\left(\mu - \frac{\sigma^2}{2}\right) \cdot \tau + \sigma \cdot \sqrt{\tau} \cdot \varepsilon^i\right].$$

Premenná ε^i je náhodný prvok z istého rozdelenia pravdepodobnosti, kde hovoríme prevažne o normálnom rozdelení pravdepodobnosti $N(0, 1)$.

Premenné μ a σ nám prevažne vyjadrujú strednú hodnotu prírastku a smerodajne odchýlky výnosov modelovaných cien EE S. vyjadrenú ročne ale kvôli výkyvom cien EE na burze PXE použijeme denné, týždenné a mesačné hodnoty v nasledujúcich scenároch. Podľa známeho autora Tichého nám vzorec $\tau = T - t$ označuje dobu do zrelosti.

3.3 Metóda Monte Carlo v podniku VSS Energy, s.r.o.

Pri vytváraní nespočetného množstva simulácii za pomoci metódy Monte Carlo sme používali všetky interné údaje podniku VSS Energy, s.r.o., ktorými boli mesačné ukazovatele, resp. faktory ako fixné náklady, variabilné náklady (nakupovaná EE), množstvo, predaná EE, výška hrubého zisku a podobne. Všetky použité hodnoty faktorov sú znázornené v nasledujúcej Tabuľke 3.

Tabuľka 3: Vstupné faktory a jeho hodnoty pre výpočet simulácií

Faktor	Hodnota	Jednotky
FN	1 216	€/mesiac
VN	77	€/MWh
P	2 500	€/MWh
C	100	€/MWh
HZ	42 908	€

Zdroj: vlastné spracovanie podľa interných údajov podniku VSS Energy, s.r.o. (2022)

Hrubý zisk skúmaného podniku VSS Energy, s.r.o. bol vypočítaný podľa nasledujúceho vzorca ako:

$$HZ = C*P - FN*12 - VN*P$$

kde:
FN sú fixné náklady za jeden mesiac,
VN sú variabilné náklady nakupovanej EE,
P je množstvo EE,
C je výška predanej ceny EE a
HZ je hrubý zisk.

Pre metódu Monte Carlo v podniku sme si vybrali 3 možnosti simulácii akými sú:

- pesimistický scenár,
- realistický scenár,
- optimistický scenár.

Pre pesimistický scenár sme si vypočítali hodnotu pomocou matematického vzorca, ako rozdiel hodnoty predajnej ceny EE s variabilnými nákladmi nakupovanej EE v podniku, kde sme dospeli k hodnote -130 € za jednu MWh. Pri realistickom scenári sme dospeli k hodnote 23 € za jednu MWh a pri poslednom optimistickom scenári sme vypočítali hodnotu 40 € za jednu MWh (Tabuľka 4).

Tabuľka 4: Pravdepodobnosť vývoja troch scenárov metódy Monte Carlo

Scenár	Cena v €	Pravdepodobnosť	Množstvo predanej EE	Pravdepodobnosť
Pesimistický	130	15 %	1 500	30 %
Realistický	23	65 %	2 500	55 %
Optimistický	40	20 %	3 000	15 %

Zdroj: vlastné spracovanie

Pre nasledujúce výpočty pravdepodobnosti zisku alebo straty skúmaného podniku VSS Energy, s.r.o. sme si museli učiť strednú hodnotu a štandardnú odchýlku pre všetky tri scenáre (pesimistický, realistický a optimistický). Pri výpočte strednej hodnoty pomocou funkcie MEDIAN sme ako vstupy použili hodnoty ceny EE v € z predchádzajúcej tabuľky pri všetkých troch scenároch s výsledkom medián = 40. Štandardná odchýlka pri rovnakých premenných, čiže hodnoty ceny EE v € za pomoci funkcie STDEVA bola na úrovni 58.

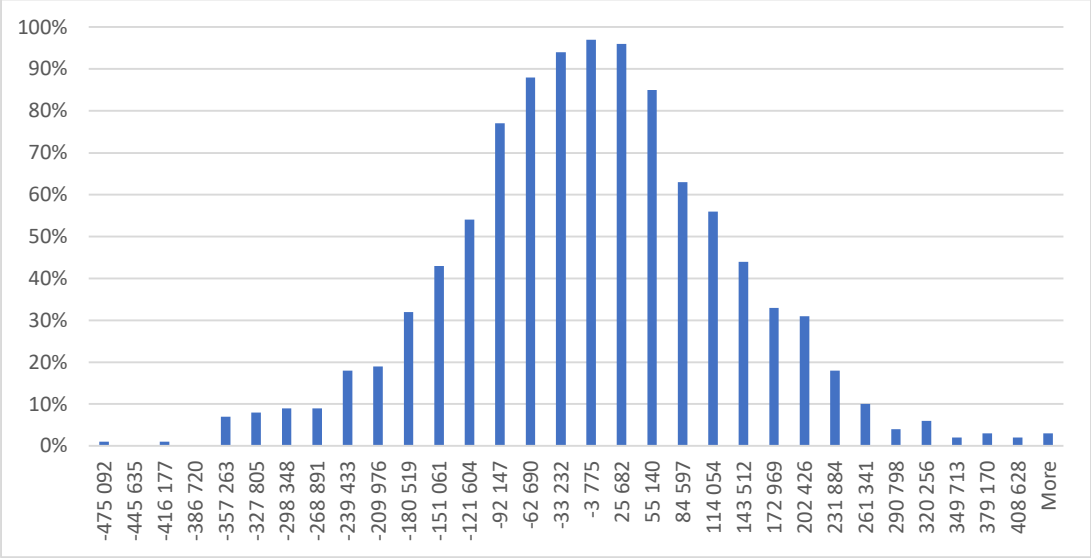
3.4 Pravdepodobnosť zisku a straty skúmaného podniku

Pri výpočte pravdepodobnosti zisku alebo straty skúmaného podniku VSS Energy, s.r.o. sme vychádzali zo vstupných údajov podniku akými sú cena EE pri nákupe na burze, cena predávanej EE koncovému spotrebiteľovi, množstvo predanej EE odoberateľovi a v neposlednom rade aj zisk z predaja EE určený pre skúmaný podnik VSS Energy, s.r.o.

Cena EE je daná normálnym rozdelením určenou strednou hodnotou a štandardnou odchýlkou. Pri vytváraní nespočetných množstvách simulácií sme využívali okrem predajnej ceny EE, jej množstva a výšku zisku aj náhodné čísla (náhodné číslo môže byť v tomto prípade simulácie chápané ako hodnota kumulatívnej pravdepodobnosti v rámci normálneho rozdelenia, prostredníctvom funkcie NORMINV).

Graf 3 znázorňuje simuláciu hrubého zisku alebo straty podniku VSS Energy, s.r.o. pri 1 000 opakovaní náhodných čísel s cenou EE ako aj s množstvom predanej EE pri hodnote fixných nákladov na úrovni 1 216 € a pri hodnote variabilných nákladov na úrovni 77 €.

Graf 3: Pravdepodobnosť zisku alebo straty pri simulácií metódy Monte Carlo v podniku VSS Energy, s.r.o.



Zdroj: vlastné spracovanie

Graf 3 znázorňuje histogram podľa vstupných údajov z nasledujúcej Tabuľky 5, kde je vypočítaná výška pravdepodobnosti zisku alebo straty podniku VSS Energy, s.r.o. pri istom počte frekvencií v rozhraní od 0 až po 99. Výška zisku (kladné hodnoty) alebo straty (záporné hodnoty) sú znázornené v stĺpci s názvom triedy (Tabuľka 5).

Tabuľka 5: Pravdepodobnosť zisku alebo straty podniku VSS Energy, s.r.o.

Triedy	Frekvencia	Pravdepodobnosť
- 475 092	1	1%
- 445 635	0	0%
- 416 177	1	1%
- 386 720	0	0%
- 357 263	7	7%
- 327 805	8	8%
- 298 348	9	9%
- 268 891	9	9%
- 239 433	18	18%
- 209 976	19	19%
- 180 519	32	32%
- 151 061	43	43%
- 121 604	54	54%
- 92 147	77	77%
- 62 690	88	88%
- 33 232	94	94%
- 3 775	97	97%
25 682	96	96%
55 140	85	85%
84 597	63	63%
114 054	56	56%
143 512	44	44%
172 969	33	33%
202 426	31	31%
231 884	18	18%
261 341	10	10%
290 798	4	4%
320 256	6	6%
349 713	2	2%
379 170	3	3%
408 628	2	2%

Zdroj: vlastné spracovanie

ZÁVER

Dnešný trh s EE na burze prekonáva svetové rekordy cien, kde sa ich predajná cena oproti jej výrobnej cene, ktorá sa pohybuje pri výrobe EE z jadrovej elektrárne na úrovni okolo 38 € za MWh až niekoľkonásobne zvyšuje a dosahuje hodnoty takmer 1 000 €. Tabuľka 5 v ktorej sú uvedené vypočítané hodnoty všetkých troch scenárov (pesimistický, realistický a optimistický) metódy Monte Carlo, nám jednoznačne poukazuje na to, že ak cena vstupu EE bude prudko rásť, čiže ak skúmaný podnik bude nakupovať EE na burze PXE stále drahšie, čím túto vyššiu cenu vstupu bude odzrkadľovať aj na cene výstupu, čiže predajnej EE koncovému spotrebiteľovi, resp. odberateľovi, tým horšie to budú znášať koncoví spotrebitelia, keďže účty za EE budú stále vyššie. Tým že podnik VSS Energy, s.r.o. má výhradné právo transformácie EE z VVN a VN na NN a následnú distribúciu v okolí od Slovenských elektrárni, a.s. tak má istú konkurenčnú výhodu oproti jej konkurencií. Skúmaný podnik má podpísané zmluvy od svojich odberateľov na isté množstvo EE na niekoľko mesiacov dopredu za vopred vyrokúvanú cenu, čím vie predikovať približnú stratu alebo zisk pri nakupovaní EE na burze.

Pri použití stochastickej metódy Monte Carlo a podľa výsledkov simulácii tejto metódy vychádzajúc z Grafu 3 je zrejmé, že by podnik nedosahoval výrazne zisky, ak vôbec nejaké, pri neustálom premenlivom trhu s EE na svetových burzách. Podľa simulácií modelu a pri vložení všetkých relevantných premenných z interných zdrojov podniku je až 97 %-ná pravdepodobnosť, že by skúmaný podnik dosahoval stratu síce len 3 775 €, ale pri neustálom zvyšovaní ceny EE na burze by to bolo výrazne vyššia strata.

Nehovoriac o tom, že by okolité podniky, ktoré sú koncovými odberateľmi, nedokázali platiť svoje záväzky podniku VSS Energy, s.r.o. a boli by odpojení od distribučnej siete. Tento scenár by podnik VSS Energy, s.r.o. s takmer 100 % pravdepodobnosťou uviedol do výraznej straty, čo by bolo pre skúmaný podnik až priam likvidačné.

Pri ďalších simuláciách podľa našich troch scenárov by bol podnik ziskový na úrovni okolo 100 000 € pri pravdepodobnosti okolo 50 až 60 %.

Bibliografia

BRADLEY, Robert – FULMER, Richard. 2004. Energy: The Master Resource. Kendall: Hunt Publishing, 2004. 230 s. ISBN 075-75-116-94.

Deming, W. Edwards. 1986. Out of the crisis. Massachusetts Institute of Technology. Center for advanced engineering study, Cambridge, 1986. MA, 510, 419-425.

FABIAN, František – KLUIBER, Zdenek. 1998. Metoda Monte Carlo a možnosti jej uplatnenia. Praha: Prospektrum, 1998, str.13-14.

FEIGENBAUM, V. Armand. 1983. Total quality control. Published by McGraw-Hill.1983. s. 214. ISBN 978-0070-2035-32.

HELDMAN, Kim. 2013. PMP (Project Management Professional). Výukový průvodce přípravou na zkoušku. Brno: Computer Press, 2013. s. 672. ISBN 978-80-251-3799-4.

HROMKOVÁ, Ludmila. 2001. Teorie průmyslových podnikatelských systémů I. Zlín: Univerzita Tomáše Bati ve Zlíně, 2001. 118 s. ISBN 80-731-8038-3.

MATEIDES, Alexander et al. 2006. Manažérstvo kvality. Bratislava: Epos, 2006. s. 751, ISBN 80-8057-656-4.

Medzinárodná burza s elektrickou energiou. 2022. [cit. 2023-06-06]. Dostupné na: <pxe.cz/cs/>.

PREISINGER, Dušan – DASHÖFER, Verlag. 2019. Charakteristika bodu zvratu, 2019. [cit. 2023-06-06]. Dostupné na internete: <https://www.anafin.sk/33/charakteristika-bodu-zvratu-uniqueiduchxzASYZNbZPksWr5xNIJ-muvC304WB0qo8wlGnpxw/>. [online]. Bratislava: AnaFin.

PXE. 2015. Sazebník poplatků. 2015. [cit. 2023-08-06]. Dostupné na internete: <https://www.pxe.cz/pxe_downloads/Rules_Regulation/Cz/PXE_sazebnik_poplatku.pdf>.

SESP. 2021. Slovenská elektrizačná prenosová sústava. 2021. [cit. 2023-08-28]. Dostupné na: <http://www.sepsas.sk>.

TICHÝ, Tomáš. 2010. Simulace Monte Carlo vo financiách. Ostrava: VŠB-TU Ostrava, 2010. ISBN 978-80-248- 2352-2.

VSE, 2022. Východoslovenská energetika, a.s. [online]. [cit. 2023-08-29]. Dostupné na: <http://www.vse.sk>.

VSS Energy, s.r.o. 2022. [cit. 2023-08-30]. Dostupné na: <http://www.vss.sk>.

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Innovation management of business processes

Inovačný manažment podnikových procesov

Petra Szaryszová, Lenka Kuhnová

Abstrakt

Príčiny neúspechov malých a stredných podnikov v oblasti inovácií spočívajú v nesprávnych riešeniach a chybných rozhodnutiach zamestnancov a manažmentu podniku už pri procese vzniku invencií, kde prebieha podľa aktuálnych výskumov nesystematický proces nakladania s inovačnými impulzmi podmieňujúci vznik invencií. Dôvodom je aj súčasná ekonomická kríza spôsobená pandémiou COVID-19 a zároveň vojnovým konflikt Ukrajina-Rusko, čo prináša okrem problémov aj príležitosti ako zefektívniť činnosť podniku, nad ktorými sa v čase bezproblémového fungovania podniku takmer nikto nezamýšľal. Dané skutočnosti viedli autorov príspevku k sledovaniu dynamiky systému vzniku invencií v malých a stredných podnikoch a odvodeniu odporúčaní pre zlepšenie inovačného manažmentu v týchto podnikoch, čo predstavuje hlavný cieľ tohto príspevku. Výsledky uskutočnených simulácií v zmysle navrhovanej optimálnej inovačnej taktiky boli spracované v podobe odporúčaní pre manažment malých a stredných podnikov.

Kľúčové slová

Vznik invencií, dynamika systému, inovácie, inovačný manažment, podnikové procesy

Úvod

Zvyšovanie efektívnosti podniku, vyššie požiadavky kvality, konkurenčný tlak, rastúce nároky zákazníkov a mnoho ďalších faktorov vytvárajú priestor na zamýšľanie sa nad podnikovými procesmi, ich analýzou, dokumentáciou, optimálnym fungovaním, monitorovaním a postupným zlepšovaním. V snahe zvyšovať kvalitu, podnik inovuje svoje procesy a produkty, čím dosahuje vyššiu konkurencieschopnosť na trhu svojho pôsobenia. Užitočným nástrojom na zabezpečenie prevádzkovej efektívnosti podnikových procesov pri súčasnom napĺňaní požiadaviek zákazníkov a vnútorných potrieb spoločnosti je integrovaný systém procesného riadenia.

Príspevok je zameraný na manažment inovačného procesu, konkrétne na manažment procesu vzniku invencií malých a stredných podnikov, čo je v súčasnosti považované za veľmi aktuálnu, podstatnú a zaujímavú problematiku nielen z makroekonomického, ale najmä mikroekonomického hľadiska. Malé a stredné podniky (MSP), ktoré sú považované za tzv. chrbtovú kosť inovačného potenciálu súčasnej Európy, uplatňujú podľa dostupných výskumov

nevhodné modely inovačných procesov, čo naznačuje potrebu ich modelovania. Inovácie sa často zamieňajú s metódami na vývoj produktov, resp. procesov, s jednoduchými kreatívnymi technikami alebo s marketingom. Zároveň sú pri vzniku invencií, resp. generovaní nových riešení uplatňované nevhodné metódy ako napr. jednoduché intuitívne metódy, či metóda pokus – omyl. V inovačnom procese ide na základe získaných poznatkov o určité stupňovanie inovačného reťazca v podniku od vzniku invencie po realizáciu inovácie, čomu však predchádza identifikácia inovačných impulzov z rôznych externých či interných zdrojov podniku.

V malých a stredných podnikoch prebieha oproti veľkým podnikom nesystematický proces nakladania s impulzmi podmieňujúci vznik invencií, kedy dochádza k nesprávnej interpretácii zachytených impulzov a tým k strate a následne k nedostatočnej transformácii na invencie, čo spôsobuje tiež celkovo nižší počet invencií. Hlavným cieľom výskumu bolo navrhnúť model dynamiky vzniku invencií pre MSP a na základe výsledkov prevedených simulácií formulovať optimálnu inovačnú taktiku odporúčaní pre manažment inovácií malých a stredných podnikov. Cieľom tohto príspevku je prezentovať závery simulácií kauzálneho modelu vzniku invencií a argumentovať navrhované odporúčania pre zlepšovanie inovačného manažmentu malých a stredných podnikov.

1 Riadenie inovačného procesu v podnikoch

V globalizovanej ekonomike musia byť spoločnosti adaptabilné, aby si udržali svoju prítomnosť na trhu. Mení sa aj celý hodnotový reťazec a spoločnosti musia byť pri tejto zmene proaktívne. V spoločnostiach, najmä v prípade MSP, výskumy zistili silný pozitívny vzťah medzi inováciou a rastom a medzi inováciou a výkonnosťou. Bohužiaľ, MSP často nemajú zdroje na úplné investovanie do najnovších technológií. Musia uprednostniť svoje investície a byť veľmi opatrní pri rozdeľovaní kapitálu. Okrem toho je vo všeobecnosti možné získať hodnotu z nových technológií len vtedy, keď MSP prijmú vhodné obchodné modely (Erol a kol., 2016).

Optimalizácia procesov v smere vyššej kvality, efektívnosti a organizačnej dynamiky je taktiež považovaná za ďalšie z viacerých možných pozitív procesného podnikového riadenia. Zároveň je potrebné si uvedomiť, že zavedenie procesného riadenia neznamená automaticky zavedenie aj systému kvality a naopak. Zavedenie procesného riadenia však znamená širší koncept akým je zavedenie systému kvality v podniku (Patmawati a kol., 2023).

Požiadavky zákazníkov na kvalitu produktov, procesov a služieb neustále narastajú. Zmena ako prechod medzi pôvodným a novým stavom sa tak stáva neustálou a potrebnou skoro v každej oblasti. V podniku ju možno dosiahnuť formou zlepšovania, čo predstavuje neustály proces, ktorým sa zvyšujú výkonnostné parametre (výrobných aj nevýrobných) procesov. Je to spôsob ako dosiahnuť zlepšenie úspešnosti podniku cez zlepšovanie procesov, pričom úspešnosť zlepšovania procesov závisí od počtu zmien a kvality prevádzaných zmien.

Na to, aby bola zmena úspešná, je potrebné prispôsobiť metódy, techniky, stratégie a implementačné taktiky konkrétnej histórii, kultúre a ľuďom v podniku. Netreba však zabúdať na to, že každá zmena by mala byť zmenou plánovanou a nanútená zmena vedie vždy k odporu (Maier a kol., 2019). Plánovitý prístup k zmenám je vhodnejší pre stabilné, resp. predvídateľné prostredie. Spontánny prístup je určený pre podniky pôsobiace v neistých a nepredvídateľných

podmienkach. Neistota až neurčitosť podnikateľského prostredia znehodnocujú plánovanú zmenu a otvárajú tak priestor na spontánnu zmenu.

Predstavitelia spoločnosti IPA Slovakia (2009) uviedli, že tradičné prístupy považovali za hlavný cieľ inovácie zmeny v produktoch, ktoré prinášali len kreatívni zamestnanci podniku. V súčasnosti sú inovácie považované za zmeny už aj v procesoch a v podniku ako podnikateľskom systéme. Tradičný prístup je založený na princípe individuálnych nápadov a úsilia, avšak nový na systematike a tímovej práci. V minulosti sa hovorilo hlavne o inováciách produktov. V dnešnom globálnom svete sú okrem produktových inovácií stále dôležitejšie inovácie v oblasti marketingu a predaja, logistiky, organizácie procesov a zdrojov v podniku, ako aj celých podnikateľských systémov. Tieto inovácie môžu viesť k zníženiu materiálovej spotreby a mzdových nákladov, zlepšeniu pracovných podmienok, zníženiu energetickej spotreby či zlepšeniu životného prostredia.

Zlepšovanie aj inovácia procesu sú zmenou k lepšiemu zdokonalenému stavu v zmysle mier výkonnosti, ako sú náklady, kvalita, služby a rýchlosť. Inovácia ako realizovaná invencia a výsledok inovačného procesu vedie ku kvalitatívnemu zlepšeniu na základe nového princípu riešenia požiadaviek zákazníka či manažmentu podniku. Inovácia ako „nová tvár kvality“ tak so sebou prináša zlepšenie v podobe novej hodnoty pre zákazníka, ale tiež podnik, ktorý ju implementoval.

Mikropodniky charakterizujeme ako skutočných ťahúňov európskeho hospodárstva. MSP chýbajú často finančné zdroje a vlastné odborné zázemie na vykonávanie výskumu, pričom hľadanie kompetentného obchodného partnera na realizáciu vlastných nápadov a prístup k programom, ktoré spolufinancujú výskum a inovácie, je náročné. Mnoho podnikateľských príležitostí vzniká na základe nového nápadu, inteligentného vynálezu, či novátorského spôsobu uvedenia produktu alebo služby na trh. Uvedenie inovácie na trh vyžaduje však určitý čas a často aj značné investície. V týchto prípadoch potrebuje podnik efektívnu právnu ochranu svojich kreatívnych myšlienok. MSP, ktoré nedisponujú dostatočným odborným zázemím a ľudskými zdrojmi, sa však len ťažko môžu vysporiadať so zložitými súvisiacimi právnymi a technickými problémami.

Výskyt inovačných bariér je neovplyvniteľný, avšak možno im predchádzať, resp. eliminovať ich vhodným riadením. Faktory regionálneho prostredia sa prejavujú najmä pri komercializácii produktov a služieb v iných regiónoch, ovplyvňujú prioritne úroveň a kvalitu inovačnej kapacity podniku: deficit vo fyzickej infraštruktúre podniku, nedostatočný prístup ku kapitálu, slabá štruktúra podporných inštitúcií, regionálna izolovanosť a uzamknutosť, infraštruktúra a vzdelanostná úroveň regiónov, klastre a iné typy sietí, situácia na trhu pôsobenia a pod. (Migdadi, 2022).

Podľa Mesároša a kol. (2008) digitálne technológie zlacňujú a zjednodušujú prístup k vedomostiam, ich spracovanie, ukladanie a prenos. V súčasnosti sa stali dôležitým nástrojom riadenia a jedným z prostriedkov zlepšenia ekonomického postavenia podniku a jeho konkurencieschopnosti na trhu. Samotné moderné technológie neprinášajú spomínané výhody automaticky, predpokladom ich úspešného využitia je pripravenosť podnikových manažérov na využívanie koncepcie riadenia vedomostí a inovácií, ako aj podniková kultúra podporujúca poznatkové fungovanie organizácie.

Hrašková (2008) v tejto súvislosti uvádza, že úlohou manažmentu inovácií je racionálne a efektívne riadiť inovačný proces a previesť nové myšlienky, resp. výsledky vedy a výskumu z ich teoretickej podoby ku konkrétnej aplikácii až priamo k spotrebiteľovi. Základným predpokladom komerčného úspechu podnikateľskej jednotky v podmienkach globálneho trhu je práve inovačný manažment, ktorý predstavuje dynamizujúci faktor organizácie prepojený s teóriu a praxou všeobecného manažmentu podniku. Úroveň efektívnosti investícií do nových produktov a procesov zvyšuje synergia strategického a inovačného manažmentu.

Bártok a Ješka (2006) vytvorili model riadenia inovácií v podobe vývojového diagramu, ktorý je svojou konštrukciou podobný procesu strategického manažmentu, keďže obsahuje posúdenie vnútorných a vonkajších faktorov, resp. ich strategickú analýzu. Ich model začína inovačnou ideou a pokračuje posúdením vonkajších a vnútorných faktorov, analýzou strategických faktorov, rozpracovaním inovačného projektu, jeho implementáciou a končí sa hodnotením inovácie.

V súčasnosti je vytvorených mnoho modelov inovácií. Modely inovácií podľa autorov ako Schmookler, Kline, Bessant a Tidd a pod. sú skôr lineárnym stvárnením inovačného procesu. Neobsahujú podrobnejšie členenie prvej fázy pred vznikom invencií, ktorá sa týka určenia, resp. identifikácie inovačných impulzov. Z nich potom možno generovať, selektovať a následne implementovať invencie v podobe inovácií. Z tejto myšlienky odvíjal aj návrh inovačného modelu v tejto štúdii.

2 Ciele a metódy výskumu

Proces vzniku invencií nezvykne byť predmetom podrobného skúmania autorov, hoci z nášho pohľadu predstavuje významnú súčasť inovačného procesu, keďže ide o jeho počiatočné fázy súvisiace s identifikáciou impulzov a ich transformáciou na invencie. Na základe tohto procesu sa dosahuje úspešnosť ďalších fáz inovačného procesu, a preto je potrebné riadiť ho. Aj z toho dôvodu bolo cieľom výskumu navrhnúť model dynamiky vzniku invencií pre MSP. Navrhovaný model by mal byť riešením v podobe rozšírenia (systematickosť v zmysle dodržania fáz procesu vzniku invencií), resp. skrátenia (vznik invencií podmienený rýchlosťou reakcie na identifikované impulzy) tzv. lievika procesu vzniku invencií. V rámci výskumu boli stanovené dve vedecké hypotézy, na ktorých bola postavená kľúčová myšlienka výskumu týkajúca sa priebehu a systémového zabezpečenia procesu vzniku. (Hypotéza 1: Relatívny počet vzniknutých invencií je závislý na veľkosti podniku, Hypotéza 2: Mikro podniky sú pružnejšie v tvorbe invencií ako stredné podniky).

Zhodnotenie viacerých teoretických a praktických prístupov a poznatkov umožnilo identifikovať podstatné premenné inovačného procesu, formulovať vedecký problém a tiež nové poznatky teoretického charakteru. Nakoľko sumarizované, prehľadne spracované a analyzované poznatky iných autorov obsahovali pre naše riešenie nedostatok podrobných informácií o priebehu inovačného procesu v praxi, bolo potrebné zrealizovať vlastné na seba nadväzujúce prieskumy (osobné riadené rozhovory vo vybraných podnikoch, dotazníkový prieskum). Uskutočneniu týchto prieskumov predchádzala kvalitatívna príprava. Dotazníkovými prieskumami nadobudnuté primárne dáta boli vyhodnotené použitím deskriptívnej štatistiky a interpretované smerom k identifikácii kľúčových premenných procesu vzniku invencií. Vzhľadom na čo možno najautentickejšie vyjadrenie navrhovaného modelu

vzniku invencií boli aplikované kauzálne vzťahy identifikovaných premenných definované podľa iných autorov spolu s využitím vlastných poznatkov.

Pri tvorbe mentálneho modelu bola v rámci modelovania využitá abstrakcia pre výber podstatných charakteristík objektu skúmania, zanedbaní vedľajších aspektov pre zníženie komplexnosti a jeho zjednodušení pomocou predstavivosti. Taktiež uplatnený prístup systémovej dynamiky inovačného procesu je založený na logických kauzálnych vzťahoch medzi identifikovanými kľúčovými premennými a ich vývoji v čase, čo na základe lineárnych modelov nie je možné dostatočne vysvetliť, preto navrhovaný diagram kauzálnych vzťahov pomáha chápať a komunikovať interakcie určujúce dynamiku inovačného systému. Simulácia kauzálneho modelu bola zvolená za účelom dosiahnutia lepšieho pochopenia správania sa študovaného systému, interaktívneho ovplyvňovania jeho správania, navrhovania jeho zdokonalenia a tiež posúdenia rôznych variánt jeho činnosti. Uskutočnila sa v prostredí softvérovej aplikácie Vensim PLE, ktorý pracuje za pomoci systému diferenciálnych a integrálnych rovníc.

Pri simuláciách navrhovaného kauzálneho modelu išlo predovšetkým o preverenie jeho vnútornej logiky, dynamického správania a verifikáciu stanovených vedeckých hypotéz z titulu zistenia ich pravdivosti, resp. opaku. V prostredí softvérovej aplikácie Vensim PLE boli parametrizované rôzne varianty 12 konštantných premenných, na základe čoho sme sledovali vývoj vzniknutých invencií a ostatných premenných navrhovaného modelu procesu vzniku invencií. V rámci štatistickej verifikácie kauzálneho modelu sme testovali hypotézy výskumu, kedy boli stanovené rôzne hodnoty 12 konštánt v závislosti od očakávaných výsledkov správania sa sledovaných premenných modelu podľa nadobudnutých poznatkov od iných autorov a tiež vlastných poznatkov. Na vyvodenie záveru prijatia, resp. vyvrátenia vedeckých hypotéz boli uplatnené logické metódy vedeckého skúmania a induktívnej štatistiky. V rámci testovania daných hypotéz bol použitý Shapiro-Wilkov W test kvôli overeniu vierohodnosti dát získaných simuláciou a následne Mann-Whitneyho U test na určenie závislosti medzi skúmanými premennými kauzálneho modelu vzniku invencií.

Uskutočnené simulácie vyústili do návrhu optimálnej taktiky v rámci inovačného manažmentu, ktoré predstavujú odporúčania pre dosiahnutie zlepšenia vzniku invencií a následne počtu realizovaných inovácií. Konkrétne kroky simulácie inovačnej taktiky sme zobrazili za pomoci IPO diagramu, ktorý okrem priebehu daného procesu zahŕňa tiež vstupy a výstupy aj jeho podprocesov. Následne bolo možné formulovať prínosy realizovaného výskumu a interpretovať odporúčania a námety pre zameranie budúceho výskumu v oblasti riešenej problematiky.

3 Výsledky

Inovačný proces je podľa vyššie uvedených autorov vhodným rámcom pri statickom skúmaní vzťahov medzi rôznymi faktormi, ktorými je ovplyvňovaný. Inovačný proces tak v rámci výskumu realizovaného výskumu chápeme ako proces, resp. cyklus prebiehajúci od identifikácie impulzov po implementáciu inovácie. Každej z uvedených štyroch fáz inovačného procesu prislúcha určitý výstup:

1. Impulz – motív vedúci k invencii nachádzajúci sa v rámci konkrétnej informácie, ktorá môže pochádzať z interného alebo externého prostredia podniku.

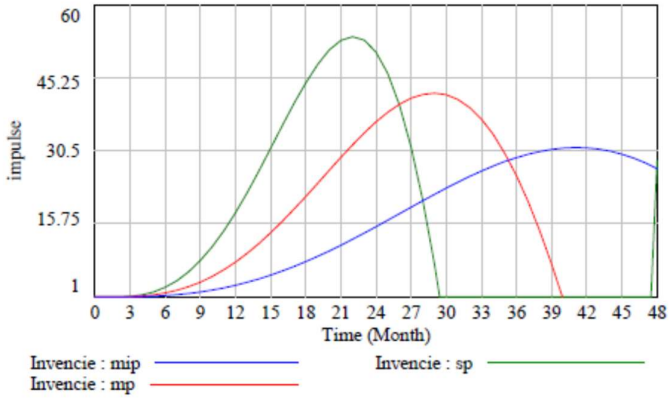
2. Invencia – realizovateľný inovačný nápad ako výsledok transformácie zaevidovaných impulzov.
3. Integrácia – pripravený a zdokumentovaný prototyp, resp. projekt inovácie určený na implementáciu.
4. Inovácia – zmena produktu, procesu alebo systému založená na invenčnom princípe ako nová hodnota pre zákazníka a podnik, ktorý ju implementoval.

Synergia strategického manažmentu s manažmentom inovácií zvyšuje úroveň efektívnosti investícií do nových produktov a procesov, a preto je potrebné uvažovať o ich vzájomnom vzťahu aj pri modelovaní procesu vzniku invencií ako súčasti inovačného procesu podniku. Nemožno však abstrahovať od manažérstva kvality, ktoré vo svojej podstate vychádza zo strategického manažmentu, čím ovplyvňuje manažment inovácií, resp. riadenie inovačného procesu. Politika kvality ako nástroj riadenia kvality musí byť v súlade s víziou, poslaním a cieľmi podniku, kde možno vnímať prepojenie so strategickým manažmentom.

Modelovaný proces pozostáva z rastového (pozitívneho) a zároveň rovnovážneho (negatívneho) cyklu. Prvý z nich je tvorený procesom vzniku invencie, na konci ktorého dochádza k preneseniu vzniknutých invencií v podobe spätnej väzby. Spätnú väzbu tvorí pomocná premenná invencie ako interný zdroj impulzov pôsobiaca na množstvo zdrojov impulzov. Tie predstavujú jednu z nosných premenných, ktoré sú hybnou silou procesu vzniku invencií. Pre zachovanie rovnovážneho stavu dynamického systému bolo potrebné namodelovať aj negatívnu spätnú väzbu procesu vzniku invencií. Daná väzba je súčasťou rovnovážneho cyklu, ktorú tvoria pomocné premenné: potreba zachytávania impulzov a využitý potenciál inovačného tímu. Zo všeobecných záverov teórie procesu vzniku invencií je zrejmé, že skúmaný proces je v najväčšej miere ovplyvnený veľkosťou podniku.

Daná závislosť sledovanej akumulácie invencií podľa veľkosti podniku je znázornená graficky (Graf 1).

Graf 1: Priebeh invencií v závislosti od veľkosti podniku



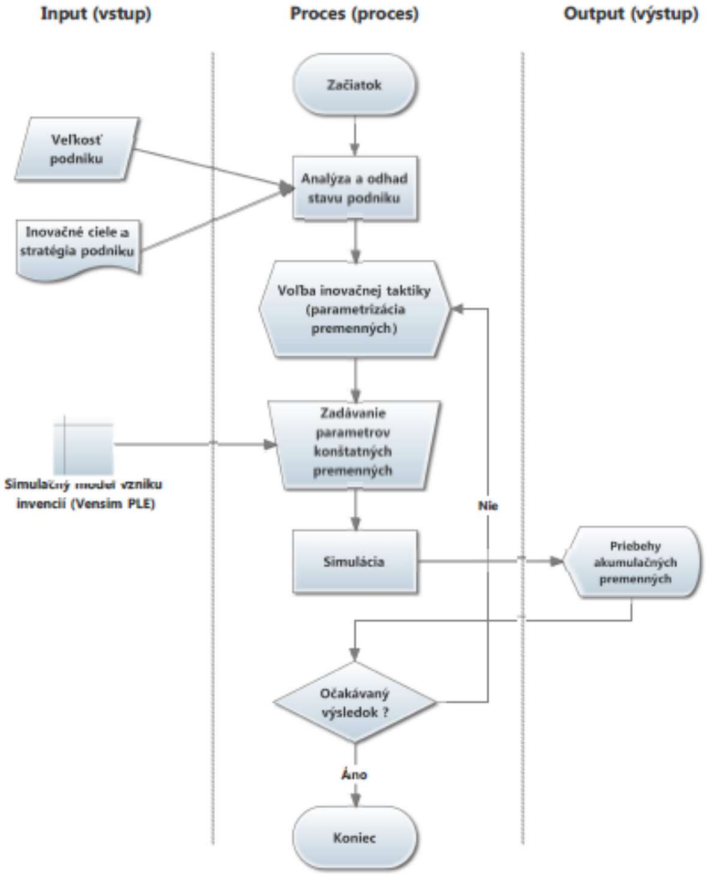
Zdroj: Vlastné spracovanie

Na Grafe 1 sú znázornené body A, B a C, v ktorých dochádza k nadobudnutiu maximálneho počtu invencií vo veľkostných kategóriách podnikov v sledovanom období. Od týchto bodov do konca sledovaného obdobia sa počet vzniknutých invencií znižuje vzhľadom na dynamiku

modelovaného systému vzniku invencií. V praxi možno danú situáciu interpretovať ako súhrn nežiaducich vplyvov na proces vzniku invencií, ktoré spôsobia pokles ich počtu.

Kauzálny model vzniku invencií bol navrhnutý na základe predpokladu vplyvu veľkosti podniku na množstvo vzniknutých invencií. Zároveň poukazuje na nevyhnutnosť účasti v procese zachytávania impulzov a tvorby invencií okrem inovačného tímu aj ostatných zamestnancov a manažmentu podniku. V rámci simulácie potvrdila hypotéza 1 fakt, že k zvyšovaniu počtu vzniknutých invencií s narastajúcou veľkosťou podniku dospejeme práve vtedy, keď sa v procese vzniku invencií budú okrem členov inovačného tímu podieľať aj ostatní zamestnanci a manažment. V procese vzniku invencií je možné predpokladať, že mikro a malé podniky, napriek svojmu hendikepu množstva ľudských zdrojov ako tvorcu inovačného potenciálu podniku, by mali byť schopné tvorby invencie z dôvodu jednoduchej organizačnej štruktúry. Tá ma napomôcť rýchlejšie sa zorientovať v inovačnej stratégii a cieľoch, pre dosiahnutie ktorých budú invencie vytvárať. Invenčná pružnosť podniku v procese vzniku invencií je analogicky chápaná ako rýchlosť ich vzniku. Invenčná pružnosť mikro a stredných podnikov vyšla ako štatisticky významná, a teda hypotézu 2 možno považovať za pravdivú. Použitý štatistický test invenčnej pružnosti tak potvrdil rozdielnosť reakcií na zachytávanie impulzov v mikro a stredných podnikoch.

Obrázok 1: IPO diagram procesu simulácie inovačnej taktiky podniku



Zdroj: Vlastné spracovanie

Z výsledkov overovania jednotlivých hypotéz a navrhovaným riešením identifikovaného problému v rámci tohto výskumu je možné problematiku procesu nakladania s impulzmi podmieňujúcimi vznik invencií v malých a stredných podnikoch systematicky opísať pomocou IPO diagramu (Obrázok 1).

Inovačná taktika rozhodovateľa predstavuje skupinu úkonov pozostávajúcich z prvkov strategického riadenia procesov v podniku, ktoré je následne manažér, resp. užívateľ schopný uplatniť v tvare konštantných premenných a aplikovať ich s cieľom simulovania jej navrhovaného optimálneho nastavenia. To znamená, že počas sledovaného obdobia v žiadnej simulovanej skupine podnikov (mikro, malý a stredný) za rovnakých predpokladov, ktoré platili pre verifikáciu stanovených hypotéz, nedôjde ku kolízii vzniku invencií, a teda podniky sú schopné vytvárať invencie v každom mesiaci.

Na báze výsledkov skúmania prostredníctvom navrhovaného kauzálneho modelu, verifikácie hypotéz a skutočností vyplývajúcich z realizácie tohto výskumu bola mikro, malým a stredným podnikom odporúčaná parametrizácia 12 konštantných premenných uvedená v Tabuľke 1. Tá predstavuje zároveň navrhovanú optimálnu inovačnú taktiku.

Tabuľka 1: Odporúčaná parametrizácia konštantných premenných

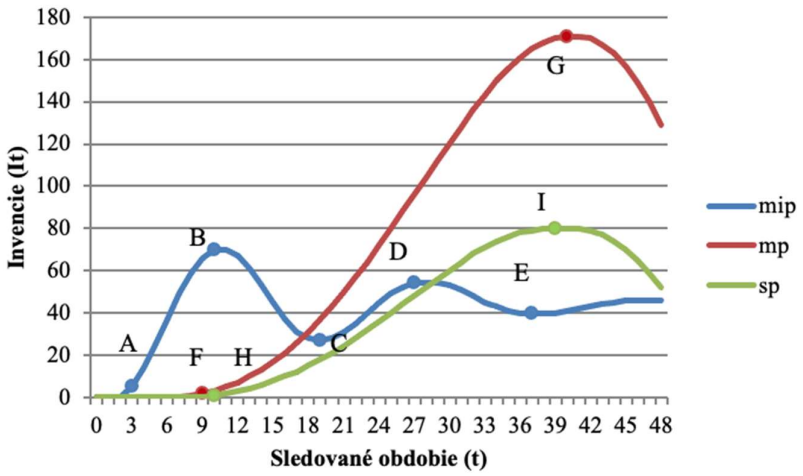
Konštanty	**Parametre**		
	mip	***mp***	***sp***
vp	5	50	150
ip	0	0,3	0,1
iizi	1	1	1
ezi	3	2	2
it	5	5	5
pcit	3	3	2
i	0,5	0,5	0,5
kr	1	1	1
t_c	3	6	8
t_z	1	12	12
t_e	3	12	24
t_t	1	8	12

Legenda: mip – mikro podnik, mp – malý podnik, sp – stredný podnik, vp – veľkosť podniku, ip – inovačný potenciál podniku, iizi – počet interných informačných zdrojov podniku, ezi – počet externých zdrojov impulzov, it – inovačný tím, pcit – potenciál člena inovačného tímu, i - interpretácia, kr – kreatívne metódy, t_c – reakčný čas zamestnancov, t_z – čas zaevidovania, t_e – doba evidencie, t_t – trvanie transformácie

Zdroj: Vlastné spracovanie

Parametre konštantných premenných boli zvolené tak, aby odpovedali predpokladaným, resp. očakávaným stavom v reálnych malých a stredných podnikoch s prihliadnutím na ich možnosti a kapacity. Zdôvodnenie voľby konkrétnych hodnôt je možné definovať pre jednotlivé mikro, malé a stredné podniky na základe výsledkov simulácií pre konkrétnu veľkostnú kategóriu podniku, a to vzhľadom na navrhovaný optimálny priebeh počtu vzniknutých invencií zobrazený na Grafe 2.

Graf 2: Navrhovaný optimálny priebeh počtu vzniknutých invencií podľa veľkosti podniku



Zdroj: Vlastné spracovanie

V závislosti od výsledkov navrhujeme optimálnu taktiku pre mikro podniky. Odporúčaným nastavením parametrov konštantných premenných navrhovaného modelu možno dospieť k priebehu počtu vzniknutých invencií, ktorý je zobrazený na Grafe 2. Daný priebeh potvrdzuje v porovnaní s ostatnými dvoma veľkostnými kategóriami podnikov tú skutočnosť, že ide o rýchly rast vznikajúcich invencií. Mikro podnik bol schopný na základe výsledkov simulácie už v 3. mesiaci sledovaného obdobia vytvoriť 5 invencií (bod A). Následne priebeh nadobúdal rastúci charakter s dosiahnutím ich maximálneho počtu (bod B). Potom má priebeh invencií klesajúci charakter s najvyšším poklesom počtu invencií v 19. mesiaci (bod C), ktorý mohla spôsobiť napr. neschopnosť zachytávať ďalšie impulzy, vyťaženosť tvorcov invencií zaoberajúcich sa prácou na nápadoch, ktoré si vyžadujú maximálnu sústredenosť, prípadne nízka potreba tvorby ďalších invencií. Nárast a pokles vznikaných invencií je prirodzený jav, ktorý vzniká v dôsledku dynamiky simulovaného systému s cieľom dosiahnutia rovnovážneho stavu (body D a E). Ustálenie vznikaných invencií nastáva v posledných štyroch mesiacoch sledovaného obdobia, kedy podnik konštantne vytvára 46 invencií.

V nasledujúcom texte uvádzame zvolenie inovačnej taktiky pre malý podnik s cieľom dosiahnutia optimálneho priebehu vzniknutých invencií. Priebeh invencií v sledovanom období odpovedajúci navrhovanej optimálnej inovačnej taktike malého podniku vykazuje vytvorenie prvej invencie v 8. mesiaci sledovaného obdobia (bod F), čoho dôvodom môže byť veľké množstvo zachytených impulzov od ostatných zamestnancov mimo inovačného tímu, vyťaženosť tvorcov invencií, ale tiež dĺžka simulovaných fáz v rámci procesu vzniku invencií. V nasledujúcich mesiacoch má vývoj invencií rastúci charakter s dosiahnutím svojho maxima v 40. mesiaci (bod G). Ďalej dochádza k poklesu počtu vznikaných invencií z vyššie uvedených dôvodov presýtenia vytvorenými invenciami a vplyvmi dynamiky systému.

Pre stredné podniky sme taktiež formulovali odôvodnenia voľby optimálnej inovačnej taktiky. Napriek tomu, že má stredný podnik k dispozícii 20 ľudí zainteresovaných v procese vzniku invencií, prvá vzniknutá invencia sa objavuje až v 10. mesiaci (bod H), a to napr. z dôvodu

časovo dlhších fáz procesu vzniku invencií v súvislosti s rozbehom zainteresovaných pracovníkov, prípadných strát impulzov z dôvodu nesprávnej interpretácie, či veľkému množstvu neaktuálnych impulzov. V nasledujúcom časovom období je stredný podnik schopný tvoriť invencie až do 38. mesiaca (bod I), a to v celkovom počte 80 invencií vytvorených transformáciou zaevidovaných impulzov. Do konca sledovaného obdobia podnik vytvára invencie s klesajúcim trendom, ktorý dosahuje svoje minimum s hodnotou 52 invencií na konci sledovaného obdobia.

V rámci odporúčaní pre MSP sme sa im snažili poskytnúť jednoduchý návod pre analýzu vývoja tvorby invencií pomocou simulačného programu Vensim PLE s popisom metodiky voľby optimálnej inovačnej taktiky a poukázaním na najpodstatnejšie súvislosti vývoja premenných navrhovaného modelu.

Za prínos realizovaného výskumu považujeme realizáciu, vyhodnotenie a interpretáciu vlastných prieskumov týkajúcich sa manažmentu inovačného procesu v prostredí podnikov východného Slovenska. Identifikáciu kľúčových premenných ovplyvňujúcich proces vzniku invencií a definovanie kauzálnych vzťahov medzi nimi za účelom vytvorenia navrhovaného (mentálneho) kauzálneho modelu vzniku invencií považujeme tiež za významné prínosy pre teóriu týkajúcu sa riadenia inovačného procesu. Tento model poskytuje pohľad na manažment inovácií ako integrovaný systém prvkov strategického manažmentu a manažérstva kvality.

ZÁVER

Spájať zdanlivo nespojiteľné a hľadať nové riešenia, ktoré sa prelínajú v rámci spoločností a trhov, to je úloha, ktorú musia „úspešní hráči“ zvládnuť, ak chcú i naďalej dosahovať pozitívne výsledky v rámci svojho podnikania. V prostredí malých a stredných podnikov však dochádza v porovnaní s veľkými podnikmi vo všeobecnosti k nesystematickému procesu nakladania s inovačnými impulzmi, ktorý podmieňuje vznik invencií. Hlavným cieľom výskumu bolo z uvedených dôvodov navrhnúť model dynamiky vzniku invencií pre MSP a navrhnúť pre ich inovačný manažment vhodné odporúčania.

Vytvorenie návrhu simulačného modelu vzniku invencií pre MSP, ktorý je na základe systémovej dynamiky schopný analyzovať prostredníctvom simulácií v prostredí nástroja Vensim PLE vývoj sledovaných premenných v závislosti od nastavenia identifikovaných konštantných premenných jeho užívateľom, považujeme za hlavný praktický prínos danej práce. Jedným z nadväzujúcich prínosov na navrhovaný kauzálny model v simulačnej podobe je dokumentácia procesu simulácie inovačnej taktiky podniku pomocou IPO diagramu. Podnik má tak možnosť odsimulovať reálny stav inovačnej pripravenosti a súčasne so zmenou vstupných premenných optimalizovať svoju inovačnú taktiku. Ďalším praktickým prínosom je spracovanie odporúčaní pre manažment malých a stredných podnikov s poukázaním na hlavné prínosy aké môže podnik vďaka nim dosiahnuť.

Potvrdili sa tvrdenia, že veľkosť podniku ovplyvňuje množstvo vzniknutých invencií práve vtedy, keď sa na procese vzniku invencií okrem inovačného tímu podieľajú aj ostatní zamestnanci a manažment podniku. Zároveň sme zistili, že invenčná pružnosť je základnou charakteristikou modelovaného procesu vzniku invencií. Vychádzajúc z inovačných podmienok je tak mikro podnik invenčne pružnejší ako stredný podnik. Výsledkom vlastnej práce boli formulované odporúčania pre manažment malých a stredných podnikov vo forme

krokov procesu simulácie inovačnej taktiky podniku s cieľom návrhu optimálnych výsledkov priebehu procesu vzniku invencií. Za jeho pomoci predpokladáme jednoduchšiu aplikáciu výsledkov navrhovaného kauzálneho modelu do praxe malých a stredných podnikov.

Modelovanie v prostredí Vensim PLE považujeme za vhodnú metódu jednak na dokumentáciu správania sa navrhovaného modelu ako celku a jednak sledovania vývoja premenných, na základe ktorých je vytvorený. Zvolený nástroj simulácie je uplatnený vo svojej najnižšej verzii určenej k akademickej činnosti, ktorý však neobsahuje niektoré funkcie, ktoré by mohli simuláciu a nastavenia modelu pomocou definovania kauzálnych vzťahov skvalitniť. Danú verziu softvérovej aplikácie ale možno hodnotiť ako dostačujúcu na vyhodnocovanie priebehov premenných pre účely overovania hypotéz výskumu. Nie všetky identifikované premenné, získané na základe rešerše súčasného stavu a vlastných prieskumov, bolo možné v dôsledku ich zložitej merateľnosti zahrnúť do navrhovaného kauzálneho modelu. Ten je tak zostavený z premenných, ktoré bolo možné z istou dávkou abstrakcie a analógie matematicky zadefinovať vzhľadom na predpokladaný vývoj vzťahových premenných. Uvedené výhody a nevýhody môžu slúžiť malým a stredným podnikom k rozhodnutiu uplatnenia navrhovaného kauzálneho modelu vzniku invencií do svojej praxe.

Nakoľko sme bližšie špecifikovali prvú fázu inovačného procesu, ktorou je proces vzniku invencií, resp. invenčný proces, cieľom budúceho výskumu by mohlo byť podrobnejšie rozobratie a následne modelovanie jeho ďalších dvoch fáz a určenie premenných, ktoré v nich vystupujú ako kľúčové a usmerňujúce vývoj sledovaných premenných. V rámci tzv. lievika inovačného procesu by bolo zaujímavé poukázať tiež na účinnosť inovačného procesu podniku vzhľadom na počet realizovaných inovácií zo vzniknutých invencií.

Príslušnosť k projektu

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Bibliografia

BÁRTOK, M. a JEŠKA, A., 2006. Procesy riadenia a implementácie inovácií vo firemných podmienkach. In Transfer inovácií [online]., 2006, č. 9, s. 222-224. [cit. 2023.19.22]. Dostupné z: http://www.sjf.tuke.sk/transferinovacii/pages/archiv/transfer/9-2006/pdf/222-224.pdf> ISBN 80-8073-703-0.

EROL, S., JÄGER, A., HOLD, P., OTT, K. a SIHN, W., 2016. Tangible Industry 4.0: A Scenario-Based Approach to Learning for the Future of Production. In Procedia CIRP 2016, 54, 13–18.

HRAŠKOVÁ, D., 2008. Úloha inovácií v rozvoji organizácie. [online]. 2008. [cit. 2023.19.21]. Dostupné z: http://www.logistickymonitor.sk/en/images/prispevky/uloha-inovacii.pdf.

IPA Slovakia. 2009. [online]. 2009. [cit. 2023.19.21]. Dostupné z: http://www.ipaslovakia.sk/slovnik_view.aspx?id_s=150.

MAIER, D., MAFTEI, M., MAIER, A. a BIŢAN, G. E., 2019. A review of product innovation management literature in the context of organization sustainable development. In Amfiteatru Economic, 21(13), 816-829.

MESÁROŠ, P., MESÁROŠ, F. a ČARNICKÝ, Š., 2008. Manažment znalostí a perspektívy jeho uplatnenia v slovenských podnikoch. Bratislava : Ekonóm, 2008. 204 s. ISBN 978-80-225-2490-2.

MIGDADI, M. M., 2022. Knowledge management processes, innovation capability and organizational performance. In International Journal of Productivity and Performance Management, 71(1), 182-210.

PATMAWATI, S., DEWI, V. M. a ASBARI, M., 2023. THE Effect of Short-Term and Long-Term Learning in Quality Management and Innovation. In Journal of Information Systems and Management (JISMA), 2(1), 21-26.

VERHEUGEN, G., 2008. Malé a stredné podniky na prvom mieste: Európa pomáha MSP, MSP pomáhajú Európe. [online]. Európske spoločenstvá: Úrad pre publikácie, 2008. [cit. 2023.19.22]. Dostupné z: http://ec.europa.eu/enterprise/newsroom/cf/_getdocument.cfm?doc_id=4569>. ISBN 978-92-79-11444-1.

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Depreciation as an internal source of financing the company's assets

Odpisy ako interný zdroj financovania majetku podniku

Eva Manová, Jana Simonidesová

Abstrakt

Podniky v súčasnosti využívajú rôzne formy financovania majetku. Pri financovaní z interných zdrojov má z kvalitatívneho hľadiska najväčšiu váhu zisk, ale nemôžeme zabúdať ani na odpisy, pomocou ktorých podnik získava finančné prostriedky na obstarávanie nového majetku, ktorý potrebuje pre svoju činnosť. Odpisy patria k interným zdrojom financovania a ich výška pôsobí na finančnú situáciu každého podniku. Sú vnímané ako jeden zo stabilných zdrojov samofinancovania potrieb podniku a majú dôležitý vplyv na základ dane, rentabilitu a aj na výsledok hospodárenia podniku, pretože sú nákladovou položkou. Systém odpisovania dlhodobého majetku má významný vplyv na finančné hospodárenie podniku. Odpisy ako ekonomickú kategóriu je potrebné posudzovať nielen z účtovného aj z daňového hľadiska. Ekonomicky správne využitie odpisov má vplyv na reprodukciu neobežného majetku, jeho modernizáciu alebo inováciu, ale aj na výsledok hospodárenia podniku. Príspevok sa zaoberá porovnaním účtovných odpisov podľa vybranej metódy výpočtu s daňovými odpismi a ich vplyvom na výsledok hospodárenia podniku.

Kľúčové slová

Odpisy dlhodobého majetku, účtovné odpisy, daňové odpisy

Úvod

Finančné zdroje potrebné na existenciu podniku a na jeho úspešné rozvíjanie v prostredí konkurencie sú charakterizované ako zdroje, z ktorých každý podnik môže získať finančné prostriedky. Existuje viacero foriem financovania podniku, ale v tomto príspevku sme sa zamerali na vybranú formu vlastných zdrojov financovania, konkrétne interný zdroj, ktorým sú odpisy.

Odpisy predstavujú veľmi podstatný vnútorný zdroj, ktorý slúži predovšetkým na financovanie obnovy alebo rozšírenia dlhodobého majetku.

Odpisy sú ekonomickou kategóriou, pri ktorej je potrebné, aby ich podnik posudzoval osobitne nielen z účtovného, ale aj z daňového pohľadu. Daňové odpisy sú upravené štátom prostredníctvom Zákona č. 595/2003 Z. z. o dani z príjmov a nepredstavujú skutočné opotrebenie majetku, ale iba určitú fiškálnu politiku štátu. Účtovné odpisy vyjadrujú skutočné

opotrebenie majetku za určité časové obdobie. O účtovných odpisoch a ich výpočte rozhoduje podnik sám, pričom dodržiava postupy účtovania a Zákon č. 431/2002 Z. z. o účtovníctve. Podnik má možnosť voľby z rôznych metód odpisovania dlhodobého majetku. Platí však, že ich musí aplikovať konzistentne počas celej doby životnosti majetku. V súčasnej dobe podniky nemalú pozornosť venujú práve zložitej a rozsiahlej oblasti odpisovania dlhodobého majetku. Aktuálnosť riešenia problematiky odpisov je v každom podniku rozdielna a závisí od činností, na ktoré sa podniky zameriavajú. Na problematiku odpisov sa kladie dôraz častejšie vo výrobných podnikoch, ako v sektore služieb, pretože činnosť výrobných podnikov je nepredstaviteľná bez zložiek dlhodobého majetku.

1 Odpisy dlhodobého majetku

Jednotlivé podniky potrebujú k výkonu svojej činnosti rôzne druhy majetku. Pravidelným používaním majetku dochádza k zmenám jeho úžitkových vlastností, čím sa vytráca jeho pôvodná funkcia, na ktorú bol majetok obstaraný a po určitom čase je podnik nútený tento majetok reprodukovať (Majdúchová – Rybárová, 2019). V procese používania dlhodobého majetku dochádza k znižovaniu jeho produkčnej schopnosti ako následku jeho využívania v transformačnom procese, respektíve nevyužívania v podniku a označujeme to ako opotrebenie majetku. Pojem opotrebenie používame iba v spojení s nehmotným a hmotným majetkom pôsobiacim v podniku dlhodobo. Opotrebenie zároveň predpokladá prenos hodnoty majetku do hodnoty novovytvorených produktov (výkonov) vytvorených používaním daného majetku (Majdúchová a kol., 2020).

Rozlišujeme fyzické a morálne opotrebenie dlhodobého majetku. Fyzické opotrebenie označované je označované aj ako materiálové opotrebenie majetku. Fyzické opotrebenie sa prejavuje tým, že majetok podniku postupne stráca schopnosť poskytovať úžitok, ktorý sa od neho očakával. To znamená, že postupne dochádza k strate jeho úžitkovej hodnoty. O fyzickom opotrebení hovoríme iba pri majetku, na ktorý sa nevyvíja tlak zo strany inovácií a je typický dlhším životným cyklom (Majdúchová a kol., 2020). Existujú dve podoby fyzického opotrebenia:

- aktívne opotrebenie, ktoré vzniká v dôsledku toho, že sa majetok intenzívne využíva v transformačnom procese,

- pasívne opotrebenie, ktoré nastáva pôsobením rôznych vplyvov, akými sú napríklad prírodné, chemické, biologické a iné vplyvy, ktoré pôsobia v okamihu nepoužívania majetku. Za najčastejšie príčiny opotrebenia majetku sa považuje korózia, prašnosť, zvetrávanie a podobne (Majdúchová – Rybárová, 2019). Fyzické opotrebenie sa týka len hmotného majetku.

Morálne opotrebenie, nazývané taktiež ako hodnotové opotrebenie. Vzniká v dôsledku vedeckého a technického pokroku. Pri morálnom opotrebení dochádza k postupnému znehodnocovaniu jednotlivých položiek majetku napríklad v dôsledku neustáleho zdokonaľovania vo výrobe (zlepšovanie parametrov), vplyvov vedecko-technického rozvoja (existencia modernejších, produktívnejších zariadení), čo v konečnom prípade vedie k strate hodnoty majetku (Majdúchová – Rybárová, 2019).

Majetok, ako napríklad stroje a zariadenia môžu byť ešte technicky schopné, ale po morálnej stránke sú už zastarané. Pre podnik nemusí byť prekážkou na jeho ďalšie používanie v

transformačnom procese, ale po ekonomickej stránke sa takýto majetok stáva menej prospešný. Podnik nemá žiadnu možnosť ako ovplyvniť morálne opotrebenie a je nútený sa mu prispôsobovať. Morálne opotrebenie sa vyskytuje v dvoch podobách (Majdúchová a kol., 2020):

- v dôsledku zvyšovania produktivity práce sa zlacňuje produkcia dlhodobého majetku,

- vedecko-technický pokrok dáva možnosť zakúpiť za identickú cenu účinnejšiu, technicky ideálnejšiu položku dlhodobého majetku.

Morálne opotrebenie je typické pre dynamické odvetvia s vysokým tempom vedecko-technického pokroku a týka sa hmotného aj nehmotného majetku (Majdúchová – Rybárová, 2019).

Peňažné vyjadrenie opotrebenia dlhodobého majetku, či už fyzické alebo morálne predstavujú odpisy. Na vyčíslenie výšky odpisov dlhodobého majetku existujú dva pohľady, a to z hľadiska účtovníctva a z daňového hľadiska, preto sa rozlišujú účtovné a daňové odpisy. Snahu o reálne vyjadrenie opotrebenia hodnoty majetku, ktorá sa prenáša na vytvorené výkony predstavujú účtovné odpisy.

Stanovenie účtovných odpisov môže prebiehať:

- sadzbou v percentách z obstarávacej ceny dlhodobého majetku vo vzťahu k výkonom v závislosti od doby životnosti,

- absolútnou sumou podľa dosiahnutých výkonov daného roka vo vzťahu k celkovým výkonom.

Pre stanovenie skutočného opotrebenia dlhodobého majetku a teda účtovných odpisov, sú charakteristické dve základné metódy odpisovania a to:

- časové metódy odpisovania:

  - časová lineárna (rovnomerná) metóda odpisovania - výška odpisu sa počas doby odpisovania nemení,

  - časová progresívna metóda odpisovania - výška odpisu je v prvých rokoch odpisovania nižšia a postupne narastá, zabehnutia,

  - časová degresívna metóda odpisovania - výška odpisu je v prvom roku odpisovania najvyššia a postupne klesá.

- výkonové metódy odpisovania - pri tomto type účtovných odpisov je potrebné:

  - stanovenie predpokladaného výkonu majetku za celú dobu jeho odpisovania,

  - poznať jeho skutočný výkon za obdobie, za ktoré sa počíta odpis,

  - po skončení obdobia presne určiť skutočný výkon zariadenia za toto obdobie.

Každý podnik má možnosť voľby vhodnej metódy odpisovania majetku najmä z dôvodu vplyvu odpisov na výšku výsledku hospodárenia.

Výber vhodnej metódy odpisovania je dôležitý aj z dôvodu, že slovenská legislatíva neumožňuje v priebehu doby odpisovania pristúpiť k zmene metódy, ktorá bola zvolená na začiatku odpisovania.

Vzhľadom k potrebe disponovať v budúcnosti internými zdrojmi financovania, by mali podniky odpisovanie plánovať strategicky.

Daňové odpisy sú vyčíslené v súlade so zákonom o dani z príjmov, ktoré sa v účtovníctve neúčtujú a ich kvantifikácia je potrebná len pre uplatnenie odpisov ako nákladu v daňových výdavkoch. Daňové odpisy upravuje zákon č. 595/2003 Z. z. o dani z príjmov v znení neskorších predpisov. Tento zákon určuje podniku výšku daňových odpisov podľa odpisových skupín a doby odpisovania dlhodobého majetku. Tabuľka 1 zobrazuje odpisové skupiny a dobu odpisovania dlhodobého majetku s príkladmi zaradenia majetku do odpisových skupín.

Tabuľka 1: Odpisové skupiny a doby odpisovania

Odpisová skupina	**Druh zaradeného dlhodobého majetku**	**Doba odpisovania v rokoch**
0	elektromobily a hybridné automobily.	2
1	Napr.: počítače, spotrebná elektronika, kancelárske stroje a zariadenia, stroje pre poľnohospodárstvo, stroje pre textilný, odevný a kožiarsky, priemysel, osobné automobily, motorové vozidlá	4
2	Napr.: elektromedicínske a elektroterapeutické prístroje, prístroje pre domácnosť, ostatné elektrické zariadenia, chladiace zariadenia, trolejbusy a autobusy, motocykle a prívesné vozíky	6
3	Napr.: elektrické motory, generátory a transformátory a elektrické rozvodné a ovládacie zariadenia	8
4	Napr.: montované budovy, lode a plavidlá, železničné lokomotívy a vozový park	12
5	Napr.: budovy okrem budov uvedených v odpisovej skupine 6	20
6	Napr.: bytové budovy, hotely, budovy pre administratívu, budovy pre kultúru a verejnú zábavu, vzdelávanie a zdravotníctvo	40

Zdroj: Vlastné spracovanie podľa zákona o dani z príjmov č. 595/2003 Z. z.

Daňové odpisy nezohľadňujú skutočný rozsah opotrebenia dlhodobého majetku ale stanovujú, akú sumu zo vstupnej ceny dlhodobého majetku v danom roku a to raz ročne, môže podnik uplatniť v daňových výdavkoch. Na rozdiel od účtovných odpisov, je možné daňové odpisy prerušiť a neskôr ďalej pokračovať, akoby k prerušeniu nedošlo. Možnosť prerušenia daňových odpisov je aj jeden z legálnych nástrojov daňovej optimalizácie.

Daňové odpisy predstavujú náklady, ktoré upravujú zdaniteľné príjmy na účely zistenia základu dane z príjmov, a tak odpisy sú vnímané ako možný zdroj financovania majetku podniku, a tým ovplyvňujú jeho finančnú situáciu.

2 Odpisy ako zdroj samofinancovania majetku podniku

Efektívne vykonávanie každej podnikateľskej činnosti si vyžaduje existenciu finančných zdrojov v podniku, ktoré môže podnik použiť na krytie kapitálovej a finančnej potreby. Na uvedené potreby podnik môže využiť cudzie a vlastné zdroje. K vlastným zdrojom financovania, konkrétne k interným zdrojom patria odpisy. Odpisy sú podstatným vnútorným zdrojom, ktoré slúžia na financovanie obnovy alebo rozšírenia dlhodobého majetku. Odpisy sú pre podnik nákladovou položkou započítanou do ceny produktov. To znamená, že hodnota odpísaného majetku sa do podniku postupom času vracia vo forme tržieb. Na konci doby životnosti dlhodobého majetku podnik prostredníctvom odpisov tak má zabezpečené finančné prostriedky na financovanie nového dlhodobého majetku. Z toho vyplýva, že odpisy sú trvalým zdrojom financovania a v niektorých prípadoch aj jediným zdrojom, ktorý nezávisí na stupni podnikovej efektívnosti (Šebo, 2021).

Odpisy sú zdrojom uvoľneného kapitálu. Postupnosť uvoľňovania kapitálu v podobe odpisov do dlhodobého majetku má za následok, že uvoľnené odpisy budú podnikom využité na reprodukciu dlhodobého majetku až po celkovom odpísaní (Fetisovová a kol. 2018). Využívanie odpisov formou uvoľneného kapitálu súvisí s používanou odpisovou metódou. Odpisy a ich samotná výška sa účtuje do nákladov a ovplyvňuje výsledok hospodárenia, ktorý predstavuje rozdiel medzi celkovými výnosmi a celkovými vynaloženými nákladmi podniku za stanovené obdobie. Je potrebné si uvedomiť, že odpisy pre podnik predstavujú náklad a nie peňažný výdavok. V danom účtovnom období pre podnik výška odpisov je súčasťou nákladov, ktoré priamo ovplyvňujú výsledok hospodárenia, čo pre podnik znamená aj nižší základ na vyčíslenie daňovej povinnosti. Odpisy znižujú dosiahnutý zisk podniku, ale na stav peňažných prostriedkov nemajú žiaden vplyv, to znamená, že ich neznižujú.

Každý podnik má možnosť voľby vhodnej metódy odpisovania majetku najmä z dôvodu vplyvu výšky odpisov na výsledok hospodárenia.

3 Vplyv odpisov na finančnú situáciu podniku

Pre neustále sa rozvíjanie podniku a snahu udržať sa v prostredí stále rastúcej konkurencie, je potreba finančných zdrojov nevyhnutná. Podniky využívajú rôzne formy financovania. Pri financovaní podniku z interných zdrojov má z kvalitatívneho hľadiska najväčší význam zisk, ale ani odpisy nie sú zanedbateľné, pomocou ktorých podnik získava finančné prostriedky na obstarávanie nového majetku, ktorý potrebuje pre svoju činnosť.

Odpisy a ich výška vplývajú na finančnú situáciu každého podniku. Sú vnímané ako jeden zo stabilných zdrojov samofinancovania potrieb podniku a majú dôležitý vplyv na základ dane, rentabilitu a samozrejme aj na podnikom dosiahnutý výsledok hospodárenia, pretože sú súčasťou nákladových položiek. Odpisy, ako zdroj samofinancovania, sú každému podniku neustále k dispozícii, a to i v takom prípade, že nedokázal vytvoriť zisk. Odpisy sú interným finančným zdrojom, pretože vznikajú hospodárskou i finančnou činnosťou podniku.

Pri financovaní z odpisov ide vlastne o cyklus, pri ktorom sa kalkuláciou odpisov do predajných cien výstupov podniku neobežné aktíva premieňajú na peniaze, ktoré má podnik k dispozícii dovtedy, kým neobstará nové neobežné aktíva ako náhradu za opotrebené. Predstavujú časť hodnoty, ktorá sa prenáša do nákladov, vykazuje sa vo výkaze ziskov a strát, a tým ovplyvňujú výsledok hospodárenia. Odpisy neovplyvňujú cash flow, lebo sú považované za nepeňažný náklad. Odpis je peňažným vyjadrením postupného opotrebovávania časti neobežného majetku, ktoré sa prenáša do hodnoty novovytvorených výkonov. Odpismi je vyjadrená výška hodnoty prenesenej v priebehu jedného roka. Prenesenú hodnotu za viac rokov odpisovania počas doby životnosti opotrebovaného majetku vyjadrujú oprávky. Oprávky predstavujú súčet odpisov, ktorým sa vyjadruje výška ceny odpisovaného majetku, ktorá už bola prenesená do nákladov a o túto sumu bola znížená účtovná hodnota dlhodobého majetku v súvahe.

Na finančné hospodárenie podniku má systém odpisovania významný vplyv. V prípade, že podnik bude odpisy ekonomicky správne využívať, môže ich uplatniť pri reprodukcii dlhodobého majetku, jeho modernizácií alebo inovácií. To však neznamená, že ich nemôže využiť aj na ďalšie nevyhnutné potreby. Odpisovanie dlhodobého majetku, či už hmotného alebo nehmotného, predstavuje dôležitý nástroj pre objektivizáciu výsledku hospodárenia (Suhányiová – Szalay – Fukerová, 2017). Podniky na konci účtovného obdobia porovnávajú účtovné odpisy účtované na nákladovom účte 551 Odpisy a daňové odpisy podľa zákona o dani z príjmov pre potreby správneho vyčíslenia základu dane.

Pri porovnaní účtovných a daňových odpisov na konci účtovného obdobia môžu nastať nasledujúce situácie:

• účtovné odpisy < daňové odpisy

V prípade, že účtovné odpisy sú nižšie ako daňové odpisy, podnik upravuje účtovný výsledok hospodárenia znížením o sumu, o ktorú sú daňové odpisy vyššie ako účtovné. To znamená, že podnik si uplatní položku znižujúcu základ dane.

• účtovné odpisy > daňové odpisy

V prípade ak sú účtovné odpisy vyššie ako daňové odpisy, podnik upravuje účtovný výsledok hospodárenia na základ dane pripočítaním sumy, ktorá prevyšuje účtovné odpisy nad daňovými.

• účtovné odpisy = daňové odpisy

Ak účtovné odpisy sa rovnajú daňovým odpisom, znamená, že podnik si nebude upravovať základ dane z titulu odpisov. Účtovné odpisy sa v plnej výške zahrnú do výsledku hospodárenia.

Najviditeľnejšie rozdiely medzi účtovými a daňovými odpismi vznikajú z miery opotrebenia, pretože účtovné odpisy vyjadrujú skutočnú mieru opotrebenia majetku, daňové odpisy nezodpovedajú skutočnej miere opotrebenia.

Z uvedených dôvodov podniky prehodnocujú metódy odpisovania, doby použiteľnosti a zostatkové hodnoty majetku ku dňu, ku ktorému sa zostavuje účtovná závierka, a podľa potreby uskutočňujú úpravy.

Na objasnenie rozdielu, ktorý môže vznikať pri porovnaní účtovných a daňových odpisov sme vybrali dlhodobý majetok zaradený do 2. odpisovej skupiny s dobou odpisovania 6 rokov, ktorý bol obstaraný a zaradený do majetku v roku 2018 v obstarávacej cene 79 000 €, ktorá je vstupnou cenou pre odpisovanie. Na výpočet účtovných odpisov daného majetku aplikujeme progresívnu metódu odpisovania. Účtovné odpisy pri progresívnej metóde odpisovania v prvých rokoch sú nižšie a postupne narastajú. Majetok v účtovníctve sa odpisuje do výšky vstupnej ceny, teda v našom prípade podľa vybranej metódy až 11 rokov.

Pre daňové odpisy uvádzame rovnomernú metódu odpisovania. Pri využití rovnomernej metódy odpisovania výška ročných odpisov v každom roku počas 6 rokov podľa doby odpisovania bude rovnaká.

V tabuľke 2 sú uvedené účtovné aj daňové odpisy vybraného dlhodobého majetku s vplyvom rozdielu na výsledok hospodárenia v jednotlivých rokoch odpisovania.

Tabuľka 2: Účtovné a daňové odpisy vybraného dlhodobého majetku

Rok	Vstupná cena	Účtovné odpisy (ÚO)	Daňové odpisy (DO)	Rozdiel ÚO a DO	Vzťah rozdielu k účtovnému výsledku hospodárenia pri úprave na základ dane (ZD)
2018	**79 000**	6 557,00	13 166,67	-6 609,67	Položka znižujúca ZD
2019	**79 000**	6 819,28	13 166,67	-6 347,39	Položka znižujúca ZD
2020	**79 000**	7 092,05	13 166,67	-6 074,62	Položka znižujúca ZD
2021	**79 000**	7 375,73	13 166,67	-5 790,94	Položka znižujúca ZD
2022	**79 000**	7 670,76	13 166,67	-5 495,91	Položka znižujúca ZD
2023	**79 000**	7 977,59	13 166,67	-5 189,08	Položka znižujúca ZD
2024	**79 000**	8 296,70		8 296,70	Položka zvyšujúca ZD
2025	**79 000**	8 628,56		8 628,56	Položka zvyšujúca ZD
2026	**79 000**	8 973,71		8 973,71	Položka zvyšujúca ZD
2027	**79 000**	9 332,66		9 332,66	Položka zvyšujúca ZD
2028	**79 000**	275,96		275,96	Položka zvyšujúca ZD
Spolu		**79 000,00**	**79 000,00**		

Zdroj: vlastné spracovanie

Z výsledkov v tabuľke 2 vyplýva, že účtovné odpisy podľa progresívnej metódy odpisovania majú rastúcu tendenciu. V prvých rokoch odpisovania sú nižšie a postupne narastajú. Pri porovnaní účtovných a daňových odpisov v rokoch 2018 až 2023, teda prvých šesť rokov, daňové odpisy sú vyššie ako účtovné, preto podnik v uvedených rokoch tento rozdiel odpočítava od účtovného výsledku hospodárenia, čím znižuje základ dane aj daňovú povinnosť. Ako je zrejmé z tabuľky 2, najvyššiu sumu môže podnik odpočítať v prvom roku odpisovania, kedy výška účtovných odpisov ja najnižšia. Počas doby odpisovania sa účtovné odpisy zvyšujú, a tak podnik odpočítava pri úprave výsledku hospodárenia na základ dane za nasledujúce roky stále nižšiu sumu, čo samozrejme zvyšuje daňovú povinnosť podniku a nepriaznivo ovplyvňuje jeho finančnú situáciu.

Graf 1: Zobrazenie účtovných a daňových odpisov

Zdroj: vlastné spracovanie podľa výsledkov tabuľky 2

Pri porovnaní účtovných a daňových odpisov v posledných piatich rokoch pozorujeme aj v grafickom zobrazení, že účtovné odpisy sú vyššie ako daňové. Keďže dlhodobý majetok sa odpisuje do výšky vstupnej ceny, tak pri tejto metóde odpisovania bude potrebné vykonať odpisovanie majetku aj v 11. roku životnosti, t. j. v roku 2028, kde sa ešte doúčtuje rozdiel vo výške 275,96 € na vyrovnanie vstupnej ceny dlhodobého majetku.

Využitie progresívnych odpisov môže byť napríklad pri dlhodobom majetku, ktorého výkon alebo využiteľnosť je v prvých rokoch najnižšia a postupne rastie. Je to druh odpisov, ktorý je vhodný vtedy, ak podnik chce v prvých rokoch znížiť svoje náklady a v posledných rokoch odpisovania naopak znížiť svoj dosahovaný výsledok hospodárenia.

ZÁVER

Pri výbere vhodnej metódy odpisovania je dôležité poznať vlastnosti každého majetku a výšku jeho opotrebenia v jednotlivých rokoch životnosti. Základným východiskom uplatnenia progresívnej metódy odpisovania je predpoklad, že efektívnosť stálych aktív sa zvyšuje. To znamená, že postupný rast účtovných odpisov je kompenzovaný rastom tvorby zisku. Táto forma odpisovania je vhodná pre podniky, ktoré sú v etape rozšírenej reprodukcie prevádzkového cyklu. Pri progresívnej metóde odpisovania je výška odpisov v prvých mesiacoch nižšia a postupne narastá. Táto metóda sa využíva napríklad pri strojoch, ktoré majú v prvých mesiacoch obmedzenú výkonnosť a s narastajúcim počtom mesiacov používania budú plne zabehnuté a výkonné. Aplikácia tejto metódy odpisovania, sa neodporúča podnikom, ktoré dlhodobo vykazujú stratu.

Bibliografia

FETISOVOVÁ, Elena a kol. Podnikové financie: praktické aplikácie a zbierka príkladov. 3. vyd. Bratislava: Wolters Kluwer SR s. r. o., 2018. 224 s. ISBN 978-80-8168- 790-7

MAJDÚCHOVÁ, Helena a kol. Podnikové hospodárstvo. 1. vyd. Bratislava : Wolters Kluwer, 2018. 422 s. ISBN 978-80-8168-806-5.

MAJDÚCHOVÁ, Helena a kol. Podnikové hospodárstvo. 2. vyd. Bratislava: Wolters Kluwer SR s. r. o., 2020. 424 s. ISBN 978-80-571-0271-7.

MAJDÚCHOVÁ, Helena a kol. Podnikové hospodárstvo. Praktické príklady a kontrolné testy. 2. vyd. Bratislava: Wolters Kluwer SR s. r. o., 2020. 304 s. ISBN 978- 80-571-0164-2.

MAJDÚCHOVÁ, Helena – RYBÁROVÁ, Daniela. Podnikové hospodárstvo pre manažérov. 1. vyd. Bratislava: Wolters Kluwer SR s. r. o., 2019. 272 s. ISBN 978-80-571- 0035-5.

ŠEBO, Alexander. Podnikové financie. 5. vyd. Nitra: Vydavateľstvo SPU v Nitre, 2021. 178 s. ISBN 978-80-552-2304-9.

SUHÁNYIOVÁ, Alžbeta – SZALAY, Zoltán – FUKEROVÁ, Anna. 2017. Účtovné odpisy dlhodobého majetku a ich vplyv na výsledok hospodárenia podniku. Journal of Global Science. [online]. 1-10. [cit. 2022-02-15]. ISSN 2453-756X. Dostupné z: http://www.jogsc.com/pdf/2017/2/uctovne_odpisy.pdf

Zákon č. 431/2002 Z. z. o účtovníctve v znení neskorších predpisov

Zákon č. 595/2003 Z. z. o dani z príjmov v znení neskorších predpisov

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Tax cooperation in the world and the change of information by international experts

Spolupráca v daňovej oblasti a výmena informácií medzinárodnými odborníkmi

Jana Simonidesová, Adela Feranecová

Abstrakt

Daňový systém je jednou z najdôležitejších oblastí pri formovaní trhovej ekonomiky a tvorí súhrn všetkých daní, ktoré sa vyberajú na konkrétnom území. Znalosť daňového systému je preto pre každého jedného občana veľmi dôležitá. V súčasnosti je spolupráca medzi štátmi veľmi dôležitá nielen v daňovej oblasti, ale aj v ekonomických a politických otázkach. Čoraz viac sa vo svete stretávame s daňovými únikmi a podvodmi, preto je veľmi dôležité proti nim spoločne bojovať prijímaním rôznych opatrení, nariadení a pod. V posledných rokoch je EÚ spolu so svojimi členskými štátmi postupne nútená zaujať dôraznejší postoj voči rastúcemu trendu daňových podvodov, daňových únikov a vyhýbania sa daňovej povinnosti. V článku sa zameriavame na pojmy ako daňová spolupráca, inštitúcie, ktoré bojujú proti daňovým únikom a medzinárodná spolupráca odborníkov. Aplikačná časť obsahuje konkrétne kroky v boji proti daňovým únikom v rámci USA, EÚ a OECD.

Kľúčové slová

Daňová spolupráca, kooperácia, daňové úniky

Úvod

V príspevku sa venujeme vymedzeniu pojmov daňovej kooperácie a priblížením inštitúcií v boji proti únikom na daniach. Ide konkrétne o OLAF a OECD. V ďalšej časti vysvetľujeme medzinárodnú výmenu informácií a automatickú výmenu informácií. Aplikačná časť príspevku obsahuje boj proti daňovým únikom z pohľadu USA, OECD a Európskej únie.

1 Daňová kooperácia

Pojem daňová kooperácia znamená spoluprácu jednotlivých štátov sveta. Predstavuje vzájomné dohody a výmenu informácií a tiež pomoc v otázkach ohľadom daní. Štáty, sa v poslednom období zamerali na efektívnejší výber daní hlavne cez boj proti daňovým únikom. V dnešnej dobe poznáme inštitúcie, ktoré sa zaoberajú bojom proti úniku na daniach. Medzi tieto inštitúcie patrí OLAF – Office européen de lutte anti-fraude (Európsky úrad pre boj proti

podvodom) a OECD – Organisation for Economic Cooperation and Development (Organizácia pre hospodársku spoluprácu a rozvoj).

OLAF – Európsky úrad pre boj proti podvodom
Je úradom Európskej komisie. Cieľom OLAF je vyšetrovanie podvodov v súvislosti s rozpočtom Európskej únie, korupcie a porušenie pravidiel v rámci európskych inštitúcií. (EURACTIV Slovensko, 2019)

Úrad bol zriadený v roku 1999 Európskou komisiou a sídlo má v Bruseli v Belgicku. Pri vyšetrovaní sa sústreďuje na výdavky a príjmy EÚ. Rieši oprávnenosť finančných prostriedkov a druhov výdavkov EÚ. Tiež kontroluje oblasti príjmov, hlavne colné poplatky. (EURACTIV Slovensko, 2019)

OECD – Organizácia pre hospodársku spoluprácu a rozvoj
Je medzivládna organizácia, do ktorej patrí 38 najrozvinutejších krajín sveta, ktoré prijali princípy demokracie a trhovej ekonomiky. Založená bola v roku 1961. Vznikla pretransformovaním sa z Organizácie pre hospodársku spoluprácu. Slovenská republika je od roku 2000 členom OECD.

Cieľom OECD je koordinácia ekonomickej a sociálno-politickej spolupráce členských štátov. Sprostredkúva nové investície a presadzuje liberalizovanie medzinárodného obchodu. Medzi hlavné orgány patrí rada, ktoré je zložená z ministrov, ktorí sú zástupcovia členských štátov, výkonného výboru a sekretariátu na čele s generálnym tajomníkom. (OECD, 2021)

Daňovú kooperáciu, teda daňovú spoluprácu pri správe daní, definujeme ako vzájomnú výmenu informácií a s tým súvisiaci spoluprácu alebo inú pomoc v záujme zabezpečovania vyrubovania daní a ich platenie medzi orgánom Slovenskej republiky a úradom zmluvného štátu na základe medzinárodných zmlúv, ktoré boli vyhlásené spôsobom, ktorý ustanovuje zákon a na základe právneho aktu Európskej únie a Európskych spoločenstiev.

Spolupráca medzi krajinami pri správe daní sa vzťahuje na:

- Daň z nehnuteľností,
- Daň z príjmov,
- Daň z darovania, dedičstva, z prevodu a prechodu nehnuteľností pokiaľ nezaniklo právo vyrubiť daň,
- Dane, ktoré sú v zmluvnom štáte a majú podobný charakter ako vyššie dane,
- Ďalšie dane, ak túto spoluprácu upravuje medzinárodná zmluva.

Aj keď sa Európska únia snaží o maximálne zladiť daňové systémy štátov, existujú viaceré stupne spolupráce. Môžeme ich rozdeliť:

- Daňová koordinácia – predstavuje najnižšiu formu spolupráce štátov EÚ.
- Daňová harmonizácia – predstavuje najvyšší stupeň zjednotenia daňových sústav s rovnakými pravidlami Európskej únie.
- Daňová aproximácia – vyjadruje smer daňovej spolupráce, ktorá nemusí skončiť absolútnou zladenosťou dane štátov. Nemusia vyť dodržané jednotné podmienky pri daňovej sadzbe, stačí ak sa daňové základy vzájomne približujú.

2 Medzinárodná výmena daňových informácií

Medzinárodná výmena daňových informácií medzi orgánmi členských krajín výraznou mierou môže znižovať daňové úniky. Najvýznamnejším efektom, ale nepriamym a nevyčísliteľným je podpora dobrovoľného plnenia a jej preventívny účinok. Efektívny a funkčný systém výmeny informácií medzi členskými krajinami vytvára pre daňové subjekty zabraňujúci účinok.

Členské krajiny musia dodržiavať normy, ktoré sa týkajú dobrej správy a sú rovnocenné s normami Európskej únie, aby bol boj proti daňovým únikom účinný. Pri tomto majú dôležitý význam poverenia, o ktoré požiadala Komisia na účel rokovania o prísnejších úsporách a dohodách.

Automatická výmena informácií

Definíciou automatickej výmeny informácií je: „systematické oznamovanie vopred určených informácií bez predchádzajúcej žiadosti vo vopred určených pravidelných lehotách“. (Babčák, 2019)

Podstatou výmeny informácií je predchádzanie daňovým únikom. Dôležitým dokumentom je Smernica Rady 16/2011/EÚ, ktorá má päť novelizácii a poznáme ju ako Smernicu DAC. Posledná novela rieši výmenu informácií týkajúcu sa cezhraničných opatrení. (Szakács, 2021)

Kvôli rozšírenej digitalizácii sa predpokladá efektívnejšia spolupráca pri výmene informácií medzi krajinami. Potenciál na zvýšenie transparentnosti v daňovej oblasti cez výmenu informácií prostredníctvom digitálnych platforiem má práve využívanie technológií, napr. blockchain.

3 Výsledky

Boj proti únikom na daniach v USA

V USA je najvýznamnejším zákonom, ktorý sa dotýka daní Internal Revenue Code (IRC), ktorý obsahuje procesnoprávnu a hmotnoprávnu úpravu. Od prijatia tohto zákona vypĺňajú vlády medzery a vytvárajú opatrenia a dávajú sankcie tak, aby odlákali čo najviac subjektov od úniku na daniach. Niektoré štáty dokonca majú verejný zoznam daňových podvodníkov.

V USA sa o vyberanie daní stará daňová služba Spojených štátov, nazýva sa Internal Revenue Service (IRS). IRS má právo vyšetrovať daňové priznanie ktoréhokoľvek subjektu na odhalenie daňového úniku. (eFile, 2023)

Foreign Account Tax Comliance Act – „FACTA“

Je to novela IRC, za účelom zmapovať a zistiť účty amerických klientov u inštitúcií v zahraničí, aby odhalili vzniku daňových únikov u klientov, ktorý majú kapitál uložený mimo USA. Každoročne majú klienti povinnosť informovať IRS o svojich amerických účtoch. Povinnosť nahlasovať tieto údaje je od 50 000 dolárov. (IRS, 2021)

Boj proti únikom na daniach v rámci OECD

OECD sa prispôsobuje trendom, ktoré súvisia s globalizáciou medzinárodných obchodov a daňovými únikmi. Reaguje na vývoj daňových únikov prostredníctvom rôznych opatrení. (OECD, 2022a)

Štandard pre automatickú výmenu informácií v daňovej oblasti (AEOI) je významným opatrením OECD. Je dôležité, aby finančné správy krajín spolupracovali, a aby bolo zabezpečené, že daňové subjekty odvádzajú dane v správnej krajine. Od roku 2014 je táto automatická výmena informácií všeobecným štandardom v rámci OECD. Inštitúcie majú povinnosť nahlasovať informácie o:

- investičných príjmoch,
- podieloch v obchod. Spoločnostiach a o výnosoch z predaja podielov,
- zostatkoch na účtoch, depozitoch a informáciách o ostatných aktívach,
- identifikačných údajoch majiteľov. (OECD, 2022b)

Štandard AEOI obsahuje zložky:

1. ***Common reporting Standard (CRS)*** – spoločný štandard pre oznamovanie v oblasti fin. účtov obsahuje:
- informácie, ktoré sa majú vymieňať,
- finančné inštitúcie, ktoré musia vytvárať report,
- subjekt, o ktorom sa informácie musia udeľovať,
- procedúry, podľa ktorých sa majú identifikovať účty, za ktoré sa vytvára report.
2. ***Competent Authority Agreement (CAA)*** – dohoda o automatickej výmene informácií, je to model zmluvy s podrobnými pravidlami na výmenu informácii medzi krajinami. Zmluva môže byť jednostranná alebo viacstranná. Základom je zmluva o zamedzení dvojitého zdanenia alebo zmluva o vzájomnej správnej pomoci v daňových záležitostiach. (OECD, 2022b)

Boj proti únikom na daniach v rámci Európskej únie

Európska únia sa už od začiatku riadi zásadami dobrej správy daňových záležitostí: spravodlivú hospodársku súťaž, automatickú výmenu informácií a transparentnosť. Európska únia vytvára nástroje, ktoré majú pomôcť v boji proti daňovým únikom. Ide o:

1. Právne predpisy Európskej únie
- prostredníctvom nariadení a smerníc sa snaží o transparentnosť a výmenu informácií,
- Európska únia nevytvára vlastné pravidlá, ale prispôsobuje sa nastoleným trendom.
2. Odporúčania členským štátom – obsahujú postupy proti agresívnemu daňovému plánovaniu
3. Osobitné akčné plány Európskej Komisie (2013).

ZÁVER

Daňové úniky sú reálnou súčasťou demokraticky vyspelých krajín, keďže stále neexistuje optimálny daňový systém (neexistuje absolútna daňová spravodlivosť) a taktiež motívy konania daňových subjektov sú variabilné. Eliminovať daňové úniky a daňové podvody úplne nie je možné, ale potrebné je ich aspoň minimalizovať,

V príspevku sme priblížili pojmy daňová kooperácia a špecifikovali inštitúcie, ktoré sa zaoberajú daňovým únikom. V ďalšej časti sme teoreticky vymedzili medzinárodnú výmenu informácií a automatickú výmenu informácií. V aplikačnej časti sme priblížili boj proti daňovým únikom v rámci USA, OECD a EÚ.

Bibliografia

BABČÁK, V., 2019. Daňové právo na Slovensku a v EÚ, Bratislava: EPOS, 2019. ISBN 9788056202470.

eFile, 2023. Tax evaders tax cheaters tax evasion. [online]. [cit. 15. septembra 2023]. Dostupné z: http://www.efile.com/tax-evaders-tax-cheaters-tax-evasion/

EURACTIV Slovensko, 2019. OLAF. [online]. [cit. 15. septembra 2023]. Dostupné z: https://www.europskaunia.sk/olaf

EURÓPSKA KOMISIA, 2013. Boj proti daňovým podvodom a únikom. 2013 [online]. [cit. 15. septembra 2023]. Dostupné z: http://www.c.europa.eu/europe2020/pdf/tax_sk.pdf

IRS, 2021. Whistleblower Informant Award. [online]. [cit. 15. septembra 2023].Dostupné z: https://www.irs.gov/uac/Whistleblower-Informant-Award/

OECD, 2021. About. [online]. [cit. 15. septembra 2023]. Dostupné z: https://www.oecd.org/about/

OECD, 2022a. BEPS Action Plan. [online]. [cit. 15. septembra 2023]. Dostupné z: www.oecd.org/ctp/BEPSActionPlan.pdf/

OECD, 2022b. Exchange of tax information. [online]. [cit. 15. septembra 2023]. [cit. 15. septembra 2023]. Dostupné z: http://www.oecd.org/ctp/exchange-of-tax-information/taxtransparency_G8report.pdf

Slovensko.sk, 2023. Medzinárodná pomoc a spolupráca daní. [online]. [cit. 15. septembra 2023]. Dostupné z: https://www.slovensko.sk/sk/agendy/agenda/_medzinarodna-pomoc-a-spolupraca/

SZAKÁCS, A., 2021. Výmena informácií na účely správy daní so zameraním na smernicu DAC 6 v podmienkach Slovenskej republiky. In: Bulletin Slovenskej komory daňových poradcov. No. 1. ročník 2021.

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The use of python programming language in multi-criteria business evaluation - a theoretical perspective

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Abstract

This paper deals with the use of Python programming language in multi-criteria enterprise assessment. Multi-criteria enterprise assessment is an important tool for managers and analysts in decision making and evaluating enterprise performance. With the increasing complexity of the business environment and rising customer expectations, it is important to ensure that decisions are objective and based on multiple criteria. The Python programming language has now become one of the most popular languages in the field of data analytics. Its wide range of libraries and tools enable efficient processing and analysis of large volumes of data, making it an ideal candidate for implementing multi-criteria business assessments. In this article, we describe three Python programming language libraries that are suitable for multicriteria analysis. The libraries include multicriteria analysis methods, criteria weighting models, ranking/best alternative determination models, and result visualization models. Python makes it easy and fast to retrieve data from a wide range of sources, analyse it, and then transform it into information that managers and analysts can use to compare different models and comprehensively evaluate an enterprise.

Key words

AHP, DEA, Multicriteria analysis, PROMETHEE, Python, Python libraries, TOPSIS

Introduction

The classical evaluation of an enterprise on the basis of one criterion is currently no longer sufficient and therefore business managers have turned their attention to multi-criteria analysis of the enterprise, which represents a comprehensive approach to evaluating the performance of the enterprise. In the context of growing competition, constantly changing conditions of the business environment and increasing demands from customers, multi-criteria analysis of the enterprise allows to provide an overview of the current situation and to identify opportunities for improvement and development. The importance of multicriteria analysis, as opposed to traditional financial analysis, lies in its ability to take into account not only financial indicators but also intangible factors that can have a decisive impact on the performance and competitiveness of the enterprise. In practice, several methods of multicriteria analysis are available, which differ in their procedures, approaches and results. The most well-known and widely used methods include Analytic Hierarchy Process (AHP), Technique for Order of

Preference by Similarity to Ideal Solution (TOPSIS), Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE), and many others.

Conducting a multi-criteria analysis of a business can be costly for businesses if the business conducts it through experts. However, there is now a less costly solution, namely, conducting the multi-criteria analysis by one of the managers of the enterprise. The Python programming language has the libraries and tools needed for multicriteria analysis of business evaluation. Due to its ease of use, businesses do not need to hire experts but can comprehensively evaluate the enterprise on their own. The main advantages are that Python allows easy integration with existing systems and data sources, which reduces implementation and maintenance costs and reduces the time to perform the analysis.

1 Current method used in multi-criteria enterprise assessment

As we have mentioned, with the current changes in the business environment, classical financial analysis is no longer sufficient because traditional methods of financial analysis often provide only a limited view of the company's situation and do not take into account important aspects such as customer satisfaction, product and service quality, innovation, environmental sustainability, and others. Multicriteria analysis allows these critical factors and their interrelationships to be included in the overall assessment.

The term multicriteria decision methods (MCDM) refer to the set of analytical methods used in multicriteria analysis. They are primarily used in multi-criteria decision making, where the objective is to determine the best alternative by considering more than one criterion. According to Sotoudeh-Anvari (2022), we divide MCDM methods into two groups with respect to the decision space: multiple attribute decision making (MADM) and multiobjective decision making (MODM). Multiple Attribute Decision Making (MADM) methods are used for discrete decision problems with predetermined alternatives. Multiobjective Decision Making (MODM) methods are used to solve continuous problems where the number of alternatives is infinite. However, in the literature, one may come across the fact that the term MCDM is confused with MADM.

To find the best solution among the possible alternatives evaluated based on several conflicting criteria, both quantitative and qualitative, we can use several classical MCDM methods such as AHP, ANP, TOPSIS, VIKOR, PROMETHEE, GRA, DEMATEL and others. Several researchers have tried to develop new MCDM methods to solve real life problems with different characteristics, e.g., COPRAS, WASPAS, BWM, SWARA, MULTIMOORA, SODOSM, ARAS, OPA, MARCOS, and GLDS (Sotoudeh-Anvari, 2022). The wide range of MCDM methods creates a sense of uncertainty in users because they do not know which method is appropriate for their research. In his work, Dožić (2019) pointed out that the application of any of the MCDM methods depends on the problem we want to solve and the availability of the data we use to solve it.

Due to the advantages, robustness and more sophisticated evaluation, a combination of several techniques such as fuzzy cognitive map (FCM) and data envelopment analysis (DEA) or a hybrid of best and worst (BWM) and TOPSIS method has started to be used. (Abdel-Basset et al., 2020)

The Analytic Hierarchy Process (AHP) method is the method of choice for considering expert judgments to rank decision options and is the most used technique for prioritizing key performance indicators in performance measurement. (Ho, Ma, 2018; Lima-Junior, Carpinetti, & Carpinetti, 2017) Since the use of the AHP method is mostly applied to compare a small number of problems researchers decided to investigate its use in combination with other methods. De Felice et al. (2015) used the AHP in combination with the Balanced Scorecard (BSC), De Castro Vivas et al. (2019) used a model in which they combined the AHP and the Preferential Ranking Organization Method for Evaluation Enrichment (PROMETHEE). Shete et al. (2020) combined AHP with Pythagorean fuzzy sets.

Liu et al. (2017) describe TOPSIS as an MCDM method that is used to find and prioritize the best solution from a set of alternative solutions using similarity. TOPSIS considers decision ambiguity and is used to select the best alternative solution using interrelated relational criteria derived from a limited set of decision solutions. It is widely used because it is easy to implement and logical. (Magableh, Mistarihi, 2022)

Data envelopment analysis (DEA) method is an effective tool for evaluating decision making with multiple inputs and outputs. DEA has wide applications in many fields due to its nonparametric and objective characteristics. (Azad, Moshkov, 2017) The DEA method has three models, the first model is CCR named after the researchers who developed it. This model assumes constant returns, that is, if there is an increase in production inputs proportionally the outputs will also increase. The second model is the BCC, which, unlike the previous model, assumes variable returns, i.e., there is no proportional increase in outputs when inputs increase. Three possibilities can occur (1) yields increase, (2) yields decrease, and (3) yields remain constant. The third model is the SBM the latter differs from the traditional CCR and BCC models in that it incorporates spare capacity variables into the objective function and the optimal solution shows that there are too many inputs or too few outputs for any process. (Sun, Zhang, & Mao, 2022) Due to the widespread use of the DEA method over the years, researchers have developed several combinations of DEA and other MCDM methods. Rakhshan (2017) integrated the advantages of DEA methods and developed the TOPSIS-DEA evaluation approach. Rouyendegh et al. (2019) proposed the DEA-FAHP method to assess hospital efficiency. Chen et al. (2022) combined DEA with the DTRS model and developed a new three-way decision-making method based on the DEA model with interval data.

PROMETHEE is one of the multicriteria decision making methods that solves complex decision problems efficiently. The original PROMETHEE I method has evolved and the current version PROMETHEE II allows the parameters to be flexibly adjusted according to the needs and preferences of the decision maker, providing complete alternatives, and offering an advantage over other types of decision methods in computational complexity. (Tong et al., 2022; Amaral, Costa, 2014) The method can express the ambiguous and uncertain information in the decision environment, but it also provides a simple tool to solve the evaluation problem. To obtain the objective weights of evaluation criteria, researchers use the maximum deviation method to calculate the relative importance of criteria. (Liu and Li, 2018)

2 Python

The Python programming language is very appealing to many scientists, developers and programmers. Since its development in 1991, it has become one of the most popular interpreted

languages along with Perl, Ruby and others. Among interpreted languages, a large and active Python community of scientific computing and data analysis has emerged. Over the past 10 years, Python has transformed from a bleeding-edge or "at your own risk" language for scientific computing to one of the most important languages for data science, machine learning, and general software development in academia and industry. For data analysis and interactive computation and data visualization, Python is inevitably compared to other widely used open source and commercial programming languages and tools such as R, MATLAB, SAS, Stata, and others. In recent years, Python has become a popular choice for data analysis tasks due to better library support (e.g., pandas and scikit-learn). (McKinney, 2018)

- Compared to other programming languages, Python has several advantages Teoh and Rong (2022) list among them:
- Simple syntax and better understandability - this makes it easy to use and easy to learn even for new data scientists.
- It provides a number of tools to invoke data.
- Plenty of libraries - it has a number of useful and easy to use libraries that are an important tool for data scientists.
- Wide range of uses - in addition to software development and web development, it is suitable for data analysis, numerical and logical data calculations.

Data analysis is an essential part of data science. Data analytics tools provide information on various frameworks that are important to assess performance in any enterprise. Python programming language is the best choice for creating data analysis tools. It can easily provide better knowledge, get examples and correlate data from large sets. Moreover, it is significant in self-service analytics. (Teoh and Rong, 2022)

Using Python

As mentioned above Python is used in several areas due to its simplicity and versatility. According to Srinath, Adawadkar, and QuantInsti (2017), it is used by novice programmers as well as highly skilled professional developers. It is used in academia, web companies, large corporations, and financial institutions. Saabith, Fareez, and Vinothraj (2019) list eight common applications of Python today. According to them, these include:

- Python applications in web frameworks and applications.
- Python application in desktop with graphical user interface.
- Python application in image processing and graphic design.
- Application of Python in scientific and computational applications.
- Application of Python in games and 3D graphics.
- Application of Python in software development.
- Applications of Python in business.
- Applications of Python in language development.

Python libraries used for multi-criteria evaluation

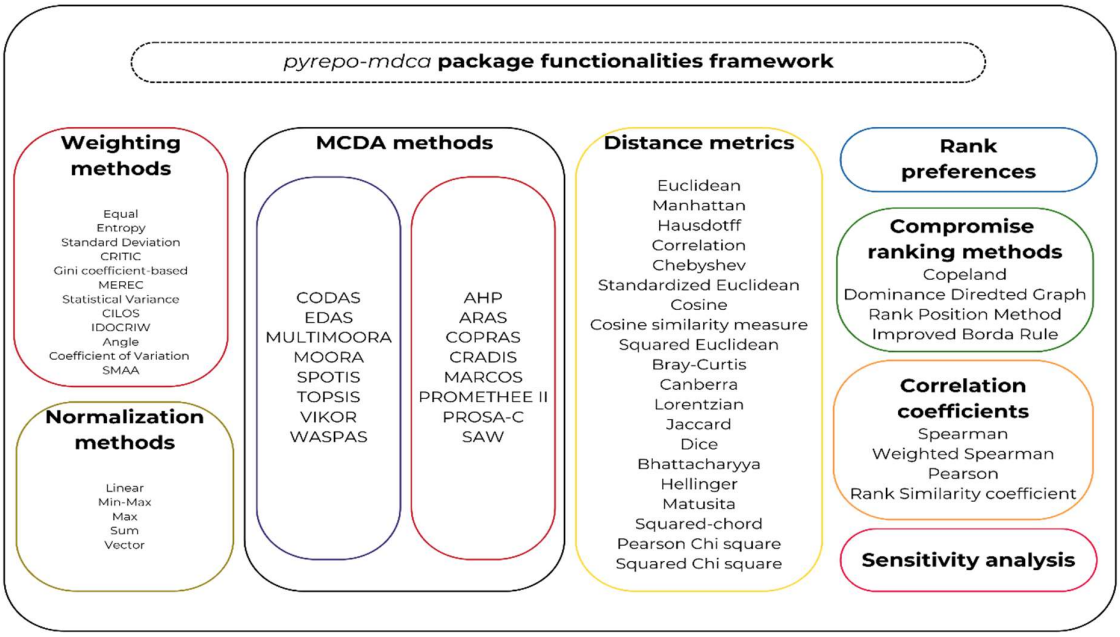
Python offers users several features that are available in the built-in libraries it works with. Although Python libraries offer a wide variety of functionality and uses, they cannot cover all needs. Python therefore provides several mechanisms to complement the standard libraries with additional libraries and frameworks.

For multicriteria analysis, `pyrepo-mcda, pymcdm, crispyn` are used. These libraries have tools implemented in them to enable multicriteria analysis. They contain the above multicriteria analysis methods along with the necessary subpackages such as sensitivity analysis, methods for determining the significance of criteria, methods for determining distance, graphical visualization of results, etc.

Library - `PyPREPO-MCDA`

The PyREPO-MCDA library was designed by Bączkiewicz, who, together with Wątróbski and Sałabun (2022), describes the architecture of the library in their work as follows: the "`pyrepo-mcda`" package contains a module in which MCDA methods and other modules with methods supporting multi-criteria analysis are embedded. The "`rank_preferences`" methods provide the ability to sort alternatives by preference value in both ascending and descending order depending on the MCDA method algorithm. It also considers the possibility of ties for alternatives that receive the same score. The "`compromis_rankings`" methods provide the ability to find a uniform compromise ranking based on the rankings obtained by the selected MCDA methods. This module contains four compromise ranking strategies: 1. "`Copeland`", 2. "`dominance_directed_graph`", 3. "`rank_position_method`", 4. "`improved_borda_rule`". The weighting methods module includes four objective criteria weighting methods: 1. "`equal_weighting`", 2. "`entropy_weighting`", 3. "`critic_weighting`", and 4. "`std_weighting`". The sensitivity analysis consists of two methods: "`sensitivity_analysis_weights_percentages`", a sensitivity analysis concerning the percentage modification of the weight of the selected criterion, and "`sensitivity_analysis_weights_values`", a sensitivity analysis concerning the adjustment of the selected values and the selected weights of the criteria. The architecture of the updated library is shown in Figure 1.

Figure 1: Architecture of the updated PyPREPO-MCDA library



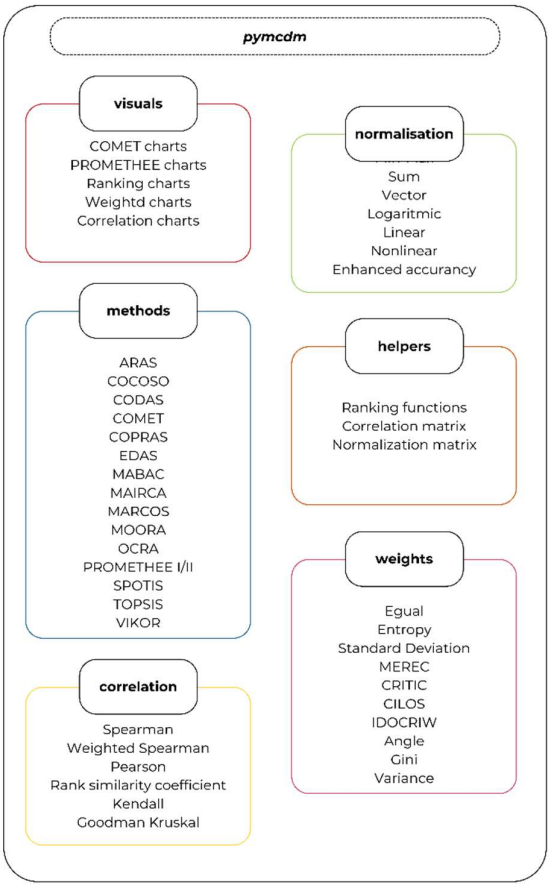
Source: Wątróbski, Bączkiewicz a Sałabun (2022)

The PyREPO-MCDA library uses Python's integrated "`numpy`" library as a base. NumPy is a library that supports working with multidimensional arrays, mathematical operations, and linear algebra. Since it is based on working with arrays it is necessary to input data in the form of a matrix, which it then works with. For files with large amounts of data, this procedure is time consuming and illogical. Therefore, it is possible to use another integrated Python library "`pandas`", which uses the function "`data_frame`" to create an array from the CSV file, which we can further work with.
The PyREPO-MCDA library is available in the Python Package Index (PyPI) central package repository. PyPI is the official repository for Python packages, containing thousands of libraries and tools that can be easily downloaded and installed using the Python package manager, which is usually pip (Package Installer for Python). To install any library from the PyPI site, use the following command: "`pip install library_name`". The author has also made this library available on GitHub, where it can be downloaded and installed. However, installing via GitHub requires more steps than installing directly from PyPI. Currently (2023), the current version of `pyrepo-mcda is 0.1.3`.

Library – `PyMCDM`

According to Kizielewicz, Shekhovtsov and Sałabun (2023), the "`pymcdm`" library is designed to solve decision problems with the characteristics of evaluating alternatives, determining the importance of criteria, sensitivity analysis, similarity analysis and determining optimal solutions. Its architecture consists of six modules, of which, like the above library, one contains fifteen MCDM methods and the others contain methods supporting multicriteria analysis. The weights module contains the methods needed to select the weights associated with decision problems based on which the relevance of the decision criteria is determined. The normalization module contains functions related to the normalization of criteria so that they can be considered together in the decision process regardless of their actual ranges. The correlations module works with correlation coefficients that can be used to determine the similarity of the ratings obtained from the methods. The helpers module is used to determine the ranking and for the normalization and correlation matrices. The last model is the visualization model, which can be used to present the results in graphical form. (Kizielewicz, Shekhovtsov and Sałabun, 2023) The architecture of the updated library is shown in Figure 2.

Figure 2: Architecture of the updated PyMCDM library



Source: Kizielewicz, Shekhovtsov a Sałabun (2023)

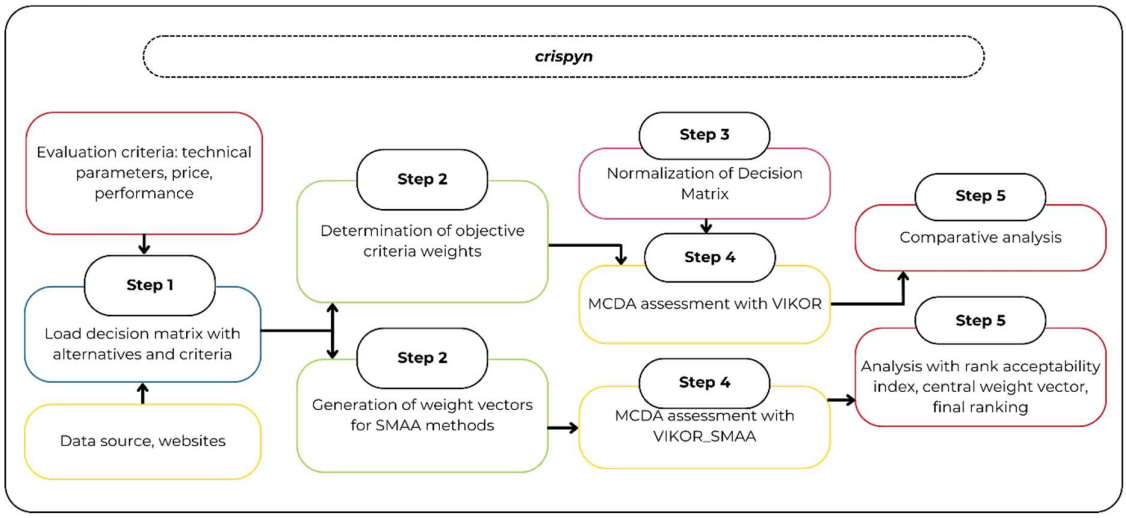
Since its development, the library has undergone several updates that have improved its quality and expanded its functionality. Currently (2023), the current version is "`pymcdm 1.1.0`", which was released on September 15, 2022.

The libraries "`numpy`", which is used for mathematical calculations, and "`matplotlib`", which can be used to visualize the results, are the main basis for "`pymcdm`". an array that we can further work with. The "`pymcdm`" library is available in the central PyPI package repository.

Library – `CrispyN`

According to Bączkiewicz and Wątróbski (2022), the main contribution of the crispyn library in miltcriteria analysis is the implementation of eleven objective criteria weighting methods and five normalization techniques. It also has the advantage of being based on Stochastic Multicriteria Acceptability Analysis (SMAA) methods, which allow problems to be solved or decided with a certain degree of uncertainty and variability. Classical multicriteria analysis methods assume that the criteria are precisely known and have no degree of uncertainty. The library contains three correlation coefficients that compare the generated scores. It also has built-in visualisation methods to display result graphs or simulations. The architecture of the crispyn library is shown in Figure 3.

Figure 3 Architecture of the library CrispyN



Source: Bączkiewicz, Wątróbski (2022)

This library works with decision matrix, weight vector matrix and criterion types. The first step is to generate the weight vectors using the "`generate_weights`" function. In this function, a central weight vector and a rank score are generated using simulation. Then, a ranking is created and compiled based on the generated weights. Next, the counters of the respective ranks are incremented relative to the alternatives. When an alternative obtains a rank the weight vector is added to its summary weight vector. The ranking function gives the alternatives a final rank by assigning a value of 1 to each alternative if it has better preference values than all other alternatives.

The current version (2023) is "`crispyn 0.0.2`", which was released on June 26, 2022. The "`crispyn`" library is available in the PyPI central package repository.

All the above libraries are compatible with the Python programming language version 3. If using the "`pyrepo-mcda`" and "`crispyn`" libraries, Python version 3.4 and higher is required. For the "`pymcdm`" library, Python version 3.8 and higher is required.

CONCLUSION

With the increasing availability of data and advances in analytical techniques, multicriteria analysis will be used even more widely and effectively. The use of the Python programming language in this area includes speed, flexibility, and ease of implementation of results. The use of the Python programming language and its libraries in multicriteria analysis brings significant advantages as it provides a comprehensive solution. With the help of Python and its libraries, the user can perform multicriteria analysis without the need for additional programs. The main advantage of using the Python programming language is the simplicity of its syntax and its rich documentation, which is accessible to everyone from beginners to experienced programmers and data scientists. Regular updates to the libraries and the programming language itself are

another advantage, as they will help to eliminate bugs in the code, improve usability and extend features.

Bibliography

ABDEL-BASSET, Mohamed. - MOHAMED, Rehab. - SALLAM, Karam. – ELHOSENY, Mohamed. A novel decision-making model for sustainable supply chain finance under uncertainty environment. In: Journal of Cleaner Production. 2020. Vol. 269. ISSN 0959-6526. DOI: https://doi.org/10.1016/j.jclepro.2020.122324.

AMARAL, Thiago M. - COSTA, Ana P.C. Improving decision-making and management of hospital resources: An application of the PROMETHEE II method in an Emergency Department. In: Operations Research for Health Care. 2014. Vol. 3, Is. 1. ISSN 2211-6923. DOI: https://doi.org/10.1016/j.orhc.2013.10.002.

AZAD, Mohammad, - MOSHKOV, Mikhail. Multi-stage optimization of decision and inhibitory trees for decision tables with many-valued decisions. In: European Journal of Operational Research. 2017. Vol. 263, Is. 3. ISSN 0377-2217. DOI: https://doi.org/10.1016/j.ejor.2017.06.026.

BĄCZKIEWICZ, Aleksandra. – WĄTRÓBSKI, Jarosław. Crispyn - A Python library for determining criteria significance with objective weighting methods. In: SofrwareX. 2022. Vol. 19. ISSN 2352-7110. DOI: https://doi.org/10.1016/j.softx.2022.101166.

De CASTRO, Vivas Renato. - SANT'ANNA, Angelo Márcio O. - ESQUERRE, Karla P.S. Oliveira. – FREIRES, Francisco Gaudêncio M. Integrated method combining analytical and mathematical models for the evaluation and optimization of sustainable supply chains: A Brazilian case study. In: Computers & Industrial Engineering. 2019. Vol. 139. ISSN 0360-8352. DOI: https://doi.org/10.1016/j.cie.2019.01.044.

De FELICE, Fabio. - PETRILLO, Antonella. - AUTORINO. Claudio. Development of a Framework for Sustainable Outsourcing: Analytic Balanced Scorecard Method (A-BSC). In: Sustainability. Vol. 7. No. 7. ISSN 8399-8419. DOI: https://doi.org/10.3390/su7078399.

DOŽIĆ, Slavica. Multi-criteria decision making methods: Application in the aviation industry. In: Journal of Air Transport Management. 2019. Vol. 79. ISSN 0969-6997. DOI: https://doi.org/10.1016/j.jairtraman.2019.101683.

HO, William. – MA, Xin. The state-of-the-art integrations and applications of the analytic hierarchy process, In: European Journal of Operational Research. 2018. Vol. 267. Is. 2. ISSN 0377-2217. DOI: https://doi.org/10.1016/j.ejor.2017.09.007.

CHEN, Qinxia. - LIU, Dun. - ZHANG, Lu. Three-Way Decision Making Based on Data Envelopment Analysis with Interval Data. In: Cognitive Computation. 2022. Vol. 14. Is. 6. ISSN 1866-9964. DOI: https://doi.org/10.1007/s12559-021-09964-0.

KIZIELEWICZ, Bartłomiej. – SHEKHOVTSOV, Andrii. – SAŁABUN, Wojciech. Pymcdm - The universal library for solving multi-criteria decision-making problems. In: SoftwareX. 2023. Vol. 22. ISSN 2352-7110. DOI: https://doi.org/10.1016/j.softx.2023.101368.

LIMA-JUNIOR, Francisco Rodrigues. – CARPINETTI, Luiz Cesar Ribeiro. Quantitative models for supply chain performance evaluation: A literature review. In: Computers & Industrial Engineering. 2017. Vol. 113. ISSN 0360-8352. DOI: https://doi.org/10.1016/j.cie.2017.09.022.

LIU, Chao-chao. - ZHAN-WEN, Niu. - PEI-CHANN, Chang. – BO, Zhang. Assessment approach to stage of lean transformation cycle based on fuzzy nearness degree and TOPSIS. In: International Journal of Production Research. 2017. Vol. 55. No. 23. ISSN 7223-7235.

LIU, Peide. – LI, Ying. The PROMTHEE II Method Based on Probabilistic Linguistic Information and Their Application to Decision Making. In: Informatica. 2018. Vol. 29, No. 2. ISSN 0868-4952. DOI: https://doi.org/10.15388/Informatica.2018.169.

MAGABLEH,Ghazi M. – MISTARIHI, Mahmoud Z. Applications of MCDM approach (ANP-TOPSIS) to evaluate supply chain solutions in the context of COVID-19. In: Helyon. 2022. Vol. 8. No. 3. ISSN 2405-8440. DOI: https://doi.org/10.1016/j.heliyon.2022.e09062.

McKINNEY, William. Python for Data Analysis Data Wrangling with Pandas, NumPy, and IPython. United States of America. p. 522. ISBN 978-1-491-95766-0.

RAKHSHAN, Seyed Ali. Efficiency Ranking of Decision Making Units in Data Envelopment Analysis by Using TOPSIS-DEA Method. In: The Journal of the Operational Research Society. 2017. Vol. 68. No. 8. ISSN 0160-5682. DOI: https://doi.org/10.1057/s41274-017-0237-0.

ROUYENDEGH, Babak Daneshvar. - OZTEKIN, Asil. – EKONG, Joseph. – DAG, Ali. Measuring the Efficiency of Hospitals: A Fully-ranking DEA–FAHP Approach. In: Annals of Operations Research. 2019. Vol. 278, No. 1-2. ISSN 0254-5330. DOI: https://doi.org/10.1007/s10479-016-2330-1.

SAABITH, Ahamed Lebbe Sayeth. – FAREEZ, Mohamed M. M. – VINOTHRAJ, Thangarajah. Python current trend applications-an overview. In: International Journal of Advance Engineering and Research Development. 2019. Vol. 6. ISSN 2348-4470.

SHETE, Pankaj C. - ANSARI, Zulfiquar N. - KANT, Ravi. A Pythagorean fuzzy AHP approach and its application to evaluate the enablers of sustainable supply chain innovation. In: Sustainable Production and Consumption. 2020. Vol. 23. ISSN 2352-5509. DOI: https://doi.org/10.1016/j.spc.2020.05.001.

SOTOUDEH-ANVARI, Alireza. The applications of MCDM methods in COVID-19 pandemic: A state of the art review. In: Appl Soft Comput. 2022. doi: 10.1016/j.asoc.2022.109238. PMID: 35795407; PMCID: PMC9245376.

SUN, Chenguang. - ZHANG, Le. - MAO, Zhihui. Analysis of Public Management Performance Evaluation Model Based on Fuzzy DEA Model. In: Discrete Dynamics in Nature and Society. 2022. ISSN 1026-0226. DOI: https://doi.org/10.1155/2022/8228763.

TEOH, Teik Toe – RONG, Zheng. Artificial Intelligence with Python. Springer. 2022. p. 336. ISBN 978-981-16-8615-3. DOI: https://doi.org/10.1007/978-981-16-8615-3.

TONG, Li Zhong. - WANG, Jindan. - PU, Zhongmin. Sustainable supplier selection for SMEs based on an extended PROMETHEE II approach. In: Journal of Cleaner Production. 2022. Vol. 330. ISSN 0959-6526. DOI: https://doi.org/10.1016/j.jclepro.2021.129830.

WĄTRÓBSKI, Jarosław. – BĄCZKIEWICZ, Aleksandra. – SAŁABUN, Wojciech. Pyrepo-mcda - Reference objects based MCDA software package. In: SofrwareX. 2022. Vol. 19. ISSN 2352-7110. DOI: https://doi.org/10.1016/j.softx.2022.101107.

WĄTRÓBSKI, Jarosław. – BĄCZKIEWICZ, Aleksandra. – SAŁABUN, Wojciech. Version [1.1] - [pyrepo-mcda — Reference Objects based MCDA Software Package]. In: SofrwareX. 2022. Vol. 19. ISSN 2352-7110. DOI: https://doi.org/10.1016/j.softx.2022.101197.

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The use of artificial intelligence in the PPC campaigns of the residential housing project Gribľovec

Viliam Murin

Abstract

In the article, we investigate the utilization of artificial intelligence (AI) integration within Pay-Per-Click (PPC) campaigns and their implications for the "Gribľovec" residential development project. The study investigates the ways in which AI technologies enhance precision in targeting, campaign customization, and overall effectiveness in the digital marketing landscape pertaining to these properties. By applying AI to the "Gribľovec" campaign, advanced analytical tools are employed to evaluate customer preferences and optimize the campaign's impact. The article examines the advantages, obstacles, and practical application of AI in PPC campaigns using a concrete real-world case study. It evaluates the influence of AI on conversion rates, the reduction of customer acquisition expenses, and the enhancement of potential property buyers' engagement. The conclusion underscores the potential role of AI in augmenting the efficiency and success of PPC campaigns, extending beyond the "Gribľovec" residential project.

Key words

Artificial intelligence, digital marketing, PPC

Introduction

The rapid evolution of digital technologies has profoundly transformed various industries, including real estate marketing. In recent years, the integration of artificial intelligence (AI) has become a pivotal force reshaping how companies approach their marketing strategies. Particularly in the realm of Pay-Per-Click (PPC) campaigns, AI has the capability to enhance targeting accuracy, campaign personalization, and overall efficiency. In this article, we delve into the utilization of AI within the context of PPC campaigns for the residential development project "Gribľovec," elucidating the transformative potential of AI-driven strategies in the competitive real estate market environment. As traditional marketing methods undergo metamorphosis, development companies and marketers seek innovative approaches to engage potential buyers and streamline the conversion flow. The concept of AI, once confined to the realm of science fiction, has now become an integral part of digital marketing strategies, promising data-driven insights and the automation of intricate processes. The residential development project "Gribľovec" serves as a case study to explore the benefits, challenges, and implications of AI implementation in executed PPC campaigns. Through AI-driven tools, we

aim to optimize the efficiency of this digital marketing endeavor, tailor messages and banners to the right target audience, and thereby maximize return on investment. Our goal is to provide a comprehensive overview of AI utilization within PPC campaigns, not limited to the residential development project "Gribľovec." Through empirical evaluation, we aim to elucidate how AI technologies can redefine marketing strategies across diverse business domains. By examining the specific strategies employed by "Gribľovec," we contribute to the growing body of knowledge about effective AI integration in real-world marketing campaigns, offering deeper insights into potential benefits and challenges in this dynamically changing field. In the subsequent sections, we will delve into the theoretical foundations of AI in marketing, discuss its relevance within the context of PPC promotion, introduce the "Gribľovec" project, and subsequently analyze the results and impacts of AI-driven campaigns using appropriate methods. In conclusion, we will evaluate the influence of AI in shaping the future of strategies in digital marketing.

1 Artifical intelligence in digital marketing

According to Sudhir, Malhotra, and Toubia, artificial intelligence (AI) represents a discipline within computer science that focuses on developing systems capable of simulating human intelligence and learning from data (2023). As early as 2018, Pradeep, Appel, and Sthanunathan highlighted the growing significance of AI in the context of digital marketing, particularly in optimizing and personalizing marketing strategies. Foundational AI techniques, including machine learning, deep learning, data analysis, and automation, find application in the realm of digital marketing. The application of AI in digital marketing offers numerous advantages, particularly in areas where data and its analysis play a key role. UI allows for a deeper understanding of customer behavior, the creation of personalized ads, and targeting specific demographic groups (2018). In the field of PPC campaigns, where precision targeting and conversion measurement are crucial, UI provides invaluable contributions. The conclusions regarding the impact of UI on campaign effectiveness and enhanced return on investment (ROI) are supported by King in their work "AI Strategy for Sales and Marketing" (2022). Various methods can be used to measure the outputs of UI in digital marketing. For PPC campaigns, the most common approach is measuring conversion rates – the ratio between the number of ad clicks and the number of realized conversions (e.g., product purchases). Another key indicator is the customer acquisition cost (CAC), which quantifies the investment required to acquire a single customer through advertising. Additionally, metrics like ROI and return on ad spend (ROAS) are used to evaluate overall campaign effectiveness. In conclusion of this section, it can be stated that UI introduces revolutionary possibilities to digital marketing, enabling enhanced efficiency and personalization of campaigns, resulting in better outcomes and increased return on investment. These concepts are also addressed in the work "The Modern AI Marketer" by Didner (2020) and the publication "The Role of Artificial Intelligence in Marketing" by Chacko (2023). Performics et al. state that PPC stands for Pay Per Click and represents payment for each click on an online ad. It involves online advertising campaigns operating through auctions for selected keywords or target groups. This form of internet marketing encompasses advertisers who pay for each click on their ad (2021). Marketing expert Andersen explains in their publication "Data-Driven Marketing Trends for 2023: Why You Need to Update Your Strategy" that PPC can be perceived as a means of driving website traffic, complementing organic visits. Through this approach, ads offering better click-through rates

than competitors for specific keywords can appear at the top of Google search results (2023). This visibility and profitability boost for businesses is emphasized by Valleys, who highlights that for companies, this form of online advertising is advantageous when optimized for cost-effective PPC campaigns (2023).

2 Research objectives and methods

In this section of the article, we provide a detailed description of the methods we employed. The primary objective of our work is to thoroughly examine the effectiveness of Pay-Per-Click (PPC) campaigns in the context of artificial intelligence. We aim to explore the impact of specific metrics and probabilistic analysis on evaluating the performance of these campaigns. To achieve these goals, we employed the following procedures:

1. Return on Investment (ROI) Analysis: ROI analysis serves as a fundamental indicator of campaign success, measuring financial gain in relation to the invested capital. Through our ROI analysis, we evaluate the efficiency of campaigns in achieving positive financial outcomes. This method enables us to assess whether the campaigns effectively contribute to achieving desired financial goals.
2. Customer Acquisition Cost (CAC) Evaluation: The CAC metric is pivotal in assessing costs associated with acquiring new customers. It plays a crucial role in comparing customer acquisition costs with the value these customers bring. Our CAC evaluation provides insights into the cost-effectiveness of various PPC campaign types.
3. Return on Advertising Spend (ROAS) Assessment: ROAS is a crucial performance indicator that quantifies the effectiveness of advertising expenditures by measuring generated revenue. Our ROAS assessment allows us to discern the extent to which advertising investments manifest as actual revenue, contributing to an understanding of the overall efficiency of PPC campaigns.

These methods will enable us to gain valuable insights into the effectiveness of PPC campaigns using artificial intelligence for the residential development "Gribľovec." This contributes to a better comprehension of their impact and efficacy.

3 Results

In this part of the article, we will analyze the data obtained from the PPC campaigns of residential housing Gribľovec and calculate the CAC, ROAS and ROI both for manual campaign settings and especially when using artificial intelligence.

Table 1: Data for „Gribľovec“ PPC campaigns set by the marketer for 30 days

Campaign	Campaign type	Views	Interations / Clicks	Interation rate	Average Price (per click)	Price
GDN / Responsive	Content	64,331	432	0.67%	€0.19	€82,08
Search / Generally	In search	52,302	619	1.18%	€0.13	€80.47
Search / Competition	In search	20,632	237	1.15%	€0.21	€49.77
TOTAL:		**137,265**	**1,288**	**0.93%**	**€0.17**	**€212.32**

Source: own processing by Google Ads account of “Gribľovec”

Advertising Costs in Table 1 are €212.32 and Number of Acquired Customers to the website is 1 288.

$$CAC = \frac{212.23}{1,288} \approx €0,17$$

This means that the average cost to acquire one customer through these campaigns was approximately €0,17. Visits to the website using this PPC turned into 1 residential house sold for €200,542. Net income is €34,900.

$$ROAS = \frac{34,900}{212.32}\ x\ 100 \approx 16,433.18\%$$

The ROAS is approximately 16,433.18%. This means that for every euro invested in advertising generated a return of about 164.33 euros.

To calculate the ROI, it is necessary to add a commission for the broker for one sold house of €5,000 or €1,500 for a non-refundable reservation per house. The broker's commission is a cost that must be added to the price of the ad for ROI calculation, because he is the last point in the transformation of the PPC ad into a non-refundable reservation or direct sale of the house.

$$ROI = \frac{34,900}{5,212.32}\ x\ 100 \approx 670.07\%$$

The ROI is approximately 670.07%. This means that for every euro invested we gained a return of approximately €6.70.

Table 2: Data for „Gribľovec“ PPC campaigns set by the marketer with using AI for 30 days

Campaign	Campaign type	Views	Interations / Clicks	Interation rate	Average Price (per click)	Price
GDN / Responsive	Content	84,875	875	1.03%	€0.12	€102,81
Search / Generally	In search	83,506	1 490	1.78%	€0.09	€135.80
Search / Competition	In search	39,458	940	2.38%	€0.11	€102.38
TOTAL:		**207,839**	**3,305**	**1.59%**	**€0.10**	**340.99**

Source: own processing by Google Ads account of "Gribľovec"

Advertising Costs in Table 2 are €340.99 and Number of Acquired Customers to the website is 3,298.

$$CAC = \frac{340.99}{3,305} \approx €0,10$$

This means that the average cost to acquire one customer through these campaigns was approximately €0,10. Visits to the website using this PPC turned into 1 residential house sold for €200,542 and 3 non-refundable reservations in the amount of €15,000 for the purchase of a house. Net income with non-refundable reservations is €79,900. If all 3 reserved houses were also bought, the net income would be €139,000 in total.

$$ROAS_1 = \frac{79,900}{340.99}\ x\ 100 \approx 23,431.77\%$$

$$ROAS_2 = \frac{139,600}{340.99}\ x\ 100 \approx 40,939.61\%$$

The $ROAS_1$ is approximately 23,431.77%. This means that for every euro invested in advertising generated a return of about 234.31 euros. The $ROAS_2$ is approximately 40,763.66%. This means that for every euro invested in advertising generated a return of about 407.63 euros.

$$ROI_1 = \frac{79,900}{9,840.99}\ x\ 100 \approx 811.91\%$$

$$ROI_2 = \frac{139,600}{20,340.99}\ x\ 100 \approx 686.29\%$$

The ROI_1 is approximately 811.91%. This means that for every euro invested we gained a return of approximately €8.11. The ROI_2 is approximately 686.29%. This means that for every euro invested we gained a return of approximately €6.86.

CONCLUSION

In this article, we examined the performance of the "Gribľovec" residential development's PPC campaigns over a 30-day period. Two sets of campaigns were analyzed: one without the utilization of AI and another with the integration of AI. The campaigns were aimed at promoting the project, generating leads, and ultimately driving sales. The data presented in Tables 1 and 2 provide valuable insights into the effectiveness of these campaigns and the impact of AI on their outcomes. The comparison between the two sets of campaigns emphasizes the transformative impact of AI on PPC campaigns. The utilization of AI resulted in a more cost-effective acquisition of customers, improved targeting, and higher interaction rates. The integration of AI technology allowed for more informed decision-making, optimizing budget allocation and generating higher returns on investment. Both the ROAS and ROI calculations reflect the substantial benefits of incorporating AI into marketing strategies.

Bibliography

ANDERSON, D. AI in Digital Marketing Training Guide. Amazon Digital Services LLC – Kdp, 2022. 80 p. ISBN 979-88-477724-1-9

ANDERSEN, D. Data-Driven Marketing Trends for 2023: Why You Need to Update Your Strategy. 2023 Retrieved from https://www.invoca.com/blog/state-of-data-driven-marketing-update-your-strategy

DIDNER, P. The Modern AI Marketer. Relentless Pursuit, 2020. 60 p. 978-17-345986-0-5

CHACKO, A. The role of artificial intelligence in marketing. 2023 Retrieved from https://sproutsocial.com/insights/ai-marketing/

KING, K. AI Strategy for Sales and Marketing. Kogan Page, 2022. 288 p. 978-13-986020-1-4

PERFORMICS, a kol. Uspejte v online. Lion Communications Slovakia, 2021. 296 p. ISBN 978-80-973694-0-8.

PRADEEP, A.K., APPEL, A., STHANUNATHAN AI for Marketing and Product Innovation. Wiley, 2018. 272 p. ISBN 978-11-194840-6-6

SELINGMAN, J. Artificial Intelligence / Machine Learning In Marketing. Lulu.com, 2020. 250 p. ISBN 978-02-445638-8-2

SUDHIR, K., MALHOTRA, N.K., TOUBIA, O. Artificial Intelligence in Marketing. Emerald Publishing Limited, 2023. 344 p. ISBN 978-18-026287-5-3

WERNER, G. A Guide to AI Marketing Analytics for Marketing Professionals. 2023 Retrieved from https://influencermarketinghub.com/ai-marketing-analytics/

VALLEYS, F. Unlevel the Playing Field. Modern Marketing Masters, 2022. 262 p. 978-15-445233-3-0

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Improving the performance of business processes in the hotel industry

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Abstract

The aim of the article is to evaluate the improvement of process performance in a service company. A hotel operator who wants to remain competitive has to compensate for the inevitable increase in the price of stays, which is caused by the increase in input costs, by increased quality of service. The basic prerequisite for improving service processes is knowledge of the customer's needs and the ability to meet their requirements. The present paper is oriented on the basic research of KPI (key process indicators) parameters. In a selected hotel in the post-restriction period related to the COVID-19 pandemic. The time series of selected parameters obtained on a 1-day basis, which were generated by monitoring the main process in the operation of the said hotel, will be used to measure its performance. Based on the knowledge of the shape of the said time series, a model will be developed to describe the consumer behaviour of the hotel visitors during the period.

Key words

Enterprise, investment, regional development, tourism, AHP method

Introduction

Tourism is currently experiencing a major slump globally in the wake of the COVID-19 pandemic. Although tourism in Slovakia is far from reaching the levels of other European countries, it is nevertheless an important component of the Slovak economy, employing many people. In the period before the pandemic, tourism, and the hotel industry in particular, experienced a certain upsurge in connection with the regulation of the then government, according to which every employer had to provide employees with a one-off allowance for a holiday in a Slovak holiday resort. This incentive was motivating for many hoteliers who, in anticipation of increased demand for services, began to prepare various investment projects aimed at expanding or improving the quality of the services provided.

The optimistic market development at that time encouraged many investors to prepare even more demanding investment projects in connection with the development of tourism and especially the provision of hotel services. The hunger for leisure services can create an exorbitant demand for tourism services, assuming a favourable development. This increased demand can only be a competitive advantage for a hotelier that has retained a substantial part of its staff and is ready to offer services immediately. However, the same entrepreneur may, in

the event of adverse developments, drive his hotel into bankruptcy because of unexpected low revenues at somehow unchanged costs. In the event of a negative development, the hotelier who lays off the majority of his staff and thus minimises costs would have an advantage. However, the same entrepreneur would probably not have the chance to provide the expected quality of service in the event of a positive market development.

1 Current status of the issue at home and abroad

Now and in the future, processes play a vital role in considering and positioning the potential impact of rapidly emerging digital technologies. The business process management narrative is no longer purely driven by a reactive analysis of the parts of the process that are disrupted. Rather, technologies such as artificial intelligence, advanced data analytics, robotics or blockchain have expanded the set of process design options and provided companies with new opportunities. Instead of focusing on optimising processes, cost-efficiency and mass production, processes are increasingly focused on personalisation and change, which more often than not leads to the notion of minimum feasible processes.

For all these reasons, it is impossible to consider businesses, their operations, the changes they go through and their ultimate well-being without their processes. In light of this, it is surprising that businesses vary considerably in the extent to which they manage their processes explicitly and as a matter of priority.

1. Company process

Business processes describe the sequences of activities of an enterprise that transform inputs into outputs (Garvin, 1998). Business processes management (BPM) describes the attempts of enterprises to manage these processes in such a way that positive effects such as improved quality, customer satisfaction, financial performance, reduced production time or reduced costs accrue (Kohlbacher, 2010; Ranganathan and Dhaliwal, 2001). Conversely, poor process management can lead to reduced financial performance, organizational conflicts, and reduced innovation (Benner and Tushman, 2003; Ittner and Larcker, 1997).

Just as businesses differ in terms of their markets, value propositions, customers, performance, etc., so too do the processes that take place in businesses. In manufacturing, for example, processes vary along with physical characteristics (such as machines), dimensional tolerances (size and shape), or defect rates (more or less). Management manuals for process management talk about primary versus secondary activities (Porter, 1985) or core, control and support processes (Ould, 1995). Some also propose principles to distinguish between them (vom Brocke et al., 2016). Similarly, researchers have reported studies of organizational processes ranging from mass customized and automated processes (Feitzinger and Lee, 1997) to more artistic or creative processes (Seidel et al., 2015; Voigt et al., 2013) to intensive processes (Davenport, 2010), context-dependent processes (Rosemann et al., 2008), and so on. Clearly, there are many 'different' processes, and researchers and practitioners alike seem to have some intuition that different processes may need to be managed differently.

However, these 'differences', which constitute observable variability, have not been incorporated into BPM in a consistent way. Instead, business process management still strives for a single best method (Pentland, 2003) - a method following the tradition of scientific

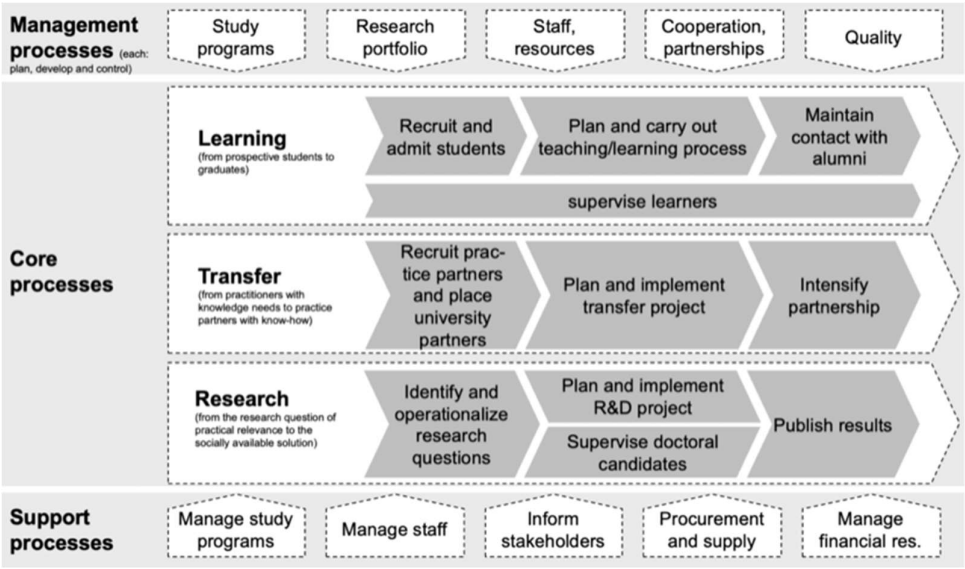
management (Taylor, 2004) and its idealization of the perfect enterprise. In order to make informed decisions and avoid wasted effort, process management research needs to understand and conceptualize process differences, classify processes into meaningful categories, and link them to appropriate process management approaches (Venkatesh, 2006).

2. Differences in business processes

Our starting point is the observation that business processes in enterprises are heterogeneous. There are processes that represent the core of the business, such as the production process in a manufacturing company, and processes that support core activities, such as human resources or financial processes. Processes can be machine-intensive and (partially) automated (Feitzinger and Lee, 1997), but other processes are also labelled "artistic" (Hall and Johnson, 2009), "knowledge-intensive" (Davenport, 2010), or "creative" (Seidel et al., 2015). Theoretically and empirically, a number of process classification systems have been developed to enable comparisons of processes across enterprises (Vilkas and Stancikas, 2005). Such classification systems are fundamental to the conceptualisation and progression of research as they help to reduce complexity and recognise underlying structure and interrelationships (Bailey, 1994; Recker and Mendling, 2016).

Most available process classification systems distinguish processes into several high-level categories based on the degree of importance of the process. A well-known example of process classification is the differentiation into core, managerial and support processes (Ould, 1995). Core processes contribute directly to the value creation of the business, while support processes enable core processes to operate more efficiently.

Figure 1: Process map



Source: Šľapka 2013

In the literature, different process dimensions are used to describe process differences. Examples of dimensions are degree of knowledge-intensity (Isik et al., 2013), interdependence (Davenport, 2010), routinization (Lillrank, 2003) or complexity (Schäfermeyer et al., 2012). A systematic literature review identified 59 such dimensions to describe processes (vom Brocke et al., 2016). The consolidation and aggregation of these process dimensions into 5 high-level dimensions based on the information processing perspective (Galbraith, 1973) led to five process dimensions:

1. process variability
2. analyzability
3. interdependence
4. differentiation
5. relevance

Process performance and the mitigating effect of the nature of the processes

In OIPT, firm performance is the result of the match between IP requirements and IP capacity, which is the result of the firm's control and coordination mechanisms (Galbraith, 1973). If processes are viewed as information processing systems, high process performance is expected in situations where process control requirements (determined by process characteristics) match process control mechanisms. Lack of matching can result from two situations:

1. Providing large amounts of information and information with a high level of specificity is inefficient and a waste of resources in situations where processing or interpretation of large amounts of information is not required (low process uncertainty and ambiguity).

2. Providing too little information or information with a low level of specificity prevents participants from carrying out the process in situations where a lot of information actually needs to be processed and interpreted, leading to lower levels of quality and customer satisfaction.

KPI measurement in the hotel industry

Tourism is also a very important sector in Slovakia from a financial point of view, in terms of its share in the country's GDP and the number of employees working in this sector.

Harris and Mongiello (2001) identified a decision-making procedure for hotel managers who are linked to KPIs. In the right selection step, hotel managers and owners should define the KPI. Subsequently, the selected indicator would need to be interpreted and finally in the application step the decision making process would be carried out.

In the hotel industry, it is the measurement of KPIs that will help to decide whether they are working in the right way and whether the performance of the hotel is competitive or not. Analyzing and tracking the right set of KPIs can also support the hotel in achieving its goals and objectives, due to which it has information about the average price per room, percentage of occupancy, bed occupancy rate and price per occupied room which is measured on a daily basis (Srivastava, Maitra; 2016).

Based on secondary research and their own practical experience, the authors developed a special set of ten key performance indicators to measure the performance of the selected database. The researchers also included other indicators, for example, from performance management theory

(Fitzgerald, et al., 1991), the so-called innovation and also liquidity. Job satisfaction (Borralha et. al, 2016) and guest satisfaction (Lim, 2017) are also other indicators. A special new KPI matrix with ten indicators is also populated with online reviews, because nowadays feedback is also important in this online world. These KPI are:

1. ADR (angl. average daily rate),
2. RevPAR (revenue per available rooms),
3. occupancy rate
4. average length of stay of guests
5. improvement projects and innovation
6. financial indicator such as liquidity
7. the quality of products and services offered by the wellness hotel
8. employee satisfaction and loyalty
9. guest reviews online
10. guest satisfaction in an overall sense

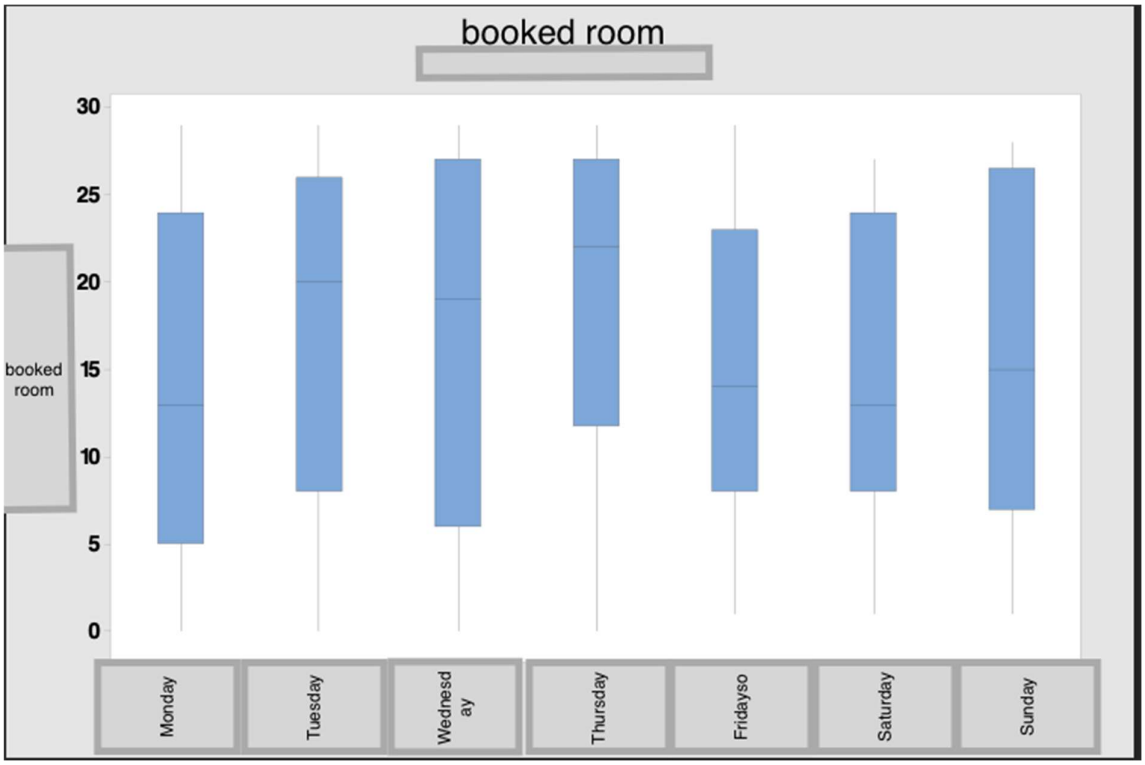
Performance measurement has been recognized as a key element for improving the hotel business in general. Performance measurement has been recognized as a means to gain advantages over competitors. Properly implemented performance measures ensure that the actions of employees are aligned with the strategic goals of companies (Behery, et al., 2014). Despite the ongoing developments in the use of performance measures in the hotel industry, various researchers (Wadongo et al., 2010; Zigan and Zeglat, 2010; Komlosi and Nemeth, 2014) have pointed out the lack of use of non-financial key performance indicators in the hotel sector and instead rely solely on financial indicators.

2 Results

In the framework of the paper, a hotel was selected. The basic research consisted in monitoring the basic parameters of the main process, i.e. focused on the provision of accommodation services. The occupancy of the hotel was also monitored both in terms of room occupancy and bed occupancy.

Despite the fact that the monitoring took place from 1.1.2021 to 31.12.2022, it is not possible to perform more sophisticated and precise analyses oriented, for example, on the seasonality of interest of the customers of the facility in question as one of the key KPI parameters described in the theoretical part of the thesis (Measurement of KPI in the hotel industry). The two-year period in question is in fact marked by zero occupancy in the first three months due to the ban on business due to the COVID-19 pandemic.As the monitoring in question is still ongoing, it was possible to draw up the following graphs based on the available data from the ongoing monitoring. Figure 2 presents a box plot diagram characterizing the hotel room occupancy for each day of the week.

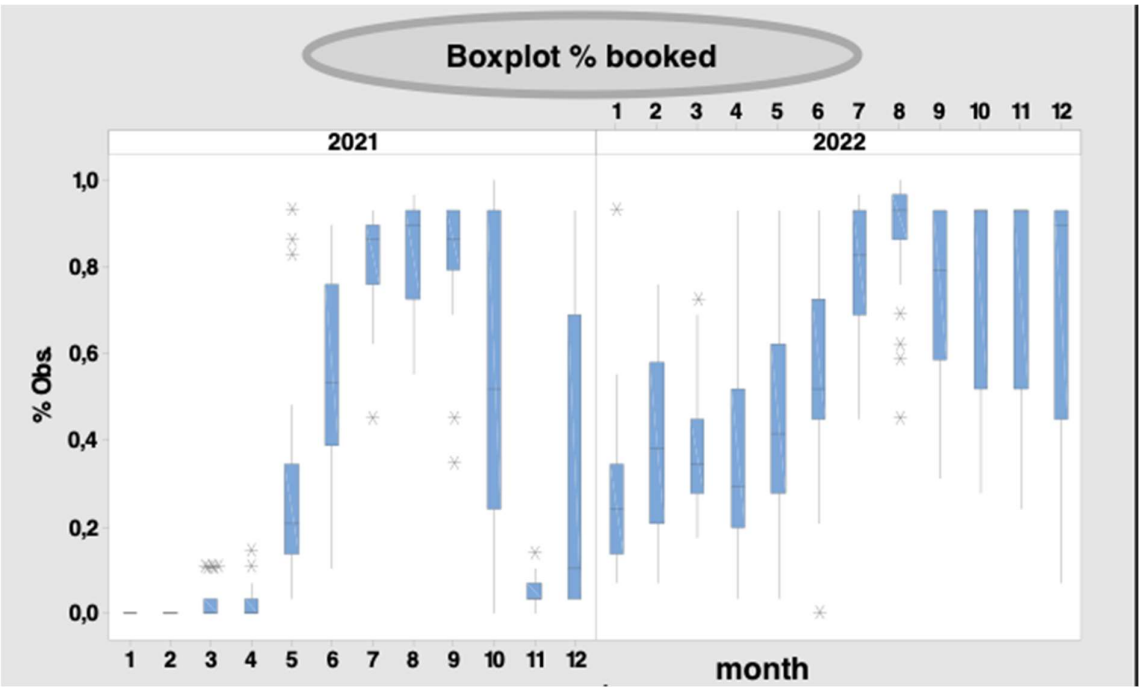
Figure 2: Box plot



Source: Own processing

Note that for all graphs presented, the zero values from the first three months were excluded from the analyses. The figure shows the highest occupancy on Tuesdays, Wednesdays, Thursdays, i.e. during the week. Friday, Saturday and Monday represent the lowest median occupancy. However, the chart shows a relatively large variation in occupancy for the different days of the week.

Figure 3: Box plot



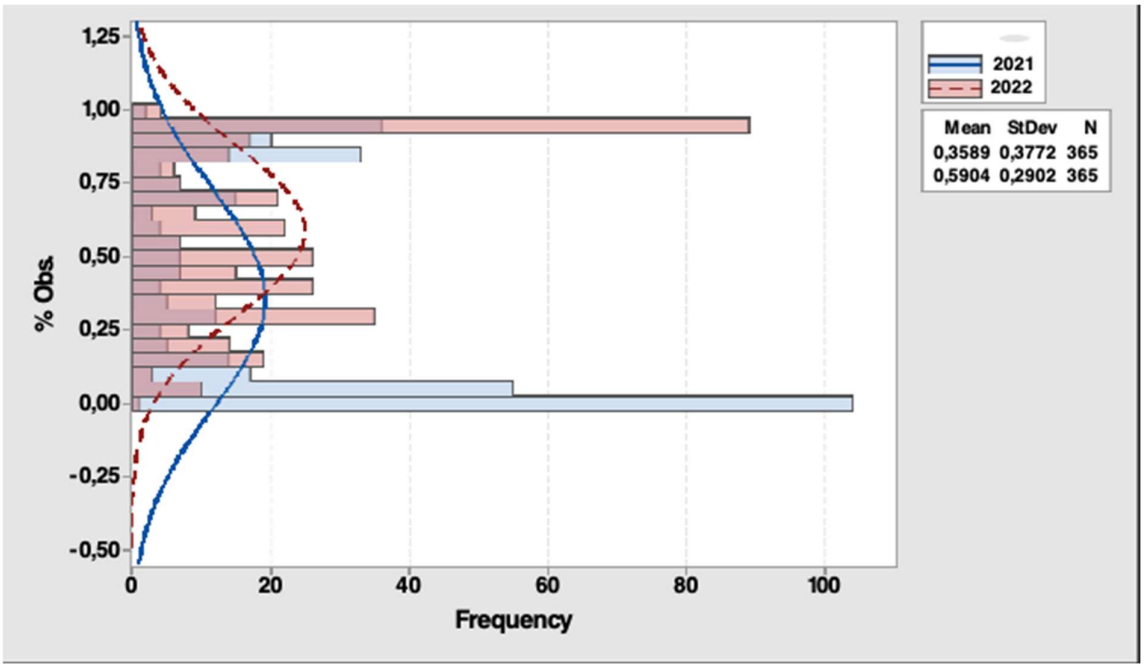
Source: Own processing

Figure 3 characterizes the seasonality on a monthly basis in the form of a box plot diagram. The figure shows the aforementioned relatively low interest in November 2021.

One possible explanation for this phenomenon is that customers were expecting the next wave of pandemic to occur in November weather and therefore interest in hotel services was minimal. In Figure 3, a box plot analysis is performed for each day of the month.

In this plot, in addition to the median value, the mean value is also indicated, based on which it can be concluded that the average interest is significantly higher throughout the study period in 2022.

Figure 4: Box plot Histogram of % booked



Source: Own processing

Figure 4 shows, in the form of individual values, the number of vacant rooms that can be seen in some ways as not meeting the opportunity. The x-axis shows the individual months from January to December and the y-axis shows the number of vacant rooms.

CONCLUSION

The paper is based on basic research carried out in a hotel establishment. The data collection is carried out over two consecutive years, but this allows for some sophisticated comparisons of the time series obtained from a given survey. However. as the monitoring is ongoing.

In the previous section we have shown simple graphs describing selected indicators based on the data available so far. One of the important characteristics obtained in the time series is their seasonality. This is a natural property of the process of the basic parameters of the hotel operation process. The analyses carried out in this thesis will be the basis for the creation of a model, on the basis of which it will be possible to estimate both the basic attributes of the customers' consumption behaviour and to predict with greater or lesser accuracy their interest in the services of a given hotel.

Bibliography

Huľo, P. 2014. *Hotelový a gastronomický manažment*. 1. vydanie. Bratislava: Slovenské pedagogické nakladateľstvo. 136 s. ISBN 978-80-10-02607-4.

Orieška, J. 2011. *Služby v cestovnom ruchu*. 1. časť. 1. vydanie. Banská Bystrica: DALI-BB, s.r.o. 138 s. ISBN 978-80-89090-93-8.

Rosemann, M., Recker, J. and Flender, C. (2008), Contextualization of Business Processes, International Journal of Business Process Integration and Management, Vol. 3 No. 1, pp. 47-60.

Safizadeh, M. H., Field, J. M. and Ritzman, L. P. (1999), An empirical analysis of financial services processes with a front-office or back-office orientation, Journal of Operations Management, Vol. 21 No. 5, pp. 557-576.

Segars, A. H. and Grover, V. (1998), Strategic information systems planning success: an investigation of the construct and its measurement, MIS Quarterly, Vol. 22 No. 2, pp. 139-163.

Schäfermeyer, M., Rosenkranz, C. and Holten, R. (2012), The Impact of Business Process Complexity on Business Process Standardization - An Empirical Study, Business & Information Systems Engineering, Vol. 4 No. 5, pp. 261-270.

Synek M. a kol. 2011. *Manažerská ekonomika*. 5., aktualizované a doplnené vydání. Grada. 480 s. ISBN 978-80-247-3494-1.

Vaštíková, M. 2008. *Marketing služieb - efektívne a moderne*. Bratislava: Grada publishing. 232 s. ISBN 978-80-247-2721-9.

Wadongo, B. and Odhuno, E. and Kambona, O. and Othuon, L. (2010), Key performance indicators in the Kenyan hospitality industry: a managerial perspective. Emerald Insight Benchmarking: An International Journal, Volume 17, Issue 6, pp 858-875.

Weber, R. (2012), Evaluating and Developing Theories in the Information Systems Discipline, Journal of the Association for Information Systems, (13)1, pp. 1-30.

Wieland, M., Kopp, O., Nicklas, D. and Leymann, F. (2007), Towards Context-Aware Workflows, Proceedings of the Workshops and Doctoral Consortium, pp. 11-15.

Zigan, K. & Zeglat, D. (2010), Intangible resources in performance measurement systems of the hotel industry, Facilities, Vol. 28 (13/14), pp. 597 – 610.

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The impact of transfer pricing on economic inequalities and wellbeing

Stanislav Rudý

Abstract

Multinational companies that have subsidiaries in different countries could have the opportunity to avoid tax obligations by transferring profits from one country with a higher tax rate to another country with a lower tax rate. The topic of this paper is to approach the meaning and importance of transfer pricing because the transfer of profits of a multinational company can create and cause economic inequalities, imbalances and disrupt the well-being of the population and the household. This contribution aims to define the transfer pricing issue and point out the inequity in the tax policies of selected countries.

Key words

Transfer pricing, economic inequalities, wellbeing, tax health

Introduction

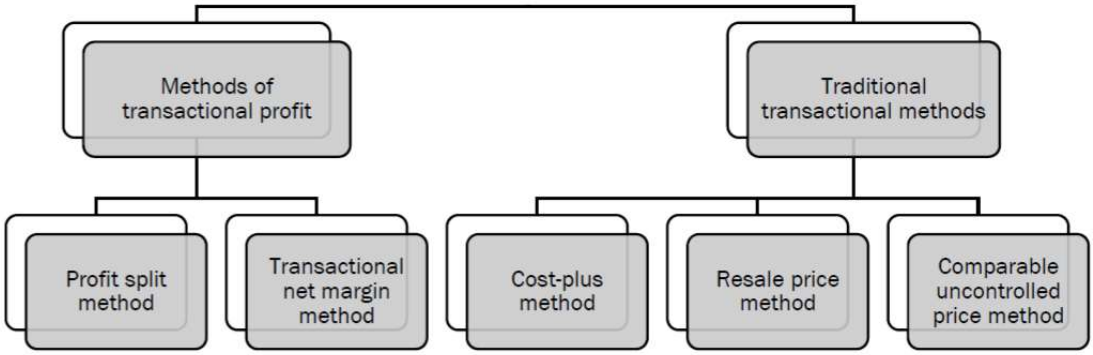
Multinational companies adjust transfer prices in internal transactions to significantly reduce their income tax. Corporate tax avoidance is closely related to foreign ownership. We are talking about transfer pricing when transactions occur between foreign-related entities during which liabilities, resources, services, or products are transferred. When national governments set tax rates for multinationals without considering their impact on the tax bases of other countries, they harm competition and create imbalances. Tax coordination is the way for nations' harmonization, well-being, and prosperity. Transfer pricing is linked to the adequacy of export and import prices, which are in accordance with the tax code and legislative framework.

1 Theoretical background

The motivation for minimizing transfer prices brings multinational companies a reduction in their costs. Income shifting within countries aims to exploit differences in tax rates that affect the profit level. Multinational companies move their profits to lower tax jurisdictions, and tax tariffs, incentives and tax policies are the most critical factors. Prices for deals and transactions within related parties of multinational companies are many times lower than independent prices. The decision on the correct transfer pricing within a global company can be seen as a conflict in which they can maximize profit to centralize transfer pricing and optimize the local objectives of individual subsidiaries (Kohlhase - Wielhouwer, 2023).

Transfer pricing is linked to tax accounting, profit reporting and shifting production to tax-friendly areas. It is influenced by the economic situation of the entities, geographical location, the rate of the given countries, state tax laws and regulations, exchange rates, the financial status of the country, the quality of regulation and other economic factors. An entity of a multinational company located in a country with high labor costs and a strong economy charges higher prices than one with lower labor costs and a weaker economy. Global companies use transfer pricing to reduce the tax base and increase profit. Artificially shifting profits to low-tax jurisdictions is a practice used by most international companies due to tax pressures that force them to identify ways to reduce their tax base. To avoid violations of legislative rules, some mechanisms and models aim to prevent tax evasion through transfer pricing (Grigoroi et al., 2023).

Figure 1: Transfer pricing methods



Source: Melega (2023)

Taxes are an essential part of countries' budgets. Multinational companies can avoid tax obligations to maximize profits, but countries' governments strive to increase state revenues. There is an increase in lost revenue due to the exploitation of taxes by multinational companies, and tax avoidance has become a global problem. The potential and opportunities for avoiding tax obligations are based on foreign ownership and transactions with foreign-related parties through transfer pricing. Transfer pricing is considered the main factor causing tax evasion because it represents a policy implemented to increase or decrease the prices of one's goods. Multinational corporations have more than one branch abroad, and tax avoidance is associated with cross-border operations with subsidiaries (Oktaviani et al., 2023).

An innovative measure that captures the complexity of corporate income tax systems and, therefore, of multinational companies is the tax complexity index, which assesses the complexity of the tax systems that global companies are forced to face. The complexity of taxes has been increasing in recent years. It is a product of tax system reforms aimed at maximizing social welfare, closing tax loopholes, and ensuring a level playing field for businesses and fairness. Greater clarity and less tax complexity are needed to support economic growth so that economic prosperity is not jeopardized, and undesirable tax planning and tax avoidance are encouraged. Tax complexity is significantly influenced by the complexity of transfer pricing regulation in individual countries (Hoppe et al., 2023).

OECD countries and jurisdictions have now adopted an agreement on a global minimum tax for multinational corporations to reverse the decline in corporate income tax rates. This is due to investment competition and profit shifting to jurisdictions with lower tax burdens. International tax coordination is intended to achieve the strategic effects of setting effective tax rates. Tax harmonization and the global minimum tax are designed to make decisions on the location of subsidiaries endogenous. Real income tax rates of multinational companies are also falling due to competition for real investment and company location. To the extent that there is tax competition, tax havens shift profits, and if countries compete in tax rates, an increase in tax havens will cause an increase in tax revenues outside these locations. Shifting profits in tax competition is costly and disrupts government tax revenues, so some countries resort to using subsidies for companies to compensate for smaller profits from revenues = higher contributions. A global minimum tax causes an equilibrium tax rate and a coordinated increase in the tax rate in tax havens to the minimum tax level, which affects the overall tax liabilities of multinational companies and increases welfare in non-haven countries by reducing profit shifting and increasing tax revenues (Janeba - Schjelderup, 2023).

Depending on medium- and long-term economic goals, multinational companies expand into different jurisdictions, bringing financial, legal and tax problems. Globalization brings with it not only advantages associated with international trade but also difficulties for tax administrations. Transfer pricing plays an important role here, where the principle of arm's length in intra-group transactions between affiliated companies is the cornerstone. The problem of transfer pricing between companies in the same group is determining a price that approximates the market price that would be concluded under comparable conditions between independent parties. Manipulation of transaction prices in a multinational company can be used through trade differences between countries and thus, profit shifting occurs in different jurisdictions (Melega et al., 2023).

Multinational companies use income-shifting tax strategies to reduce global tax payments and increase net profit. Internal transactions are suitable for taking advantage of differences in tax rates in individual jurisdictions. International corporate tax planning allows the distribution of earnings so that a subsidiary in a country with a high tax rate shows a lower profit than reality. Global corporate tax planning activities create a layer of complexity that accompanies strategic decisions and impacts affiliate performance metrics when changing tax plans. In addition to many benefits, the effective use of transfer prices also brings risks that could slow down the ability to reach performance goals. Multinational companies also need more information flows, which can slow down the responses of associated enterprises in tax planning. Tightening the rules on income transfers should benefit the economic prosperity of countries, encourage consideration of the consequences of careless tax planning and reduce the diversity of transfer operations (Klassen - Ruiz, 2023).

2 Research objectives and methods

The aim of the paper is the analysis of the theoretical background of transfer pricing and to define the framework and methods in connection with transfer pricing affecting economic inequalities and well-being. In the first chapter of the paper, the methods and economic importance of using transfer pricing within multinational companies were pointed out. In the third chapter of this paper, the differences in the jurisdictions of selected countries were shown

using the International Tax Competitiveness Index and Tax and Transfer Pricing Complexity Index. The aim of this paper is to emphasize the economic effect of transfer pricing and, at the same time, serve as a basis for further statistical research not only of countries but also of multinational companies that have their companies located in several countries and to reveal which factors cause global companies to resort to tax avoidance and to propose possible measures to prevent such behavior. Basic methods such as analysis, synthesis and comparison were used to fulfil the purpose of this paper.

3 Results

In this chapter, the differences in tax systems in countries are shown. We will compare their tax complexity, transfer pricing complexity, corporate income taxes, cross-border tax rules and others. For comparison, in this paper, we used the International Tax Competitiveness Index, where the latest available information is available for 2022, and the Tax and Transfer Pricing Complexity Index, where the latest available data are for 2020.

Table 1: International Tax Competitiveness Index 2022

Country	Overall Rank	Overall Score	Corporate Tax Rank	Individual Taxes Rank	Consumption Taxes Rank	Property Taxes Rank	Cross-Border Tax Rules Rank
Estonia	1	100	2	1	14	1	14
Latvia	2	89.9	1	4	26	5	9
New Zealand	3	89.7	32	7	1	2	21
Switzerland	4	82.9	11	9	4	36	2
Czech Republic	5	81.9	6	5	25	6	11
Luxembourg	6	80.6	26	14	6	14	5
Hungary	7	77.9	5	6	38	18	3
Lithuania	8	76.9	3	11	31	7	24
Turkey	9	76.6	20	8	13	23	8
Israel	10	76	17	30	10	10	10
Australia	11	75.5	29	20	9	4	23
Sweden	12	74.2	8	18	22	8	12
Slovak Republic	13	74.1	21	3	29	3	34
Netherlands	14	71.3	25	22	16	22	4
Germany	15	70.2	30	26	15	11	6
Canada	16	69.3	27	31	8	25	16
Norway	17	69	15	23	23	16	13
Austria	18	68.6	23	32	17	15	7
Costa Rica	19	67.5	36	33	7	12	17
Finland	20	67.4	9	28	21	20	22
Japan	21	67.3	33	16	5	27	26
United States	22	66.8	22	21	3	29	35
Slovenia	23	66.1	7	12	32	26	20
Belgium	24	65.1	14	13	24	31	19
Korea	25	64.1	34	27	2	33	33
United Kingdom	26	62.9	10	24	34	34	1
Chile	27	61.9	13	34	11	13	38

Poland	28	59.3	12	10	35	32	29
Greece	29	59.2	19	17	30	30	25
Mexico	30	58.4	28	29	12	9	37
Iceland	31	57.9	16	19	28	28	31
Colombia	32	57.8	38	2	18	24	36
Denmark	33	57.3	18	36	20	19	30
Spain	34	56.9	31	25	19	37	18
Ireland	35	55.6	4	37	36	17	32
Portugal	36	51.4	37	35	27	21	28
Italy	37	49.1	24	15	37	38	27
France	38	45.3	35	38	33	35	15

Source: Tax Foundation (2022)

An essential factor of economic performance is the tax structure. The International Tax Competitiveness Index assesses and evaluates the competitiveness of countries and their tax neutrality and compares the tax systems of OECD countries. The most harmful taxes are corporate taxes, and the growth of property taxes has the most negligible impact. The index examines more than 40 tax policy variables. If tax laws are more complex, they reduce their neutrality. Estonia has the best tax code and level, and the features of the tax system drive this country's results. Turkey, Chile, and the United Kingdom increased their tax rates for corporates. On the contrary, they were reduced by the United States, Belgium, and France, which ranked last, mainly due to the combined corporate income tax rate.

Table 2: Tax and Transfer Pricing Complexity Index 2020

Country	Tax Complexity Index	Transfer Pricing Complexity	Country	Tax Complexity Index	Transfer Pricing Complexity
Croatia	0,489	0,743	**Thailand**	0,364	0,665
Italy	0,466	0,773	**Russia**	0,364	0,602
Colombia	0,464	0,574	**Greece**	0,356	0,666
Belgium	0,462	0,746	**Israel**	0,354	0,542
India	0,461	0,759	**Malaysia**	0,354	0,675
Costa Rica	0,453	0,606	**Armenia**	0,354	0,564
Ukraine	0,451	0,764	**United Kingdom**	0,351	0,613
Philippines	0,443	0,805	**Canada**	0,351	0,627
Pakistan	0,440	0,565	**Denmark**	0,349	0,678
Brazil	0,435	0,714	**Malta**	0,349	0,475
Romania	0,432	0,695	**Guatemala**	0,342	0,658
Argentina	0,431	0,689	**Japan**	0,342	0,638
Poland	0,431	0,676	**Latvia**	0,341	0,663
Mexico	0,424	0,688	**South Africa**	0,340	0,618
Cambodia	0,422	0,704	**Slovakia**	0,337	0,610
Ecuador	0,415	0,505	**Kazakhstan**	0,333	0,550
Hungary	0,413	0,744	**Austria**	0,333	0,645
Czech Republic	0,410	0,711	**Turkey**	0,328	0,662
Slovenia	0,408	0,705	**Taiwan**	0,327	0,621

United States	0,406	0,741	**Uruguay**	0,325	0,558
Chile	0,402	0,566	**Ireland**	0,324	0,511
China	0,397	0,671	**Luxembourg**	0,323	0,614
Portugal	0,393	0,657	**Korea, Republic**	0,306	0,602
Kenya	0,391	0,568	**New Zealand**	0,304	0,725
Indonesia	0,391	0,755	**Norway**	0,297	0,487
Peru	0,391	0,589	**Sweden**	0,287	0,608
Vietnam	0,388	0,743	**Belarus**	0,284	0,617
France	0,387	0,716	**Hong Kong**	0,275	0,651
Australia	0,386	0,786	**Lithuania**	0,271	0,576
Bulgaria	0,373	0,623	**Cyprus**	0,270	0,599
Puerto Rico	0,371	0,477	**Finland**	0,249	0,501
Germany	0,369	0,762	**Switzerland**	0,243	0,496
Spain	0,367	0,748	**Singapore**	0,225	0,565
Uganda	0,365	0,512	**Mauritius**	0,179	0,403
Netherlands	0,364	0,657			

Source: Tax Complexity (2020)

The Tax Complexity Index was last published in 2020. This index measures the complexity of the corporate tax system in 69 countries. It covers the tax framework that multinational companies face to transfer pricing, dividends, loss carryforwards, capital gains, tax rates, investment incentives and more. The Tax Complexity Index describes the complexity of tax systems and regulations and has a range from 0 (the tax system is not complex) - 0,500 (the tax system is complicated), and the Transfer Pricing Complexity Index describes regulations that prevent excessive reduction of taxable income and has a variance from 0 - 0,900. The tax framework is complex, which results from the processes of the tax system of individual countries. In the paper, we point to a group of countries, which are Mauritius, Switzerland, Norway, Malta, and Puerto Rico, in which the regulations for compliance with the tax code and the network of tax services in connection with transfer pricing is not as comprehensive as in the other monitored countries, which can lead to economic inequalities and disruption of the well-being and prosperity of countries in different parts of the world.

CONCLUSION

Multinational companies use transfer pricing in intra-company transactions to avoid taxes at the international level and shift profits between countries. Tracking transfer pricing due to distortion of the tax base brings harmonization of tax regulations, procedures, and methods for related party transactions. A transfer price is a price charged by one part of a multinational group organization to another part of the same organization in cross-border transactions for a product, service, or asset. The allocation and manipulation of revenues in the framework of transfer pricing disrupt the dynamics of economies and the well-being of countries that are thus deprived of tax profits. Multinational company revenue management entails centralized control, minor information asymmetry between operations, and the art of seizing opportunities and adapting to local conditions.

Bibliography

GRIGOROI, Lilia and Veronica GROSU and Anatol MELEGA, 2023. Financial-accounting model for transfer pricing based on standardised accounting policies. In: European journal of accounting, finance & business. Volume 11, Issue 1, pp. 1-11, ISSN 2344-102X, DOI: 10.4316/EJAFB.2023.1111

HOPPE, Thomas et al., 2023. The Tax Complexity Index – A Survey-Based Country Measure of Tax Code and Framework Complexity. In: European Accounting Review. Volume 32, Issue 2, pp. 239-273, https://doi.org/10.1080/09638180.2021.1951316

JANEBA, Eckhard and Guttorm SCHJELDERUP, 2023. The Global Minimum Tax Raises More Revenues than You Think, or Much Less. In: CESifo Working Paper. Issue 10318, pp. 1-36, ISSN 2364-1428, https://ssrn.com/abstract=4394843

KLASSEN, J. Kenneth and Cinthia Valle RUIZ, 2023. The Effect of Changes in Income Shifting on Affiliate Managers' Internal Reporting Decisions. In: Contemporary Accounting Research. Volume 40, Issue 1, pp. 120-165, https://doi.org/10.1111/1911-3846.12783

KOHLHASE, Saskia and Jacco L. WIELHOUWER, 2023. Tax and tariff planning through transfer prices: The role of the head office and business unit. In: Journal of Accounting and Economics. Volume 75, Issues 2-3, pp. 1-22, ISSN 0165-4101, https://doi.org/10.1016/j.jacceco.2022.101568

MELEGA, Anatol et al., 2023. Development of an Optimal Geographical Location Index to Reduce Transfer Pricing Risks. In: Montenegrin Journal of Economics. Volume 19, Issue 2, pp. 57-72, ISSN 1800-6698, https://doi.org/10.14254/1800-5845/2023.19-2.5

OKTAVIANI, Rachmawati Meita and Sartika WULANDARI and SUNARTO, 2023. Multinational Corporate Tax Avoidance in Indonesia. In: International Journal of Professional Business Review. Volume 8, Issue 2, pp. 1-15, ISSN 2525-3654, https://doi.org/10.26668/businessreview/2023.v8i2.1549

TaxComplexity, 2020. Tax Complexity Index. [online]. [cited 16. July 2023]. Accessible from www.taxcomplexity.org

TaxFoundation, 2022. International tax competitiveness index 2022. In: Center for global tax policy. [online]. pp. 1-73, [cited 16. July 2023]. Accessible from https://taxfoundation.org/publications/international-tax-competitiveness-index/#Index

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Assessment of the state of crime and its impact on unemployment in Slovakia

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Abstract

The present study provides an in-depth analysis of the relationship between crime and unemployment over the period 2012-2022, focusing on different forms of crime, such as property crime, economic crime and corruption, and their potential impact on unemployment fluctuations. We have carefully analysed the long-term trends and statistical relationships between the two variables to identify dependencies and possible patterns. We used reliable sources and quantitative analyses to draw relevant conclusions. This study will contribute to a better understanding of the relationship between crime and unemployment, and the findings may have important implications for the formulation of policies and measures to combat crime and promote economic stability.

Key words

crime, unemployment, correlation

Introduction

The present study provides a comprehensive analysis of the relationship between crime and unemployment over the decade 2012-2022. Both social phenomena have a significant impact on individuals and society as a whole. The paper examines various forms of crime, including property crime, financial crime and corruption, and their potential impact on changes in unemployment. The analysis includes quantitative data on crime and unemployment, as well as a qualitative study of the factors that may influence this relationship. In order to obtain reliable and meaningful results, we used reliable sources and official statistics. Our findings have the potential to influence policymaking and actions aimed at combating crime and promoting economic stability. Recognition of this interdependence can provide the basis for effective solutions and strategies to reduce crime and promote employment in society.

1 Crime and unemployment

An offence is a series of legally responsible criminal acts committed intentionally or recklessly by an individual in a specific place and over a specific period of time, generally years in the case of a state. (Heretik, 2019) In the book Understanding Criminology, co-authored by Stephen Case and Philip Johnson (2017), crime is described as an unlawful act that disrupts the social

order and violates the laws and norms of a given society. According to the American Psychological Association (2020), crime is generally defined as an act or activity prohibited by law and punished by public authorities in order to maintain social order and ensure safety. Terence Miethe and Hong Loo, in their academic work "Crime Victimisation Theory in a Violent World"(2005), listed a number of crimes and offences against individuals and society as a whole. They pointed out that these unlawful behaviours have serious consequences and have a significant impact on the security and stability of society. The study "Community participation in crime prevention and control in rural Nigeria" focuses on the issue of community participation in crime prevention and control in rural Nigeria. The main objectives are to examine the challenges facing rural areas in the area of crime, to identify prevention efforts by the community and the police, and to explore ways of increasing community participation through a community policing style of policing. The results of the study revealed that rural Nigeria faces a significant crime problem, with theft and drug addiction among the most common forms of crime. The youths, especially the unemployed ones, become the major actors in these offences. The study highlighted the distrust of the population towards the police, which makes it difficult to involve the community in crime prevention.

In the above-mentioned research article "Geography of unemployment in Slovakia: spatial impact of local economic conditions", the author Cupak (2019) and his colleagues analysed the geographical distribution of unemployment in Slovakia and its relationship with local economic conditions. The focus of the study is a systematic review of how local economic factors affect unemployment rates in different regions of the country. The aim of the study is to examine and analyse spatial differences in unemployment rates in detail and to gain insight into how local economic conditions affect unemployment rates in different municipalities. The results of the study may provide valuable information for the development of policies and measures aimed at improving labour market conditions in different regions of Slovakia. Berg, Kucera and Lena-Nozal (2016) examined the role of education in mitigating long-term unemployment in their study "The role of education in mitigating long-term unemployment: evidence from OECD countries". The aim of the study was to provide empirical evidence on the impact of education on the risk of long-term unemployment and how education can be used as a tool to combat this phenomenon. The researchers analysed data from several OECD countries and examined the relationship between an individual's educational attainment and his or her likelihood of long-term unemployment. The aim of the study is to provide relevant evidence and recommendations to support the development of policies and measures to promote education and reduce long-term unemployment in OECD countries.

"The authors of Crime and Unemployment: The Relationship Between Crime and Unemployment in European Countries" (Bell, Fasani and Machin, 2013). Their study focuses on evidence and analyses of how unemployment affects crime in the region. The authors analysed data on unemployment and crime rates in different European countries and attempted to determine the relationship between these two variables. The results of the study have important implications for understanding which socio-economic factors may influence crime in European economies. "Labour Markets and Crime: New Evidence on an Old Puzzle" (2015) discusses the relationship between labour markets and crime. The study explores how labour market conditions affect crime rates and provides new evidence to help us better understand this long-standing puzzle. The authors analysed data from multiple sources and found a significant link between unemployment and crime rates. They also found that improving the

labour market and reducing unemployment can have a positive impact on reducing crime. The study provides important insights for policies and measures to combat crime and improve labour market conditions. Raphael and Winter-Ebmer (2016) published an academic article in the Journal of Law and Economics entitled 'Identifying the Impact of Unemployment on Crime'. The article focuses on the key question of how unemployment affects the incidence of crime. The authors conducted an in-depth analysis of data in an attempt to reveal the causal relationship between unemployment and crime rates. Using a sophisticated methodology, they examined available data from a variety of sources to determine exactly to what extent unemployment affects crime in society. The results of the study showed that there is a positive correlation between the unemployment rate and the crime rate, which means that an increase in the unemployment rate leads to an increase in the crime rate. The study provides valuable information on the relationship between unemployment and crime, which can serve as a basis for the formulation of policies and measures to reduce crime and improve labour market conditions.

A 2016 article by Ioannis Laliotis examines the relationship between unemployment and crime in Greece before and after the crisis using panel data at the regional level over the period 1999-2013. The study focuses on different categories of crime and distinguishes between male and long-term unemployment. The results suggest a positive relationship between specific crime categories and male unemployment only during the crisis, while the effect of long-term unemployment on overall crime is weaker. The paper also highlights important dynamics in crime over time. Study "Unemployment and Crime in US Cities During the Coronavirus Pandemic" focuses on the relationship between unemployment and crime during the coronavirus pandemic in 16 US cities. It analyses different forms of crime, such as violent crime and crimes involving firearms. The research seeks to identify links between changes in unemployment and crime levels. They find that an increase in unemployment during a pandemic may be associated with an increase in the frequency of violent crime and crimes involving firearms. The results of the study point to possible links between economic conditions and crime during a pandemic.

2 Research objectives and methods

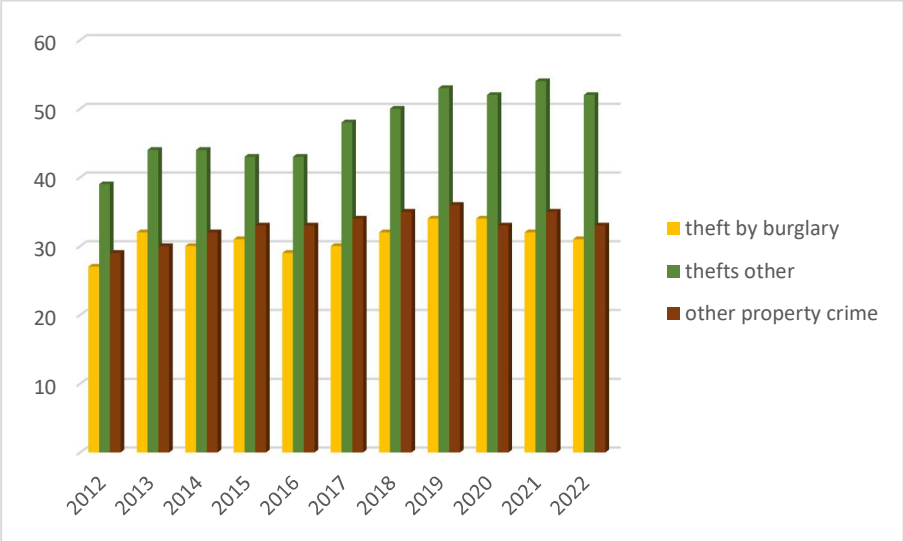
This chapter introduces the methodology chosen for the research report on the relationship between crime and unemployment in Slovakia. The main objective is to assess the current level of crime and its impact on unemployment. The analytical methods used include analysis, synthesis, inference, deduction, and correlation. The object of study is Slovakia and the crime rate in a specific period. We analyse the available data on crime, crime trends and unemployment in different periods in order to establish relationships and correlations between these variables. We use an analytical approach to decompose the overall data on crime and unemployment into their individual components. A deductive approach is used to summarise the results and draw conclusions based on existing principles and theories. An inductive approach is used to discover new conclusions and theories based on data and findings. Correlational analysis helps you understand the relationship between crime and unemployment. It examines possible causal relationships where crime can cause unemployment and vice versa. Statistical analysis is used to determine the causes and factors that influence these phenomena and to determine whether there is a link between crime and unemployment in Slovakia.

3 Results

This chapter provides a comprehensive assessment of the relationship between crime and unemployment from 2012 to 2022. The analysis of data and trends provides insight into the impact of crime on the labour market and its likely consequences.

The figure 1 shows the percentage share of each type of property crime between 2012 and 2022. The values reflect the share of burglary, theft, other theft and other property offences in the total number of offences in the respective category.

Figure 1: Property crime

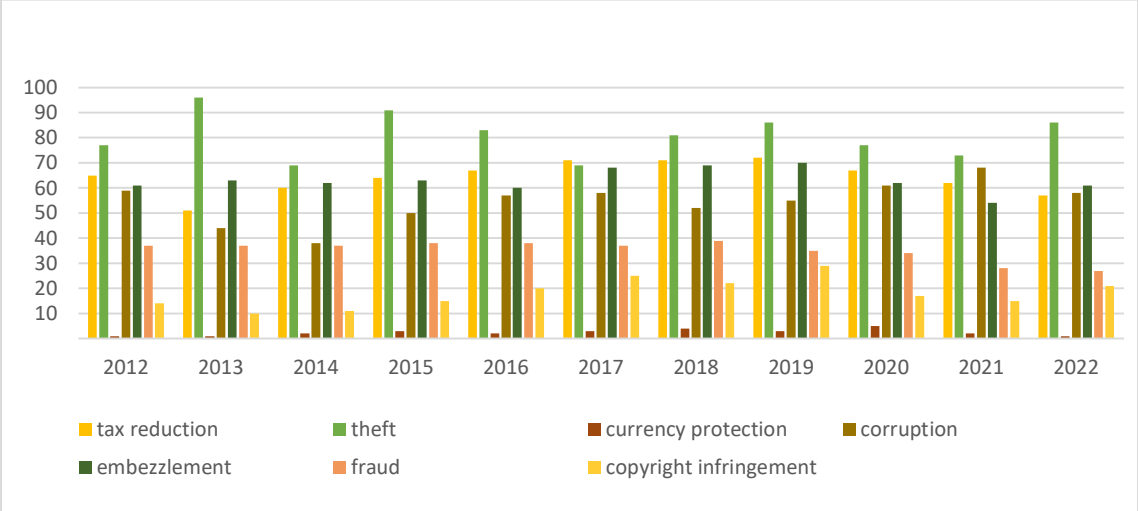


Source: own elaboration according to the Ministry of Interior of the Slovak Republic (2022)

The first column is burglary, which accounted for 27 per cent in 2012 and then gradually increased, peaking at 34 per cent in 2018. It then falls back to 31 per cent in 2022. This type of crime falls under the category of property crime, which includes offences involving the theft of property. The second column shows other thefts, which account for the remainder of property crimes. In 2012, such crimes accounted for 39 per cent of all property crimes. In subsequent years, the proportion fluctuated between 43 per cent and 54 per cent. Other theft includes property offences that do not fall under the category of burglary but are part of other types of property crime. The third column refers to other property crimes. This category accounted for 29 per cent of all property crimes in 2012. In subsequent years, the proportion fluctuated between 30 and 36 per cent. Other property crime includes offences that do not fall under the category of burglary or other theft. The evolution of the various types of property crime in recent years shows that the number of burglaries and other property crimes has not changed much and their share of total property crime has remained relatively stable. On the other hand, other burglaries have fluctuated but not changed much.

The figure shows the percentage of economic offences in each category from 2012 to 2022. The figures reflect the percentage share of that category in the total number of crimes, which is represented by individual economic crimes.

Figure 2: Economic crime



Source: own elaboration according to the Ministry of Interior of the Slovak Republic (2022)

The first category of economic crime is tax evasion, which accounted for 65 per cent of total economic crime in 2012 and gradually decreases to 57 per cent by 2022. Tax evasion is the illegal reduction of taxes or the wilful non-payment of taxes, which threatens the economic stability of the country. In second place is "theft", with a rate of 77 per cent in 2012 and between 69 and 91 per cent in subsequent years. Theft is one of the most common types of economic crime and involves the unauthorised appropriation of another person's property. The third category is "corruption", with a rate of 59 per cent in 2012 and rates ranging from 38 to 68 per cent in subsequent years. Corruption consists of illegal behaviour affecting the public sector for the purpose of certain benefits. Other types of economic offences include "misappropriation of public funds", "fraud", "copyright infringement" and "currency hedging". Their percentage share has varied over the years, but in general they represent a significant proportion of economic offences. The dynamics of the percentage ratios over the years suggests that there is a wide variety of economic offences and that certain types may fluctuate.

Table 1 analyses the correlation between the different types of crime and the unemployment rate from 2012 to 2022. The values of the correlation coefficients provide valuable information about the possible relationship between these variables.

Table 1: Correlation of crime and unemployment

	PRC	PRC-TBB	PRC-SO	PRC - OP	EC	EC-TR	EC- T	EC - C	UMR	UMRW1Y	LTUMR
PRC	1										
PRC-TBB	0,8962	1									
PRC-SO	0,9168	0,9125	1								
PRC - OP	0,9632	0,9720	0,9589	1							
EC	0,9874	0,9228	0,9447	0,9844	1						
EC-TR	0,9513	0,8239	0,9455	0,9182	0,9592	1					
EC- T	0,9526	0,9055	0,9842	0,9681	0,9778	0,9808	1				
EC – C	0,9534	0,9181	0,9789	0,9735	0,9813	0,9751	0,9986	1			
UMR	0,9596	0,8818	0,9318	0,9477	0,9781	0,9774	0,9795	0,9847	1		
UMRW1Y	0,9141	0,8151	0,8362	0,8828	0,9340	0,9302	0,9166	0,9285	0,9756	1	
LTUMR	0,9365	0,9435	0,9127	0,9612	0,9631	0,9196	0,9531	0,9663	0,9739	0,9573	1

Source: own processing SO SVK and MI SVK (2022)

Legend to the table

PRC: property crime

PRC-TBB: property crime - theft by burglary

PRC-SO: property crime - stealing others

PRC – OP: property crime - other property

EC: economic crime

EC-TR: economic crime - tax reduction

EC- T: economic crime – theft

EC – C: economic crime – corruption

UMR: unemployment rate

UMRW1Y: unemployment within one year

LTUMR: long-term unemployment rate

We see that there is a positive correlation between the total number of crimes (PRC) and the theft type of crime (PRC-TBB) with a correlation coefficient of 0.8962, which suggests that an increase in the total number of crimes may be associated with an increase in the theft type of property theft. Similarly, there is a positive correlation between total crime (PRC) and 'other theft' crime types (PRC-SO) with a correlation coefficient of 0.9168, suggesting that the increase in total crime may be associated with an increase in theft types other than burglary. There is also a positive correlation (0.9526) between economic crime (EC) and theft type of crime (EC-T), which suggests that an increase in economic crime may be associated with an increase in theft type of crime. Meanwhile, there is a positive correlation of 0.9534 between economic crimes (EC) and 'corruption type' of crimes (EC-C), suggesting that an increase in economic crimes may be associated with an increase in corruption in all sectors of the society. In terms of unemployment, there is a positive correlation of 0.8818 between unemployment rate (UMR) and 'other types of theft' (PRC-SO), suggesting that an increase in unemployment may have a marginal impact on the level of other types of theft.

CONCLUSION

A comprehensive analysis of the relationship between crime and unemployment for the period from 2012 to 2022 provides valuable information for a better understanding of the main social problems and their interrelationships. The study draws several important conclusions. First, there is a correlation between crime and unemployment. Periods of rising crime tend to coincide with periods of rising unemployment and vice versa. Second, different types of crime, such as property crime, economic crime and corruption, have different impacts on changes in unemployment, with economic crime and corruption being more strongly correlated with rising unemployment. Finally, our longitudinal analyses suggest that crime trends in a region over time may have an impact on unemployment rates over time. These findings highlight the need to address crime to promote economic stability and employment opportunities.

Bibliography

Arisukwu, O., et al. (2020). Community participation in crime prevention and control in rural Nigeria. Evidence from Published by Elsevier Ltd. Retrieved from https://www.cell.com/heliyon/fulltext/S2405-8440(20)31858-2?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2405844020318582%3Fshowall%3Dtrue

Bell, B., Fasani, F., & Machin, S. (2013). Crime and Unemployment: Evidence from Europe. The Economic Journal, 123(570), 319-342.

Berg, J., Kucera, D., & Lena-Nozal, A. (2016). The role of education in reducing long-term unemployment: Evidence from OECD countries. OECD Social, Employment and Migration Working Papers, No. 177. Retrieved from https://www.oecd.org/social/soc/36165298.pdf

Cupak, A., et al. (2019). The geography of unemployment in Slovakia: The spatial impact of local economic conditions. Post-communist economies, 31(3), 313-331.

Heretik, A. (2019). Forensic Psychology. Bratislava: Lindeni. 608 p. ISBN 9788056612132.

Laliotis, I. (2016). Crime and unemployment in Greece: Evidence before and during the crisis. Evidence from Economics and Business Letters. Retrieved from https://reunido.uniovi.es/index.php/EBL/article/view/10893/10546

Mustard, D. (2010). How Do Labor Markets Affect Crime? New Evidence on an Old Puzzle: Evidence from Georgia. No. 4856. Retrieved from https://docs.iza.org/dp4856.pdf

MV SR. Crime statistics in the Slovak Republic. Evidence form Slovakia. Retrieved from https://www.minv.sk/?statistika-kriminality-v-slovenskej-republike-xml

Schneider, F. (2006). Shadow Economies and Corruption All Over the World: What Do We Really Know?: Evidence from Linz. No. 2315. Retrieved from https://docs.iza.org/dp2315.pdf

Schleimer, J., et al. (2022). Unemployment and Crime in US Cities During the Coronavirus Pandemic. Evidence from Springer Nature. Retrieved from https://www.proquest.com/docview/2632036730?pq-origsite=wos&accountid=32253

Statistical Office of Slovakia, https://datacube.statistics.sk/#!/view/sk/VBD_SK_WIN/pr3108rr/v_pr3108rr_00_00_00_sk, 2023/04/30

Turner, L., Gregg, P., & Tominey, E. (2018). The hidden unemployed: Evidence from England. The Economic Journal, 128(610), 1984-2010.

Witner – Ember, R., Raphael, S. (2001). Identifying the Effect of Unemployment on Crime. Evidence from Journal of Law and Economics, 44(1):259-83

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The primary sovereign bond market in a pandemic period

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Abstract

The paper dealt with the analysis of the primary government bond market in the period before and after the outbreak of the COVID-19 pandemic. For the issuer (i.e. the state), the primary government bond market is important when the primary market issuance determines the costs that the state will have to incur to repay a given bond. Our results show that the primary market for sovereign bonds changed much more significantly with the advent of the COVID-19 pandemic than the market for other bonds. There has been a significant increase in the number of bonds issued by individual countries, with some countries increasing the number of bonds issued more than 7-fold in the period following the COVID-19 pandemic. In conjunction with the increase in the number of bonds issued, as well as the increase in the debt subscribed in these bonds, a statistically significant decline in bond yields can be observed in the post-COVID-19 period. interestingly, the distribution of sovereign bond yields has followed the distribution of yields of other types of bonds in the period since the pandemic outbreak.

Key words

COVID-19, government bonds, yield, primary market, issuance

Introduction

Governments need money to function. The impact of the COVID-19 pandemic, as well as the current energy situation in the world, has made finding the resources to cover budget deficits even more challenging. While governments meet part of their capital needs through commercial bank loans, bilateral official loans or multilateral official loans, private bond-based financing has been a central element of government financing since the early 1990s (according to World Bank statistics). Research has often focused on secondary market indicators to understand the political economy of sovereign debt. However, when governments coordinate with sovereign bond buyers, they issue debt instruments in primary capital markets. It is at this point that the government commits to the cost of borrowing. A bond issued at 8% interest today, but trading at 10% next year, costs the government 8% in annual interest payments over the life of the bond. The 10% interest rate in the secondary markets correlates with the terms available for new debt in the primary market, but these terms are only relevant when the government decides to issue new debt. Thus, primary market analysis is a key and somewhat overlooked area of fiscal policy (Ballard-rosa et al., 2021). The global financial crisis and subsequent European sovereign debt dilemma underscored the significance of robust sovereign bond markets for prudent sovereign debt management. Such bond markets, notably in the euro zone and beyond,

rely on a select set of financial middlemen, known as primary dealers. Governments offer fresh bonds to these specialized institutions at standard auctions, with the dealers then intending to resell these securities to their clientele. Furthermore, to ensure the secondary market remains fluid, primary dealers are often encouraged, or even mandated by governments (Eisl et al., 2019). These primary dealers in advanced economies primarily assist in distributing government bonds, while in developing nations, they bolster the growth of domestic debt markets. While their goals might differ based on the country, some key objectives include: maintaining a consistent demand for government bonds, guaranteeing liquidity in the secondary market, expanding the circle of investors, and fostering trust in the bond market (Speian, 2022). Assessments of various countries' primary dealer systems reveal that the evaluation approach for these dealers' operations impacts the growth of the bond market. Issuers typically achieve their goals by placing specific responsibilities on these dealers. Within this framework, both the issuer and the dealer aim to meet their core aims: for the issuer, it's about sourcing funds affordably, and for the dealers, it's about profiting from government securities (Speian, 2022). However, while dealers' main goal is to enhance bond trading in the secondary market and boost market liquidity, trading economics and dealers' risk tolerance can influence their participation in bond auctions and their capacity to offer immediate liquidity in the secondary market. These factors might also impact the securities portfolios market players hold and the sovereign debt pricing (Eisl et al., 2019). This paper tries to provide overview of sovereign primary bond market in COVID-19. It tries to provide answer to research question how sovereign primary market changed during COVID-19 era.

1 Government bond market in the period of COVID-19

During the global financial crisis (2008), the world economy witnessed huge shocks between individual countries that affected macroeconomic performance and its recovery worldwide. Similarly, the COVID-19 pandemic forced the world to experience an unprecedented health crisis that led to economic and financial disasters in all markets (Umar et al., 2021). The impact of the pandemic varies from market to market. Various preventive measures; the lockdown, shutdown, declaration of micro-protection zones and social distancing adopted by the governments of various countries to control the spread of the virus have threatened economic activities. However, the governments of different countries simultaneously adopted different stimulus packages to counter the effects of the pandemic and stimulate economic activities. In this context, mature government bond markets have significantly supported the financing of these stimulus packages. (Rout and Mallick, 2022)

Government bond markets are beneficial for project financing and help finance the fiscal packages of various governments. Hordahl and Shim (2020) argued that government bonds play an important role in local financing requirements and act as a more reliable indicator reflecting investor confidence. Yields on government bonds with different maturities in developed and emerging markets have fluctuated dramatically during this pandemic. This volatility has adversely affected corporate and public sector investment financing and fiscal stimulus support measures. In the short term, this affected the balance sheets of the public and private sectors. Arellano et al. (2020) illustrated that the economic costs of COVID-19 are extremely high and can generate a long-lasting debt crisis of states. The importance of portfolio management has intensified during the pandemic. Understanding the optimal trade-off between risk and return

involves the dynamic correlation and interconnectedness of investment portfolios (Elsayed et al., 2022). Investors want to diversify their portfolios globally and policy makers are trying to maintain financial stability. Therefore, the spillover of shocks between international bond markets is essential for asset and risk management (Sensoy et al., 2017). A comprehensive understanding of the spillover of shocks in international bond markets can advance several important policy implications. For example, it can help investors diversify their risks by putting part of their capital in fixed income assets with different maturities or bonds issued by foreign countries (Ahmad et al., 2018). International investors adjust their bond portfolios when global economic conditions change (Claeys & Vasicek, 2012).

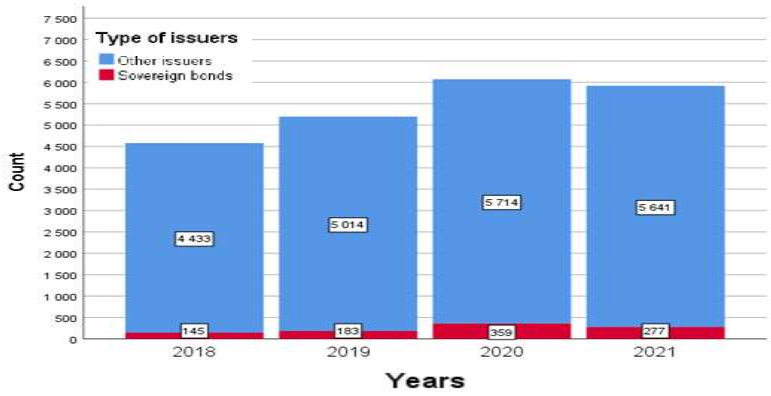
2 Research objectives and methods

As mentioned above the paper deals with the analysis of the primary government bond market as a basic instrument for countries to finance their functioning. The research in this paper relies on a sample of real bonds that have been issued in the international bond market and that have been published in the Bond Radar database. This database focuses on primary bond markets. The research sample covers bonds ranging from January 1, 2018 to January 1, 2022. The aim of this split was to divide the dataset into two equal periods, i.e. periods of equal length measured in days. The first period represents the period before the COVID-19 outbreak and the second period represents the period during the COVID-19 pandemic, with the beginning of 2020 serving as the dividing point. In total, the research sample contains 964 government bonds and 20,802 bonds of other types.

3 Results

The first research section is devoted to the comparison of issues in the primary market in terms of time. The motivation for this type of research was to describe changes in the government bond market compared to the rest of the bond market in the years leading up to the pandemic and during the pandemic. As part of our investigations, we compared the quantity of bonds issued and the size of issuance measured in USD. The results of the findings for the quantity of bonds issued are presented in Figure 1.

Figure 1: Analysis of sovereign bond issuance by year of issuance



Source: own processing

As can be seen from Figure 1, within the period under study, the largest increase in the number of bonds issued, whether sovereign or otherwise, was achieved in the first year of the pandemic in 2020. It should also be pointed out that while for other bonds the increases were relatively small at around 13%. In the case of sovereign bonds, the year-on-year increase was 26% between 2018-2019 and was 96% in 2019-2020. We observe similar behavior when we analyze issues based on volume size. Again, the largest increases in issuance are observed between 2019-2020. Here again, the volume of sovereign bonds issued denominated in USD increased by 76% between 2019-2020, while for other bonds the year-on-year increase was only 31%. It should also be noted that in 2018-2019, sovereign bonds accounted for around 3.3% of the market. In 2020, it was already less than 6%. We next examined how countries issued their bonds over the period under review. The motivation for this research was to find out which countries were issuing the most bonds and how sovereign bond issuance changed with the advent of the COVID-19 pandemic. The results of our findings are presented in Table 1. It should be emphasized here that the data in Table 1 represents only countries whose market share, either in terms of number of issues or in terms of volume of issuance, exceeded 1% of the market during COVID-19.

Table 1: Sovereign primary bond market based on country of issuer

Country	COVID-19				Increase		COVID-19				Increase
	Before		During				Before		During		
	n	%	n	%		Country	USD eq.	Sum %	USD eq.	Sum %	
AUSTRIA	12	3,66	66	10,38	450%	ITALY	56350	8,76	149549	13,28	165%
INDONESIA	13	3,96	34	5,35	162%	UK	53998	8,39	125828	11,17	133%
FINLAND	4	1,22	32	5,03	700%	SPAIN	56298	8,75	97498	8,66	73%
SLOVENIA	6	1,83	26	4,09	333%	AUSTRIA	21499	3,34	48982	4,35	128%
CHILE	7	2,13	24	3,77	243%	FRANCE	17289	2,69	39065	3,47	126%
ISRAEL	7	2,13	20	3,14	186%	BELGIUM	24046	3,74	35792	3,18	49%
ITALY	10	3,05	19	2,99	90%	GERMANY		0,00	35685	3,17	-
MEXICO	8	2,44	15	2,36	88%	GREEK REPUBLIC	14083	2,19	30680	2,72	118%
UNITED KINGDOM	9	2,74	15	2,36	67%	IRELAND	24641	3,83	29065	2,58	18%
CHINA	11	3,35	14	2,20	27%	FINLAND	13956	2,17	27302	2,42	96%
PERU	5	1,52	13	2,04	160%	CHILE	5595	0,87	25228	2,24	351%
ABU DHABI	3	0,91	12	1,89	300%	MEXICO	10414	1,62	23928	2,12	130%
PHILIPPINES	3	0,91	12	1,89	300%	INDONESIA	13918	2,16	22959	2,04	65%
HUNGARY	1	0,30	12	1,89	1100%	PORTUGAL	13002	2,02	22695	2,01	75%
ROMANIA	10	3,05	12	1,89	20%	SAUDI ARABIA	26149	4,06	21908	1,94	-16%
SAUDI ARABIA	9	2,74	12	1,89	33%	ROMANIA	11384	1,77	21396	1,90	88%
DUBAI	0	0,00	11	1,73	-	ABU	9875	1,53	20068	1,78	103%
GREECE REP.	5	1,52	11	1,73	120%	CHINA	13595	2,11	19277	1,71	42%
DOMINIC. REP.	5	1,52	10	1,57	100%	ISRAEL	5898	0,92	19233	1,71	226%

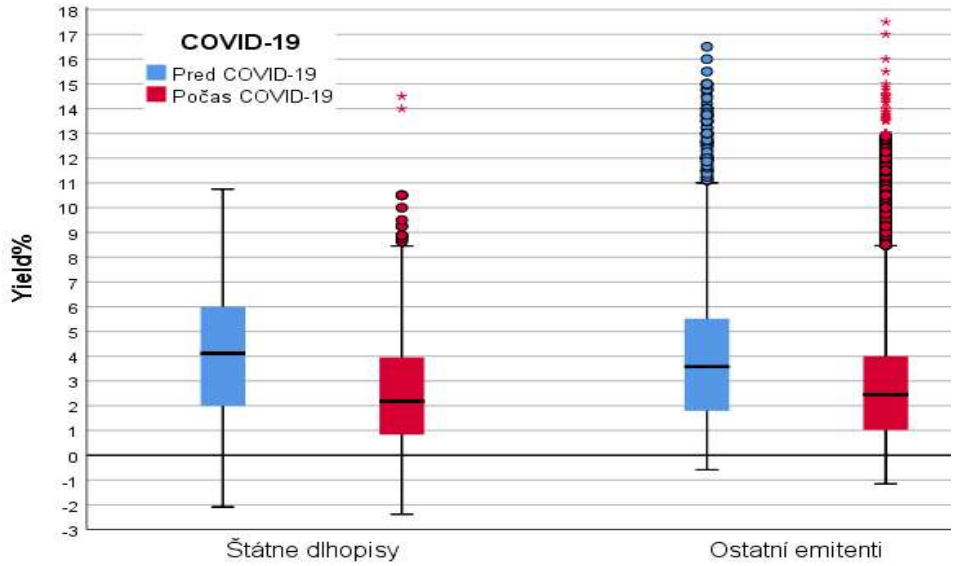
EGYPT	13	3,96	10	1,57	-23%	TURKEY	18830	2,93	18703	1,66	-1%
SPAIN	7	2,13	10	1,57	43%	PERU	7131	1,11	16962	1,51	138%
TURKEY	10	3,05	10	1,57	0%	SLOVENIA	5467	0,85	12627	1,12	131%
BAHRAIN	3	0,91	9	1,42	200%	HUNGARY	1160	0,18	12524	1,11	980%
COLOMBIA	4	1,22	9	1,42	125%	EGYPT	14710	2,29	12500	1,11	-15%
URUGUAY	4	1,22	9	1,42	125%	PHILIPPINES	4330	0,67	12400	1,10	186%
HONG KONG	1	0,30	8	1,26	700%	DOMINICAN REP.	5608	0,87	12162	1,08	117%
OMAN	6	1,83	8	1,26	33%						
PANAMA	7	2,13	8	1,26	14%						
BRAZIL	4	1,22	7	1,10	75%						
CYPRUS	4	1,22	7	1,10	75%						
GHANA	5	1,52	7	1,10	40%						
IRELAND	6	1,83	7	1,10	17%						

Source: own processing

Table 1 shows that countries such as Indonesia, Egypt and Austria issued the most bonds in terms of number of bonds in the pre-COVID-19 period under review. In the case of Austria and Indonesia, this trend continued during the COVID-19 pandemic, when, over the 2-year period under review, Austria issued 66 bonds, an increase of up to 650%, and Indonesia issued 34 bonds, an increase of up to 162%. On the other hand, Egypt represents the only country with at least 1% of the sovereign bond market that experienced a decline in bond issuance during the pandemic period. It is also worth mentioning issuers such as Hungary, Finland and Hong Kong, which have increased the amount of sovereign bonds issued in the period since the outbreak of the pandemic by 700 % in the case of Finland and Hong Kong and by 700 % and 1 100 % in the case of Hungary. Hungary also leads the table in terms of the increase in issuance, with a 980% increase in issuance in 2 years. In terms of issuance volumes, countries such as Italy, Spain and the UK had the largest share of the sovereign bond market before and during the pandemic (see left-hand side of the table).

An important parameter of bonds is their yield. For this reason, the next part of our research was devoted to analyzing the yields of government bonds and comparing them with the yields of bonds from other issuers. The motivation for this research was to see to what extent government bond yields have changed with the advent of the COVID-19 pandemic. As well as how the yields of this special type of bond have changed relative to other bonds. The results of the box-plot analysis and hypothesis testing are presented in Figure 2 and in the tables below.

Figure 2: Box-plot analysis of bond yields by type of issuer



Source: own processing

The box-plot analysis shows that, prior to the pandemic, the distribution of government bond yields was statistically significantly (at the 5% significance level) different from the distribution of yields of other bonds; specifically, bonds with other issuers had lower median yields than government bonds. After the outbreak of the COVID-19 pandemic, the differences in the return distributions have been reduced to such an extent that, at the 5% significance level, we cannot reject the hypothesis that the return distributions of Treasury bonds and those of other issuers are identical in the post-crisis period. We have also verified these findings with a statistical test, which is presented in Table 2.

Table 2: Hypothesis testing comparing the distributions of sovereign bond yields and other types of bonds

Hypothesis Test Summary				
COVID-19	**Null Hypothesis**	**Test**	**Sig.**	**Decision**
During	The distribution of Yield % is the same across categories of Type of issuer	Independent-Samples Mann-Whitney U Test	0,064	Retain the null hypothesis.
Before	The distribution of Yield % is the same across categories of Type of issuer	Independent-Samples Mann-Whitney U Test	0,023	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is ,05.				

Source: own processing

In the next section, we test whether the distribution of returns for Treasury bonds and other bonds changed statistically significantly with the COVID-19 pandemic outbreak. The box plot analysis presented above showed that both government bonds and other bonds experienced a significant decline in returns after the COVID-19 pandemic outbreak; we tested whether this was a statistically significant decline using the tests presented below in Table 3.

Table 3: Hypothesis testing comparing bond yield distributions in the pre- and post-COVID-19 pandemic

Hypothesis Test Summary				
Type of issuers	**Null Hypothesis**	**Test**	**Sig.**	**Decision**
Sovereign bonds	The distribution of Yield % is the same across categories of COVID-19.	Independent-Samples Mann-Whitney U Test	0	Reject the null hypothesis.
Other issuers	The distribution of Yield % is the same across categories of COVID-19.	Independent-Samples Mann-Whitney U Test	0	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is ,05.				

Source: own processing

Table 3 shows that at the 5% significance level, we can reject the null hypothesis that the distribution of bond returns in the sample of bonds collected before the COVID-19 pandemic is the same as the distribution in the sample of bonds collected after the COVID-19 pandemic, both for government bonds and for other issuers.

CONCLUSION

The research in this thesis was concerned with the analysis of real sovereign bond issues over a period of 4 years, with the dataset split to capture the two years before the COVID-19 pandemic and the two years after the COVID-19 pandemic.The objective of this thesis was to track changes in the sovereign bond market and compare them with changes in other types of bonds. Initial analyses of the primary bond market already showed that, regardless of the type of issuer, the arrival of the COVID-19 pandemic caused an increase in bond issuance. Whereas for bonds from other issuers, the increase in issuance was around up to 15%. In the case of sovereign bonds, the number of bonds issued almost doubled between 2019-2020 with the advent of the COVID-19 pandemic. Also, the volume issued by states in USD terms increased by 76% in the first year of the pandemic. These results suggest that a number of states chose to use sovereign bonds specifically to raise additional capital, which could then be used to combat the COVID-19 pandemic. Although there was a decline in bond issuance in 2021, it is fair to say that these levels did not reach pre-pandemic levels. In terms of the countries themselves that issued bonds, it should be noted that Austria issued the most bonds during the COVID-19 pandemic over the two-year period under review (66 bonds at most), followed by Indonesia (with almost half as many bonds, 34) and Finland (with 32) in third place. In the context of Finland, it is worth mentioning that, together with Hong Kong, in the two years since the outbreak of the COVID-19 pandemic, they have seen an almost 700% increase in bond issuance

compared to the same period before the outbreak of the COVID-19 pandemic. The largest increase was recorded in Hungary, which amounted to 1100%. And in terms of the volume of debt denominated in USD, the largest issuers were the countries of Italy, the UK and Spain. Since the pandemic outbreak, these three countries have issued a volume of bonds denominated in USD that accounts for a third of the total volume captured in the sovereign bond sample. On the other hand, our analyses do not show that sovereign bond issuers significantly changed bond maturities with the onset of the crisis. Further yield analyses showed that while the differences in yield distributions between sovereign bonds and other types of bonds were statistically significant before the COVID-19 pandemic, after the COVID-19 pandemic, these differences in yield distributions appear to be statistically insignificant. Statistical hypothesis tests also confirm that bond yields after the COVID-19 pandemic, whether government or other, are statistically more significant than bond yields before the COVID-19 pandemic. In the context of the recommendations, investors should perhaps be cautious of the bonds of countries such as Italy, Spain and the UK, whose sovereign bonds account for perhaps as much as a third of the volume (in USD terms) of all sovereign bonds according to our findings, not forgetting that although countries such as Italy and Spain have had sovereign debt problems in the past, the volume of issuance in USD terms since the advent of the COVID-19 pandemic has risen by 165% in the case of Italy and by 73% in the case of Spain.

Bibliography

Ballard-Rosa, C., Mosley, L., & Wellhausen, R. L. (2021). Contingent advantage? Sovereign borrowing, democratic institutions and global capital cycles. British Journal of Political Science, 51(1), 353-373.

Eisl, A., et al. (2019). Dealer Inventory and the Linkage between Primary and Secondary Markets for Eurozone Sovereign Debt. NYU Stern School of Business.

Speian, O. (2022). The role of the primary dealers in the government securities market. Eastern European Journal for Regional Studies (EEJRS), 8(2), 68-81.

Umar, Z., Manel, Y., Riaz, Y., & Gubareva, M. (2021). "Return and volatility transmission between emerging markets and US debt throughout the pandemic crisis". Pacific-Basin Finance Journal, 67, 101563.

ROUT, Sanjay Kumar; MALLICK, Hrushikesh. "Sovereign Bond Market Shock Spillover Over Different Maturities: A Journey from Normal to COVID-19 Period". Asia-Pacific Financial Markets, 2022, 1-38.

Hordahl, P., & Shim, I. (2020). "EME bond portfolio flows and long-term interest rates during the Covid-19 pandemic". Bank for International Settlements Bulletin (No. 18, pp. 1-9).

Arellano, C., Bai, Y., & Mihalache, G. P. (2020). Deadly Debt Crises: COVID-19 in Emerging Markets. (No. w27275). National Bureau of Economic Research Working Paper.

Sensoy, A., Ozturk, K., Hacihasanoglu, E., & Tabak, B. M. (2017). "Not all emerging markets are the same: A classification approach with correlation based networks". Journal of Financial Stability, 33, 163-186.

Ahmad, W., Mishra, A. V., & Daly, K. J. (2018). "Financial connectedness of BRICS and global sovereign bond markets". Emerging Markets Review, 37, 1-16.

Claeys, P., & Vašíček, B. (2012). "Measuring sovereign bond spillover in Europe and the impact of rating news". Czech National Bank Working Paper, No. 7.

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Selected indicators driving innovation in V4 countries

Mária Dolná

Abstract

To ensure competitiveness and progress, economies all over the world make innovation, research and development expenditures. Key objective of Global Innovation Index is to support countries at all stages of development in effort to strengthen their innovation ecosystem. By focusing on selected indicators of Global Innovation Index, this article aims to evaluate innovation of V4 countries using data of the chosen sub-index number 7 – Creative outputs of the economics with emphasis on strengths and weaknesses within 7th Pillar including Intangible assets, Creative goods and services and Online creativity using data collected by World Intellectual Property Organization (WIPO). By evaluating the V4 countries' innovation potential via selected variables of Global Innovation Index we realized, that Czechia and Poland are leading countries, however Slovakia is the worst evaluated economy within V4 countries according last pillar - Creative outputs.

Key words

Innovation, intangible assets, creative goods, creative services, online creativity, Global Innovation Index

Introduction

Innovation stands as a pivotal driver of economic growth, competitiveness, and societal progress. For the Visegrád Group, composed of Poland, Hungary, Czech Republic, and Slovakia, fostering innovation has become a strategic priority in their pursuit of sustainable development and global competitiveness. World Intellectual Property Organization focuses on innovations potential studies of 132 countries using 7 pillars. The last of them aims at really interesting segment of innovation – creative outputs.

1 Innovative capacity evaluation and creative outputs

The innovation, research and development expenditures and the investments in technology are premises for ensuring competitiveness and progress, and through them a sustainable economic growth. The crucial role of innovation is considered a major factor in creating value and enhancing business performance. However, the analysis of innovation has long been limited to technological innovation and few studies have been devoted to other forms of innovation including managerial innovation. The more a company conducts technological innovations, the more it is prone to adopt managerial innovations (Habidi, Benabdeljlil, 2015).

The results provide evidence of a positive relationship between economic growth and innovation. Study on Poland, Czech Republic and Hungary proved, that the economic development of an economy is influenced by the innovation degree, the allocation of resources for research and development activities, the quality of human capital and by foreign direct investments stock. They as well confirmed a positive connection between economic growth and innovation (Pece, Simona, Salisteanu, 2015). Innovation hailed as a driver for economic growth is also ecologically problematic (Pansera, Fressoli, 2021).

Socioeconomic impact of innovation may be split into three categories: labor productivity, life expectancy and emissions. Largely due to the influences of the COVID-19 pandemic, the socioeconomic impact of innovation seems to be at a low point, with labor productivity and life expectancy experiencing a significant slowdown if not coming to a standstill and, in the case of carbon emissions, failing to show ongoing reductions in pollution (Dutta et al. 2019).

Economists and policy makers around the world have been worrying for decades about low productivity growth and how to turn this around using innovation. Life expectancy has seen a considerable increase over the long term, rising to 72.7 years in 2020, up from 52.6 years in 1960 (Dutta et al. 2019). CO_2 emissions are estimated to have risen again by 4.9 % in 2021, casting doubt on the proposition that 2019 could have been a tipping point in global fossil-fuel emissions (Davis et al., 2022). Innovation is not only about progress in science and technology, but arguably also about the creation, maintenance and development of a particular form of production and way of organizing society (Walsh, 2021). The business environment impacts the relationship between the innovation spirit, research and development investment, and innovation performance of firms (Yin et al., 2023).

Those countries that have science-technology-innovation based economic policies and strategies have great superiority and sustainable competitive advantage in not only global competitiveness but also economic growth and development leading to wealth and welfare of the country (Cvetanovic et al., 2014). Innovation performance is essential for an economy to be strong, competitive and resource efficient on the world markets (Kaynak et al., 2017). Competitiveness is one of the major benefits that innovation generates (Braha, Oineti, Serenčéš, 2023). Ivanová, Čepel (2018) claim that the value of innovation and business sophistication indexes is significantly affected by the value of the overall Global Competitiveness Index of the V4 countries. Innovations became an important aspect of every business activity creating potential specialization and future growth. Today’s globalized and interconnected world makes innovations a necessity rather than an option bringing positive benefits both for their inventor and the user (Ehrenberger, Koudelkova, Strielkowski, 2015). Pansera and Fressoli (2021) argue that the fundamental purpose of innovation should not be to increase productivity to foster economic growth. Instead the purpose of innovation should shift towards the aim of use-value creation. European regions with above-average concentrations of creative industries are generally characterized by higher economic prosperity (European Commission, 2011). Two basic assumptions that have become hegemonic (and thus largely unquestioned) in the way innovation is overwhelmingly framed: a) Innovation delivers growth and prosperity for all and is thus inherently good (*productivism*) and b) Innovation is inevitable and unstoppable (*determinism*) (Robra et al., 2023).

Supporting countries at all stages of development in strengthening their innovation ecosystem is a key objective of the Global Innovation Index (GII). More than a reference guide, the GII

has established itself as a powerful tool for the construction and development of pro-innovation policies, cooperating to create similar indices at the sub-national level. Of the 110 responding countries, more than 75 use the GII either to improve their innovation ecosystem, strengthen innovation metrics, or as a specific reference in economic policymaking. (WIPO, 2022)

Top 3 innovation economies in Europe region are Switzerland, Sweden and United Kingdom. Moreover, Switzerland – for the 12th year in a row – ranks first in the GII 2022 (WIPO, 2022). Supporting the overall global research and development increase economies showed continued, and sometimes strong, growth in 2020, with growth strongest in Hungary (+100 %), Japan (+65 %) and Australia (+25 %) (WIPO, 2022).

The last pillar of GII research area covers creative outputs. Creative industries have grown tremendously over the past decades in many developed countries (Jin et al., 2019). Creative industry involves subsectors on the one hand highly capitalized and industrialized in their modes of production and distribution (film and television), and on the other hand those that are more labor-intensive and artisanal (arts and crafts, designer fashion, music, the visual and performing arts), as well as combining highly commercial sectors strongly affected by the business cycle (advertising, architecture), with arts sectors largely driven by public subsidy (Flew, Cunningham, 2010). Creative industries include: publishing and literature, performing arts (music dance, drama – performed to the audience), music, film, video, and photography, broadcasting (television and radio), visual arts (multiple genres associated with drawing, painting and sculpture, calligraphy, printmaking, photography…) and crafts (basket weaving, cabinetmaking, ceramics, embroidery, flower arranging, glassmaking...), advertising, design - including fashion, museums, galleries, and libraries, interactive media (web, games, mobile…) (Flew, Cunningham, 2010). Creative industries ca be characterised by three features. First, creative industries contain cultural and economic aspects relating to cultural policy goals such as cultural diversity and access to culture, as well as economic policy goals. Second, creative industries are a combination of art, in the narrow sense, and commerce : the combination of a specific form of creativity, cultural content creation , and its delivery. Third, creative industries are defined to include both nonprofit and for-profit organizations (Goto, 2017).

GII has always emphasized measuring creativity as part of its Innovation within the last pillar. The last pillar, on creative outputs, has three sub-pillars. The first sub-pillar on intangible assets includes statistics on trademark applications by residents at the national office. This indicator sums the values of all the top 5,000 most valuable brands of each economy and then scales this brand value by GDP. In this pillar, industrial designs included in applications at a regional or national office replaces one survey question on organizational models. The second sub-pillar on creative goods and services includes proxies to get at creativity and the creative outputs of an economy. The third sub-pillar on online creativity includes four indicators: generic and economy/country-code top-level domains, average yearly edits to Wikipedia; all scaled by population aged 15 through 69 years old and mobile app creation which is scaled by GDP (WIPO, 2022).

2 Research objectives and methods

Main objective of the article is to evaluate innovation of V4 countries using data of the chosen sub-index number 7 – Creative outputs of the economics with emphasis on strengths and weaknesses within 7th Pillar including Intangible assets, Creative goods and services and Online

creativity using data collected by World Intellectual Property Organization (WIPO) The GII 2022 model includes 81 indicators, which fall into three categories: quantitative/objective/hard data (65 indicators); composite indicators/index data (13 indicators); and survey/qualitative/subjective/soft data (3 indicators). For the purposes of the study was chosen 7th Pillar of Global Innovation Index involving 3 sub-pillars: Intangible assets, Creative goods and services, Online creativity, and subsequently its 13 variables: Intangible asset intensity, Trademarks by origin, Global brand value, Industrial designs by origin, Cultural and creative services exports, National feature films, Entertainment and media market, Printing and other media, Creative goods exports, Generic top-level domains, Country-code TLDs, GitHub commit pushes received, Mobile app creation – which methodology and as well sources are explained in Table 1.

Table 1: Methodology od selected variables

Subindex		**Methodology**	
Number	**Subindex indication**	**Explanation**	**Source**
7.1	**Intangible assets**		
7.1.1	Intangible asset intensity, top 15, %	The data cover a global list of firms for which intangible asset value and total firm value are observed, ranked by intangible assets in absolute terms (in USD).	Brand Finance Global Intangible Finance Tracker (https://brandirectory.com/ reports/gift-2021)
7.1.2	Trademarks by origin/bn PPP$ GDP	Number of classes in resident trademark applications issued at a given national or regional office (per billion PPP$ GDP) A trademark can consist of words or a combination of words and other elements, such as slogans, names.	World Intellectual Property Organization, Intellectual Property Statistics (www. wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database (https://www.imf.org/en/Publications/WEO/weo-database/2021/October)
7.1.3	Global brand value, top 5,000, % GDP	Sum of global brand values, top 5,000 as a percentage of GDP	Brand Finance database (https://brandirectory.com/); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/ Publications/WEO/weo-database/2021/October)
7.1.4	Industrial designs by origin/bn PPP$ GDP	Number of designs contained in resident industrial design applications filed at a given national or regional office (per billion PPP$ GDP)	World Intellectual Property Organization, Intellectual Property Statistics (www. wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October).
7.2	**Creative goods and services**		

7.2.1	Cultural and creative services exports, % total trade	Creative services exports as a percentage of total exports according to the Extended Balance of Payments Services Classification EBOPS 2010.	World Trade Organization and United Nations Conference on Trade and Development, Trade in Commercial Services database (https://stats.wto.org/).
7.2.2	National feature films/mn pop. 15–69	Number of national feature films produced (per million population, 15–69 years old)	OMDIA (https://omdia.tech.informa.com/products/cinema-and-movies intelligence-service); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp/).
7.2.3	Entertainment and media market/th pop. 15–69	Global entertainment and media market (per thousand population, 15–69 years old)	PwC, Global Entertainment and Media Outlook, 2021–2025 (www.pwc.com/ outlook); United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October).
7.2.4	Printing and other media, % manufacturing	Printing and reproduction of recorded media output (the sum of ISIC Revision) as a percentage of total manufacturing output (ISIC Revision 4, section C).	United Nations Industrial Development Organization, Industrial Statistics Database, four-digit level of International Standard Industrial Classification (ISIC) Revision 4 and ISIC Revision 3 (INDSTAT 4 2022) (https://stat.unido.org)
7.2.5	Creative goods exports, % total trade	Total value of creative goods exports (current USD) over total trade. Creative goods exports based on the 2009 UNESCO Framework for Cultural Statistics.	United Nations Comtrade Database (http://comtrade.un.org); and World Trade Organization and United Nations Conference on Trade and Development (https://stats.wto.org/)
7.3	**Online creativity**		
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	Generic top-level domains (TLDs) (per thousand population 15–69 years old). The statistic covers the five generic domains .biz, .info, .org, .net and .com. Generic domains .name and .pro and sponsored domains (.arpa, .aero,	ZookNIC Inc (https://www.zooknic.com); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp)

		.asia, .cat, .coop, .edu, .gov, .int, .jobs, .mil, .museum, .tel and .travel) are not included.	
7.3.2	Country-code TLDs/th pop. 15–69	Country-code top-level domains (TLDs) (per thousand population 15–69 years old). The statistic represents the total number of registered domains (existing domains + new registrations – expired domains). Data are collected from the registry responsible for each country-code TLD and represent the total number of domain registrations in the country-code TLD.	ZookNIC Inc (https://www.zooknic.com); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp)
7.3.3	GitHub commit pushes received/mn pop. 15–69	GitHub commit pushes received (per million population, 15–69 years old). Thus, “GitHub commit pushes received” refers to the number of batched changes received by publicly-available projects on GitHub within a specific economy.	GitHub (https://github.com/); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population. un.org/wpp/)
7.3.4	Mobile app creation/bn PPP$ GDP	Mobile app creation/bn PPP$ GDP Global downloads of mobile apps (per billion PPP$ GDP, two-year average) Global downloads of mobile apps, by origin of the headquarters of the developer/firm, scaled by PPP$ GDP (billions).	data.ia (formerly App Annie) (https://www.data.ai/en/); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October).

Source: Processed using data from GII 2022 WIPO (2022)

The strengths and weaknesses of a specific economy according WIPO are based on the percentage of economies with scores that fall above or below its own score. For a given economy, strengths are those scores with percent ranks greater than the 10th largest % rank among the 81 indicators in that economy. For that same economy, weaknesses are those scores with % ranks lower than the 10th smallest % rank among the 81 indicators in that economy. Similarly, for a given economy, income group strengths are those scores that are above the income group average plus the standard deviation within the group. For that same economy, income group weaknesses are those scores that are below the income group average minus the standard deviation within the group (WIPO, 2022). Lastly we used SPSS and descriptive statistics - minimum, maximum, mean, standard deviation, skewness, kurtosis – for all variables.

3 Results

According data collected by WIPO as seen in Table 2, in first sub-index Intangible assets, Poland scores 38,6 followed by other remaining countries far behind, Slovakia (14,6) at the last place with less than half score. Intangible assets intensity shows negative value in case of Slovakia (-114,2) as well as Latvia, Slovenia and other countries – scoring 78th position, overall 80th position for Intangible assets causing Intangible assets intensity to be weakness of Slovakia, as well as Hungary (49th position). This category, moreover, possesses the highest value of standard deviation (82,9870). On the other hand, Trademarks by origin represents the flattest distribution among statistical file (-5,333), however the lowest value belongs to Hungary (28,8) resulting in weakness (78th position).

Table 2: Selected variables

Subindex		State			
Number	**Subindex indication**	**Czechia**	**Hungary**	**Poland**	**Slovakia**
7.1	**Intangible assets**	**24,1**	**26,8**	**38,6**	**14,6**
7.1.1	Intangible asset intensity	n/a	52,3	70,0	-114,2
7.1.2	Trademarks by origin	59,2	28,8	33,9	56,6
7.1.3	Global brand value	23,0	9,1	42,6	2,7
7.1.4	Industrial designs by origin	3,4	2,3	5,2	2,7
7.2	**Creative goods and services**	**40,6**	**30,8**	**25,7**	**31,5**
7.2.1	Cultural and creative services exports	0,7	0,6	1,1	0,3
7.2.2	National feature films	9,1	2,8	1,5	5,7
7.2.3	Entertainment and media market	24,2	13,8	11,2	n/a
7.2.4	Printing and other media	0,9	0,7	1,2	0,5
7.2.5	Creative goods exports	12,5	8,2	4,8	6,9
7.3	**Online creativity**	**30,9**	**19,1**	**16,4**	**14,7**
7.3.1	Generic top-level domains	17,1	11,0	7,2	3,3
7.3.2	Country-code TLDs	54,5	35,3	26,7	31,8
7.3.3	GitHub commit pushes received	38,5	25,3	20,3	14,9
7.3.4	Mobile app creation	13,3	5,0	11,2	8,9

Source: Processed using data from country profiles WIPO (2022)

Global brand value shows huge disparities between Poland (42,6 %), respectively Czechia (23,0 % of GDP) and Slovakia (2,7 % of GDP), respectively Hungary (9,1 %) on the other site resulting in Global brand value to be weakness of Slovakia at 74th position in global.

Czechia (40,6) within second sub-index Creative goods and services takes 7th position in globe (strength), subsequently in the category Creative goods exports ranged Czechia 1st position (12,5 %), Poland 13th (4,8 %), Hungary 7th (8,2 %) and Slovakia 9th position (6,9 %), meaning, that Czechia exports the biggest share of creative goods in total trade in the world (within 132 evaluated countries by WIPO). Within category National feature films we can observe not only strength through 5th position of Czechia (9,1), but as well weakness through 52nd position of Poland (1,5) for production of national feature films per population. Entertainment and media market is weakness of Hungary and Poland within income group. Printing and other media

category seems to be weakness of all V4 countries with exception of Poland (Czechia 57th position, Hungary 68th position, Slovakia 82th position).

In last sub-index Online creativity scored the best Chechia (30,9) followed by Hungary (19,1), Poland (16,4), Slovakia (14,7). It is a left-skewed distribution - 1,648, one higher value and several lower ones. Slovakia's income group weakness Generic top-level domains (3,3), ranged 61st position overall.

Table 3: Strengths and weaknesses of V4 countries

	Strengths and weaknesses			
	Strengths	**Income group strengths**	**Weaknesses**	**Income group weaknesses**
Czechia	•Creative goods and services (7), •National feature films (5), •Creative goods exports (1)	•Creative goods and services (7), •Creative goods exports (1)	•Printing and other media (57)	---------
Hungary	•Creative goods exports (7)	•Creative goods exports (7)	•Intangible asset intensity (49), •Trademarks by origin (78), •Printing and other media (68)	•Intangible asset intensity (49), •Entertainment and media market (29)
Poland	•Industrial designs by origin (23), •Creative goods exports (13)	•Creative goods exports (13)	•National feature films (52)	•National feature films (52), •Entertainment and media market (32)
Slovakia	•Creative goods exports (9), •Country-code TLDs (22)	•Creative goods exports (9)	•Intangible asset intensity (78), •Printing and other media (82)	•Intangible assets (90), •Intangible asset intensity (78), •Global brand value (74), •Printing and other media (82), •Generic top-level domains (61)

Source: Processed using data from WIPO (2022)

Slovakia ranged 70th position within 7th pillar Creative outputs as seen in Table 4 in comparison with Czechia (37th), followed by Poland (38th) and Hungary (46th). Slovakia scored the least nearly in all sub-indexes with exception of Creative goods and services sub-pillar (23th position), followed just by Hungary (26th position). On 90th position for Intangible assets and 38th position for Online creativity is Slovakia the worst evaluated economy among V4 countries with exception of Creative goods export category acting as strength (9th position). On the other hand, Czechia (37th position) and Poland (38th position) are leading countries within V4 group in the range of Creative outputs. Although Czechia ranged 70th position in Intangible assets category, thanks to 24th position in Online creativity sub-index and even 7th position in Creative goods and services is the best evaluated economy according WIPO, moreover, achieving great success in category Creative goods export (1st position). Poland possess balanced scores in all categories as well as Hungary (46th position) being somewhere in the middle between Slovakia at the bottom and Czechia and Poland at the top.

Table 4: Final range of V4 countries in major categories

Category	Range			
	Czechia	**Hungary**	**Poland**	**Slovakia**
Creative outputs	37	46	38	70
Intangible assets	70	65	39	90
Creative goods and services	7	26	45	23
Online creativity	24	33	34	38

Source: Processed using data from WIPO (2022)

CONCLUSION

According data collected by WIPO, Slovakia ranged 70th position within 7th pillar Creative outputs in comparison with Czechia (37th), followed by Poland (38th) and Hungary (46th). Slovakia ranged the lowest possitions nearly in all sub-indexes with exception of few strengths in various variables. Czechia is the best evaluated economy according WIPO, moreover, achieving great success in category Creative goods export (1st position).

Bibliography

BRAHA, Kushtrim – OINETI, Artan – SERENČÉŠ, Roman. 2023. Innovation And Economic Growth: The Case Of Slovakia. In: Visegrad Journal on Bioeconomy and Sustainable Development. vol. 4, num. 1, p. 7-13. ISSN 1339-3367.

CVETANOVIC, Slobodan et al. 2014. The analysis of innovation in Western Balkan countries in 2012 The moderating role of business environment. In: Economic Research-Ekonomska Istraživanja. vol. 27, num. 1, p. 830–846. ISSN 1331677X.

DAVIS, Steven Joseph et al. 2022. Emissions rebound from the COVID-19 pandemic. In: Nature Climate Change. vol. 12, p. 412–414. ISSN 1758-678X.

DUTTA, Soumitra et al. 2019. Creating healthy lives— the future of medical innovation.

EHRENBERGER, Marek – KOUDELKOVA, Petra – STRIELKOWSKI, Wadim. 2015. Factors Influencing Innovation in Small and Medium Enterprises in the Czech Republic. In: Periodica Polytechnica Social and Management Sciences. vol. 23, num. 2, p. 73–83. ISSN 1416-3837.

EUROPEAN COMISSION. 2011. The European Cluster Observatory Priority Sector Report: Creative and Cultural Industries Luxembourg. Publications Office of the European Union. ISBN 978-92-79-18470-3.

FLEW, Terry - CUNNINGHAM, D Stuard. 2010. Creative Industries after the First Decade of Debate. In: The Information Society. vol. 26, num. 2, p. 113–123. ISSN 0197-2243.

GOTO, Kazuko. 2017. Defining Creative Industries. In: Hemels, S., Goto, K. (eds) Tax Incentives for the Creative Industries. Creative Economy. Springer, Singapore. ISBN 978-981-287-832-8_2.

HAMIDI, Siham – BENABDELJLIL, Nadia. 2015. Managerial and Technological Innovations: Any Relationship? In: Procedia - Social and Behavioral Sciences. vol. 181, p. 286-292. ISSN 1877-0428.

IVANOVÁ, Eva – ČEPEĽ, Martin. 2018. Impact of innovation performance on the competitiveness of the Visegrad 4 countries. In: Journal of Competitiveness. vol. 10, num. 1, p. 54 - 72. ISSN 1804-171X.

KAYNAH, Selahattin – ALTUNTAS, Serkan – DERELI, Turkay. 2017. Comparing the innovation performance of EU candidate countries: an entropy-based TOPSIS approach. In: Economic Research-Ekonomska Istrazivanja. vol. 30, num. 1, p. 31–54. ISSN 1331-677X.

PANSERA, Mario - FRESSOLI, Mariano. 2021. Innovation without growth: Frameworks for understanding technological change in a post-growth era. In: Organization. vol. 28, num. 3, p. 380-404. ISSN 1350-5084.

PECE, Andreea Maria - SIMONA, Olivera Ecaterina Oros – SALISTENAU, Florina. 2015. Innovation and Economic Growth: An Empirical Analysis for CEE Countries. In: Procedia Economics and Finance. vol. 26, p. 461-467. ISSN 2212-5671.

ROBRA, Ben et al. 2023. From creative destruction to convivial innovation - A post-growth perspective. In: Technovation. vol. 125. ISSN 0166-4972.

TAO, Jin. 2019. Agglomeration economies in creative industries. In: Regional Science and Urban Economics. vol. 77, p. 141-154. ISSN 0166-0462.

WALSH, Shannon. 2023. How does innovation spirit affect R&D investment and innovation performance? The moderating role of business environment. In: Journal of Innovation & Knowledge. vol. 30, num. 2, p. 345–360. ISSN 1350-5084.

WIPO. 2022. Global Innovation Index 2022 What is the future of innovationdriven growth?. p. 262. ISBN 978-92-805-3432-0.

YIN, Xingmin. 2023. Creative Industries after the First Decade of Debate. In: Journal of Innovation & Knowledge. vol. 8, num. 3. ISSN 2444-569X.

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Direct investing in the financial market

Frederik Jankaj

Abstract

The main objective of this article is to offer a comprehensive view of the investment landscape, to assess the current trends and challenges facing investors, and to identify possible directions for financial market investing in the near future. This scholarly article reviews current trends and strategies in investing, analyzing the risks and returns associated with different types of investments. Based on the findings, it seeks to provide insights into the future of financial market investing and the potential challenges that may affect it. The results of this study contribute to a better understanding of the complexity of financial markets and assist investment professionals and investors in their decision-making processes.

Key words

Investing, market, performance

Introduction

Financial market investing offers a wide range of options for different types of investors, from those who prefer the stability of bond funds, to those seeking the balanced approach of blended funds, to those seeking high returns through equity funds. This research paper focuses on analyzing and comparing the performance of these three main types of mutual funds in the financial market. The main objective of this study is to provide an in-depth look at the evolution and performance of bond, commingled and equity mutual funds in the current investment environment. The results of this study will serve as a useful source of information for investors, fund managers and other actors in the financial markets interested in different forms of mutual fund investing.

1 Investing in financial markets

Both the financial system as a whole and the financial market itself, an important subsystem of the financial system, are an integral part of the economic system. Since the financial market can only function within the overarching financial system, neither can financial market theory be studied in isolation from the rest of financial theory. (Rejnuš, 2014) There are several definitions of the financial market besides the one mentioned above, depending on how one looks at the financial market. Regarding the definition sensu stricto, i.e. the financial market in a narrower sense, in the book Investing in Capital Markets the readers are presented with a

definition in the content of which it can be read that it is a group of market segments, namely the market of short-term and long-term securities, the market of financial derivatives, the market of real assets and the foreign exchange market. If we are interested in the definition of the financial market in a broader sense, the range of the mentioned market segments is extended to include the market of short-term and long-term loans. (Veselá, 2019) We use three sentiment indices to measure investor sentiment: the investor sentiment index created by Baker and Wurgler, the University of Michigan's consumer sentiment index, and the Organisation for Economic Co-operation and Development's (OECD) consumer confidence index. (Ashour, 2023) In the modern perception of the financial market, it is necessary to emphasize the absence of its temporal and local determination and to understand it as a permanently operating global decentralized system. (Čunderlík, 2019) In conclusion, it is important to note that the financial market is a sensitive barometer of the state of development of a given economy and its future prospects, making it clear that the role of the financial market is indispensable in a functioning market economy. (Bakeš, 2012)

We will be looking at direct investing, also called active investing. This type of investing gives investors the opportunity to put their spare cash resources into specific investment assets that they personally prefer. The range of investment assets available on the financial markets is indeed very diverse, but for individual investors it is relatively limited compared to the range of products available to institutional investors. Before an individual investor embarks on active investment, it is essential to establish an investment plan which he or she will try to implement through the chosen investment strategy. There are countless investment strategies and they can be divided up on the basis of different criteria. Although there are relatively well-known divisions into short-, medium- and long-term, conservative, balanced and dynamic, active and passive, or growth-, income- or total return-oriented investment strategies. In principle it can be stated that the difference between the different investment strategies lies mainly in the preferences and needs of the investor himself. Thus, there is no one-size-fits-all investment strategy generally applicable to any situation. (FILIP, 2006)

2 Research objectives and methods

The objective of this research study is to analyze and compare in detail the performance of bond, mixed and equity mutual funds in the financial market over a time horizon of the last decades. The methodology of this study involves a comprehensive analysis of historical fund performance data, including statistical methods and econometric models that will allow us to objectively evaluate the performance of these funds. In addition, we will use literature search and secondary sources to aid in our understanding of direct investing in the financial market. These objectives and methods will provide a basis for critically analyzing and comparing the performance of bond, blend and equity funds and will help us to better understand the factors that influence investment decisions and outcomes in financial markets.

3 Results

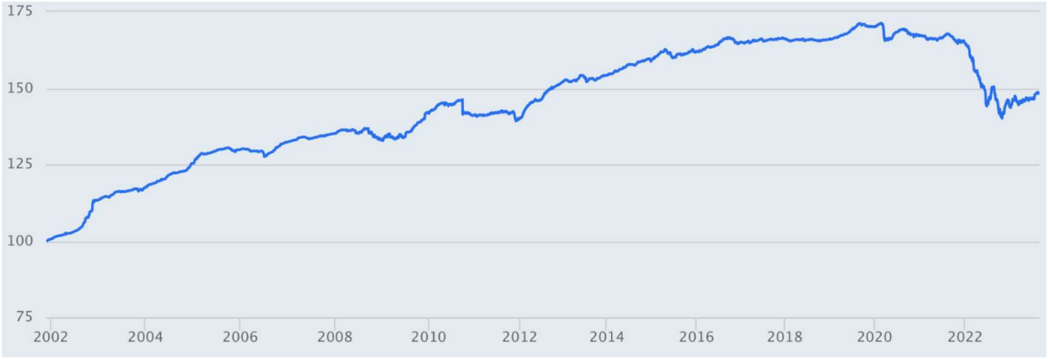
In this scientific paper I decided to present the performance of selected mutual funds offered by the largest bank in Slovakia, namely SLSP. The reason why I chose this particular bank lies mainly in the transparency of information provided by the bank to potential investors. When

drawing up the examples of regular investments through mutual funds, I focused on the funds offered by SLSP to its clients as part of the Investment Savings Scheme. An important factor in the choice of the bank and investment products was the fact that under SLSP Bank's Investment Savings Plan, no entry, exit or management fee is charged to investors, provided that the minimum savings period (at least 3 years) is met, and that this type of investment is available to a relatively wide range of the population, as the minimum investment in the fund is €20 per month.

In order to provide the most varied overview of possible investments in mutual funds of different nature, I have decided to reconstruct the regular investment in 3 open-end mutual funds (hereinafter referred to as o.p.f.), differing in the ratio of stocks and bonds in their portfolio, which significantly affects the profitability but also the riskiness of a given investment.

The first fund we will introduce in this paper is a bond fund called AM SLSP Euro Bond Fund, o.p.f. created in 2001. This fund is considered to be a conservative type of fund as it focuses on debt investments. In terms of the risk-return profile of the assets, this fund has a risk-return ratio (SRRI) of 2 out of a possible 7, which makes the fund a priority for investors who are not comfortable with taking a higher risk of a possible decline in the value of their investment and who are also able to settle for lower potential returns. The investment structure of the fund is 99% in debt securities, mainly government and corporate bonds, and the remaining 1% is invested in money market instruments and deposits in various banks. The fund is actively managed by a management company which invests the fund's assets at its own discretion, with no restrictions on the extent to which these decisions may be made. As stated by SLSP Bank on its website, the recommended investment horizon under this fund is for a minimum of 3 years and investors can request redemption of units on a daily basis. (Asset Management Slovenskej sporiteľne (b), 2023 [online])

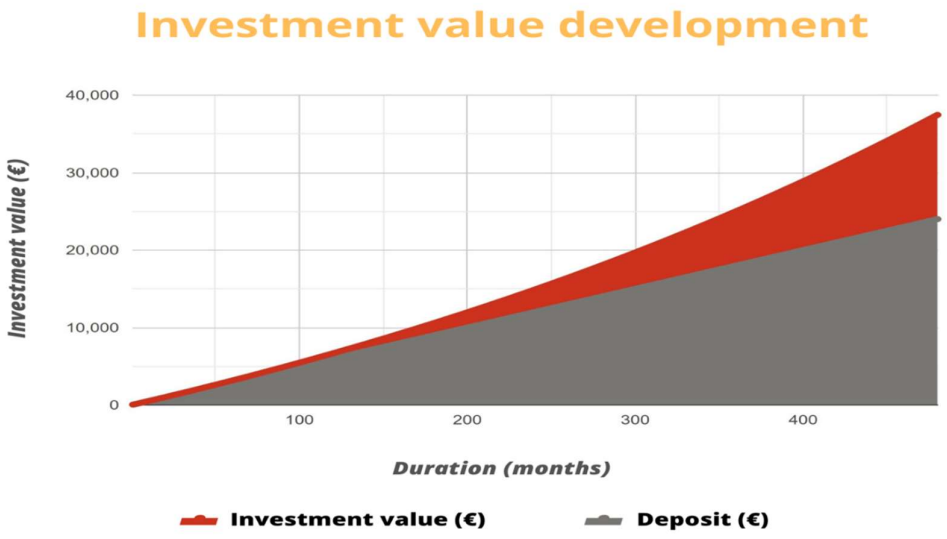
Figure 1: Total return of the fund AM SLSP Euro Bond Fund, o.p.f.



Source: Asset Management Slovenskej sporiteľne (b2). AM SLSP Euro Bond Fund, o.p.f., 2023. [online]. Available at: https://www.erste-am.sk/sk/amslsp/graf/am-slsp-eurovy-dlhopisovy-fond-opf/SK3110000328

As can be seen in Chart 1, the evolution of the overall performance of the Eurobond Fund has been very positive over the years, ending with a fairly pronounced decline in value during 2020 and 2021, persisting to the present day. SLSP Bank in conjunction with this fund states on its website that the performance of the mutual fund is 53.24% (2.11% p.a.) from its inception on 26.11.2002 to 26.04.2022.

Figure 2: Evolution of the value of the investment at 2.8% yield



Source: Financial Compass. Investment calculator. 2023. [online]. Available at: https://www.financnykompas.sk/investovanie-pravidelne/kalkulacka#vysledok

S = 12*50* {1+ [(12-1)/(2*12)] * 0,0208} * {[(1+0,0208)^40]-1}/0,0208 = rounded €37,228

After subtracting the investor's total deposits of €24,000, we get the amount of potential appreciation of the investment, which is €13,228. If we wondered how much of an improvement this saved amount would provide over the 16 years from retirement age, we would see a monthly improvement of €194 per month.

The second mutual fund I focused on at SLSP Bank is AM SLSP Active Portfolio, o.p.f. We classify this fund as a mixed fund whose portfolio includes both equity and debt securities. While the proportion of equity investments is capped at a maximum of 30% of total investments, investments in bonds and money market instruments are not restricted in any way. Like the Euro Bond Fund, this fund is actively managed by the management company on a discretionary basis. For this fund, the management company uses the absolute return principle in managing the portfolio, the purpose of which is to hedge the portfolio against large declines in value. In simple terms, the company protects itself during negative market trends by selling off asset classes with relatively low return potential while buying assets with an upward trend and relatively high potential return. The SRRI is slightly higher for this fund at 3, and as a result investors are advised to invest in the fund, particularly if you are willing to take slightly higher risks with an expectation of returns higher than bond funds and if you are interested in investing for a minimum of 4 years.

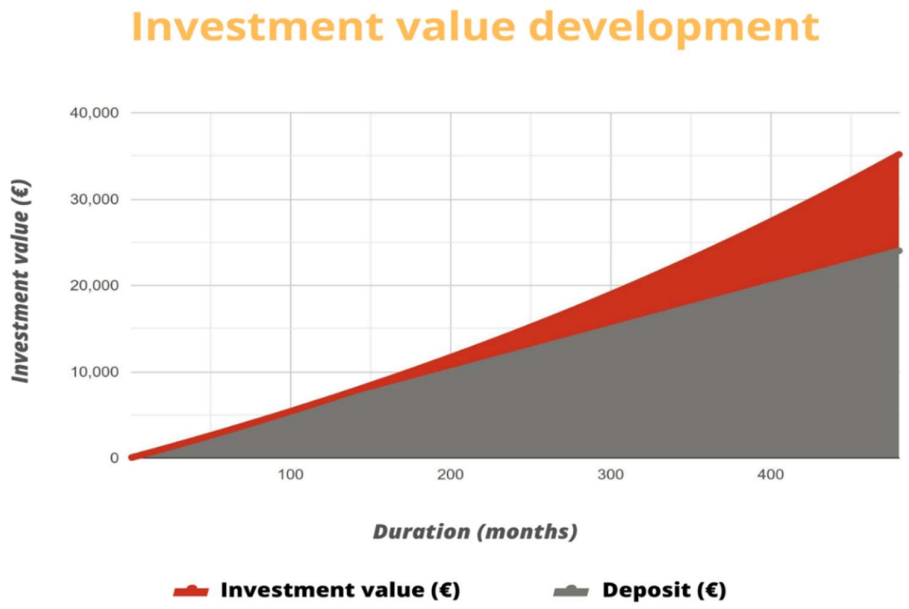
Figure 3: Total return of the fund AM SLSP Active Portfolio, o.p.f.

Source: Asset Management Slovenskej sporiteľne (a2). AM SLSP Active Portfolio, o.p.f., 2023. [online]. Available at: https://www.erste-am.sk/sk/amslsp/graf/am-slsp-aktivne-portfolio-o-p-f/SK3110000336

Based on the data on SLSP Bank's website and the observation chart, it can be noted that since the inception of the Fund in 2002, the performance of the Fund, despite a relatively large decline in 2008, has been on an upward trend, which the Fund has been able to maintain even after a significant decline in 2020, resulting in a performance of 41.88% (1.8% p.a.) from inception to 28.04.2022.

S = 12*50* {1+ [(12-1)/(2*12)] * 0,018} * {[(1+0,018)^40]-1/0,018 = rounded €34.997 €

Figure 4: Evolution of the investment value

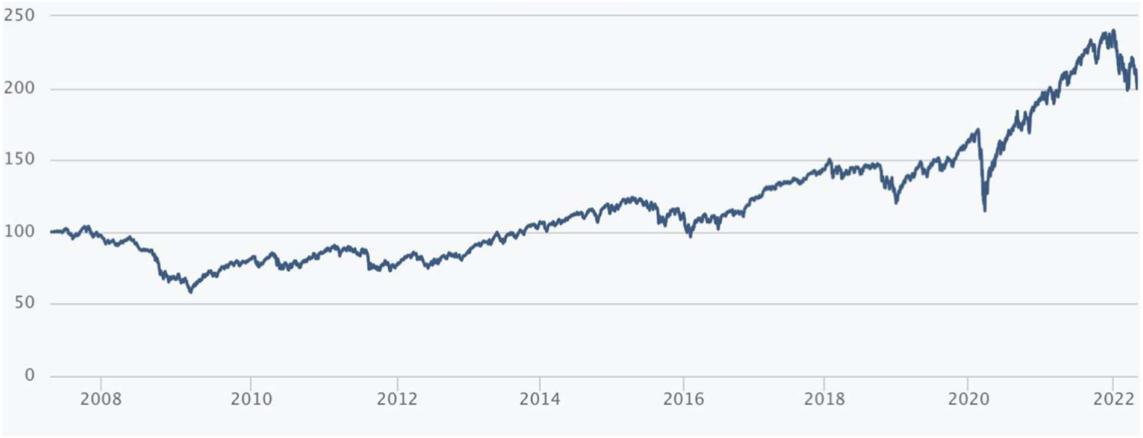


Source: Financial Compass. Investment Calculator. 2023. [online]. Available at: https://www.financnykompas.sk/investovanie-pravidelne/kalkulacka#vysledok

If we apply this average annual performance to our sample example, we would be able to save €34,997 through this fund, which, after deducting the saver's contribution, would leave us with an appreciation of €10,997. The monthly addition to the pension of the person defined by us would amount to €182.

The group of funds that we will present in this paper is rounded off by an equity fund called AM SLSP Fund of Maximised Returns, o.p.f. The asset management of this fund is handled in the same way as for the previous two funds, i.e. the portfolio of investments is actively managed by the management company, investing solely on a discretionary basis, depending on the fundamental analysis of the specific investment parameters and the current value and settings of the business models, while the objective of the management company is to achieve above-normal potential returns. The essential difference between this equity fund and the other two funds mentioned above lies in the composition of the portfolio, which consists exclusively of equity securities, mainly shares in world-famous companies. The strategic share of equities within this fund is therefore at 100%, and the fund's strategy also includes the use of derivatives in the form of futures and options, which are considered to be very helpful in managing the equity component of the mutual fund. The risk structure of this fund's portfolio is also matched by the SRRI, which is set at 6 for the fund, making the fund recommended exclusively for investors who are willing to take significantly higher risks with the expectation of achieving high potential returns, while the investment of cash is recommended for persons whose investment horizon exceeds the lower limit of 5 years. (Asset Management Slovenskej sporiteľne (c), 2023 [online])

Figure 5: Total return of the AM SLSP Maximum Return Fund, o.p.f.



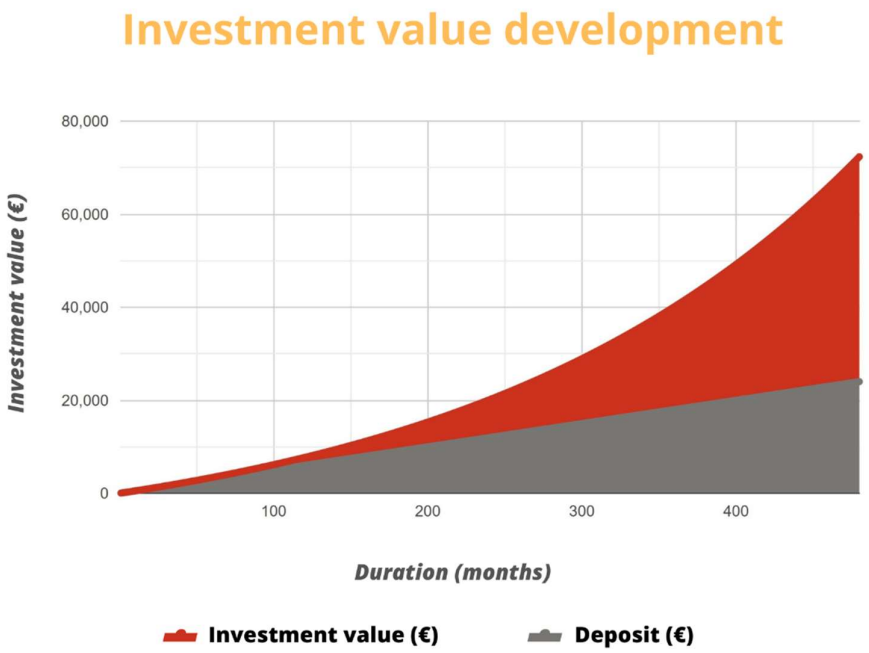
Source : Asset Management Slovenskej sporiteľne (c2). AM SLSP Fund of maximised returns, o.p.f., 2023. [online]. Available at: https://www.erste-am.sk/sk/amslsp/graf/am-slsp-fond-maximalizovanych-vynosov-o-p-f/SK3110000377

In the attached chart of the performance of the equity fund since it is inception, it can be observed that the fund suffered a rather deep loss at the beginning of its operation, from which it recovered to its original level only at the end of 2013. However, despite a few upward trend fluctuations, a positive development in the value of the fund can be observed since 2009,

interrupted by a deep downturn in early 2020. Interestingly, however, the annual performance of the fund in that year, despite this significant drop, was almost 20%, which is an ideal example of the erratic nature of equity funds caused by the high volatility of equity prices. Focusing on the Fund's evolution since its inception, SLSP Bank puts the Fund's overall performance to 29.4.2022 at 101.64% (4.78% p.a.).

S = 12*50* {1+ [(12-1)/(2*12)] * 0,0478} * {[(1+0,0478)^40]-1}/0,0478 = rounded 70 210

Figure 6: Evolution of the investment value at 4.78% yield



Source: Financial Compass. Investment calculator [online]. Available at: https://www.financnykompas.sk/investovanie-pravidelne/kalkulacka#vysledok

Taking into account the average annual performance, the savings of € 70210 can be predicted in the sample example of which € 46 210 can be considered as the appreciation of the investment itself. If the amount saved is spread over 16 years, the pension enhancement alone would amount to €366 per month.

CONCLUSION

In focusing on the performance of the Fund, I find it necessary to note that past developments performance of the Fund is not a predictor of its future development. This can be understood to mean that even a long-term positive development of the fund's performance in the past or present in no way guarantees the investor a certain amount of appreciation in the future, not even a positive return on the investment itself. In this context, I would also like to note that, although I have chosen to calculate the return of the funds by means of the average annual performance since the inception of the fund in question, I personally anticipate in reality a

substantially higher appreciation of the investments than can be predicted on the basis of my calculations. The potential appreciation at a level higher than I calculated is mainly due to the fact that each of the funds has needed some time to adapt to the market and to be generally accepted as a suitable investment instrument among investors. There is a lot of expectation attached to the appearance of a new fund on the market, accompanied by great enthusiasm and success, often followed by uncertainty and fear, leading to huge losses, which can misrepresent its potential in the first years of its existence.

Bibliography

Finančný kompas. Investičná kalkulačka 2023. [online]. Dostupné na: <https://www.financnykompas.sk/investovanie-pravidelne/kalkulacka#vysledok

Finančný kompas. Investičná kalkulačka 2023. [online]. Dostupné na: <hhttps://www.financnykompas.sk/investovanie-pravidelne/kalkulacka#vysledok

Finančný kompas. Investičná kalkulačka 2023. [online]. Dostupné na: <https://www.financnykompas.sk/investovanie-pravidelne/kalkulacka#vysledok

Asset Management Slovenskej sporiteľne (c2). A AM SLSP Fond maximalizovaných výnosov, o.p.f. 2023. [online]. Dostupné na: https://www.erste-am.sk/sk/amslsp/graf/am-slsp-fond-maximalizovanych-vynosov-o-p-f/SK3110000377

Asset Management Slovenskej sporiteľne (c2). AM SLSP Aktívne portfólio, o.p.f. 2023. [online]. Dostupné na: : https://www.erste-am.sk/sk/amslsp/graf/am-slsp-aktivne-portfolio-o-p-f/SK3110000336

Asset Management Slovenskej sporiteľne (c2). AM SLSP Eurový dlhopisový fond, o.p.f. 2023. [online]. Dostupné na: https://www.erste-am.sk/sk/amslsp/graf/am-slsp-eurovy-dlhopisovy-fond-opf/SK3110000328

REJNUŠ, O. Finanční trhy. 4., aktualizované a rozšírene vydanie. vyd. Praha: Grada, 2014. ISBN 978-80-24746-71-6.

VESELÁ, J. Investovaní na kapitálových trzích. 3. vydanie, vyd. Praha: Wolters Kluwer, 2019. ISBN 978-80-75982-12-4.

ČUNDERLÍK, Ľ., a spol., Inovatívne a atypické modely správy majetku na finančnom trhu a súvisiace otázky: vedecká monografia., vyd. Praha: Leges, 2019. ISBN 978-80-75024-05-3.

BAKEŠ, M., a spol., Finanční právo. 6., upravené vydanie. vyd. Praha: C. H. Beck, 2012. ISBN 978-80-74004-40-7.

FILIP, M. Osobní a rodinné bohatství: kam s penězí. 1. vyd., vyd. Praha: C. H. Beck, 2006. ISBN 978-80-71794-16-3.

ASHOUR, S., a spol., Investor sentiment, style investing, and momemntum, Dostupné na: https://doi.org/10.1016/j.finmar.2022.100755.

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Municipal waste management in selected municipalities in the Vranov region

Pavol Kaľuha, Michal Stričík

Abstract

The aim of the scientific paper is to evaluate the state of municipal waste management in selected municipalities of the Vranov region and to propose measures that can contribute to a positive impact on the environment and waste management not only in environmental but also in economic terms. Waste management is a relatively frequently addressed issue in many Slovak municipalities and therefore it is essential to address it and look for effective ways and solutions that can actually help municipalities to actively manage their waste management in the best possible way at the lowest possible cost. The scientific paper offers concrete recommendations and suggestions aimed at optimal waste management in local governments.

Key words

Municipal waste, waste management, recycling, Agenda 2030

Introduction

Sustainable development on a global or European scale can only be achieved if, if waste management rules are properly set up in countries and their municipalities. Municipal waste management is a key aspect of how to achieve a sustainable environment. The objectives of the Slovak Republic, the European Union and the specific objectives of the 2030 Agenda in this area are directed towards the application of the waste management hierarchy and the principles of the circular economy.

We are currently facing ever-increasing challenges regarding the treatment of municipal waste. It is therefore extremely important for municipalities to play their part in ensuring the efficient collection and subsequent management of municipal waste.

1 Definition of basic terms

In this part of the paper we will focus on basic terms such as waste, municipal waste, separate collection, waste management as well as the waste hierarchy.

1.1 Waste

In the literature we encounter different definitions of waste.

Zákon o odpadoch č. 79/2015 Z. z., § 2, ods. 1 defines waste as a movable thing or substance which the holder disposes of, wants to dispose of or is obliged to dispose of in accordance with this Act or special regulations. (Zákon č. 79/2015 Z. z. o odpadoch).

In his publication, Pitchel identified waste as a solid material that has no economically added value (Pitchel 2014, p. 5).

According to the EVREKA portal, the basic types of waste include:

- Food waste,
- municipal waste,
- industrial waste.

The different types are then subdivided according to further breakdowns, such as material breakdown (paper, glass, plastic, bio-waste,...), safe and hazardous waste (hospital waste, oil waste) (EVREKA).

Waste can also be subdivided according to the waste catalogue, which is laid down in a decree of the Ministry of the Environment derived from the European catalogue. "Waste is classified in the Waste Catalogue according to its origin and the conditions of its management as hazardous waste, as well as according to its properties or the content of harmful substances which determine or condition their hazardous nature." (Stričík 2019).

1.2 Municipal waste

The Waste Act defines municipal waste as "mixed waste and separately collected waste from households, including paper and cardboard, glass, metals, plastics, biological waste, wood, textiles, packaging, waste electrical and electronic equipment, used batteries and accumulators and bulky waste, including mattresses and furniture, mixed waste and separately collected waste from other sources if such waste is similar in nature and composition to household waste." (§ 80 zákon č. 79/2015 Z. z.).

The waste produced must be collected and managed in an appropriate manner, which is still a problem in many developed countries, leading to potential risks such as water or air contamination. (Ahmed, Dijk 2023).

Protection against this type of waste is conditioned by environmental, social and economic circumstances and for this reason it becomes an element of cities' sustainable development. (Mesjasz-Lech, 2014)

Municipalities are obliged under § 81 ods. 7 zákona o odpadoch:

a) "to ensure the collection and transport of mixed municipal waste arising on its territory for the purpose of its recovery or disposal in accordance with this Act, including the provision of collection containers corresponding to the system of collection of mixed municipal waste in the municipality,

b) ensure the introduction and implementation of separate collection:

- biodegradable kitchen waste, except for that generated by natural persons - entrepreneurs and legal entities operating catering establishments,
- edible oils and fats from households,

- biodegradable waste from gardens and parks, including waste from cemeteries,

c) ensure the introduction and implementation of separate collection of municipal waste for paper, plastics, metals, glass and cardboard-based multilayer composite materials at least to the extent resulting from the requirements laid down for the separate collection of municipal waste." (Zákon 79/2015 Z. z.).

Points a) and b) shall be financed by municipalities from municipal waste charges. Point c), which concerns the separate collection of waste (paper, plastics, metals, glass), is financed by the producers through producer responsibility organisations (PROs).

These organisations carry out activities such as:

- setting up, financing, operating and maintaining a functional aggregated management of a dedicated waste stream,
- carrying out promotional and educational activities,
- ensuring that the full amount of separately collected municipal waste is collected.

Producer responsibility organisations are not established for profit. (OZV NATUR-PACK).

The reduction of environmental pollution caused by municipal waste can be achieved mainly in two ways, namely through the development of more advanced and economically advantageous zero-waste technologies or through the organised collection of waste, which is associated with its more environmentally friendly recovery and recycling (Stričík, Čonková, Bačová, 2019).

The increasing amount of municipal solid waste generated in many parts of the world has become a significant environmental challenge. (Hassan et al., 2023)

Waste sorting

Separate collection of municipal waste means an activity in which the individual components of municipal waste are collected separately in individual collection bins.

Components of separate collection of municipal waste include packaging (made of glass, plastic, plastic materials, metal), non-packaging products, small construction waste, edible oils and fats, batteries and accumulators, electrical equipment, biodegradable waste and biodegradable kitchen waste.

The European Union has set the following key targets for municipal waste recycling:

1. to increase the preparation for recycling and reuse of household waste at least to 50 % by weight by 2020,
2. to increase the rate of preparation for recycling and reuse of municipal waste to at least 55% by weight by 2025,
3. a recycling rate of at least 60% by 2030,
4. a reduction in the rate of municipal waste to landfill to less than 10% by 2035 (Smernica Európskeho parlamentu a Rady (EÚ) 2018/851).

Figure 1. Waste management hierarchy

Source: own processing (2023)

The waste management hierarchy is composed of 5 activities, which are arranged from the most appropriate waste management options.

Waste must be prevented first (Ogunwumi, Salami 2023).

If this is not possible, the product generated needs to be prepared for reuse through various treatments. In this step, the product may not become waste but rebirth takes place.

The third activity is recycling, in which the production resource is recovered and input material is created to carry out the next production process.

Another activity is waste recovery, during which waste is positively used (e.g. for energy).

The last activity of the waste management hierarchy is perceived as the worst option of the waste management hierarchy, namely disposal (e.g. incineration without energy recovery).

The waste management hierarchy points to the most environmentally friendly steps to be taken before waste is landfilled. (EPA 2020). This is also why it is an environmentally unacceptable activity that is considered extremely harmful to the environment and therefore not usually listed in the hierarchy. There are many negative impacts associated with landfilling, such as the release of methane gas or the contamination of groundwater with leachate. (Wenga, 2023).

2 Research objectives and methods

The object of the study is the state of municipal waste management in selected municipalities of the Vranov region, which are the municipalities of Nižný Hrušov, Nižný Hrabovec and Sedliská.

The municipalities were selected on the basis of their common location within the Vranov nad Topľou district and similar population size, where we can compare not only waste production according to their size but also in economic terms, as it is assumed that the municipalities have similar revenues and expenditures for waste management.

In the research we used the following methods: analysis, excursion, graphical representations, comparison, consultation, mathematical-statistical methods, observation and synthesis.

3 Results

In this part of the research we compare individual municipalities on the basis of their municipal waste production, waste sorting and also on the basis of finances spent on waste management.

Table 1: Demographic development of selected municipalities in terms of population

	2016	2017	2018	2019	2020	2021
Nižný Hrušov	1 578	1 559	1 537	1 522	1 499	1 508
Nižný Hrabovec	1 643	1 646	1 653	1 668	1 660	1 625
Sedliská	1 412	1 443	1 442	1 432	1 447	1 477

Source: own processing based on municipal reports

In Table 1 we can see the demographic development of each municipality between 2016 and 2021. All three municipalities are similar in terms of population and the average number of inhabitants is 1 542.

Table 2: Amount of municipal waste produced in kilograms

	2016	2017	2018	2019	2020	2021
Nižný Hrušov	325 596	322 009	319 887	274 895	258 397	307 891
Nižný Hrabovec	297 690	266 274	289 896	657 483	1 930 164	411 132
Sedliská	89 590	98 410	91 780	106 397	151 780	211 837

Source: own processing based on municipal reports

Table 2 shows the collected data on municipal waste production in selected municipalities. The municipality of Nižný Hrabovec produced the highest amount of waste (3 852 639 kg). This result was achieved due to the year 2020, in which almost 2 000 000 kilograms of municipal waste was collected, but less than 1 700 000 kilograms of this waste was made up of iron and steel components.

Table 3: Percentage of landfilled and sorted waste

	activity	2016	2017	2018	2019	2020	2021
Nižný Hrušov	landfilling	65,53%	63,71%	67,63%	59,53%	41,40%	43,29%
	separation	34,47%	36,29%	32,37%	40,47%	58,60%	56,71%
Nižný Hrabovec	landfilling	85,80%	86,25%	86,53%	34,12%	11,88%	55,65%
	separation	14,20%	13,75%	13,47%	65,88%	88,12%	44,35%
Sedliská	landfilling	81,05%	78,95%	77,40%	69,39%	56,26%	41,70%
	separation	18,95%	21,05%	22,60%	30,61%	43,74%	58,30%

Source: own processing based on municipal reports

Amount of landfilled and sorted municipal waste in individual municipalities is shown in Table 3. The highest waste sorting rate was achieved by the municipality of Nižny Hrabovec in 2020 (88.12 %) due to the above-mentioned sorted waste components in the description of Table 2 - iron and steel. This municipality had the highest landfilling rate in 2018 at (86.53%).

Table 4: Fee for municipal waste export per citizen according to the municipal ordinance in €

	2016	2017	2018	2019	2020	2021
Nižný Hrušov	11,50	11,50	11,50	11,50	0,078 /kg	0,27/kg
Nižný Hrabovec	5,00	5,00	5,00	5,00	12,00	12,00
Sedliská	6,50	6,50	6,50	11,00	11,00	11,00

Source: own processing based on the general binding regulations

In the municipalities of Nižný Hrabovec and Sedliská, export fees have been increasing over the years studied. In Nižny Hrabovec, the one-off increase was 7 €/capita/year between 2019 and 2020 and in Sedliská also a one-off increase of 4.50 €/capita/year between 2018 and 2019. In Nižný Hrušov, the type of collection of the export fee changed in 2020 from a flat fee per person to a fee per 1 kg of municipal waste exported.

The municipality of Nižný Hrušov collects the money for collection on the basis of an advance payment and then a settlement is made in which the advance payment is compared with the actual amount of municipal waste collected. The calculation of the advance payment is shown in Table 5.

Table 5: Advance payment calculation

number of household members	minimum number of waste exports	Container size 110l	Container size 120l	Container size 240l
1 - 2	6/year	21,06 €	22,68 €	38,88 €
3 - 4	11/year	38,61 €	41,58 €	71,28 €
5 <	20/year	70,20 €	75,60 €	129,60 €

Source: own processing based on the general binding regulations about waste management in Nižný Hrušov

The minimum number of exports is determined on the basis of the number of household members. For 1 to 2 members the minimum number of exports is 6 times per calendar year, for 3 to 4 members 11 times and for 5 or more members 20 exports per calendar year.

Thus, a household with one or two members will pay a minimum of € 21.06 for a 110 litre collection container. The highest fee for a minimum number of exports is paid by a family of 5 or more members, where the fee is € 129.60 for a 240 litre collection container with a minimum number of exports.

The municipality of Nižný Hrušov had the highest revenues from the collection of municipal waste export fees in all the years studied. Until 2019, these revenues were annually higher by more than 100% compared to the other municipalities surveyed. This phenomenon was caused by a fee of €11.50 per person, while in the other municipalities it was a fee of €5.00 and €6.50 per person. The municipality of Sedliská had the lowest expenditure and also the lowest additional payment for waste management. The level of fees was set higher than necessary in Nižný Hrušov (year 2021) and in Sedliská (years 2020 and 2021), resulting in revenues from the collection of fees for the collection and export of municipal waste. Following observations and consultations with the individual mayors

of the municipalities, this is a normal phenomenon, but the money has to be spent for the operation of the municipality's waste management, otherwise it may be illegal revenue, which is not in line with the legislation of the Slovak Republic.

Table 6: Waste management incomes, expenditures and co-financing of municipalities

	type	2016	2017	2018	2019	2020	2021
Nižný Hrušov	incomes	17 241,00 €	15 455,00 €	14 841,00 €	15 771,00 €	19 073,00 €	20 964,00 €
	expenditures	24 454,00 €	23 052,00 €	25 106,00 €	20 527,00 €	21 558,00 €	19 624,00 €
	co-financing	7 213,00 €	7 597,00 €	10 265,00 €	4 756,00 €	2 485,00 €	-1 340,00 €
Nižný Hrabovec	incomes	6 401,00 €	6 802,00 €	6 995,00 €	7 766,00 €	14 341,00 €	16 274,00 €
	expenditures	18 599,00 €	21 000,00 €	23 435,00 €	25 177,00 €	29 117,00 €	33 410,00 €
	co-financing	12 198,00 €	14 198,00 €	16 440,00 €	17 411,00 €	14 776,00 €	17 136,00 €
Sedliská	incomes	7 815,00 €	6 763,00 €	6 678,00 €	7 487,00 €	13 550,00 €	12 728,00 €
	expenditures	8 447,00 €	7 468,00 €	8 536,00 €	8 926,00 €	13 394,00 €	12 312,00 €
	co-financing	632,00 €	705,00 €	1 858,00 €	1 439,00 €	-156,00 €	-416,00 €

Source: own processing

In Table 7 we can see how individual municipalities have set fees for collection and export of municipal waste.

Table 7: Rate of co-financing of waste management by citizens and the municipality

	type	2016	2017	2018	2019	2020	2021
Nižný Hrušov	citizens	70,50%	67,04%	59,11%	76,83%	88,47%	100,00%
	municipality	29,50%	32,96%	40,89%	23,17%	11,53%	0,00%
Nižný Hrabovec	citizens	34,42%	32,39%	29,85%	30,85%	49,25%	48,71%
	municipality	65,58%	67,61%	70,15%	69,15%	50,75%	51,29%
Sedliská	citizens	92,52%	90,56%	78,23%	83,88%	100,00%	100,00%
	municipality	7,48%	9,44%	21,77%	16,12%	0,00%	0,00%

Source: own processing

Two municipalities, namely Nižný Hrušov in 2021 and Sedliská in 2020 and 2021, managed to achieve zero co-financing of waste management by the municipality, which is a reflection of the efforts to optimise the financing of waste management in the monitored municipalities.

CONCLUSION

Based on the findings on the state of municipal waste management in individual municipalities, we propose the following measures:

A) for the Slovak Republic:

- increase of landfill tipping fees - the introduction of this measure can help to achieve the European Union's target of reducing landfill waste to below 10% by 2035,
- tightening legislation on the creation of illegal landfills,
- intensify the level of publicity on the importance of waste sorting - this measure can help achieve the target of the Slovak Republic Waste Management Programme for 2021-2025 to achieve a sorted municipal waste collection rate of more than 60% by 2025.

B) for local government:

- introduction of SMART systems for waste management - this measure may have facilitate the administration of waste management,
- introduction of quantitative collection of municipal waste - this measure will relieve municipalities from co-financing the collection and export of municipal waste, which optimises the municipal budget,
- motivating citizens to separate collection.

Each of the above measures can contribute to the sustainable development of our country and the European Union. The state of municipal waste production is increasing and it is therefore necessary to find optimal solutions that are economically manageable for local authorities, because it is they who make up the states that in turn make up the world in which we live. Meeting the targets set will help us to improve the environment in line with the targets set by the European Union, as well as the United Nations in its AGENDA 2030 for sustainable development.

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Bibliography

AHMED, Abdulkerim a VAN DIJK, Meine Pieter, 2023. Waste separation and 3R’s Principles for Sustainable SWM: Practice of Households, Private Companies and Municipalities in Five Ethiopaian Cities. In: Solid Waste and Landfills Management – Recent Advances. 2023. s. 200, ISBN: 978-1-80356-326-8

Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries. United States Environmental Protection Agency. 2020. [cit. 2023-05-10]. Dostupné na: https://www.epa.gov/sites/default/files/2020-10/documents/master_swmg_10-20-20_0.pdf

HASSAN, Abu Md. Mehdi et al., 2023. Characterization of municipal solid waste for effective utilization as an alternative source for clean energy production. Journal of Radiation Research and Applied Sciences. Volume 16. Issue 4. 2023. ISSN 1687-8507. [cit. 2023-10-25]. Dostupné na: https://www.sciencedirect.com/science/article/pii/S1687850723001619

MESJASZ-LECH, Agata. 2014. Municipal Waste Management in Context of Sustainable Urban Development. Procedia – Social and Behavioral Sciences. Volume 151. 2014. p. 244-256. ISSN 1877-0428. [cit. 2023-10-26]. Dostupné na: https://www.sciencedirect.com/science/article/pii/S1877042814054652

OGUNWUMI, Olawale Theophilus a SALAMI, Lukumon. Perspective Chapter: Industrial Waste Landfils. In: Solid Waste and Landfills Management – Recent Advances. 2023. s. 200, ISBN: 978-1-80356-326-8

Organizácia Spojených národov. 2015 Valné zhromaždenie. Rezolúcia prijatá na Valnom zhromaždení 25. septembra 2015. Transformujeme náš svet: AGENDA 2030 pre trvalo udržateľný rozvoj. [online]. [cit. 2023-05-20]. Dostupné na: https://www.minzp.sk/files/oblasti/udrzatelny-rozvoj/sdgs-dokument-sk-verzia-final.pdf

PITCHEL, John, 2014. Waste Management Practices : Municipal, Hazardous and Industrial. 2nd ed. New York : CRC Press, p. 5.

PRÍRUČKA PRE SAMOSPRÁVY NATURPACK. [online]. [cit. 2023-05-20]. Dostupné na: https://www.sambron.sk/download_file_f.php?id=1583807

SMERNICA EURÓPSKEHO PARLAMENTU A RADY (EÚ) 2018/851 z 30. mája 2018, ktorou sa mení smernica 2008/98/ES o odpade (Text s významom pre EHP). [cit. 2023-05-15]. Dostupné na: https://eur-lex.europa.eu/legalcontent/SK/TXT/?uri=celex%3A32018L0851

STRIČÍK, Michal. a kol. 2019. Udržateľné nakladanie s komunálnym odpadom. 1. vyd. Ostrava: Vysoká škola báňská – Technická univerzita Ostrava. 304 s. ISBN: 978-80-248-4359-9.

STRIČÍK, Michal - BAČOVÁ, Monika - ČONKOVÁ, Monika. Motivácia občanov Slovenska k triedeniu komunálneho odpadu. In *Waste Forum : recenzovaný časopis pro výsledky výzkumu a vývoje pro odpadové hospodářství*. - Praha : České ekologické manažerské centrum. ISSN 1804-0195, 2019, č. 4, s. 399-412 online. VEGA 1/0582/2017. Dostupné na: <http://www.wasteforum.cz/cisla/WF_4_2019.pdf>

Výkaz o miere vytriedenia odpadu v obci Nižný Hrabovec

Výkaz o miere vytriedenia odpadu v obci Nižný Hrušov

Výkaz o miere vytriedenia odpadu v obci Sedliská

VZN o uložení poplatku za vývoz komunálneho odpadu obce Nižný Hrabovec

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WENGA, Terrence. Efficient Treatment of Municipal Solid Waste in Incineration for Energy Production. In: Solid Waste and Landfills Management – Recent Advances. 2023. s. 200, ISBN: 978-1-80356-326-8

What is Municipal Solid Waste (MSW)? EVREKA. [online]. [cit. 2023-05-20]. Dostupné na: https://evreka.co/blog/what-is-the-meaning-of-municipal-solid-waste/

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