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The population ageing and age equality in the V4 countries.

DENISA KOČANOVÁ[1]

[1*]*Department of Finance, Faculty of Economics, Technical University of Košice, the Slovak Republic*
denisa.kocanova@tuke.sk

Abstract

The main aim of the presented paper was to highlight the importance of the equality in every domain of society, especially those related to age. Demographic changes and opportunities for people aged 55 years and more were observed involving the population of the V4 countries. The specific indicators that evaluates the life of elderly and their development in the period 2009–2019 were analyzed. The Age Equality Index that rates every country of the Visegrad Group individually was created and the country's performance on the given indicators was evaluated at the same time. The indicators were divided into five key areas: education, labour market, earnings and social inclusion, health, and digital economy and society. Data were primarily obtained from EU-SILC and ECHP public surveys. To set the indices a data normalization and proximity-to-target methodology were used. The main results of the analysis showed that age equality is improving, mostly in the Czech Republic, where discrimination is very rare. The Czech Republic got the best score for the latest year, while Poland ranked at the second place. Third place was taken by Hungary and the worst score was achieved by Slovakia. On the other hand, the biggest change within the reference period was observed in the Czech Republic, Hungary, Slovakia and Poland, respectively.

Keywords: population ageing; age equality; discrimination; V4 countries.

1. Introduction

Population ageing and continuous increase in number of elderly people is considered to be a key demographic problem nowadays. It is connected to many economic issues, pension security, situation and implications for the labour market, the welfare of elderly and others (Lee and Mason, 2010). Another important area of research is equality, which can be related to age, gender, race, religion, etc. Age discrimination is defined as a state when you are treated unfairly because of your age or because you are a part of a particular age group. (Equality Act, 2010). It is essential to provide the same condition for people of any age, for example at the labor market, access to health care, opportunities in education, etc. The journey to achieve a full age equality is long and it will take time and effort, but it is not unreachable.

2. Literature Review

The latest studies show that ageing is significantly increasing not only with the European countries, but also in countries of Visegrad group (Káčerová and Ondačková, 2015; Šídlo et al., 2020). Demographic changes occur both at the bottom and at the top of the population pyramid (Dehnel et al., 2020). As number of elderly is increasing, the world has to face many challenges related to ageing. One of that challenges is an equal approach to people regardless of their age. Otherwise age discrimination happens. Age equality is a general principle of EU law. When comparing to other forms of discrimination, such as racism or sexism, ageism often tends to be normalized, age stereotypes are accepted and going unchallenged in most cases (EU Agency for fundamental rights, 2018). Age discrimination has been a topic for organizational psychologists for many years so they accumulated a wide range of a good theoretical and empirical basis for understanding the problem (Truxillo et al., 2017). Achieving age equality is important at many areas, such as labour market, health, social care, education, etc. (Bernard, 2013). Signs of age and gender discrimination still appear in job offers and even European Foundation of Human Rights (2020) have been fighting against discriminatory job offers, they are still being published. Age should not mean a barrier for seniors in any area of society. It is

suggested that age discriminational laws may help to avoid these struggles. it is not always a sufficient tool for such issues (Button, 2020).

3. Data and Methodology

The Age Equality Index (AEI) consists of the 15 target-oriented indicators that are grouped into five thematic areas, which are education, labour market, earnings and social inclusion, health, and digital economy and society. All variables were observed during reference period 2009 – 2019 and they were primarily obtained from EU-SILC and ECHP public surveys.
The first step to construct the Age Equality Index is to obtain the raw data from reliable sources, which are mostly EU-SILC and ECHP surveys, and then to transform them into normalized indices. In order to create normalized indices, minima and maxima need to be established and maxima are considered to be ideal outcomes. Minima are defined as lower performance benchmarks and determined as the worst possible scenario. Indicators were normalized following Emerson et al. (2012) and Hsu et al. (2016) and proximity-to-target methodology which uses the general formula (1):

non-logarithmic indicator = (observed value – lower performance benchmark) / (target – lower performance benchmark) (1)

Sometimes, indicators need to be transformed into logarithms (2) because of the high level of skewness. It allows not only to identify the differences between the best and the worst performers, but also to differentiate between top-performing countries and to better distinguish variations among them. It also enables to better identify the differences across the whole scale and these functions are a better representation of variables which have decreasing marginal welfare benefit, such as income (Emerson et al., 2012):

indicator in logarithmic form = [ln(x) – ln(m)] / [ln(t) – ln(m)] (2)

where:
t: target or sample maximum;
m: lower performance benchmark or sample minimum;
x: value of the variable.
Another approach to measure a country's performance on any given indicator and its position and to transform data into a consistent normalized scale (0,1) is used by Huba et al. (2003):

$$I_{xi} = (max\ x_i - x_i) / (max\ x_i - min\ x_i), \quad (3)$$

if indicator growth represents an undesirable trend, or

$$I_{xi} = (x_i - min\ x_i) / (max\ x_i - min\ x_i), \quad (4)$$

if indicator growth represents a desirable trend and where:
x_i: the value of the given indicator;
I_{xi}: the normalized value of that indicator for the *i-th* country.

The final score for each country and every year was calculated as an arithmetic mean of obtained normalized data, assuming that all variables have the same weight:

$$\text{Final score} = (Ix_1 + Ix_2 + ... + Ix_n) / n \quad (5)$$

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To create the Age Equality Index, the following indicators were normalized:

Table 1. Variables included in the European Retirement Index

Category	*Variable*
Education	- population with upper secondary, post-secondary non-tertiary and tertiary education (from 55 to 64 years); - participation rate in education and training (from 55 to 64 years).
Labour market	- employment rate by age (from 55 to 64 years); - employment rate by age (from 60 to 64 years); - temporary employees as percentage of the total number of employees (from 55 to 64 years); - part-time employment as percentage of the total employment (from 55 to 64 years); - unemployment rate (from 55 to 64 years).
Earnings and social inclusion	- gender pay gap in unadjusted form (from 55 to 64 years); - people at risk of poverty or social exclusion (from 55 to 64 years).
Health	- life expectancy at the age of 55 years; - percentage of people aged 55 years and more, who stated self-perceived health as at least good; - percentage of people having a long-standing illness or health problem aged 55 years and more.
Digital economy and society	- individuals using e-banking and e-commerce (from 55 to 64 years), percentage; - individuals using internet (from 55 to 64 years), percentage; - individuals using internet for interacting with public authorities (from 55 to 64 years), percentage.

Source: own processing.

The whole analysis was executed in MS Excel 2016 and SmartDraw Software LLC, 2020.

4. Results and Discussion

The individual performance and position of each country were obtained using formulas (3) and (4). Table 2 shows the final score for each country that was calculated as the arithmetic mean of normalized data assuming all indicators have the same weight. The results present the development of index from 2009 to 2019.

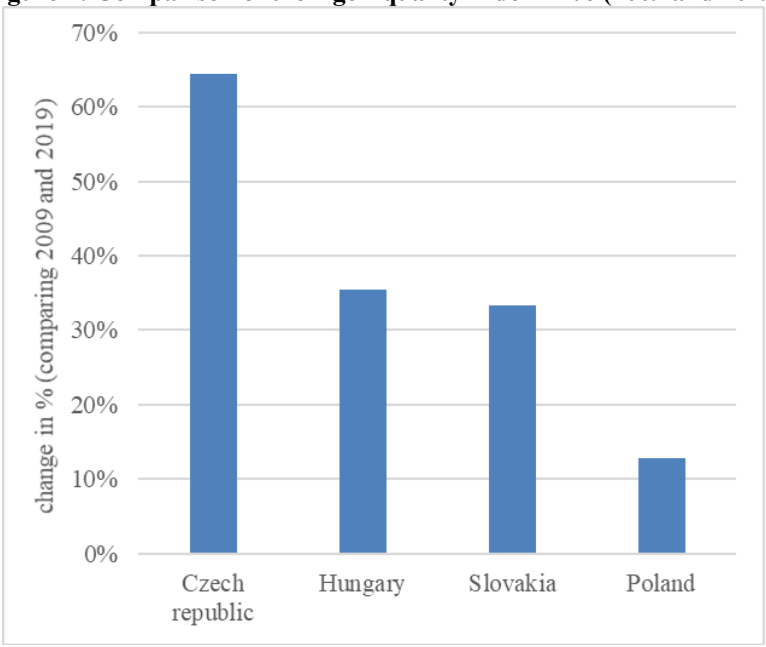
Table 1: The Age Equality Index development in the V4 countries (2007–2019)

Geo/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Czech R.	0,45	0,42	0,46	0,52	0,56	0,57	0,61	0,57	0,68	0,69	0,74
Hungary	0,31	0,29	0,31	0,34	0,33	0,35	0,37	0,37	0,39	0,40	0,42
Poland	0,47	0,47	0,48	0,47	0,48	0,49	0,50	0,50	0,51	0,52	0,53
Slovakia	0,21	0,19	0,22	0,23	0,22	0,24	0,26	0,25	0,27	0,26	0,28

Source: own processing.

In the all observed countries, the situation improved when comparing with the beginning of the reference period. The most significant change was observed in the Czech republic (64%), while Hungary and Slovakia improved by almost the same percentage (36% and 33%). The smallest improvement regarding age equality and non-discrimination was seen in Poland, only 13%. The Age Equality Index change during the reference period in percentage when comparing a current situation to situation in 2009 is presented in Figure 1.

Figure 1: Comparison of the Age Equality Index in % (2009 and 2019)



Source: own processing (Eurostat, 2020)

Figure 2 shows how countries of Visegrad Group can be divided into different groups according to the results achieved in the latest available year (2019). Countries with the highest score (ranged from 0,61 to 0,80) are coloured on dark blue, with medium score (from 0,41 to 0,60) on green and countries with the lowest score (from 0,21 to 0,40) on yellow. Other countries coloured on light blue were not involved in the analysis.

Figure 2: Clustering V4 countries based on the AEI (2019)

Source: own processing in SmartDraw 2020

Legend: yellow (0,21 – 0,40); green (0,41 – 0,60); dark blue (0,61 – 0,80); light blue (not involved in the analysis)

The best performance of the Czech republic in the issue of age equality is confirmed by the Czech Public Defender of Rights (2018) as well. They try to raise awareness on the issue of age discrimination and consider it to be a topic of the year. Both young and old are protected in Czech and discrimination cases are very rare there. Age discrimination is regulated together with other types of discrimination such as gender discrimination, racial discrimination, and religious discrimination. According to Ius Laboris

Poland (2018) Polish legislation prohibits any discrimination in the field of employment on the grounds of age, although they reached the worst score in the analysis. The law covers employees, job applicants, self-employed and those working on the basis of service contracts or other civil law contracts. There are no categories of employees who are generally excluded from the protection against age discrimination. There are no age limits to protection against discrimination. Discrimination against all age groups, young and old, is prohibited in all countries of the Visegrad group.

Conclusion

The paper was primarily focused on demographic changes and age equality within the countries of the Visegrad group. We tried to discover which one of the V4 countries made a biggest improvement in the last ten years regarding age equality and opportunities for seniors. The specific indicators were analyzed and the AEI index was created for each country individually. It evaluates the country's performance within the five areas: education, labour market, earnings and social inclusion, health, and digital economy and society. To set the indices data normalization and proximity-to-target methodology were used.

The results showed that age equality is improving and the situation got better in the all observed countries when comparing to the beginning of the reference period (2009). The Czech Republic, where discrimination is very rare, got the best score (0,74) for the latest year, while Poland (0,53) ranked at the second place. Third place was taken by Hungary (0,42) and the worst score was achieved by Slovakia (0,28). On the other hand, the biggest change within the reference period was observed in the Czech Republic, Hungary, Slovakia and Poland, respectively.

The most significant change was observed in the Czech Republic (64%), while Hungary and Slovakia improved by almost the same percentage (36% and 33%). The smallest improvement regarding age equality and non-discrimination was seen in Poland, only 13%.

It is crucial to provide the same condition for people of any age, for example at the labor market, access to health care, opportunities in education, etc. The journey to acheive a full age equality in EU is long and it will take some time and effort, but it is not unreachable.

Nomenclature

V4	Visegrad Four
AEI	Age Equality Index
EU-SILC	European Union Statistics on Income and Living Conditions
ECHP	European Community Household Panel

References

Bernard, C. (2013). Achieving age equality in health and social care. *Working with Older People, 17*(1), 19–24, doi: 10.1108/13663661311312548.

Buttton, P. (2020). Population Aging, Age Discrimination, and Age Discrimination Protections at the 50th Anniversary of the Age Discrimination in Employment Act. In: Czaja S., Sharit J., James J. (eds) Current and Emerging Trends in Aging and Work. Springer, Cham. doi: 10.1007/978-3-030-24135-3_9.

Czech Public Defender of Rights. (2018). Annual report on protection against discrimination. [cited 17.08.2020]. Available online at: <https://www.ochrance.cz/fileadmin/user_upload/DISKRIMINACE/Vyrocni_zpravy/2018-DIS-annual-report.pdf>.

Dehnel, G., Golata, E., Walesiak, M. (2020). Assessment of changes in population ageing in regions of the V4 countries with application of multidimensional scaling. *Argumenta Oeconomica, 44*(1), 77–100, doi: 10.15611/aoe.2020.1.04.

European Foundation of Human Rights. (2020). Category Archives: Discrimination in job advertisements. [cited 17.08.2020]. Available online at: < http://en.efhr.eu/category/our-interventions/discrimination-in-job-advertisements/>.

Equality Act. (2010). Part 2 Equality: key concepts – Chapter 1 Protected characteristics – 5. Age. [cited 17.08.2020]. Available online at: < https://www.legislation.gov.uk/ukpga/2010/15/contents>.

EU Agency for fundamental rights. (2017). Ageism: the latest acceptable form of discrimination. [cited 17.08.2020]. Available online at: < https://www.fundamentalrightsforum.eu/en/frf/blog/ageism-last-acceptable-form-discrimination>.

Huba, M., Ira, V., Hanušin, J., Lehotský, M., Szollos, J. (2003). Regional aspects of development towards sustainable Slovakia. *Ekológia*, *22*(2), 66–78.

Hsu, A., Esty, D.C., Levy, M.A., Sherbinin, A. (2016). Global metrics for the environment. New Haven, CT: Yale University, https://doi.org/10.13140/RG.2.2.19868.90249.

Ius Laboris Poland. (2018). Nierówne traktowanie a diskryminacja. [cited 17.08.2020]. Available online at: https://raczkowski.eu/files/media/dziennik_gazeta_prawna_tygodnik_2017_02_24_spor_o_przyczyny_dyskryminacji_czy_kazdy_powod_jest_dobry_by_pozwaa_pracodawce__pdf_k.pdf>.

Káčerová, M., Ondačková, J. (2015). The process of population ageing in countries of the Visegrad Group (V4). *Erdkunde, 69*(1), 49–68, doi: 10.3112/erdkunde.2015.01.04.

Lee, R., Mason, A. (2010). Fertility, human capital and economic growth over the demographic transition. *European Journal of Population, 26*(2), 159–182, doi: 10.1007/s10680-009-9186-x.

Šídlo, L., Šprocha, B., Ďurček, P. (2020). Prospective Dimension of Population Ageing and Potential Use in Pension Security in the V4 Countries. *Ekonomický časopis, 68*(6), 601–621.

Truxillo, D., Fraccaroli, F., Yaldiz, L., Zaniboni, S. (2017). Age Discrimination at Work. In: Parry E., McCarthy J. (eds) The Palgrave Handbook of Age Diversity and Work. Palgrave Macmillan, London, pp. 447–472, doi: 10.1057/978-1-137-46781-2_18.

The use of statistical functions of selected software in a solution of a probability problem

Martin Fajkus[1]

[1*]*Department of Mathematics, Faculty of Applied Informatics, Tomas Bata University in Zlin, Czech Republic*
[*]*Corresponding Author: e-mail: fajkus@utb.cz*

Abstract

The aim of this paper is to demonstrate some statistical functions of selected types of software. Hence, they can be used in the process of solving some probability problems. The demonstration is made on a typical probability problem which can be solved by the Poisson distribution or, approximately, by the normal distribution. As for the software, discussed are three different types: a) widely used commercial software, b) special commercial software and c) software free of charge.

Keywords: probability, Poisson distribution, Excel, Mathematica, GeoGebra

1. Introduction

Presented paper shows solutions of a problem on probability. Different ways how to solve it are shown. Exact solution uses the appropriate probability distribution, in this case the Poisson distribution, while the approximate solution uses, according to the Central limit theorem, the normal distribution. Calculations are made with a help of different kind of software. In this article following representatives of software were chosen:

a) widely used commercial software – MS Excel and Open Office Calc
b) special commercial software – Wolfram Mathematica
c) software free of charge – GeoGebra

Next, in the first section of this paper, a probability problem is formulated. In the second section, the Poisson distribution and the normal distribution are introduced. Subsequently in the third section, different ways how to solve the problem are shown.

Finally, a short discussion with a conclusion is made.

2. Formulation of a probability problem

In a bakery a special pastry is made. Each half kilogram of dough for this pastry contains 10 pieces of raisins on an average. What is the probability that in a pastry of a weight of 1.5 kg there will be A) exactly 32 pieces of raisins, B) more than 32 pieces of raisins?

3. Two probability distributions

In this section, two probability distributions, which will be used in the solution of the problem are introduced.

3.1 The Poisson distribution

The Poisson distribution is a discrete distribution. Its probability function expresses the probability of a number of random events in an amount of continuous medium like time, length, area, volume, mass etc. The random events should occur independently with a constant mean rate. Let X be a random variable with a Poisson distribution and let:

k denotes the number of random events; ($k = 0, 1, 2, \ldots$)
t denotes the amount of the continuous medium (e.g. the length of a time interval, or the amount of volume)

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λ denotes the constant mean rate, i.e. the number of events occurring in a unit of the continuous medium (e.g. the number of events in a unit time interval or in a mass unit).

Then the probability mass function expressing the probability that exactly k events occur in an amount of t is:

$$f(k) \equiv f(X = k) = \frac{e^{-\lambda t} \cdot (\lambda t)^k}{k!} \quad (1)$$

The cumulative distribution function expressing the probability that less than or equal to k events occur in an amount of t is:

$$F(k) \equiv f(X \leq k) = \sum_{j=0}^{k} f(k) = \sum_{j=0}^{k} \frac{e^{-\lambda t} \cdot (\lambda t)^j}{j!} \quad (2)$$

A curiosity of the Poisson distribution is that both the expected value E(X) ("mean") and the variance Var(X) have the same value of λt:

$$\mathrm{E(X)} = \lambda t = \mathrm{Var(X)} \quad (3)$$

3.2 The normal distribution

The normal distribution is a continuous distribution. Let X be a random variable with a normal distribution and let:

μ denotes its expected value (the mean) and σ^2 denotes its variance (hence σ means the standard deviation).

Then the probability density function of X is:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \quad (4)$$

The cumulative distribution function is then:

$$F(x) = \int_{-\infty}^{x} f(x)\, dx \quad (5)$$

4. Solution of the problem

The number of pieces of raisins is discrete, the amount of dough is continuous. The average number of raisins in each half kilogram of dough is constant. Hence, a random variable X describing the number of pieces of raisins (k) in the amount of dough (t) has the Poisson distribution with a parameter $\lambda = \frac{10}{0.5\ \mathrm{kg}} = 20\ \mathrm{kg}^{-1}$.

Both expected value and variance are according to (3):

$$\lambda t = \mathrm{E(X)} = \mathrm{Var(X)} = 20\mathrm{kg}^{-1} \cdot 1.5\mathrm{kg} = 30 \quad (6)$$

The probability mass function is then according to (1) and (6):

$$f(k) = \frac{e^{-30} \cdot (30)^k}{k!} \quad (7)$$

Next, the exact solution and the approximate estimation of the exact solution will be shown. Notation P(X = k) will be used for the probability of the case that the random variable X has a value of k. Similar notation will be used for P(X > k), P(X $\geq$ k), P(X < k) and P(X $\leq$ k) throughout the text.

4.1 An exact solution

A) To calculate the probability that in an amount of 1.5 kg of dough there are exactly 32 raisins, we simply use the probability mass function (7). The probability is then:

$$\mathrm{P(X = 32)} = f(32) = \frac{e^{-30} \cdot (30)^{32}}{32!} \approx 0.066 \quad (8)$$

One may get the answer with a help of different software:

a) To calculate the probability in a spreadsheet calculators like *Excel* or *Calc* one may simply type a formula representing the fraction above: EXP(–30)*30^32/FACT(32).

However, there are some statistical functions built in Excel. A function *poisson.dist* is one of them. The structure of this function is POISSON.DIST(x; mean; cumulative), where:

"x" is the variable representing the discrete number of events (in our problem it is k),

"mean" is the expected value (in our problem it is 30, according to (6))

"cumulative" is either "FALSE" for a probability mass function or "TRUE" for a cumulative distribution function.

Hence, to get the desired probability, one may type POISSON.DIST(32; 30; FALSE).

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b) In the *Mathematica* environment the command PDF is used. As the Poisson distribution is discrete, PDF returns the probability mass function. The structure of the command is: PDF[*dist*, x], where *dist* is a given distribution with its parameters and x is a value of a variable at which the PDF should be evaluated. Hence the results will be obtained after entering PDF[PoissonDist[30], 32] //N. Symbols "//N" at the end provide the result will appear in a form of a decimal number.

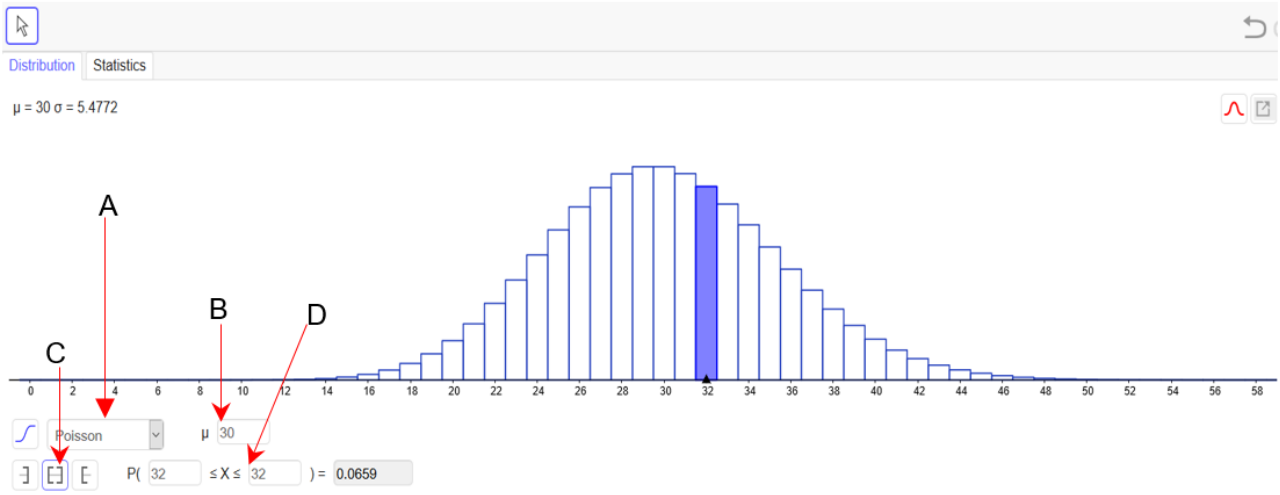

Figure 1. Probability P(X = 32) for the Poisson distribution in GeoGebra

c) As for the *GeoGebra* (accessible also online from the browser with no need of installation), firstly a mode "probability" should be launched. Figure 1 shows the environment which appears.

The user chooses a desired distribution from a combo box A – in our case the Poisson distribution, then types into the text input box B the value of the parameter μ, which is equal to the product of λt (see equation (6) in this text). The probability for the exact value of 32 should be calculated, the option [ ] should be selected from the three possibilities C, and the lower and upper values D must be set to the same value of 32.

B) To calculate the probability that in an amount of 1.5 kg of dough there are more than 32 raisins, we firstly use the identity:

$$P(X \leq k) + P(X > k) = 1$$

Hence:

$$P(X > 32) = 1 - (X \leq 32)$$

According to (2) and (6) we may continue further:

$$P(X > 32) = 1 - P(X \leq 32) = 1 - \sum_{j=0}^{32} \frac{e^{-30} \cdot 30^j}{j!} = 1 - F(32) \qquad (9)$$

To get the numeric value, the sum must be evaluated, or - which is the same - the value of the cumulative probability function must be found.

a) In a spreadsheet calculator the sum can be calculated e.g. by preparing two columns: one filled with values from 0 to 32 and another one with values calculated according to the formula (1). After that all thirty two values in the second column will be added.

The shorter way is to use again the *poisson.dist* function. The value of (9) is then:

$$1 - F_{Po}(32) = 1 - \text{POISSON.DIST}(32; 30; \text{TRUE}) \approx 1 - 0.685 = 0.315 \qquad (10)$$

b) As for *Mathematica*, it is possible to calculate the sum directly with no need to calculate its single terms separately. A command Sum[Exp[–30]*30^j/j!,{j,0,32}]//N executes the calculation of the sum in (9) and gives the result of 0.684541.

The same value, of course, returns a command for a cumulative distribution function: CDF[PoissonDistribution[30],32]//N.

Hence, again, the probability of having more than 32 pieces of raisins in a pastry of a weight of 1.5 kg is, according to (9): $P(X > 32) = 1 - 0.684541 \approx 0.315$

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c) In *GeoGebra´*s probability mode (see Figure 2) the users chooses again the Poisson distribution in A and types the value of the parameter μ into B. Now, the probability P(X > 32) should be calculated, so the option [should be selected from the three possibilities C. As there is no choice to calculate P(X > 32), one has to calculate P(X ≥ 33) which is, for the discrete case, the same.

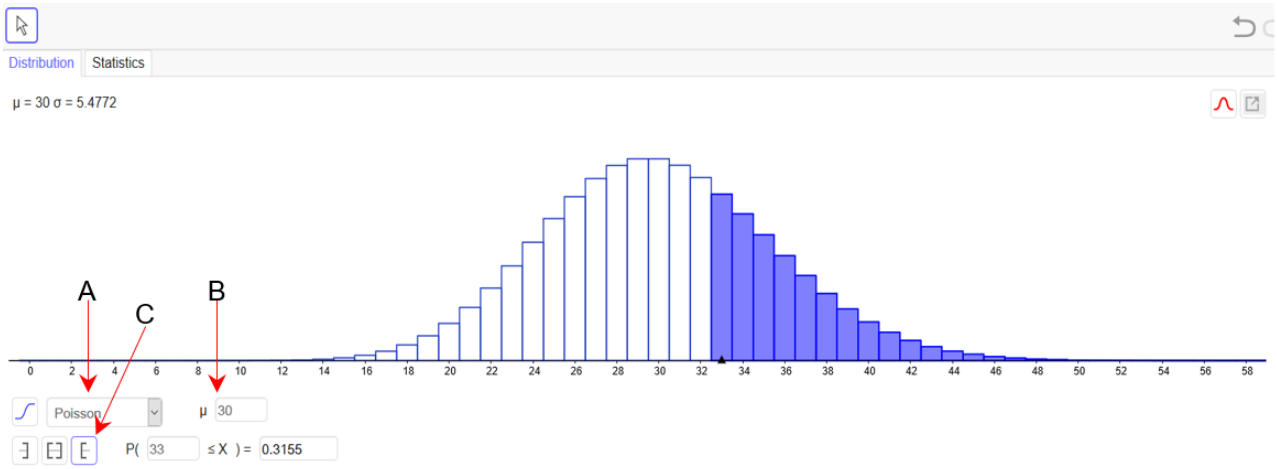

Figure 2. Probability P(X ≥ 33) for the Poisson distribution in GeoGebra

4.2 An approximate estimate of the exact solution

To estimate the probability that in an amount of 1.5 kg of dough there are exactly 32 raisins, the Central limit theorem (CLT) will be used. According to the CLT the sum of independent random variables tends toward the normal distribution. Figure 3 shows the probability mass function of the Poisson distribution (blue) and the probability density function of the normal distribution (red).

Hence, the probability mass function of the Poisson distribution can be approximated by the probability density function of the normal distribution. Similar approximation can be done for cumulative distribution functions of the Poisson and normal distributions.

A) To estimate the probability P(X = 32) a problem arises. The normal distribution is continuous, so the probability of any exact value of X is equal to zero. On the other hand, the Poisson distribution is discrete, so it has a sense to ask what is a probability of a case when random variable X has an exact value and this probability might be non zero as was shown and calculated in the section 4.1 A). To estimate such probability, continuity correction will be used. For a continuous distribution, the probability of P(X = *k*) is then estimated as follows:

$$P(X = k) \approx P(k - 0.5 < X < k + 0.5) = F(k + 0.5) - F(k - 0.5) \quad (11)$$

Hence, according to CLT and (8) the approximate estimate of the probability P(X = 32) is:

$$P(X = 32) \approx P(31.5 < X < 32.5) = F_N(32.5) - F_N(31.5) \quad (12)$$

where F_N is the cumulative distribution function of a normal distribution.

The values E(X) and Var(X) of the Poisson distribution will be used as the estimations of the parameters μ and σ of the normal distribution. Since for the Poisson distribution holds (3), the values are:

$$\mu = E(X) = \lambda t = 30 \quad \text{and} \quad \sigma = \sqrt{Var(x)} = \sqrt{\lambda t} = \sqrt{30} \approx 5.477 \quad (13)$$

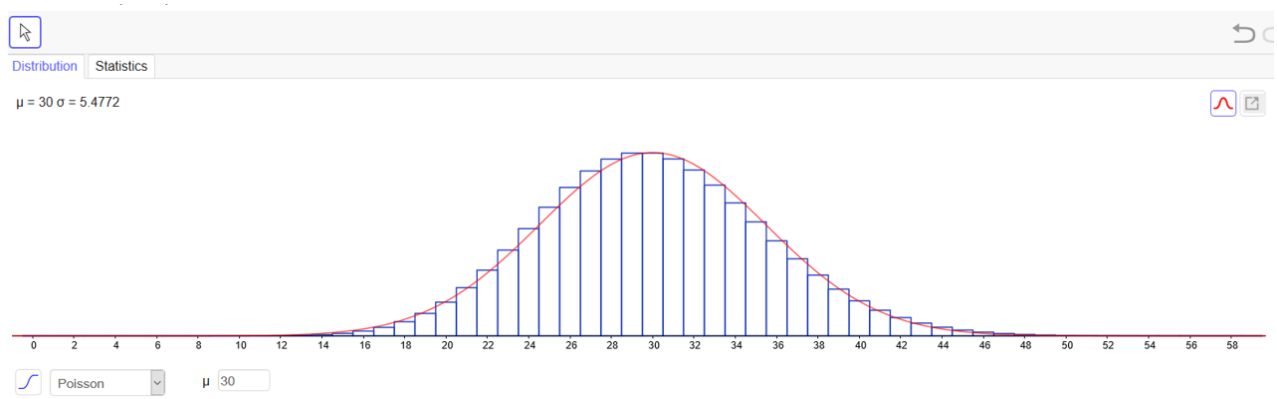

Figure 3. A comparison of the *pmf* of the Poisson distribution (blue) and the *pdf* of the normal distribution (red)

Let´s continue in (12):

$$P(X = 32) \approx P(31.5 < X < 32.5) = F_N(32.5) - F_N(31.5) = \Phi\left(\frac{32.5-30}{\sqrt{30}}\right) - \Phi\left(\frac{31.5-30}{\sqrt{30}}\right) \approx \Phi(0.456) - \Phi(0.274) \approx 0.068 \quad (14)$$

which is the estimate of (8). The values of $\Phi(x)$ are to be found in a statistical table for standardized normal distribution. Let´s see again, how the value is calculated using different software.

a) Spreadsheet calculators *Excel* and *Calc* have statistical functions *norm.dist* (for normal distribution with any μ and σ) and *norm.s.dist* (for standardized normal distribution). The probability (according to (14)) can be calculated either like:

$\Phi(0.456) - \Phi(0.274)$ = NORM.S.DIST(0.456;TRUE) – NORM.S.DIST(0.274;TRUE) ≈ 0.068

or, more directly with no need to transform the cumulative density function to the standardized one:

$F_N(32.5) - F_N(31.5)$ = NORM.DIST(32.5;30;SQRT(30);TRUE) – NORM.DIST(31.5;30;SQRT(30);TRUE) ≈ 0.068

b) *Mathematica* knows only NormalDistribution[], but if the square brackets are left empty, it is assumed standardized normal distribution, otherwise parameters μ and σ have to be entered. Hence:

$\Phi(0.456) - \Phi(0.274)$ = CDF[NormalDistribution[],0.456] – CDF[NormalDistribution[],0.274] ≈ 0.068

Similarly:

$F_N(32.5) - F_N(31.5)$ = CDF[NormalDistribution[30,Sqrt[30]],32.5] – CDF[NormalDistribution[30,Sqrt[30]],31.5] ≈ 0.068

c) In a graphical environment of *GeoGebra*, the situation looks similar to those in Figure 1. After choosing "Normal" in the A field, two other fields appear (B) to enter μ and σ. An option [ ] should be chosen from the three possibilities C. Then initial and final values should be entered. If μ and σ were set to 0 and 1 respectively, then the initial value is 0.274 and the final one is 0.456.

If μ = 30 and σ = $\sqrt{30}$ then the initial value is 31.5 and the final value is 32.5. In both cases the probability calculated by *GeoGebra* is 0,0681.

B) To calculate the estimate of the probability P(X > 32), the process is the same as in the section 4.1 B), but in all appropriate formulae instead of the Poisson distribution, the normal distribution will be used. Hence, also in the equation (9) the symbol F means now a cumulative distribution function of the normal distribution, not the Poisson´s one. In this section it will be also shown how numerical value differs when calculated without and with the continuity correction.

a) In *Excel* or *Calc*: without the continuity correction:

$$P(X > 32) = 1 - P(X \leq 32) = 1 - F_{Norm}(32) = 1 - \text{NORM.DIST}(32;\ 30;\text{SQRT}(30);\text{TRUE}) \approx 0.358 \quad (15a)$$

With the continuity correction:

$$1 - F_{Norm}(32.5) = 1 - \text{NORM.DIST}(32.5;\ 30;\text{SQRT}(30);\text{TRUE}) \approx 0.324 \quad (15b)$$

This value is closer to the exact one (10).

b) As for Mathematica, the value without the continuity correction:

$1 - F_{Norm}(32)$ =1 – CDF[NormalDistribution[30,Sqrt[30]],32] ≈ 0.358

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With the continuity correction: $1 - F_{Norm}(32.5) = 1 - CDF[NormalDistribution[30,Sqrt[30]],32.5] \approx 0.324$

The results are the same as above ones (15a) and (15b).

c) In GeoGebra: without the continuity correction $P(X \geq 32) \approx 0.358$ and with the continuity correction $P(X \geq 32.5) = 0.324$.

5. Conclusions

In the presented paper it was demonstrated how a selected probability problem could be solved with the use of in-built statistical functions of different software. To use this functions in some spreadsheet calculators and Mathematica, the user needs to study appropriate commands, in GeoGebra the graphical environment is intuitive. Excel or Calc are widely used in schools, universities and by private users. Unlike Excel or Mathematica, GeoGebra is free of charge and even does not to be installed. The accuracy of the result is comparable, hence, the choice which software to use depends on it´s accessibility by the concrete user.

References

Devore, J. L., 2004. Probability and Statistics for Engineering and the Sciences. Thomson Brooks/Cole., ISBN 0-534-39933-9
Geogebra: https://www.geogebra.org/classic#probability [cited Aug. 8, 2020]
Goldman, R. N., & Weinberg J. S., 1985. Statistics, an introduction. New Jersey: Prentice Hall, Inc., ISBN 0-13-845918-5

Organizational Learning & Leadership Research: Trends of Today and Tomorrow

Priscilla J. DuBose[1]

[1*] *PhD student in Organizational Leadership & Human Resource Development, Regent University*
[*]*Corresponding Author: e-mail: prisdub@mail.regent.edu*

Abstract

Organization learning and leadership research are essential elements of any business entity. To remain relevant, organizations should research the current trends in both aspects to keep up with the market and obtain insight into the future of the industry. The current trends in organizational learning include experiential learning, learner-centered online training, security awareness in eLearning, and training reinforcement. All these current trends are attributed to the increasing dependence of businesses on technology. From the current trends, some of the projected future trends include microlearning, telecommuting, artificial intelligence, and big data. These trends provide the most efficiency for organizations and are resilient enough to overcome changes in the industry. The future trends in organizational learning will change the leadership, which also changes research carried out on leadership. Current trends in leadership research include a focus on applying and sustaining behaviors, mobile learning, and group coaching, and democratization of leadership development. These trends are guided by prevailing leadership philosophies and preferred leadership styles. Such patterns are expected to change as the future trends will involve normalizing artificial intelligence and an increased focus on core competencies. These future trends all improve the efficiency of an organization and will increase the competitive nature of any industry.

Organizational Learning & Leadership Research: Trends of Today and Tomorrow

Organizational learning and leadership research are two elements that contribute to the growth of an organization. Communication is crucial in organizational learning, where knowledge is created, retained, and transmitted within the organization. In organizational learning, the company gains experience through creating extensive knowledge on topics that could improve the organization. For effective organizational learning, the leadership of the organization should be exemplary. On the other hand, leadership research refers to areas of exploration that influence leadership behaviors and attitudes. Therefore, the concepts of organizational learning and leadership research complement each other in the development process of an organization. However, the business world is ever-changing, and forecasting the future of organizational learning and leadership is essential in ensuring the organization experiences continuous growth even through changes in the market.

Current Trends in Organizational Learning

Organizational learning is essential in any organization because it enables the employees to obtain information that can improve their productivity. The current trends in organizational learning are based on technology, which has been the most significant change factor in businesses. Through technology, this generation of workers is operating on entirely new methods that require changes in training techniques. The current trends in organizational learning include experiential learning, learner-centered online training, security awareness in eLearning, and training reinforcement (Puranam & Maciejovsky, 2017). The experiential learning trend involves a combination of learning just-in-time (JIT) and on-the-job, which enables continuous learning despite time constraints. This trend arose due to the time pressures that limit the time available for organizational learning. The learner-centered online training trend involves the organization putting the learners' needs and strengths as a priority in the learning process (Puranam & Maciejovsky, 2017). This trend has provided employees with more meaningful experiences in organizational learning. In addition to an engaging and fun learning experience, it produces better outcomes.

The security awareness trend has become a priority in most businesses due to the increase of cyber-crimes. Among the objectives of any organization is to strengthen its security system, which implies that organizational learning should also have a

focus on security awareness (Puranam & Maciejovsky, 2017). The training reinforcement trend is primarily focused on learning retention. Most organizations have, over the years, conducted organizational learning, but the process is only valid if the knowledge and skills are applied to the workplace. Therefore, managers in the organization have resorted to repetition that will improve learner retention. These trends have been consistent in recent years, but some organizations are finding them hard to implement. However, technology is bound to make the changes easier to implement and forge organizations into adopting the trends.

Current Trends in Leadership Research

Leadership is instrumental in the success or failure of an organization. Researchers have explored different aspects in the field of leadership, and the key trends in leadership research include a focus on applying and sustaining behaviors, mobile learning, group coaching, and democratization of leadership development (Ahmed, 2018). In leadership research regarding sustainability, researchers have looked into how organizational programs put leaders through an academy then send them out to apply the skills. This occurrence does not sustain knowledge in the long-term despite the huge investment put into it. Therefore, it is recommended for the trained leaders to be offered opportunities to apply the taught skills to sustain knowledge, learn, and develop leadership skills.

Another leadership research trend is mobile learning. This trend is attributed to millennials taking over leadership and managerial roles, and as opposed to previous generations, millennials value learning and growth experiences (Harrison, 2017). The desire for learning is attributed to the new methods of learning, such as mobile learning. Mobile access to learning opportunities promotes flexibility in improving leadership knowledge and skills, which enhances organizational efficiency. The other leadership research democratization of leadership development trends involves research on how leaders are nurtured in an organization and how they interact with their juniors. As opposed to traditional leaders who were sent to learning institutions to improve knowledge, modern leaders are put in leadership development programs (Harrison, 2017). Similarly, a leader should engage his or her juniors in the leadership process to ensure coaching is a standard part of the leadership experience. These trends in leadership research are improving leadership practices and the role of leadership in the organization.

Future Trends in Organizational Learning

The future of organizational learning is determined by technology, and the trends will primarily involve new methods of organizational learning. One way that could become the most effective is through microlearning, which delivers standalone content in short and concentrated nuggets of information. The technique will incorporate multimedia tools that fit into the growing dependence of businesses on technology (Li, Gu, & Jiang, 2019). Although microlearning is already in use by different organizations, its effectiveness promises resilience that will promote organizational learning in the future. The second trend is telecommuting, where learning techniques will incorporate some cinematics accessible on office and personal devices, promoting freedom and flexibility (Puranam & Maciejovsky, 2017). For example, during lunch hours, an employee can watch a video on their mobile phone about a company burned down by a cybersecurity scandal. The video will be short but will engage the employee, and they can learn from it.

Furthermore, they can answer some questions regarding the video to advance their critical thinking skills further. Cinematic learning will help spark emotional interest, which improves engagement in organizational learning (Puranam & Maciejovsky, 2017). This trend will increase the overall performance of the business.

The most significant trend that will shape the future of organizational learning is artificial intelligence (AI). AI will be used for personalization and determining how organizational learning will affect business outcomes (Li, Gu, & Jiang, 2019). Through personalization, the efficiency of organizations will be improved, and more relevant information will weed out the irrelevant information. However, the effectiveness of AI will be determined by the amount of data an organization has, which brings forth the trend of big data, that provides more insight into the business and provide an advantage over competitors (Li, Gu, & Jiang, 2019; Calvard, 2016). AI and big data will be used to increase the amount of information while filtering out any irrelevant information.

Future Trends in Leadership Research

As different aspects within the internal and external environment of a business change, the research on elements such as leadership will also change. One of the leadership research trends will be on AI becoming the new norm (Ahmed, 2018). Leaders in the future will be expected to come up with leadership philosophies that assume AI as part of leadership development because it will improve personalization. Researchers will explore how AI will offer leaders hyper-personalized content based on an individual's personality, competencies, and objectives. Another trend in leadership research will focus on the increased demand for core competencies. The competencies include direct reports, communication, goal setting, and task delegation. The environment will change to a more complex one, and the prevailing conditions will affect the performance of the core tasks (Harrison, 2017). Therefore, the researchers will look into new competencies that will improve leadership to fit into complex systems. Such trends

will shape the future of leadership and determine the direction that leadership researchers will follow to improve the efficiency of leadership.

Conclusion

Organizational learning and leadership research are essential elements in improving business operations. However, several changes are expected to occur in the business world that will change these two elements. In a bid to keep up with the trends and ensure business continuity in case of drastic changes, organizations should research the future of organizational learning and leadership research. As discussed above, these elements are in the external and internal environment but determine how a business fits into its market and its relevancy. With the increased use of technology in business, organizations should gradually abandon traditional learning approaches to adopt digital ways, which is the future of the economy. Similarly, researchers will be faced with new topics of interest to explore and provide an understanding of the industry. Insights into the future of these elements allow organizations to prepare for changes and to keep up with the ever-changing market.

References

Ahmed, A. (2018). A Brief History and the future of leadership. In: Thakkar B. (eds) *The Future of Leadership (*pp. 1-14). Palgrave Macmillan, Cham.

Calvard, T. S. (2016). Big data, organizational learning, and sensemaking: Theorizing interpretive challenges under conditions of dynamic complexity. *Management Learning, 47*(1), 65-82. Retrieved from https://doi-org.ezproxy.regent.edu/10.1177/1350507615592113

Harrison, C. (2017). Leadership research and theory. In: *Leadership Theory and Research* (pp.15-32). Palgrave Macmillan, Cham.

Li, B., Gu, J., & Jiang, W. (2019). Artificial intelligence (AI) chip technology review. *2019 International Conference on Machine Learning, Big Data, and Business Intelligence (MLBDBI),* pp. 114-117. Doi:10.1109/mlbdbi48998.2019.00028.

Puranam, P., & Maciejovsky, B. (2017). Organizational structure and organizational learning. *The Oxford Handbook of Group and Organizational Learning* (pp. 520-534). Retrieved from https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780190263362.001.0001/oxfordhb-9780190263362-e-35

Tax optimization of a self-employed person in the context of the method of bookkeeping in the condition of the Slovak Republic

Róbert Oravský[1], Anna Bánociová[2]

[1*]*Department of Finance, Faculty of Economics Technical University of Košice, Slovak Republic*
[2] *Department of Finance, Faculty of Economics Technical University of Košice, Slovak Republic*
[*]*Corresponding Author: e-mail: robert.oravsky@tuke.sk*

Abstract

The aim of the paper is to clarify the legal possibilities of bookkeeping of a self-employed person who is not a payer of value-added tax, in the conditions of the Slovak Republic and thus to optimize his income tax. The self-employed person chooses between flat-rate expenses, simple tax records, single-entry bookkeeping, and double-entry bookkeeping. Each method of bookkeeping results in a different way of calculating the taxpayer's tax base and thus has an impact on the income tax itself. It is through the right choice of the method of bookkeeping that a self-employed person who is not in the position of a payer of value-added tax can significantly optimize his tax base and income tax. In accordance with the aim of the paper, we present a case study of a self-employed person with certain annual income and expenses, while we will analyze each method of bookkeeping, where we will evaluate which method of bookkeeping is most advantageous for taxpayers in terms of tax optimization.

Keywords: Tax optimization, personal income tax, self-employed, methods of bookkeeping

1. Introduction

Legal tax optimization of the tax base and income tax of a person in the position of a self-employed person who chooses the method of bookkeeping can have significant tax consequences for the taxpayer. To begin, it is necessary to examine the condition of whether or not a self-employed person is in the position of a payer of value-added tax. If the self-employed person is not a payer of value-added tax, the person can decide how he will keep the bookkeeping. In such a situation, the self-employed person chooses between simple tax records, single-entry bookkeeping, double-entry bookkeeping, respectively the person can use statutory expenses by a percentage, the so-called flat-rate expenditure.

A simple tax record is a record in which the self-employed person records income and expenses associated with the business. This form of registration is suitable for either beginning self-employed persons, or for self-employed persons who do not have extensive administration in their business. The advantage of this form of bookkeeping is that the self-employed person can keep it himself without the need for the help of an accountant, which can save him on administrative expenses. The tax base for simple tax records is calculated as the difference between income and expenses realized in the particular year. (*Act no. 595/2003 Coll. - Income Tax Act*)

Single-entry bookkeeping is an extension of simple tax records. Single-entry bookkeeping monitors the status of income and expenses, assets, liabilities, and receivables in the cash journal, while accounting in single-entry bookkeeping is governed by the Accounting Act. When keeping single-entry bookkeeping, additional expenses may be incurred by a self-employed person to ensure the administration by the accountant. Both in simple tax records and in single-entry bookkeeping, we calculate the tax base as the difference between income and expenses realized in the particular year. (*The measure of the Ministry of Finance of the Slovak Republic of 12 September 2018 no. MF / 13416 / 2018-74*)

Double-entry bookkeeping is the highest form of administrative records in the condition of the Slovak Republic. In double-entry bookkeeping, we monitor not only income and expenses but also turnover and costs. When keeping accounting in double-entry bookkeeping, the self-employed person must follow the law on accounting and at the same time also the accounting procedures published by the Ministry of Finance of the Slovak Republic. (*The measure of the Ministry of Finance of the Slovak Republic no. 23054 / 2002-92 of 16 December 2002*) Double-entry bookkeeping requires knowledge in bookkeeping and therefore if the self-employed person does not have this knowledge, it results in increased administrative costs for financing the accountant. The main difference in the calculation of the tax base for double-entry bookkeeping compared to simple tax records and single-entry

bookkeeping is the fact that double-entry bookkeeping does not take into account the tax base for the actual flow of income and expenses in a given year but for taxable transactions. (*Act no. 431/2002 Coll. – Accounting Law*) This means that if the self-employed person delivers services or goods in a given year but does not receive payment until the end of the year, or does not receive payment at all (if his customer is an unreliable client), due to the method of calculating the tax base the self-employed person is obliged to pay the tax even if the person did not receive real income from this delivery in the given year. This can be considered as one of the factors why self-employed persons in the Slovak Republic use double-entry bookkeeping less. The second factor is also the fact that it requires more knowledge of accounting.

The last legal way for a self-employed person to calculate the tax base and consequently the income tax is by means of so-called flat-rate expenditures. Pursuant to the Income Tax Act, flat-rate expenses represent the legal expenses of a self-employed person in the amount of 60% of his gross annual income, but not more than € 20,000 per year. (*Act no. 595/2003 Coll. - Income Tax Act*) The condition for the applicability of flat-rate expenses is the fact that the self-employed person is not a payer of value-added tax, or is a payer of value-added, but only a part of the year. In the currently valid Slovak legislation, the registration obligation of a business entity, also a self-employed person, is obligatory if the turnover in the last 12 consecutive calendar months exceeds € 49,790. (*Act no. 222/2004 Coll. - Value Added Tax Act*) At the same time, in this method of calculating the tax base, a self-employed person can, in addition to the application of flat-rate expenses in the amount of 60% of his gross income, also claim as additional expenses demonstrably paid health and social security contributions. This method of calculating the tax base is very simple and fast compared to the others mentioned above, which allows self-employed persons to be able to calculate the tax base and the tax itself without much experience. The second advantage of this procedure is the fact that the self-employed person does not have to document anything, which significantly simplifies his administration. The third advantage is the fact that this method of calculating the tax base is very advantageous for self-employed people with low expenses, as they can thus legally reduce the tax base by a significant percentage. At present, self-employed persons most often use flat-rate expenses, followed by simple tax records, or single-entry bookkeeping.

2. Comparison of the method of calculating the tax base on a case study

Let us have a self-employed person who does business exclusively in the Slovak Republic, which means that he buys and supplies goods only in the Slovak Republic. The self-employed person is not a payer of value-added tax as well as is not an employer. The monthly turnover is € 2,000, while the self-employed person receives the payment the following calendar month, the business expenses are € 500, and at the same time social and health insurance expenses are € 250. The costs are paid in a given month. At the same time, he owns a vehicle that he uses for business. The monthly depreciation of the vehicle is € 300. For a summary, we enclose the following table.

Table 2 Revenues and costs of a self-employed person in a given year

Month	Turnover (in €)	Receivables payment (in €)	Business costs (in €)	Social and health deductions (in €)	Vehicle depreciation (in €)
January	2,000,-	0,-	500,-	250,-	300,-
February	2,000,-	2,000,-	500,-	250,-	300,-
March	2,000,-	2,000,-	500,-	250,-	300,-
April	2,000,-	2,000,-	500,-	250,-	300,-
May	2,000,-	2,000,-	500,-	250,-	300,-
June	2,000,-	2,000,-	500,-	250,-	300,-
July	2,000,-	2,000,-	500,-	250,-	300,-
August	2,000,-	2,000,-	500,-	250,-	300,-
September	2,000,-	2,000,-	500,-	250,-	300,-
October	2,000,-	2,000,-	500,-	250,-	300,-
November	2,000,-	2,000,-	500,-	250,-	300,-
December	2,000,-	2,000,-	500,-	250,-	300,-

Source: Authors´ own elaboration

Due to the fact that the self-employed person is not a payer of value-added tax, not even an employer, the business is done only in the Slovak Republic, his has one obligation to file a tax return once a year to the Tax Office, and to pay the tax. Such a self-employed person can decide how he will calculate the tax base. He can choose between simple tax records, single-entry bookkeeping, double-entry bookkeeping and flat-rate expenses. The following analysis of revenues and costs of a self-employed

person will focus on individual methods of calculating the tax base and personal income tax and the possibilities of optimizing the tax base and income tax.

2.1 Simple tax records and single-entry bookkeeping

Given that the complexity of self-employed administration is not high, we can assess that in this case, the method of determining the tax base using simple tax records or single-entry bookkeeping is completely identical. The only difference is in the accounting procedures for single-entry bookkeeping, while for simple tax records, the self-employed person does not have to follow the accounting procedures.

When calculating the primary tax base, the self-employed person must state his annual gross income from the trade and at the same time his annual expenses. The annual gross income is therefore € 22,000 and the annual expenditure is € 12,600. The self-employed person will tax € 2,000 in the following tax period concerning the turnover for the month of December, due to the payment that will be realized during January of the following calendar year. The primary tax base is € 9.400. The Income Tax Act allows any natural person, after fulfilling certain conditions, to be entitled to a non-taxable part of the tax base. The non-taxable part of the tax base is the amount that the Tax Office cannot reach. In 2020, the annual non-taxable part of the tax base is € 4,414.20. (*Act no. 595/2003 Coll. - Income Tax Act*) Therefore, we adjust the primary tax base by the non-taxable part of the tax base, thus obtaining the final tax base of the taxpayer in the amount of € 4,985.80.

From the final tax base, we calculate the personal income tax by multiplying the final tax base by the income tax rate. The rate of income tax of a business entity whose annual turnover did not exceed € 100,000 is 15%. (*Act no. 595/2003 Coll. - Income Tax Act*) The income tax of a self-employed person in this case of the method of calculating the tax base is € 747.87.

2.2 Double-entry bookkeeping

As already mentioned, in double-entry bookkeeping we monitor the state of turnover and costs, not the flow of income and expenses as in other methods of calculating the tax base. It follows that, although the self-employed person has an annual gross income of only € 22,000, his annual turnover is € 24,000, the self-employed person will declare an annual turnover of € 24,000 in the tax return. Even if the self-employed person actually receives payment for the month of December in the month of January of the following year, he is obliged to tax this income in this tax period as the taxable performance took place in this calendar year, regardless of the moment of receipt of payment.

The annual costs of the self-employed person are in the amount of € 12.600. The primary tax base is therefore equal to the difference between turnover and costs in a sum of € 11.400.

By applying the non-taxable part of the tax base to the taxpayer in the amount of € 4,414.20, we receive the final tax base in the amount of € 6,985.80. Given that the self-employed person's annual turnover did not exceed € 100,000, the income tax rate is 15%. The income tax is therefore € 1,047.87.

2.3 Flat-rate expenditure

The last possible legal way in which a self-employed person can choose when calculating the tax base and income tax is flat-rate expenses. In the case of flat-rate expenses, the self-employed person does not document his expenses at all, except for expenses for social and health insurance, and thus the self-employed person does not state the actual expenses in the tax return at all. The self-employed person states the amount of expenses in the tax return as the sum of flat-rate expenditure and provably reimbursed social and health insurance costs.

In this case, the self-employed person's gross annual income is € 22,000. As with simple tax records and single-entry bookkeeping, the same rule applies to flat-rate expenses, namely when a service delivered in December, that payment will be done in January of the following year, will be taxed for the following tax period.

The flat-rate expenditures of 60% amount to a total income are in a sum of € 13,200. Provably paid social and health insurance contributions are in the annual amount of € 3,000. The total expenditure of a self-employed person in such a case is € 16,200.

The primary tax base is therefore equal to the difference between the gross annual income and the sum of the flat-rate expenditure and the social security and health insurance contributions paid. The primary tax base is therefore equal to € 5,800.

Taking into account the non-taxable part of the tax base for the taxpayer in the amount of € 4,414.20, the final tax base is equal to € 1,385.80. As in the previous methods for calculating the tax base and the tax itself, in this method for calculating the tax base as well, the self-employed person has fulfilled the condition for applying the 15% income tax rate. The resulting income tax on a self-employed person is therefore € 207.87.

3. Case study analysis

In this case study, the self-employed person can choose between the following 3 calculations of the tax base and the tax itself. For the sake of clarity, we enclose the following table, which takes into account all important facts that affect the tax base and income tax.

Table 3 Comparison of methods of calculating the tax base and income tax

Variable	Simple tax records / Single-entry bookkeeping	Double-entry bookkeeping	Flat-rate expenditure
Turnover / income (in €)	22.000,-	24.000,-	22.000,-
Business expenditures (in €)	9.600,-	9.600,-	0,-
Social and health insurance costs (in €)	3.000,-	3.000,-	3.000,-
Flat-rate expenditure (in €)	0,-	0,-	13.200,-
Total costs (in €)	12.600,-	12.600,-	16.200,-
Primary tax base (in €)	9.400,-	11.400,-	5.800,-
Non-taxable part of the tax base (in €)	4.414,20,-	4.414,20,-	4.414,20,-
Final tax base (in €)	4.985,80,-	6.985,80,-	1.385,80,-
Tax rate	15,00 %	15,00 %	15,00 %
Income tax (in €)	747,87,-	1.047,87,-	207,87,-

Source: Authors´ own elaboration based on relevant Acts

Based on the individual methods of calculating the tax base and the income tax of a self-employed person, we can see significant differences between the final tax bases and the income tax itself. Let us note that each of the above calculations is correct in accordance with the Income Tax Act. It is up to the taxpayer himself to decide which method of calculating the tax base and income tax.

From Table 2, it can be evaluated that the least advantageous way of calculating the tax base and income tax is for double-entry bookkeeping, where a self-employed person would pay € 1,047.87 for income tax.

The second most advantageous way of calculating the tax base and the tax itself is by means of simple tax records, or by means of single-entry bookkeeping, where the self-employed person would pay an income tax of € 747.87.

The most advantageous method of calculating the tax base and income tax is by means of flat-rate expenses, where the self-employed person achieved the highest tax savings. In this calculation, the self-employed person tax liability is only € 207.87. The self-employed person thus saved up to 840 euros compared to double-entry bookkeeping. Compared to simple tax records or single-entry bookkeeping, a self-employed person saves € 540 on income tax.

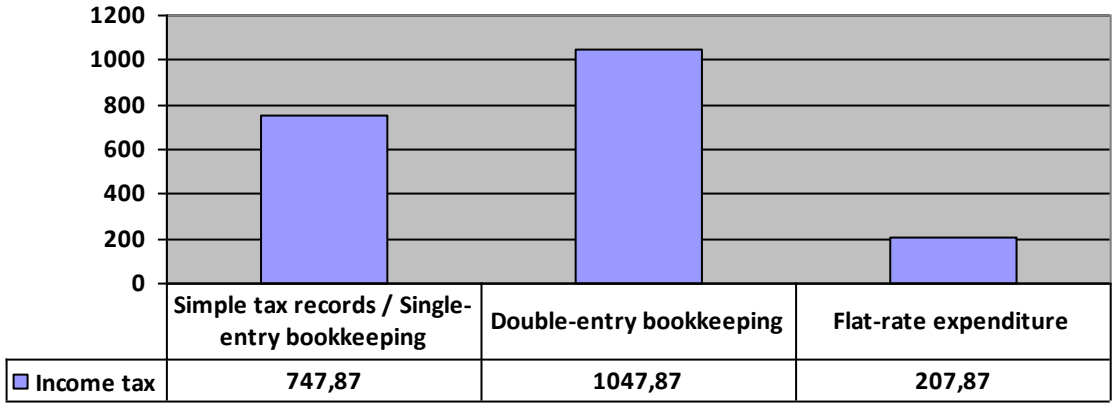

Figure 2 Comparison of income tax using individual methods of calculating the tax base and income tax
Source: Authors´ own elaboration based on relevant Acts

Our analysis shows that the self-employed person from the case study will achieve the highest tax optimization of income tax when applying the flat-rate expenditure method.

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It should be noted that in our analysis, we abstracted from an externally supplied service for bookkeeping, which would result in additional costs for the administration of the self-employed person's administration. Thus, our analysis assumes that a self-employed person can keep single-entry bookkeeping as well as double-entry bookkeeping in this case study.

The total net annual disposable income of a self-employed person after taking into account the real expenses of running a business (except for depreciation of the vehicle), social and health insurance expenses, and income tax, where self-employed uses the method of calculating the tax base and income tax using simple tax records or single-entry bookkeeping in an amount of € 12.252,13. In the case of double-entry bookkeeping, the total net annual disposable income is equal to € 11.952,13. For the flat-rate expenditure is the total net annual disposable income in the amount of € 12.792,13.

Continuing in our analysis, it should be noted that on the basis of the filed tax return, a new amount of social and health insurance contributions is determined for the self-employed person. In both social insurance and health insurance, there is a minimum monthly sum that a self-employed person must pay. For 2020, the minimum amount of health insurance is € 70.91, and social insurance € 167.89. For 2021, the minimum amount of health insurance is € 76,44, and social insurance € 180,99.

The method of calculating contributions is determined by the Act on Social Insurance and the Act on Health Insurance. The minimum monthly assessment basis for the payment of contributions to the Social and Health Insurance Company represents 50% of the average monthly wage in the economy of the Slovak Republic determined by the Statistical Office for the calendar year preceding the decisive period. This means that when determining the amount of the minimum assessment basis for the payment of contributions to the Social and Health Insurance from 1.1.2021, we need to know the average monthly wage for 2019, which is € 1,092. The minimum monthly assessment basis for the payment of levies from 1.1.2021 therefore amounts to € 546. The minimum monthly contributions of self-employed person to the Social Insurance Agency from 1 January 2021 represent the amount of € 180.99, which we calculate as 33.15% of the minimum assessment base (from the amount of € 546). *(Act no. 461/2003 Coll. - Social Insurance Act)* The minimum monthly contributions of self-employed person to the health insurance company from 1 January 2021 represent the amount of € 76.44, which we calculate as 14% of the minimum assessment base (from the amount of € 546). (*Act no. 580/2004 Coll. - Health Insurance Act)*

The assessment basis for the calculation of the new amount of social and health insurance is determined as the difference between the gross annual income claimed expenses, to which we add the paid social and health insurance in the tax period. To illustrate, we enclose the following formula, which captures the relationship in question.

$$Ded = ((GI - Exp) + PD) / 1{,}486 * r / 12 \quad (1)$$

where: *Ded* represents new social / health deductions, *GI* represents the gross income, *Exp* represents expenditures according to the method of calculation of the tax base, *PD* represents paid social and health deductions, *r* represents the social (33,15%) or health (14%) deductions rate.

In the case of the self-employed from the case study the deductions of social and health insurance for the following year are shown in the Table 3.

Table 4 The amount of new social and health insurance depending on the application of the procedure for determining the tax base

Variable	Simple tax records / Single-entry bookkeeping	Double-entry bookkeeping	Flat-rate expenditure
Turnover / income (in €)	22.000,-	24.000,-	22.000,-
Business expenditures (in €)	9.600,-	9.600,-	0,-
Social and health insurance costs (in €)	3.000,-	3.000,-	3.000,-
Flat-rate expenditure (in €)	0,-	0,-	13.200,-
Total costs (in €)	12.600,-	12.600,-	16.200,-
Assessment basis (in €)	12.400,-	14.400,-	8.800,-
Social insurance in the following year (in €)	230,51,-	267,69,-	163,59,-*
Health insurance in the following year (in €)	97,35,-	113,05,-	69,08,-*

Source: Authors´ own elaboration based on relevant Acts

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The method of choosing the calculation of the tax base has a real impact on the future amount of social and health insurance contributions. In the case of double-entry bookkeeping, there will be new levies of € 267.69 for the social insurance company and € 113.05 for the health insurance company per month.

With simple tax records or single-entry bookkeeping, there will be new monthly contributions to the social insurance company in the amount of € 230.51 and to the health insurance company € 97.35.

For flat-rate expenses, according to the Formula (1), the new amount of contributions to the social insurance company is € 163.59 and to the health insurance company € 69.08. *Due to the existence of minimum monthly deductions, the self-employed person will pay minimum deductions in this case. Social insurance will therefore be € 180.99 and health insurance will be € 76.44.

Even in this case, the most appropriate method of calculating the tax base is the flat-rate expenditure method, which, in addition to the greatest optimization of income tax, also optimizes the contribution obligation of social insurance and health insurance.

Therefore, it can be assessed in this case study that the most appropriate way of calculating the tax base and the tax itself is the method of flat-rate expenditures, which even optimize the contribution to the social insurance company and the health insurance company to the maximum.

4. Conclusions

In the conditions of the Slovak Republic, a self-employed person who is not a payer of value-added tax, or is a payer of value-added tax for part of the year, can decide between 3 possible ways of calculating the tax base and income tax – simple tax records / single-entry bookkeeping, double-entry bookkeeping or flat-rate expenditures.

In our paper, we described the method of calculating the tax base and income tax for each method, analyzing in a case study which method maximizes the taxpayer's tax savings, and also showed that the method of selecting the method for calculating the tax base and income tax also has the real impact on the self-employed person's contribution burden from the point of view of social and health insurance.

References

Act no. 431/2002 Coll. – Accounting Law
Act no. 595/2003 Coll. - Income Tax Act
Act no. 222/2004 Coll. - Value Added Tax Act
Act no. 461/2003 Coll. - Social Insurance Act
Act no. 580/2004 Coll. - Health Insurance Act
The measure of the Ministry of Finance of the Slovak Republic of 12 September 2018 no. MF / 13416 / 2018-74
The measure of the Ministry of Finance of the Slovak Republic no. 23054 / 2002-92 of 16 December 2002
Measure no. MF / 017028 / 2018-74 with effect from 1 January 2019 (Notification No. 395/2018 Coll.)
Measure no. MF / 017028 / 2018-74 with effect from 1 February 2019 (Notification No. 395/2018 Coll.)

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Input-output analysis of Slovak sectors

Dominika Varga Oravcová[1]

[1*]*Department of Economics, Faculty of Economics, Technical University of Košice, Slovakia*
[*]*Corresponding Author: e-mail: dominika.varga.oravcova@tuke.sk*

Abstract

The globalization of the world economy and the increasing division of labour on a global scale in recent decades have made it important to assess the position, importance of economies and individual sectors and their links with other sectors at home and abroad. The increasing interconnectedness of national economies leads to the need to rethink the traditional view of the comparative advantages and competitiveness of the economy at national level. Traditional indicators of competitiveness and the comparative advantages revealed do not consider the complex links between economies and sectors. The aim of this paper is to examine the development trends and the economic links of the Slovak sectors – services and manufacturing. Using input-output analysis based on World input-output tables we examine which sectors are important for Slovakia in terms of job creation. The results show significant multiplier effect of production growth on job creation in sectors such as retail trade, education, public administration, and human health sector. Surprisingly, the automotive sector as an important sector and the driving force of Slovak economy has significant lower multiplier effects on new job creation.

Keywords: employment, input-output model, multipliers, sectors, Slovak economy

1. Introduction

The openness of the Slovak economy as well as its increasing participation in the international production process raises questions about the impact on domestic employment. Due to the increasing participation of the Slovak economy in global value chains, we are seeing changes in the structure of the workforce and the creation of new jobs.

Therefore, the aim of this paper is to examine the development trends and the economic links of the manufactured and service industry in Slovakia. Our definition of the industry is based on international classification of industries - statistical classification of economic activities in the EU – NACE Revision 2. Economic links of the Slovak industries are examined based on the so-called input-output model. This approach allows us to transparently examine its direct, indirect, and induced effects in Slovakia. The economic importance of the analysed industries is evaluated based on its effects on employment.

2. Literature review

The following part of the work presents selected empirical works related to the Slovak economy with a focus on analysis of the position of individual sectors for the national economy.

The automotive industry has become the leading industry in the V4 countries in terms of capital, technology, and skilled workforce. Slušná and Balog et al. (2015) analysed the position of the Slovak automotive industry and in selected countries in the period 1995-2009. This period is characterised by significant changes in the internal structure of the workforce in most developed countries and has seen an increase in the share of highly skilled labour and a decline in the low-skilled workforce in value added creation in France and Germany. Slovakia is characterised by a high share of capital and a low share of work in value added creation. In France and Germany, the high proportion of the highly skilled workforce in value added creation is due to the high contribution of the service sector to the production of vehicles. The share of the highly skilled workforce in value added creation in the car manufacturing industry in the Slovak Republic was one of the lowest in the EU. Slovakia was characterised by large stocks of foreign capital and a relatively high proportion of medium-skilled labour. We can expect the development of the automotive industry in Slovakia to be reflected throughout the economy, provided that the country's increased participation in global value chains (Slušná and Balog 2015).

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Bednárová (2018) dealt with the analysis of the automotive industry in Slovakia and the V4 countries. According to this study the automotive industry is a key sector of the Slovak economy. It represents one of the largest employers and sources of income not only for Slovakia, but also for the Visegrad Four countries. Bednárová analysed the evolution of the V4 automotive industry in the European automotive market from 2005 to 2016. The author analysed the total number employed in the automotive industry as a share of the industry's employment in the total number employed in the economy. The automotive industry of the Czech Republic, Slovakia and Hungary has an increasing share of total employment. Poland has rather subdued development, without any major fluctuations. The changes in competitiveness were analysed by the author through the share of automotive exports in total exports. In Slovakia, this share represented up to 28.3% of total exports in 2016, the highest share within the V4 countries. Since 2000, this proportion has increased by around 46%. In Hungary, in 2016, the share of automotive exports in total exports was 23.1%, in the Czech Republic 21.3% and in Poland 12.1%.

Kubala et al. (2015) examined the position of individual sectors in the Slovak Republic in terms of various indicators and measurable outputs based on input-output analysis. The conclusions of the contribution confirm the essential role of domestic demand in creating employment and added value in Slovakia. The authors point out that even key sectors would not give positive output for the development of the entire national economy if the complex links between the sectors did not work well.

Hamza (2017) looked at the employment situation of the agricultural sector, the identification of factors affecting employment and the examination of potential job creation in the sector. By comparing the three countries, the Czech Republic had the most favourable indicators of labour market activity (activity rate, employment, and unemployment rate). The unemployment rate is the highest in Slovakia, but in 2004 there was a decrease from 18.1% to 13.2% in 2014. The number of unemployed fell from 480,000 in 2004 to 358,000 in 2014. The overall unemployment rate in Slovakia is still high compared to neighbouring countries and the EU average.

Potori et al. (2017) analysed the development of the Czech, Hungarian and Slovak food sectors in the period 2000-2014. The share of agricultural employment in the countries has been declining since 2000. A slightly upward trend was observed only after 2012. As for Slovakia, the highest share of employment in agriculture was in 2000 (6.2%) lowest in 2012 (3.2%).

From the methodological point of view, similar studies have been done in different sectors. Balla (2014) analysed sectoral interdependencies and to identify the key sectors in the Romanian, Hungarian and Slovak economy, drawing a comparison between these three countries. The author applied input-output analysis based on a model which presents interactions between sectors of the economy. As the results of the analyses show, several similarities and differences appear in the economic structure, the sectoral interdependencies, and the key sectors of the analysed countries. For example, in Romania, intersectoral transactions are axing mainly on the Trade and Manufacturing sectors, while in Hungary and Slovakia on the Manufacturing and Other professional, and technical services sectors.

Ali, Sabir and Muhammad (2019) used the Asian Development Bank (ADB) input-output database at constant prices for the selected Asian countries, i.e. Bangladesh, Sri Lanka and Nepal to analyse and compare the performance of the construction sector in these economies. The results obtained from the examined countries I-O tables show that the construction sector of each country delivers most of the share of its output to the final demand and the rest to the intermediate consumption. Finding of the linkage analysis shows that the construction sector has an important role in all these economies since it accelerates the other sectors by means of inputs it receives from them.

Marine sector offers considerable income and employment opportunity to the Irish sector. Morrissey, O'donoghue and Farrell (2014) using Leontief model estimated the employment and income contribution of the marine sector at the country. It was found that the marine sector offers higher than average income to employees in costal locations and thus is an important source of income and employment of Ireland.

The results of the comparative I-O analysis pointed out that the general trend in the Turkish construction sector is like the construction sectors in the Czech Republic, Portugal, Slovakia, and Hungary. In these countries, for instance, the value of the construction sector’s contribution to GNP and national income is higher when compared to the other countries. Furthermore, the manufacturing sectors in the Czech Republic, Portugal, Slovakia, and Hungary have the biggest GNP shares whereas in Denmark, the UK, France, and Sweden the services sectors’ shares in GNP are higher. Findings of the IO analysis show that the construction sector has an important role in Turkish economy since it accelerates the other sectors by means of inputs it receives from them (Ilhan and Yaman 2011).

3. Methodology

Since the 1950s, increased attention has come to the fore in cross-sectoral links and the identification of key sectors that are important for the country's economic growth and development. W. Leontief was the first to study structural changes in the selected economy through an input-output approach (Leontief 1953). Attention to the issue of structural change has been increased in the context of analysing the fragmentation of production chains, the interdependence of economies and industrial clusters. In empirical literature, we often encounter input-output analysis. Input-output analysis is based on input-output tables that provide information on cross-sectoral output, value added and economic growth. The input-output analysis allows us to assess economic links between

sectors and identify the most important sectors of the economy (Timmer 2012). Through the input-output model on the demand side it is possible to generate different kinds of multipliers. Among the most commonly used types of multipliers according to Miller and Blair (2009), we include those that estimate the effects of exogenous changes on: total output of individual sectors of the economy; household income and job creation and added value.

We will consider that in the national economy of the Slovak Republic there are some number of sectors *i* and the total number of these sectors will be *n* and $i = 1 \ldots N$. Each year, each sector produces production x_i and the total output of all sectors in that year is *X*.

$$X = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \tag{1}$$

The y_i variable will determine the final use of a particular consumption object, and the vector captures the values of the final use of individual consumptions.

$$Y = \begin{bmatrix} y_1 \\ \vdots \\ y_n \end{bmatrix} \tag{2}$$

The total production can be characterised as the sum of final use and intermediate consumption. The *Z* matrix captures the transfer of inputs between sectors within a single economy and takes the form of:

$$Z = \begin{bmatrix} z_{11} & \cdots & z_{1n} \\ \vdots & \ddots & \vdots \\ z_{n1} & \cdots & z_{nn} \end{bmatrix} \tag{3}$$

The total output of each sector can be registered in the form of:

$$\begin{aligned} x_1 &= z_{11} + z_{12} + \cdots + z_{1n} + y_i \\ &\vdots \\ x_n &= z_{n1} + z_{n2} + \cdots + z_{nn} + y_n \end{aligned} \tag{4}$$

The intermediate input matrix Z allows us to calculate the matrix of technical coefficients A. The matrix of technical coefficient determines the structure and volume of direct inputs of different commodities to produce one unit of production in the sector j. The individual elements of the matrix A are noted as aij and are calculated as follow:

$$a_{ij} = \frac{z_{ij}}{x_j} \tag{5}$$

The technical coefficients matrix can be written as:

$$A = Z(x)^{-1} \tag{6}$$

Using equivalent adjustments, we calculate Leontief's inverse matrix L:

$$X = (I - A)^{-1} Y = LY \tag{7}$$

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The Leontief matrix is expressed as $L = (I-A)^{-1}$ and I represents a unit matrix $(n \times n)$. If we sum the elements in the individual columns of the matrix L, we obtain a line vector of production multipliers. The vertical sum of the elements of the matrix L indicates how much total production is needed to supply one unit for final use.

The extension of the employment model allows us to analyse the direct and indirect effects on employment in the Slovak economy. Initially, we divide the number of employees of sector by the total production of the sector (x_n) and we obtain the unit vector of the direct employment coefficients E. To find the matrix of employment cumulative coefficients it is necessary to multiply the unit vector of direct employment coefficients E with Leontief inverse matrix L that can be written as:

$$EL = \begin{bmatrix} e_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & e_n \end{bmatrix} \times \begin{bmatrix} l_{11} & \cdots & l_{1n} \\ \vdots & \ddots & \vdots \\ l_{n1} & \cdots & l_{nn} \end{bmatrix} \quad (8)$$

The individual elements of the EL matrix represent directly and indirectly generated employment in a sector caused by one final-use unit of the commodity. The multiplier of the employment is then calculated as the corresponding column sum of the matrix elements. The employment multiplier reflects the employment that generates one final consumption unit of the n-th commodity. To determine employment generated by export or domestic demand (direct and indirect employment generated by export and domestic demand), we multiply the matrix EL by export (x) and domestic demand (d) as parts of final demand.

4. Results and discussion

The basic source of data for our analysis was the Eurostat database, which provided us with information on the main employment indicators in Slovakia. Data from the WIOD database were used to construct the input-output model and employment multipliers. Our analysis uses national input-output tables that are based on national accounting and captures cross-sector flows. These tables are published every 5 years. The latest update of socio-economic database was published in February 2018 and contains data for the period 2000-2014. From a structural point of view on economic changes, the results are still actual, as structural changes are not so dynamic.

4.1 Results of employment indicators

In the next section, the employment indicators of individual Slovak sectors will be presented in the period 2000-2019. Over nineteen years employment has been changed in individual Slovak sectors. Based on the data in "Table 1", we can see that sectors that had a low share of total employment also experienced a more than 50 % increase in the period considered and vice versa. Important sectors in terms of employment can include the professional, scientific, and technical activities sector; administrative and support service activities (M_N), where we see a nearly 100% increase in employment over this period. The increase in employment during the period considered was mainly observed in the service sectors - Information and communication (J), Financial and insurance activities (K), Real estate activities (L). An interesting finding is that the Agriculture, forestry, and fishing (A) sector, despite its growth over the last 19 years, has experienced almost 50% of the loss of workers. The changes that occurred in the agricultural production of Slovakia in the period from 2002 to 2010 were associated with the country's preparation and later accession to the European Union and the adoption of the EU Common Agricultural Policy (CAP) by the new member states. This policy significantly influences Slovakia's national agricultural policy. Slovak agriculture in 2004-2007 was described by the decline in the number of workers, decline in agricultural production (crop and animal production), the growth in the volume of tangible/intangible assets and investments.

Table 5 Sectoral employment in Slovakia in 2019

Sector	G-I	B-E	C	O-Q	M-N	F	R-U	J	A	K	L
Employment (thousands)	633	584	537	487	265	182	77	74	73	47	28
Share on total employment (%)	21	20	18	16	9	6	3	2	2	2	1
Growth rate (%) 2000-2019	38	2	8	7	93	49	42	66	-42	26	49

The development of wages, expressed as compensation per hour worked, is indicated in euro in "Table 2". Compensations in the individual Slovak industries is between EUR 2 per worker (Agriculture, forestry, and fishing sector) and EUR 5 per worker

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(Financial and insurance activities) in 2000. In contrast, there was a 3 to 5-fold increase in compensation across sectors in 2019. The highest level of competence was again in the information and financial services sector. The income of agricultural workers is traditionally lower, than in manufacturing and services sectors around EUR 8.

Table 6 Total and sectoral compensation of employees per hour of work in Slovakia

Sector	Compensation per hour in EUR	
	2000	2019
Total	2,84	11,85
K	4,84	20,82
J	4,04	16,98
O-Q	2,60	13,62
B-E	2,83	12,64
C	2,77	12,47
F	3,22	10,65
M-N	2,86	10,21
G-I	3,11	10,15
L	2,82	9,91
R-U	2,51	9,40
A	1,84	7,90

Furthermore, unit labour costs indicator, we use to examine the relation between labour costs and the level of competitiveness of individual sectors. Unit labour costs are expressed as the share of compensation of employees on the total value of production in individual industry. The data in "Figure 1" show that the unit labour costs in Slovak industries is heterogeneous during the period. The Public administration, defence, education, human health, and social work activities (O-Q) sector maintained a significantly high level of indicator. EUR 100 of production generated in O-Q industry required EUR 54 of compensation paid to employees. The sectors whose EUR 100 of production generated EUR 20 – 30 of compensation paid to employees we can include service industries – Wholesale and retail trade, transport, accommodation and food service activities (G-I), Information and communication (J), Financial and insurance activities (K). However, there are sectors such as Real estate activities (L), Manufacturing (C), Construction (F) which have a lower level of unit labour costs indicator, which shows the cost competitiveness of these sectors.

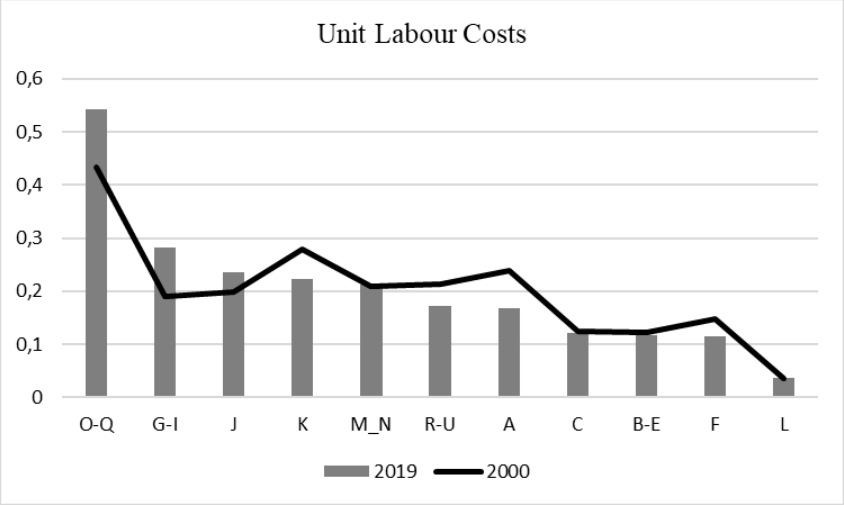

Figure 3 Unit Labour Costs (share of compensation of employees on the value of production)

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4.2 Results of employment multipliers

One of the major uses of input–output model is to assess the economic effect of changes in elements that are exogenous to the model (Miller and Blair 2009). The input-output analysis allows us to study deeper structural links between sectoral changes in final demand and employment creation. We examine the effects on jobs (physical) creation. The employment multiplier in the selected sector suggests how one-unit increase of production (in our case 1 000 000 USD) due to changes in the sector´s final demand will affect the creation of new jobs across the whole economy. "Table 3" shows the values of multipliers for the selected sectors.

Table 7 Employment multipliers (Number of jobs created by growth of sectoral output by 1 000 000 USD)

Number of jobs	Industries
1-5	D-E: Mining and quarrying and other industries
5-9	A02: Fishing
9-13	A01: Agriculture, C29: Manuf. of motor vehicles
13-17	H, I: Transportation and storage, accommodation, and food service activities F: Construction
17-21	G: Wholesale trade K: Financial and insurance activities
21-25	M, N: Professional, scientific, technical, administration and support service activities
25-43	O, P, Q: Education, Human health, and social work activities

The results reveal that the highest multiplier effect of output growth on job creation in all analysed sectors is in O, P and Q sectors (Education, Human health, and social work activities). Interestingly, the values of multipliers in all sectors have decreased over the period 2000-2014. This can be explained by the productivity, automation, and innovation growth in Slovakia, as well as the impact of the crisis consequences. As expected, manufactured sectors such as C29 have significant lower multiplier effects on employment creation to high automation and imports of intermediate inputs. The agricultural sector of the other countries also experienced significant reductions in employment and the ability to create new jobs in this sector is weak. The values of multiplier in the crop and animal production sector (A01) are remarkably on the same level as manufactured sector C29. The construction sector (F) experienced rapid development in Slovakia. This rapid expansion was mainly influenced by strong growth in real estate prices, the inflow of FDI in the real estate and construction sectors and the relatively large share of public investment. Thus, the growth of employment potential in this sector can be expected. Nevertheless, the results of employment multipliers are against this assumption and the multiplier effect is already notably weakening before the crisis period. Based on these data, the M and N sectors has a significant impact on the Slovak economy.

The following section points out to what part of total employment is generated by components of final demand – domestic demand ("Table 4") and export ("Table 5"). It is clear from the data that the main driver of job creation in domestic demand is Education (P), Construction (F) and Retail trade sectors, although countries have generally experienced a reduction in job creation as a result of domestic demand. The construction and retail trade sectors are generally more robust when it comes to economic challenges in the wider economy and are not as vulnerable to economic downturn as the other distributive trade of motor vehicles. The retail industry is heavily dependent on consumer spending and retail employment has traditionally tracked the overall state of the economy. Both retail and construction employment fell during the financial crisis, and then increased during the recovery. Another reason for the decline in employment in the retail sector is technology growth. Technologies are increasingly able to perform the tasks previously done by workers, and retail jobs are particularly vulnerable. Our analysis shows that domestic demand in construction is still a driving force for employment creation, despite falling employment.

Table 8 The share of sector on total employment generated by domestic demand (%)

	Industries
0-3	B-E: Manufacturing, mining, and quarrying and other industry A: Agriculture, forestry, and fishing C: Industry (except construction) J: Information and communication K: Financial and insurance activities
3-6	I: Accommodation and food service activities, administration N: Support service activities
9-12	O, Q: Public administration, human health, and social work activities

	G: Retail trade F: Construction
13	P: Education

Our analysis also shows, that while the impact of domestic demand on job creation is decreasing, the export generates more job creation than 14 years ago. As for Slovakia it is a country with the biggest ratio of locally produced cars per person in Europe and the automotive industry it is the most important sector which production is primarily destined for export markets. As mentioned above, the increased car production for foreign market leads to the highest share of export-generated employment. Technologically advanced industries have been developing rapidly in Slovakia, with advanced manufacturing, pharmaceuticals, and other high-tech sectors experiencing annual growth of between 7 and 10 percent since 2004. The mentioned sectors have an impact on higher job creation generated by export in Slovakia.

Table 9 The share of sector on total employment generated by export (%)

	Industries
0-3	A: Agriculture, forestry, and fishing I, J, K: Accommodation and food service activities, Financial and insurance activities, Information and communication O, P, Q: Public administration, defence, education, human health and social work activities C: Industry (except construction)
3-6	F: Construction M, N: Professional, scientific, technical, administration and support service activities
6-9	C29: Manufacture of motor vehicles, trailers and semi-trailers

5. Conclusion

Our analysis of structural changes in employment in Slovak industries shows significant changes in the analysed period. Although overall employment has increased, the involvement of the labour in value added creation has decreased. The share of labour in value added creation still dominates, however the ratio is changing at the expense of labour. The traditional sector such as crop and animal production has experienced significant job losses. Car production is primarily intended for export markets and leads to the highest share of export-generated employment. However, our results have shown that the highest multiplier effect of production growth on job creation in Education, Human health, and social work activities. The automotive sector has significant lower multiplier effects on new job creation due to high automatization and imports of intermediate inputs. Interestingly, the values of multipliers in all analysed sectors have decreased over the period, suggesting a further reduction in job creation potential.

References

Ali Y, Sabir M. and Muhammad N. 2019. A comparative input-output analysis of the construction sector in three developing economies of South Asia, Construction Management and Economics, DOI: 10.1080/01446193.2019.1571214

Bednárová, Ľ. 2016. Analýza automobilového priemyslu Slovenska a krajín V4. *Journal of Global Science* ISSN: 2453-756X.

EUROSTAT 2019a. National Accounts Aggregates by Industry (up to NACE A*64) [nama_10_a64]. [Extracted on 1.09.2020.] Brussels: Eurostat database.

EUROSTAT 2019b. National Accounts Employment Data by Industry (up to NACE A*64) [nama_10_a64_e] [Extracted on 1.09.2020.] Brussels: Eurostat database.

Hamza E., Buchta S. and Drlík J. 2017. Employment in agriculture. In Structural Changes in Agriculture since EU Accession in Slovakia, The Czech Republic and Hungary. Research Institute of Agricultural Economics. Available at: http://repo.aki.gov.hu/2085/1/2017_K_02_Cseh_szlovak_anyag_web_pass.pdf.

Ilhan B. and Yaman H. 2011. A comparative input-output analysis of the construction sector in Turkey and EU countries. Engineering, Construction and Architectural Management, Vol. 18, No. 3 pp. 248 - 265 Available at:http://dx.doi.org/10.1108/09699981111126160.

Kubala J., Lábaj M. and Silanič P. 2015. Štrukturálne väzby v slovenskej ekonomike v roku 2010: identifikácia kľúčových odvetví. *Ekonomický časopis* Vol. 8, No. 63, pp. 795 – 816.

Leontief W. 1953. Domestic Production and Foreign Trade; The American Capital Position Re-Examined. Proceedings of the American Philosophical Society Vol. 4, pp. 332–49.

Miller R. E. and Blair P. D. 2009. Input - Output analysis. Foundation and Extensions. 2nd ed., Cambridge University Press. ISBN 978-0-521-739-02-3.
Morrissey K., O'donoghue C. and Farrell N. 2014. The Local Impact ofthe Marine Sector in Ireland: A Spatial Microsimulation Analysis, Spatial Economic Analysis, Vol 9, No. 1, pp. 31-50, Available at: https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1080%2F17421772.2013.835439)
Potori N., Doucha T., Medonos T., Gálik J., Jamborová M., Čičová T. (2017). Comparison of the agro-food sectors from a macro perspective. In Structural Changes in Agriculture since EU Accession in Slovakia, The Czech Republic and Hungary. Research Institute of Agricultural Economics. Available at: http://repo.aki.gov.hu/2085/1/2017_K_02_Cseh_szlovak_anyag_web_pass.pdf.
Slušná Ľ. and Balog M. et al. 2015. Automobilový priemysel na Slovensku a globálne hodnotové reťazce. Slovenská inovačná a energetická agentúra. ISBN 978-80-88823-60-5.
Timmer M. 2012. The world input-output database (WIOD): Contents, Sources and Methods. Institute for International and Development Economics.
World Input-Output Database. World Input Output Database, November 2016 release, National Input Output Tables– Slovakia. 2000 - 2014. http://www.wiod.org/database/niots16.

Appendix

Statistical classification of economic activities in the EU – NACE (Nomenclature statistique des activités économiques dans la Communauté européenne) Revision 2

A	Agriculture, forestry and fishing
B-E	Industry (except construction)
C	Manufacturing
F	Construction
G-I	Wholesale and retail trade, transport, accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M-N	Professional, scientific and technical activities; administrative and support service activities
O-Q	Public administration, defense, education, human health and social work activities
R-U	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies

Data Envelopment Analysis as a tool to evaluate the financial health of micro companies

Michaela Kavčáková[1], Emil Exenberger[2]

[1] *Technical University of Košice, Faculty of Economics, Department of Banking and investments, Slovak Republic*
[2*] *Technical University of Košice, Faculty of Economics, Department of Applied Mathematics and Business Informatics, Slovak Republic*
[*]*Corresponding Author: e-mail: emil.exenberger@tuke.sk*

Abstract

The most vulnerable group of companies in terms of bankruptcy and financial health are micro companies, where even a small change in the market can lead to major problems. This means that the need to monitor your financial health applies not only to small, medium and large, but especially to micro companies. In this article, we will focus on Slovak micro companies that belong to the ICT sector. Our goal is to use the method of Data Envelopment Analysis to evaluate the financial health of Slovak micro companies and create for them a particular model. Used data come from the Slovak portal Finstat. Specifically, we used data of Slovak ICT micro companies in the 2013-2017 period. The overall results of this article are compared with the results of other studies that have used micro companies as a sample when evaluating the financial health of the company. We will compare these results based on the calculated index of correct classification and the index of warning reliability. Based on the results of this paper and their comparison with similar studies, we recommend using the traditional Zmijevski X-score model to predict the threat of bankruptcy for micro companies with less than 10 employees.

Keywords: financial health, bankruptcy, Data Envelopment Analysis, index of correct classification, index of warning reliability, micro companies

1. INTRODUCTION AND LITERATURE PREVIEW

The issue of evaluating the financial health of companies is very important for business managers. From these numbers, the view of this company from customers, creditors, suppliers or customers is derived. For this reason, business managers should focus on making the company prosperous and financially health. Bankruptcy due to a sudden change in the market, for example, as we see today during the global pandemic, when in many countries around the world closed mainly manufacturing companies for several months, are highly vulnerable to micro companies, which we selected as a sample for the analysis of this article.

The first significant change in the global market was the Great Depression in 1929. It was during this period that economists began to address the financial health of the company. In 1957, these foundations were laid by Farrell (1957), and over the years his idea was formed into 3 streams of contemporary traditional models, namely one-dimensional discriminatory analysis, multi-dimensional discriminatory analysis and scoring methods.

Beaver (1966) firstly used dichotomous classification t-test in one-dimensional framework and he also laid the foundations of prediction models. Other important authors in this regard are Zmijewski (1984), Deakin (1972) or Ohlson (1980). All these authors tried to find one universal indicator to determine the financial health of the company. However, this group of models has one significant disadvantage, namely that the surveyed company can be included in both the financial health zone and the zone of financial distress based on different indicators. For this reason, the authors focused on the use of multi-dimensional discriminatory analysis.

The best-known representative of models based on multi-dimensional discriminatory analysis is Altman (1968), who uses in his Z score model not only one, but several weighted indicators. Many authors followed his idea and this model is very often modified today. Other well-known representatives of this group of models are, for example, Taffler (1977), Springate (1978), or Neumaiers (1995).

The last group of traditional models used to evaluate the financial health of companies are the so-called scoring methods, the main representatives of which are Kralicek (1993) and Argenti (1983).These models are kind of transition between one-dimensional and multidimensional models. Kralicek (1993) named his model Quick test and it is often used mainly in Europe. He

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chose one selected indicator from each significant area of analysis (stability, liquidity, profitability and economic outcomes) and created point scale.

However, many current researchers are exploring the use of various alternative methods to evaluate the financial health of companies, such as neural networks or Data Envelopment Analysis (DEA). This non-parametric method is used to evaluate the technical efficiency of homogenous units, so-called Decision-Making Units (DMU) and it is based on linear programing. DEA divide the DMUs into efficient and ineffective according to the size of inputs consumed and the number of outputs and then compare these objects to the best one. The basis of this method is so-called production-possibility frontier, which is determined by the production possibility curve. The unit is effective if it lies at this production possibility curve. Otherwise, it is inefficient and it is necessary to adjust the size of its inputs or outputs to become an effective unit. Many types of DEA models exist, but the most used are Charnes-Cooper-Rhodes (CCR) model (1978), Banker-Charnes-Cooper (BCC) model (1984), ADD model of Charnes et al. (1985) or Slack Based model (SBM of Tone (2001).

Professor Paradi from the University of Toronto is the most well-known scientist dealing with the application of DEA to various area of the economy. His work from 2004 (Paradi, 2004), in which he focused on the use of DEA to assess the financial health of companies, was also followed by Slovak authors Mendelová and Bieliková (2017),who also compared the results with logistic regression and decision trees.

In our paper we will focus on using DEA for evaluating financial health of micro companies. The aim of this paper is therefore is to use the method of Data Envelopment Analysis to evaluate the financial health of Slovak micro companies and create for them a particular model.

2. Research method

A review of the literature shows that few studies are currently available to provide an algorithm for the in-house assessment of the financial health of enterprises using the Data Envelopment Analysis (DEA) method. Thus, this paper aims to propose a suitable low-cost algorithm including the DEA method for internal assessment of financial health of micro-enterprises to predict the threat of bankruptcy in the company, testing the proposed algorithm and comparing its success with previous research by Kavčáková (2020), in which the author selected the most appropriate method for assessing financial health among traditional methods. With the intention that the algorithm we propose is low-cost, we will perform it entirely in the R program, which is the language and environment for statistical computing and graphics (R Core Team, 1993), and describe the individual packages and commands used.

The basic condition for using the DEA method is its application to a set of companies from the same industry. As the industry on which we will test the algorithm, we chose the "Information Technology" (IT) industry, because it is currently the most widespread industry in Slovakia. We will test the proposed algorithm on data that consist of calculated **27 financial indicators for 15,358 micro-enterprises** from 2013 to 2017, while we consider a micro-enterprise with a company with a maximum number of employees = 9. The list of financial indicators is given in Table 1.

Table 1. Data - 27 calculated financial indicators from the FinStat internet portal

revenues, including revenues from the sale of fixed assets and securities	gross margin	return on long-term capital (EBIT)
profit before tax and interest	EBITDA margin	receivables turnover time
EBITDA (earnings before interest, taxes, depreciation, and amortization)	operating margin	time of collection of short-term receivables
sales adjusted = for inventories and capitalization	profit margin	repayment period of liabilities
accounting cash flow	accounting cash flow margin	time of repayment of liabilities concerning sales
costs of goods and services sold	liabilities / EBITDA	time of repayment of trade payables
gross generation of resources from operating activities	total insolvency	effective tax rate
net operating profit after tax	2nd level liquidity	coverage of personnel costs and charges
net debt	3rd level liquidity	surcharge

Source: Prepared by authors

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We added the value of **equity of next year (ENY)** to the columns of calculated financial indicators. According to this value, we will identify whether the company was financially sound in the next year or financial distress. We consider a financial health company, where $ENY > 0$. If the value of ENY is < 0, then this is an indicator that the company was in financial distress in the following year.

The first step is to **remove multicollinearity** from the data. We use the command $mc = lm(ENY \sim ., Data)$ to analyze multicollinearity (Chambers and Hastie, 1992; Wilkinson and Rogers, 1973). From the output we can then display the values of vif using the command $vif(mc)$, which represents the variance inflation factor calculated for each financial indicator. Based on this value, we then exclude from the dataset those indicators whose value $vif < 10$, thus removing multicollinearity from the original dataset.

The next step is to identify those financial indicators whose mean values and variance differ statistically significantly between financial healthy companies and companies in financial distress. To identify these financial indicators, we will use the Li test in the first variant and the Mann Whitney U test in the second. The resulting part of this paper will be divided into 2 parts - the first part will be based on the use of the Li test and the second on the use of the Mann Whitney U test.

Li test (consistent integrated squared difference test) (Li, Maasoumi, and Racine, 2009) is performed in the R environment using the command $npdeneqtest(healthy_table, distress_table, boot.num = 99)$ whereas we test the null hypothesis: "There are no significant differences in the jiont distribution within the tested financial indicator between financial health and financial distress companies". Under the command, the $healthy_table$ and $distress_table$ columns represent tables with ENY values divided into financial healthy and financial distress companies. Each of these tables will contain one column with the calculated values of one financial indicator. The last argument of the $boot.num$ command represents an integer value specifying the number of bootstrap replications to use (Racine, 2020). The output of the order is the value p-value, which if it is less than the significance level 0.001 given by us, then we reject the null hypothesis in favor of the alternative: "There are significant differences in the jiont distribution within the tested financial indicator between financial health and financial distress companies". We will perform the test for all 27 financial indicators, and after performing it, we will remove from the dataset those indicators for which we will not reject the null hypothesis.

Mann Whitney U test (also known as the Wilcoxon test) (Mann and Whitney, 1947; Bauer, 1972; Hollander, Wolfe, and Chicken, 2013) is performed in the R environment using the command $wilcox.test(fin_indicator \sim healthy_distress, data)$ where the $fin_indicator$ argument represents the financial indicator within the data variable in the form data.frame the $fin_indicator$ argument represents the column of the tested financial indicator and the column healthy distress represents the binary column determining whether the company in the given line was financial healthy or financial distress based on ENY. With this test we test the null hypothesis: “There is no difference within the tested financial indicator between financial health and financial distress companies”. If the resulting $p - value$ is less than the significance level we entered of 0.001, then we reject the null hypothesis in favor of the alternative: "There is a difference within the tested financial indicator between financial health and financial distress companies". After performing the test in the dataset, we will leave those financial indicators in which we rejected the null hypothesis.

After performing both tests, we will continue with the algorithm and finally compare the overall results with the results of the previous study Kavčáková (2020) and recommend one of the algorithms.

After sorting the financial indicators, we will **remove outliers** within the financial indicators especially for financial healthy and financial distress companies, which could affect the results in the next step. To identify the outliers of one financial indicator in the R program, we use the command $boxplot(healthy_companies\$fin_indicator)\$out$ The next step is to prepare the data for performing Data Envelopment Analysis. To do this, it is necessary to **divide the financial indicators into inputs and outputs within DEA method**. We will make this division based on the calculated mean values of individual financial indicators separately for financially healthy companies and financial distress companies. If the average value of the financial indicator within financial healthy companies is lower than within financial distress companies, then this indicator will represent the output of the DEA method, otherwise this indicator will represent the input of the DEA method.

After removing the outliers, we will randomly select 100 financial healthy and 50 financial distress companies from the companies, as Kavčáková (2020) did, so that the results would be comparable.

After dividing the financial indicators, we will perform the DEA method itself, which, based on the analysis of financial indicators, assigns each of the companies to one of the financial zones:

- financial healthy zone;
- gray zone;
- financial distress zone.

We perform DEA analysis in program R through a combination of commands that are included in the $deaR$ package:

```
dea_model = read_data(
        inputs = inputs_table,
        outputs = outputs_table
)

results = model_sbmeff(
        dea_model,
        orientation = "no",
        rts = "vrs"
)
```

where:

- *input_table* is a table with financial indicators that represent inputs to the DEA method;
- *output_table* is a table with financial indicators that represent outputs to the DEA method;
- *orientation* represents a non-oriented DEA model - we chose a non-oriented model, because in the framework of our analysis it is not necessary to orient the model;
- *rts* parameter determining the type of returns to scale (Suarez, 2020), within which we decided for the SBM model for the *VRS* condition (Tone, 2001) to quantify the distances of companies from the production possibility curve in connection with the selection of the unoriented model.

After performing the analysis, we calculate the success of the model using two indices, namely the Index of correct classification (I_{CC}) (Mendelová and Bieliková, 2017) and the Index of warning reliability (I_{WR}).

Based on the value of ENY, we can say about each company whether it was financially healthy or in financial distress in the next year. The **Index of correct classification** calculates what percentage of the analyzed companies was assigned correctly based on this analysis, so financial healthy companies were assigned to the financial healthy zone and financial distress companies were assigned to the financial distress zone. The calculation of the Index of correct classification is given by the following formula.

$$I_{CC} = \frac{number\ of\ correctly\ assigned\ companies}{total\ number\ of\ companies} \quad (1)$$

Although the index of correct classification calculates the accuracy of the correct assignment of companies to individual financial zones, this does not indicate the accuracy of the proposed algorithm to notification of management of the impending bankruptcy in the company on time. To calculate the accuracy of the algorithm to predict of a possible bankruptcy of the company, we use the **Index of warning reliability**. We use it to calculate what percentage of really bankrupt companies were included in either the financial distress zone or the gray zone. The calculation of this index is expressed by the following formula.

$$I_{WR} = \frac{number\ of\ companies\ assigned\ to\ financial\ distress\ or\ gray\ zone}{total\ number\ of\ financial\ distress\ companies\ based\ on\ ENY} \quad (2)$$

After calculating the indices, we **compare the results** with the results of the study (Kavčáková, 2020) and among the compared algorithms we **recommend the algorithm** with the highest accuracy for predicting the threat of bankruptcy for micro enterprises with less than 10 employees.

3. Results

We first imported data into the R program, which represented 27 calculated financial indicators and the ENY value for 15,358 micro enterprises up to 10 employees in the period of years 2013 to 2017. Subsequently, we removed multicollinearity from the data to reduce the number of monitored variables. This step removed 17 financial indicators from the dataset and 10 remained. After removing multicollinearity, we performed the Li test and the Mann Whitney U test separately to identify those financial indicators whose values differ statistically significantly for financially healthy companies and companies in financial distress. For this reason, the chapter will be further divided into 2 subchapters.

3.1 Li test

Using Li test we test the null hypothesis: "There are not significant differences in the jiont distribution within the tested financial indicator between financial health and financial distress companies". The calculated p-values of the Li test are shown in Table 2.

Table 2. Li test – results

Financial indicator	Li test p-value
EBITDA	<0.001***
gross generation of resources from operating activities	<1
net debt	<1

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liabilities / EBITDA	<0.001***
total insolvency	<0.001***
return on long-term capital (EBIT)	<0.001***
time of repayment of liabilities in relation to sales	<0.001***
effective tax rate	<0.001***
coverage of personnel costs and charges	<0.001***
surcharge	<1

*** Significant at $p < 0.001$; ** Significant at $p < 0.01$; * Significant at $p < 0.05$

Source: Prepared by authors

Based on the results, we removed from the dataset those financial indicators whose p-value was not less than the significance level of 0.001 set by us, so we do not reject the null hypothesis in theses cases. Based on the results, we removed from the dataset those financial indicators whose p-value was not less than the significance level of 0.001 set by us. In this step, 3 financial indicators were removed and 7 remained.

Subsequently, we removed outliers of financial indicators separately for financial healthy and distressed companies, while we removed 9,175 companies and 6,183 companies remained in the dataset.

We then divided the remaining financial indicators into inputs and outputs to the DEA method based on the calculated mean values shown in Table 3.

Table 3. Li test - means of financial indicators

financial indicator	**mean - fin. healthy**	**mean - fin. distress**	**DEA input/ DEA output**
EBITDA	20 820.13	8 660.17	Input
liabilities / EBITDA	1.55	5.68	Output
total insolvency	1.23	4.09	Output
return on long-term capital (EBIT)	0.42	-0.16	Input
time of repayment of liabilities in relation to sales	65.46	205.36	Output
effective tax rate	0.23	0.15	Input
coverage of personnel costs and charges	2.45	1.38	Input

Source: Prepared by authors

The table shows the calculated mean values for financial indicators within financial healthy companies and financial distress companies. We consider as input to the DEA method those indicators whose average value for financially healthy companies is greater than for financial distress companies. Other financial indicators represent the output to the DEA method.

After identifying the inputs and outputs to the DEA method, we performed the DEA method and calculated the values of the indexes of the Index of correct classification (I_{CC}) (Mendelová and Bieliková, 2017) and the Index of warning reliability (I_{WR}). The calculated values of these indices are shown in Table 4.

Table 4. Li test - calculation of accuracy indices

Method	I_{CC} (Index of correct classification)	I_{WR} (Index of warning reliability)
Li test + DEA	88.18%	27.20%

Source: Prepared by authors

The calculated value of the Index of correct classification is at the level of 88.18% and the value of the Index of warning reliability is 27.20%. This means that the use of the Li test in combination with the DEA method can only warn the company with an accuracy of 27.20% when predicting impending bankruptcy. In the end, we compare the values of these indices with the results of the algorithm in which we use the Mann Whitney U test instead of the Li test and with the results of the study by Kavčáková (2020).

3.2 Mann Whitney U test

Using Mann Whitney U test we test the null hypothesis: "There is no difference within the tested financial indicator between financial health and financial distress companies". The calculated p-values of the Mann Whitney U test are shown in Table 2.

Table 5. Mann Whitney U test – results

Financial indicator	Mann Whitney U test p-value
EBITDA	<0.001***
gross generation of resources from operating activities	<0.001***
net debt	<0.001***
liabilities / EBITDA	<0.001***
total insolvency	<0.001***
return on long-term capital (EBIT)	<0.001***
time of repayment of liabilities in relation to sales	<0.001***
effective tax rate	<0.001***
coverage of personnel costs and charges	<0.001***
surcharge	<0.001***

*** Significant at $p < 0.001$; ** Significant at $p < 0.01$; * Significant at $p < 0.05$

Source: Prepared by authors

Based on the results, we removed from the dataset those financial indicators whose p-value was not less than the significance level of 0.001 set by us, so we do not reject null hypothesis in theses cases. Based on the results, we removed from the dataset those financial indicators whose p-value was not less than the significance level of 0.001 set by us. In this step, we did not reject the null hypothesis of the Mann Whitney U test for any of the analyzed financial indicators, and therefore we will use all of them as inputs or outputs to the DEA method.

Subsequently, we removed outliers of financial indicators separately for financial healthy and distressed companies, while we removed 10,267 companies and 5,091 companies remained in the dataset.

We then divided the remaining financial indicators into inputs and outputs to the DEA method based on the calculated mean values shown in Table 3.

Table 6. Mann Whitney U test - means of financial indicators

financial indicator	mean - fin. healthy	mean - fin. distress	DEA input/ DEA output
EBITDA	18066.22	7921.44	Input
gross generation of resources from operating activities	18514.97	8432.19	Input
net debt	-20331.17	-6609.44	Output
liabilities / EBITDA	1.64	5.35	Output
total insolvency	1.25	4.26	Output
return on long-term capital (EBIT)	0.40	-0.19	Input
time of repayment of liabilities in relation to sales	66.13	208.32	Output
effective tax rate	0.23	0.14	Input
coverage of personnel costs and charges	2.38	1.38	Input
surcharge	0.91	0.52	Input

Source: Prepared by authors

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The Table 6 shows the calculated mean values for financial indicators within financial healthy companies and financial distress companies. We consider as input to the DEA method those indicators whose average value for financial healthy companies is greater than for financial distress companies. Other financial indicators represent the output to the DEA method.

After identifying the inputs and outputs to the DEA method, we performed the DEA method and calculated the values of the indexes of the Index of correct classification (I_{CC}) (Mendelová and Bieliková, 2017) and the Index of warning reliability (I_{WR}). The calculated values of these indices are shown in Table 7.

Table 7. Mann Whitney U test - calculation of accuracy indices

Method	I_{CC} (Index of correct classification)	I_{WR} (Index of warning reliability)
Mann Whitney U test + DEA	85.09%	46.40%

Source: Prepared by authors

The calculated value of the Index of correct classification is at the level of 88.18% and the value of the Index of warning reliability is 27.20%. This means that the use of the Mann Whitney U test in combination with the DEA method can warn the company with an accuracy of 46.40% when predicting impending bankruptcy.

3.3 Comparison of results

In this subchapter, we compare the results of this paper with the results of Kavčáková (2020). In this comparison, we will compare the values of the Index of correct classification (I_{CC}) (Mendelová and Bieliková, 2017) and the Index of warning reliability (I_{WR}). To ensure an adequate comparison, we randomly selected 100 financial healthy and 50 financial distress companies before using the DEA method. The calculated index values are shown in Table 8.

Table 8. Comparison of results

Method	I_{CC} (Index of correct classification)	I_{WR} (Index of warning reliability)
Mann-Whitney U test + DEA	85.09%	46.40%
Li test + DEA	**88.18%**	27.20%
Zmijewski X-score (Kavčáková, 2020)	67.60%	**86.00%**

Source: Prepared by authors

Based on the results, the highest value of the Index of correct classification (88.18%) was achieved using a combination of the Li test and DEA method and the highest value of the Index of warning reliability (86.00%) was achieved using the traditional model Zmijevski X-score.

For a company to be able to react in time to imminent danger, it needs to be warned in time. It is the Index of warning reliability that represents the accuracy of the estimate of this threat. For this reason, we consider the value of this index to be more important when assessing financial health in connection with bankruptcy prediction than the Index of correct classification. Based on the results, we therefore recommend the use of the traditional Zmijewski X-score model to evaluate the financial health of companies in connection with bankruptcy prediction for micro companies with less than 10 employees.

4. Conclusions

For businesses to respond to threats on time, they need to be informed on time. One of the most serious threats is the threat of bankruptcy. It is particularly threatening to micro-enterprises, as even the smallest changes can have a major impact on their economy. However, it is not always possible to detect the threat of danger easily and in time. This motivated us to design algorithms that could predict bankruptcy with the highest probability, and to further compare these algorithms with similar studies.

We performed the algorithms in the R program, which is freely available, so they can be applied in the company completely free of charge. Within them, we used methods such as the Li test, Mann Whitney U test, outliers identification and Data Envelopment Analysis and compared the results with the study of Kavčáková (2020). Based on the results, we recommend using the Zmijewski X-score method to predict bankruptcy for companies with less than 10 employees.

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We consider a small final number of companies selected for testing to be a lack of work, which does not allow us to generalize the results and conclusions. In future research, we plan to test the proposed algorithms in this paper for companies with a larger number of employees, or to test the accuracy of bankruptcy prediction using neural networks.

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References

Altman, E.I., 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance*, *23*(4), pp.589-609.

Banker, R.D., Charnes, A. and Cooper, W.W., 1984. Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management science*, *30*(9), pp.1078-1092.

Bauer, D.F., 1972. Constructing confidence sets using rank statistics. *Journal of the American Statistical Association*, *67*(339), pp.687-690.

Beaver, W.H., 1966. Financial ratios as predictors of failure. *Journal of accounting research*, pp.71-111.

Chambers, J.M. and Hastie, T.J., 1992. Linear models. Chapter 4 of statistical models in S. *Wadsworth & Brooks/Cole*.

Charnes, A., Cooper, W.W. and Rhodes, E., 1978. Measuring the efficiency of decision making units. *European journal of operational research*, *2*(6), pp.429-444.

Charnes, A., Cooper, W.W., Golany, B., Seiford, L. and Stutz, J., 1985. *Foundations of Data Envelopment Analysis for Pareto-Koopmans Efficient Empirical Productions Functions* (No. CCS-504). TEXAS UNIV AT AUSTIN CENTER FOR CYBERNETIC STUDIES.

Deakin, E.B., 1972. A discriminant analysis of predictors of business failure. *Journal of accounting research*, pp.167-179.

Farrell, M.J., 1957. The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A (General)*, 120(3), pp.253-281.

Hollander, M., Wolfe, D.A. and Chicken, E., 2013. *Nonparametric statistical methods* (Vol. 751). John Wiley & Sons.

Li, Q., Maasoumi, E. and Racine, J.S., 2009. A nonparametric test for equality of distributions with mixed categorical and continuous data. *Journal of Econometrics*, *148*(2), pp.186-200.

Mann, H.B. and Whitney, D.R., 1947. On a test of whether one of two random variables is stochastically larger than the other. *The annals of mathematical statistics*, pp.50-60.

Mendelová, V. and Bieliková, T., 2017. Diagnostikovanie finančného zdravia podnikov pomocou metódy DEA: Aplikácia na podniky v Slovenskej republike [Diagnosing of the Corporate Financial Health Using DEA: an Application to Companies in the Slovak Republic]. *Politická ekonomie*, *2017*(1), pp.26-44.

Kavčáková, M. 2020. Using mathematical-statistical methods to evaluate the financial health of Slovak micro companies. The 14th International Days of Statistics and Economics – Conference proceedings, pp. 470-479.

Neumaier, I. and Neumaierová, I., 1995. Zkuste spočítat svůj INDEX IN 95. *Terno,(5)*, pp.7-10.

Ohlson, J.A., 1980. Financial ratios and the probabilistic prediction of bankruptcy. *Journal of accounting research*, pp.109-131.

Paradi, J.C., Asmild, M. and Simak, P.C., 2004. Using DEA and worst practice DEA in credit risk evaluation. *Journal of productivity analysis*, *21*(2), pp.153-165.

R Core Team. 1993. "About @ Www.R-Project.Org." https://www.r-project.org/about.html.

Racine, Jeffrey, S. and Tristen Hayfield. 2020. "Package ' Np ." https://cran.r-project.org/web/packages/np/np.pdf.

Springate, G.L., 1978. *Predicting the possibility of failure in a Canadian firm: A discriminant analysis* (Doctoral dissertation, Simon Fraser University.).

Suarez, V. C., Vicente, B. and Rafael, B.. 2020. "Package 'DeaR." https://cran.r-project.org/web/packages/deaR/deaR.pdf

Taffler, R.J., 1977. *Finding those firms in danger using discriminant analysis and financial ration data: A comparative UK-based study*. City University Business School.

Tone, K., 2001. A slacks-based measure of efficiency in data envelopment analysis. *European journal of operational research*, *130*(3), pp.498-509.

Wilkinson, G.N. and Rogers, C.E., 1973. Symbolic description of factorial models for analysis of variance. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, *22*(3), pp.392-399.

Zmijewski, M.E., 1984. Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting research*, pp.59-82.

Comparison of value-added tax and turnover tax in the context of mitigation of tax evasion at the level of the European Union and the Slovak Republic

Róbert Oravský[1], Anna Bánociová[2]

[1*]*Department of Finance, Faculty of Economics Technical University of Košice, Slovak Republic*
[2] *Department of Finance, Faculty of Economics Technical University of Košice, Slovak Republic*
[*]*Corresponding Author: e-mail: robert.oravsky@tuke.sk*

Abstract

The aim of this paper is to analyze the defects of the value-added tax system, the reasons for tax evasion on value-added tax, compare the differences between the value-added tax system and turnover tax, and determine which system would be more effective in eliminating tax fraud. Value-added tax is currently the most widely used indirect tax in almost every developed economy in the world. Value-added tax, abbreviated "VAT", as one of the most advanced economies in the world - the USA does not use. The USA instead of VAT has introduced the so-called "sales tax", which can be compared to a turnover tax. Value-added tax makes it possible to refund the tax, which tax subjects can abuse and thus unjustifiably enrich themselves at the expense of the state budget of the country, thus committing tax evasion. The turnover tax system does not allow the possibility for taxpayers to claim a tax refund and therefore does not allow tax evasion at all as in the case of value-added tax. This is one of the reasons why we compare value-added tax with turnover tax. In the paper, we will examine tax evasion at the EU level, and at the same time, we will analyze the possible reintroduction of turnover tax and its effects in the conditions of the Slovak Republic.

Keywords: Value-added tax, turnover tax, tax systems comparison, mitigation of tax evasion

1. Introduction and literature review

The public sector primarily provides public goods that are economically unattractive to the business sector, but households require those goods, e.g. public protection, street lighting, etc. In order to achieve any goods, even the public, it is necessary to spend financial resources. In order to be able to finance public goods by the public sector, it needs to generate income. As the primary role of the public sector is not entrepreneurship, the sector must secure finance in a different way by collecting payments from the second and third sectors and from households. Such payments are referred to as taxes. The tax is generally characterized as a mandatory, non-refundable, non-purpose, non-equivalent, and statutory payment. (*OECD, 2010*)

At present, in every advanced economy, there are several types of taxes, which together form the tax system of an economy. The modern tax system classifies taxes into direct and indirect. Direct taxes are characteristic as taxes that are collected directly from the taxpayer, e.g. income tax. Indirect taxes are collected indirectly from the taxpayer, from the payer who pays the tax on behalf of the taxpayer. Such taxes are also referred to as consumption taxes. The most well-known indirect tax in the EU level is a value-added tax.

The historical predecessor of value-added tax was the turnover tax. Both taxes (value-added tax and turnover tax) tax the goods and services supplied, but each on a different principle. Turnover tax taxes turnover from the sale of goods, respectively services of own production or purchase of goods, respectively services from imports, while value-added tax taxes consumption. Turnover tax is currently applied in only a few world economies, in various modified forms. Today, almost all the world's economies, whether developed or emerging, apply the value-added tax. Perhaps the most well-known developed world economies that currently apply a tax that can be compared to turnover tax are the United States and Taiwan. The US applies a tax system very similar to the turnover tax system. The tax is referred to as the "sales tax". Taiwan applies a business turnover tax. To illustrate, in Slovakia, turnover tax was applied from the period of Czechoslovakia. The turnover tax was introduced in 1952 by Act no. 73/1952 Sb. It was applied throughout the existence of Czechoslovakia from 1952 until its disintegration in 1993. The new state units, the Czech Republic and the Slovak Republic, abandoned the turnover tax and introduced a new tax - value-added tax.

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The reason for the introduction of value-added tax and the replacement of turnover tax in the developed economies of the world is mainly the fact that this tax is inherently neutral and transparent (*Buydens, 2008*). Some authors argue that value-added tax is even the most effective tool for generating revenue to the state budget (*Go, Kearney, Robinson, Thierfelder, 2005*) and at the same time value-added tax is effective in terms of marginal costs of obtaining funds for public purposes. instead of other taxes (*Bird, Keen, Smith, 2008*). In the former communist economies, consideration has been given to replacing levies for state-owned enterprises and anticipating membership in the European Union (*Norregaard, Kahn, 2007*). VAT neutrality vis-à-vis international trade has helped to favor it as an alternative to customs obligations in the context of trade liberalization (*Buydens, 2008*). Exports are usually exempt from value-added tax and at the same time allow the deduction of the corresponding input tax. Imports of goods are usually subject to value-added tax. Due to the fact that the input tax on the export of goods is deductible, the value-added tax does not affect the competitiveness of domestic companies for export. Furthermore, VAT is relatively secure against serious domestic fraud, although this claim is often a point of contention. Value-added tax is based on a gradual collection mechanism in which subsequent taxpayers are entitled to deduct input tax on the acquired goods and at the same time are obliged to charge output tax on the sale of goods. At the end of this chain should be the final consumer, who will pay the tax in question to the last supplier. There are opinions that this tax is particularly effective as the revenue is secured throughout the production process, unlike the retail tax, where the final tax may be lost if there is tax evasion in this final link in the chain. Also, some authors argue that value-added tax encourages savings and investment, as VAT is an excise tax and not a tax burdening income. In addition, the OECD supports the notion that VAT has a higher growth potential than income taxes and corporate taxes. (*Johansson, Heady, Arnold, Brys, 2008*)

Value-added tax, also known as "VAT", is considered one of the main revenues of the state budget. The VAT taxes consumption in the following way: the supplier - producer of the goods, is obliged to add the value-added tax to the required consideration for the production of the goods, which the customer - consumer of the goods pays to the supplier together with the required consideration for the good. Subsequently, the supplier, who acts as a taxpayer in the given chain, is obliged to pay the tax in question to the state budget, which is collected by the tax authority in the given economy. In the conditions of the Slovak Republic, this authority is entrusted to the Financial Administration of the Slovak Republic, for which the individual tax offices act.

If there are two VAT payers in the VAT chain on both sides, the legislation allows, under certain conditions to VAT payer acting as a customer in the chain to claim a VAT deduction from the tax office. This means that the VAT payer, in the position of the customer, pays the tax to the supplier, and subsequently, the customer claims the right to deduct the tax in question.

This situation can be considered as one of the biggest weaknesses of value-added tax, due to the fact that this allows most illegal activities to take place - VAT fraud. The situation can be summarized as follows: the supplier will not intentionally or unintentionally pay the tax liability to the tax office, which in the state budget will lack the funds to which the state budget was entitled, and at the same time the customer asks the tax office for a VAT refund, thereby creating an obligation for the tax office to pay the funds. By settling the tax, its payment to the customer's account, consequently there are no funds in the state budget. *(Institute for Advanced Studies, 2018*)

The loss of state budget revenues is not negligible. In the European Union, the average annual VAT shortfall is around € 150 billion, which represents around 15% of total VAT revenue in the European Union. For visualization, € 150 billion represents approximately ten times the revenue component of the state budget of the Slovak Republic. (*Ministry of Finance of the Slovak Republic, 2019*)

The scientific community is currently focusing on VAT evasion and VAT defects. Among the authors who generally descriptively examine VAT, we can include e.g. Alm. The author is focused on general issues regarding the reason for VAT evasion. He set 3 questions: 1.) What does the theory say about motivating subjects to evade, 2.) What does the data on existing tax evasion prove, 3.) How can government measures eliminate tax evasion. The present study is purely descriptive (*Alm, 2018*). In another study, the authors focused on the impact of corruption and corporate tax evasion. In the present study, the authors contrasted corruption and its impact on bribery of tax authorities, which results in an increase in tax evasion (*Alm, Martinez-Vazquez, McClellan, 2016*). Continuing the impact of corruption on tax evasion, Pappa, Sajedi, and Vella followed, examining fiscal consolidation in the context of tax evasion and corruption using the DSGE model. The main findings include the fact that reducing government spending also reduces tax evasion, the growth of tax evasion is correlated with large output and loss of welfare (*Pappa, Sajedi, Vella, 2015*). On the other hand, Alstadsaeter et al. found that tax evasion is not evenly distributed between population groups. The richer population group achieves higher tax evasion than the poorer population groups. The richest groups of the population secure tax evasion through offshore companies in tax havens, while 0.01% of the richest people in the world rob 25% of their taxes through offshore companies (*Alstadsaeter, Johannsen, Zucman, 2019*). Speaking of the uneven redistribution of tax evasion, another study follows, which from a mathematical point of view, assesses that in a society in which there is a tax system, there are also tax evasions that depend on the behavior of taxpayers. This study used the Gini index, which in this case represents that population inequalities increase if tax evasion also increases. However, this does not depend on the spread of tax evasion in society (*Bertotti, Modanese, 2018*).

Recently, European authors have focused mainly on VAT evasion from different angles. Some authors examine e.g. the impact of the cashless economy on reducing tax evasion and the relationship between localities where tax evasion and cash withdrawals

from ATMs occur (*Immordino, Russo, 2018*). Other surveys at the European level include a study examining the size of the shadow economy among 31 European countries (EU 28, Norway, Switzerland, and Turkey) between 2003 and 2014. The main indicator monitored was the level of tax evasion and to suggest as far as possible, tax evasion can be eliminated. The MIMIC model was used in the investigation. The result of the study was the finding that among the most important factors influencing the height of the shadow economy are unemployment, tax morale, GDP growth, etc. (*Schneider, Raczkowski, Mróz, 2015*) In addition to the above research, there are also studies that are rather descriptive, describing value-added tax, its nature, and operation with selected applications, such as the impact of taxation of books and digital books in the European Union (*Colbojrnsen, 2013*). Several studies have also been carried out at the European Union level to compare value-added tax and VAT evasion between Member States (*Poniatowski, Bonch-Osmolovskiy, Duran-Cabré, 2018*).

In the conditions of individual member states of the European Union, studies were carried out e.g. in the conditions of Italy, where econometric modeling monitors tax evasion at regional levels for a selected period from 2001 to 2011. The investigation revealed that the higher the likelihood of targeted audits, the higher the effort to report correct revenues by tax entities (*Carfora, Pansini, Pisani, 2017).* In addition, another study was conducted that focused on monetary and non-monetary incentives for taxpayers to avoid tax evasion and higher government spending in a region where there are no tax evasion efforts (Casaburi, Troiano, 2015). In the conditions of Austria, the relationship between the behavior of tax subjects and the influence of emotions in the payment of income tax and value-added tax was examined (*Olsen, Kogler, Stark, Kirchler, 2017*). Similar to Italy and Romania, a study was carried out to monitor tax evasion and methods used in tax evasion for the period from 2007 to 2016. (*Trandafir, 2017*)

Within the Czech Republic, several studies have been carried out on the issue of value added tax. 2 studies can be considered among the most recent. In one study, authors examined tax evasion at the level of the Czech Republic for the period from 2006 to 2012 using various methods. The finding was that the resulting loss of value added tax compared to other member states of the European Union is acceptable and at the same time the state budget of the Czech Republic can cope with such a loss (*Stavjaňová, 2014*). Continuing to measure tax evasion in the Czech Republic, Semerád and Bartunková examined the audit report, which is part of the value-added tax return. The aim was to find out to what extent the audit report prevents tax fraud and the possibility to predict the fraud of small and medium-sized enterprises. The resulting finding was that the audit report is a suitable tool for the tax authority to inspect tax entities, but the audit report as such does not prevent tax fraud (*Semerád, Bartunková, 2016*).

Within the issue of value-added tax in the conditions of the Slovak Republic, the authors focused on the sustainable development of activities with the aim of combating tax evasion in Slovakia. The study consists of a description of individual activities of the Financial Administration of the Slovak Republic in the field of combating and eliminating tax evasion in connection with the sustainable development of the economy. The result of the study were recommendations for strengthening the fight against tax evasion in value added tax (*Drobovič, Gombár, Benková, 2017*).

From the point of view of authors outside the territory of the European Union, who deal with the issue of value-added tax, there is less authors who examine the VAT frauds. The are authors mostly from countries such as Australia, China, South Korea, Brazil, Chile, etc. Almost all authors deal exclusively with the issue of tax evasion in value-added tax. Naritomi, examined the motivation of buyers to control the issuance of tax documents by sellers and their possible reporting to the authorities in the area of Sao Paulo, Brazil. The research found that in such a case, the companies reported higher revenues of up to 21% over a period of 4 years (*Naritomi, 2019*). Schneider examined 110 economies of the world in contrast to value-added tax and shadow economies. These countries include developing countries, transition countries, and OECD countries. The main growth factors for the shadow economies include an increase in the tax and levy burden, the intensity of regulations, and public sector services. The author used various direct and indirect models to determine the size of the shadow economy. The result finding was that the intensity of regulation and the strength of regulation directly affect the size of the shadow economy, and this also has an impact on the size of tax evasion (*Schneider, 2002*). Pomeranz examined the issue of value-added tax in the light of the existing claim that VAT facilitates the collection of taxes by creating paper routes on transactions between companies, which has contributed to the widespread introduction of VAT worldwide. The study analyzes the role of third party information in the collection of value-added tax through two randomized experiments among more than 400,000 Chilean companies. Monitoring reporting has less of an impact on transactions that are subject to a paper footprint, suggesting a preventive deterrent effect of the paper footprint (*Pomeranz, 2015*). The issue of VAT in China can be considered interesting. According to Li and Ma, who analyzed Chinese companies from 1998 to 2005, Chinese companies, which are more controlled by the state than the private sector, achieved higher tax evasion (*Li, Ma, 2015*).

2. Body of Manuscript

The main part of the paper can be divided into two sections. The first deals with tax evasion at the European Union level. The second section is focused on the possible reintroduction of turnover tax in the conditions of the Slovak Republic, determination of its theoretical rate, and comparison of possible tax benefits of this tax with value-added tax from the point of view of the state.

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2.1 The issue of value-added tax and tax evasion at the EU level

As a result of tax fraud, especially in value-added tax, it is possible to monitor the income shortfall at the level of all member states of the European Union. This shortfall is referred to as the VAT gap. We monitor the VAT gap from 2010 to 2017. The amount of the gap at the level of all member states of the European Union is estimated at approximately € 150 billion annually, which for comparison represents approximately ten times the revenue component of the state budget of the Slovak Republic. In terms of the percentage collection of VAT in all member states of the European Union, the VAT gap represents approximately 14.4% of the total amount of VAT revenue at the level of the European Union. To illustrate, we present the following table, which records the evolution of the VAT gap for the period from 2010 to 2018, while the figures for 2018 are the European Union's estimate. The table also includes the amount of the VAT gap in percentage terms to the total amount of VAT collection. Data for this part of the table are available from 2010 to 2017. (*Center for Social and Economic Research, 2019*)

Table 1 **VAT GAP at EU level**

Year	VAT gap (in billions of euros)	The ratio of the VAT gap to the EU 's VAT revenue (in %)
2010	134,81	15,65%
2011	152,24	16,84%
2012	162,54	17,59%
2013	161,44	14,75%
2014	160,20	14,10%
2015	151,50	12,77%
2016	147,10	12,30%
2017	137,50	11,20%
2018	130,00	-

Source: Own elaboration based on the *Center for Social and Economic Research, 2019*

Based on the above data in the Table 1, the situation can be assessed as negative, although it can be seen that the year-on-year VAT gap in € billion gradually decreases. Along with the VAT gap, the ratio of the VAT gap to total VAT revenues at the level of the European Union is also decreasing annually. VAT gaps vary from one Member State to another, as does their ratio to total VAT revenue. From the point of view of tax evasion at the level of the European Union, according to the report of the European Commission for 2017, it can be stated that the VAT gap (in%) of individual Member States ranges from 0.60% to 35.50%. The Member States with the lowest gap (in%) include the following countries: Cyprus (0.60%), Luxembourg (0.70%), and Sweden (1.50%). On the other hand, the countries with the highest VAT gap (in%) are Romania (35.50%), Greece (33.60%), and Lithuania (25.30%). The average VAT gap (in%) at the level of the 28 member states of the European Union is 10.10%. To illustrate, we present the following figure, which captures in detail the amount of the VAT gap for individual countries in € millions, and at the same time in a percentage amount, which represents the ratio between the VAT gap and the total VAT revenue of a member state of the European Union. This representation of the situation is valid for 2017.

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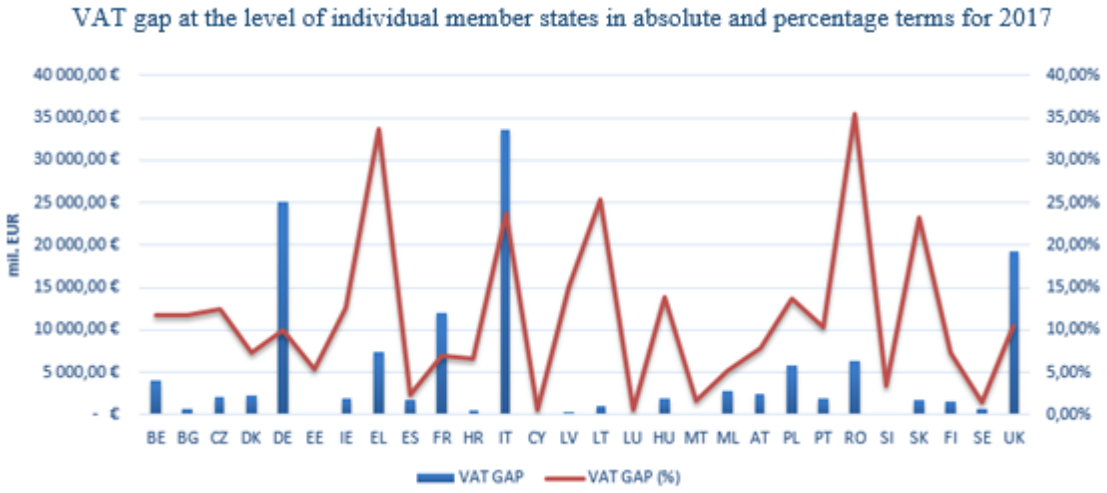

Figure 1 **VAT gap at the level of individual EU Member States**
Source: Own elaboration based on the Center for Social and Economic Research, 2019

The methodology chosen by the European Commission in calculating the VAT gaps of individual member states of the European Union is based on econometric modeling of selected determinants. The econometric model is based on a situation where a taxpayer is required to file a tax return in which they quantify the amount of their tax liability and its efforts to distort the data in the tax return in order to reduce its tax liability. This dependence on the information provided by the taxable person is based on the likelihood of the occurrence of a tax audit. The econometric model in question is also referred to as the "deterrence model". (*Allingham and Sandmo, 1972*)

In order to estimate the amount of the VAT gap, the European Commission has identified as determinants of the creation of the VAT gap mainly factors identifying the incentives of final consumers. These incentives include the European Commission's willingness of retailers to accept the final consumer demand in question, as well as the extent and nature of tax administration resources to reduce the size of the VAT gap. Therefore, in the empirical analysis, the European Commission considers the final consumer, supplier, and tax authority to be the three key actors - agents.

Among the variables explaining the incentives of agents, the European Commission includes:

- Age structure (*Age*),
- Unemployment (*Unemp*),
- Government Effect (*Gov´t Effect*),
- Sellers (*Sellers*),
- Estate (*Estate*),
- Construction (*Constr*),
- Industry (*Ind*),
- Telecommunications (*Teleco*),
- Art (*Art*),
- Dispersion of tax rates (*Disp*),
- Population (*Pop*),
- GDP per capita (*GDPpc*),
- Degree of tax administration (*Scale*),
- Expenditure on information and technology (*IT Exp*),
- Public Deficit (*Def*)

In terms of the "deterrent model", the European Commission uses variables that support voluntary taxation, and for this reason, it can be said that the higher the efforts of the tax authority, the higher the level of compliance with voluntary taxation. This hypothesis is then tested on the behavior of the tax office.

In econometric modeling, the European Commission estimates a model with fixed effects in order to test the impact of different actors on the VAT gap. The subject model with the so-called has been used by the European Commission since 2000 and considers it appropriate because some explanatory variables, e.g. government efficiency, resp. institutional variables can correlate with many

other factors that are not included in the regression. The disadvantage of the model is that it is not able to interpret estimates of fixed effects or estimate the impact of variables that show a small variance within a country, e.g. the level of the VAT rate or the size of the corporate sector.

Descriptive statistics of variables in the econometric model record for each variable the number of observations, the unit of measure, the standard deviation, and the maximum values. A total of 448 observations of VAT gaps were made at the European Union level. The average value of observations of VAT gaps is 16.17%, with a standard deviation of 10.49%, a minimum value of -1.42% (Sweden, 2015), and a maximum value of 49.28% (Romania, 2009). The degree of tax administration (Scale) was in 316 observations with a mean value of 0.25%, a standard deviation of 0.45%, a minimum value of 0.04% (Malta, 2004), and a maximum value of 1.13% (Cyprus, 2004). Expenditure on information and technology (IT Exp) was 216 observations with a mean value of 10.19%, a standard deviation of 7.01%, a minimum value of 0.1% (Matla, 2012), and a maximum value of 27.8% (Finland, 2012). The following outputs show the relevant outputs of descriptive variable statistics.

Analytically, the basic model of the VAT gap can be estimated using the equation:

$$VAT\ GAPit = \beta_1 Age_{it} + \beta_2 Unemp_{it} + \beta_3 Gov\ '\ t\ Effect_{it} + \beta_4 Sellers_{it} + \beta_5 Estate_{it} + \beta 6 Constrit + \beta_7 Ind_{it} + \beta_8 Teleco_{it} + + \beta_9 Art_{it} + \beta_{10} Disp_{it} + \beta_{11} Scale_{it-2} + \beta_{12} IT\ Exp_{it-2} + \beta_{13} Def_{it-2} + + \beta_{14} GDPpc_{it} + \beta_{15} Pop_{it} + \beta_{16} Pop^{2}{}_{it} + Fixed\ Effects + + Time\ Effects + Error\ Term_{it} \quad (1)$$

The endogenous variable VAT gap (VAT GAP) in-country i and at time t is explained by a group of variables. The first three variables refer to final consumers, the following seven variables reflect the behavior of firms, i. suppliers, the variables $\beta 11 Scaleit - 2$ to $\beta 13 Defit - 2$ express the delayed periods capturing the behavior of the tax authority and the variables $\beta 14 GDPpcit$ to control $Term$it represent the control variables mainly fixed effects - $Fixed\ Effects$ (the variable for each country remains unchanged), the time effect - $Time\ Effects$ (common variable for all countries changing over time) and standard error - $Error\ Term$it, which has standard statistical properties. Beta coefficients are estimates of the impact of individual variables. The impact of all variables is expected to be linear except for the population variable. However, due to the potential interest of policymakers, the European Commission is testing whether the impact of variables under the direct control of the tax office is non-linear.

As part of empirical testing, the European Commission tested one group of factors after another, and finally tested all groups simultaneously. In all models, the population (its square root), the variance of the value-added tax rate, and GDP per capita were controlled. The following table shows estimates of the determinants affecting the VAT gap.

Table 2 **Estimation of determinants affecting the VAT gap**

Variable	1	2	3	4	5	6
	VAT gap	VAT gap	VAT gap	VAT gap	VAT gap	VAT gap
Sellers		0,247		0,098	0,413	0,384
		(0,207)		(0,225)	(0,318)	(0,331)
Estate		-0,149		-0,355	-0,360	-0,354
		(0,129)		(0,191)	(0,37)	(0,377)
Constr		-0,156		0,230	0,518	0,555
		(0,309)		(0,350)	(0,425)	(0,435)
Ind		0,300		0,227	0,0399	0,0689
		(0,223)		(0,269)	(0,232)	(0,235)
Teleco		-0,364		0,165	-0,0579	-0,0833
		(0,448)		(0,415)	(0,466)	(0,458)
Art		1,408		1,848	-1,216	-1,115
		(0,251)		(0,304)	(0,531)	(0,549)
Disp	0,409	0,330	0,547	0,532	0,297	0,378
	(0,376)	(0,193)	(0,184)	(0,202)	(0,324)	(0,315)
Unemp			0,115	0,265	0,656	0,522
			(0,163)	(0,144)	(0,273)	(0,257)
Gov't Effect			0,0438	0,0407	-0,0118	-0,0112
			(0,0289)	(0,0320)	(0,0382)	(0,0375)
Age			1,089	1,087	0,772	(0,989)
			(0,651)	(0,606)	(0,998)	(0,880)
IT Exp (-2)	-0,178				-0,174	-0,191
	(0,130)				(0,129)	(0,127)
Scale (-2)	4,432				12,39	32,98

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	(4,516)				(5,830)	(22,27)
Scale (-2)^2						-2,141
						(2,138)
Def (-2)	-0,165				-0,0537	-0,0761
	(0,100)				(0,108)	(0,0952)
Pop	0,830	0,393	0,534	0,51	0,473	0,683
	(0,338)	(0,149)	0,193	(0,192)	(0,316)	(0,330)
Pop ^2	-0,0649	-0,0307	-0,0384	-0,0387	-0,0386	-0,053
	(0,0259)	(0,0126)	(0,0159)	(0,0161)	(0,0242)	(0,0254)
GDPpc	0,000436	-0,00139	0,000175	-0,000188	0,00228	0,00185
	(0,00174)	(0,00187)	(0,00164)	(0,00169)	(0,0025)	(0,00263)
Constant	-0,931	-0,475	-0,952	-1,085	-0,898	-1,269
	(0,412)	(0,249)	(0,333)	(0,327)	(0,484)	(0,433)
Observations	190	446	414	414	186	186
R-squared	0,343	0,230	0,214	0,284	0,437	0,447
Number of countries	28	28	28	28	28	28

Source: Prepared on the basis of the Center for Social and Economic Research, 2019

The first column tests the importance of those factors that capture the influence of the tax authority. As there are external data limitations for the tax authority, the European Commission has used secondary delays, due to which only 190 observations are made. The estimates are not statistically significant, probably due to the data limitations in question. In general, the more important the expenditure on information and technology, and at the same time the importance of the public deficit, the lower the level of the value-added tax gap. On the other hand, the larger the degree of tax administration, the larger the value-added tax gap. As surprising as this finding is, verification was made as to whether the impact is non-linear in nature.

However, the above estimates need to be taken with caution, as they did not reflect all the variables that may affect the VAT gap. The results of the first column were used by the European Commission for the quantitative interpretation of estimates, e.g. when $IT\ Exp$ increases by 0.1 percentage point, with the overall average of the sample $IT\ Exp$ being 10.19% of GDP, the VAT gap has decreased by 0.018 percentage point (the overall average of the VAT gap is 16.17%).

Similarly to the above, only those factors were included in the second column which could have explicitly influenced the behavior of the suppliers. In the third column, only those factors are included which concern only final consumers. The fourth column includes both groups of factors, namely factors affecting suppliers and final consumers. In the fifth column, all factors are included at the same time. Finally, the fifth and sixth columns include the specifications tested at the non-linear level of tax administration.

By looking at the variables influencing the behavior of suppliers, it can be seen that the higher the spread of rates, the higher the VAT gap. As for the production structure of the economy, the results do not represent a net cross-section. The residual category is agriculture, and for this reason, estimates must be interpreted as to whether the share in the sector has an impact on VAT, given the impact of agriculture. For variables affecting individuals, it can be observed that the higher the unemployment rate, the higher the level of the VAT gap. Unemployment is considered a liquidity constraint in this case. The estimate is also statistically significant in the fifth and sixth columns.

Liquidity constraints and the setting up of the tax system play an important role in the VAT gap, but they cannot be directly influenced by the tax authority. Nevertheless, this analysis draws the tax office's attention to the exogenous constraints it faces in reducing the VAT gap. This means that the effort reduced by the tax gap should be greater when the economy suffers from the phenomenon of limited liquidity, respectively. if the tax administration is complicated.

Among the most valuable results, the European Commission considers those that deal with the impact of variables under the direct control of the tax authority. In this context, there is a robust result for the variable $IT\ Exp$, namely that the more important this type of expenditure is, the lower the VAT gap. Regarding the degree of tax administration, it follows that the estimate in the sixth column indicates that the impact is non-linear. It has a positive effect on reducing differences only at very high levels of tax administration (approximately 0.77%). It follows that the nature of the expenditure ($IT\ Exp$) is more important in promoting tax compliance than the size or scope of the administration.

Finally, it should be noted that the impact of GDP on the population is not statistically significant. The influence of the population can be considered statistically significant (with the exception of the results in the fifth column), while the influence of the population is at the same time non-linear. The threshold is around 61.3 -70.3 million inhabitants, depending on the estimate. While the nature of the population's impact on the VAT gap is unknown, it is clear whether it is a small country or an extremely large country, the population has an impact on the size of the VAT gap.

2.2 Analysis of substitution of value-added tax by the turnover tax in the conditions of the Slovak Republic

The analysis of the scenario of substitution of value-added tax by means of sales tax in the conditions of the Slovak Republic, stated in the objectives of the thesis uses the database mainly from the annual reports of the Financial Administration of the Slovak Republic, Statistical Office of the Slovak Republic, relevant laws and available data on the finstat portal. (*FinStat s.r.o., 2020*)

The main idea of the analysis is the complete replacement of value-added tax by another, more appropriate tax, which is less prone to tax evasion than VAT. In this work, we decided to choose the turnover tax as a possible substitute. The tax is the predecessor of value-added tax. In our analysis, the turnover tax will appear in a modified form. That means it will contain such control elements, which include value-added tax, which help the tax authorities to control tax subjects, e.g. control report, etc.

In order to determine the tax effectiveness of the turnover tax rate, it is necessary to calculate its theoretical rate. For the purposes of calculating the theoretical rate of turnover tax, we decided to focus the calculations on the conditions of the Slovak Republic. In determining the theoretical rate of turnover tax, we assume that if turnover tax is to be a substitute for value-added tax, it is possible to determine what the total amount of revenue of this tax must be in the state budget. For the monitored period, we decided to choose the period from 2005 to 2019, the reference period is for the last 15 years. In accordance with individual acts on the state budget of the Slovak Republic for the monitored period, the VAT budget is shown in the following figure (*Act No. 740/2004 Coll., Act No. 655/2005 Coll., Act No. 681/2006 Coll. z., Act No. 608/2007 Coll., Act No. 596/2008 Coll., Act No. 497/2009 Coll., Act No. 498/2010 Coll., Act No. 511/2011 Coll., Act No. 438/2012 Coll., 473/2013 Coll., Act No. 385/2014 Coll., Act No. 385/2014 Coll., Act No. 411/2015 Coll., Act No. 357/2016 Coll., Act No. 333/2017 Coll., Act No. 370/2018 Coll., Act No. 468/2019 Coll.*).

In determining the theoretical rate of turnover tax, we use scientific studies and publications of authors who examined the introduction of a new tax on financial activities for financial institutions, abbreviated "FAT" ("Financial Activities Tax") in the conditions of the European Union in the period after the economic crisis. of 2008. (*Claessens, Keen, Pazarbasioglu, 2010; Keen, Krelove, Norregaard, 2010; Keen, 2011; Burman, 2016; Brederoda, Krever, 2017; López-Laborda, Peña, 2018*). In determining the tax rate, all authors assumed that the tax on financial activity represents the taxation of the total income and similar benefits of financial institutions through 3 possible methods: FAT1, FAT2, and FAT3.

Table 3 **FAT calculation methods**

FAT calculation method	Aim of the method
FAT1	Exclusion of VAT exemption for the financial sector
FAT2	Taxation of all income generated by the financial sector
FAT3	Discouraging the risk of taxing only income that exceeds a high rate of return

Source: Own processing based on *López-Laborda, Peña, 2018*

Based on the above, we decided to set the rate of turnover tax similar to the rate of tax on financial activity, it means the tax uses the FAT2 method, which taxes all revenues generated by business entities in the Slovak Republic that exceeded the turnover of € 49,790,- what represents statutory turnover for mandatory taxpayer registration, except for financial activities supplied to the banking sector.

The primary database is data obtained from the laws on the state budget and from the annual reports of the Financial Administration for the period from 2005 to 2018.

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Table 4 **Selected indicators of the state budget of the Slovak Republic and the Financial Administration of the Slovak Republic in the area of VAT**

Year	VAT budget	Actual VAT collection	Budget fulfillment	VAT collection by Tax Office	Income to the Slovak Republic budget	Realized VAT refund	VAT collection by Customs Office
2005	3 894 932 616,34 €	4 063 752 633,06 €	104,33 %	2 674 035 716,66 €	6 062 537 343,16 €	-3 388 501 626,50 €	1 389 716 916,40 €
2006	3 983 170 683,13 €	4 264 185 477,77 €	107,06 %	2 435 348 531,07 €	6 989 533 202,90 €	-4 554 184 671,83 €	1 828 836 946,70 €
2007	4 502 887 870,94 €	4 513 650 255,61 €	100,24 %	2 343 749 604,09 €	7 756 126 369,31 €	-5 412 376 765,22 €	2 169 900 651,52 €
2008	4 714 399 522,01 €	4 632 524 392,80 €	98,26 %	2 268 362 913,35 €	8 460 941 889,13 €	-6 192 578 975,78 €	2 364 161 479,45 €
2009	3 715 414 000,00 €	3 846 396 236,36 €	103,53 %	2 235 603 929,38 €	7 518 129 353,89 €	-5 282 525 424,51 €	1 610 792 306,98 €
2010	4 394 858 000,00 €	4 431 539 377,56 €	100,83 %	2 243 657 111,30 €	7 617 061 444,37 €	-5 373 404 333,07 €	2 187 882 266,26 €
2011	4 652 259 000,00 €	4 753 094 400,35 €	102,17 %	2 199 584 170,65 €	8 440 573 662,04 €	-6 240 989 491,39 €	2 553 510 229,70 €
2012	4 805 336 000,00 €	4 307 166 514,78 €	89,63 %	1 611 820 000,00 €	8 027 830 000,00 €	-6 416 010 000,00 €	2 695 346 514,78 €
2013	4 462 971 000,00 €	4 734 782 618,74 €	106,09 %	2 062 010 000,00 €	8 033 120 000,00 €	-5 971 110 000,00 €	2 672 772 618,74 €
2014	4 901 752 000,00 €	4 919 290 827,64 €	100,36 %	2 302 640 000,00 €	8 352 410 000,00 €	-6 049 770 000,00 €	2 616 650 827,64 €
2015	5 254 631 000,00 €	5 510 127 512,28 €	104,86 %	2 947 100 000,00 €	9 186 070 000,00 €	-6 238 970 000,00 €	2 563 027 512,28 €
2016	5 647 430 000,00 €	5 369 149 222,87 €	95,07 %	2 865 690 000,00 €	8 994 530 000,00 €	-6 128 840 000,00 €	2 503 459 222,87 €
2017	5 748 794 000,00 €	5 922 944 743,79 €	103,03 %	3 245 110 000,00 €	9 510 320 000,00 €	-6 265 210 000,00 €	2 677 834 743,79 €
2018	6 079 178 000,00 €	6 419 950 000,00 €	105,61 %	3 746 850 000,00 €	10 275 550 000,00 €	-6 528 700 000,00 €	2 673 100 000,00 €

Source: Own processing on the basis of selected laws and annual reports of the Financial Administration of the Slovak Republic

The above table records the following indicators: a plan of the state budget of the Slovak Republic for the monitored period, actual VAT revenue to the state budget for Tax and Customs Offices, budget fulfillment in%, collection of VAT by the Tax Office, and collection of VAT by the Customs Office. The VAT collection of the Tax Office is further divided as state budget revenues from tax subjects and the refund of excessive deductions from the state budget for tax subjects. Revenue to the state budget from VAT represents the collection of VAT from Tax Office from tax subjects. The realized refund of excessive deductions represents the payment of VAT by the Tax Office to the tax subject. Their sum represents the real balance of VAT collection by the Tax Office. Based on the fact that the state budget on the revenue component of VAT consists of the sum of revenues of the Customs Office and Tax Office, while the budget of the Tax Office consists of the income difference between VAT revenue and refunded excess deduction, we can assess that the state budget essentially provides for refund of excess deductions.

Continuing the proposed substitution of value-added tax for turnover tax, it is necessary to take into account the situation that turnover tax is to be taxed by taxpayers who supply taxable supplies. Since the state budget of the revenue component of value-added tax consists of the revenues of the Tax and Customs Offices, it is necessary to take into account that we abstract from the revenues of the Customs Office, as the Customs Office levies value-added tax on the basis of imported goods, that means in this charging procedure, the taxable person does not supply any taxable supply which could be levied from the point of view of turnover tax. Therefore, we focus only on the Tax Office, which collects tax on the basis of documented tax performance by the tax return. Thus, the taxable person incurs either his own tax liability, which he has to pay to the state budget or an excessive deduction, which will be returned to him from the state budget. As already mentioned, value-added tax allows the application of tax refund, whereby the taxable person can reduce his own tax liability, both legally and illegally. Since the aim of the work is to propose ways to eliminate tax evasion and based on the Sales Tax Act (*Act No. 73/1952 Coll.*), Our proposed solution will allow for an alternative where tax subjects will not be able to apply input tax, thereby the biggest mentioned lack of value-added tax is eliminated. In other words, there will only be a tax liability. If we compare this idea with the revenue component of the state budget, which was chosen by the tax administration, then the number of actual revenues will be several times higher than the budgeted tax revenues.

The rate of a turnover tax, therefore, corresponds to the share of the amount of tax collection determined by the state budget of the relevant year reduced by the budgeted amount of the customs administration's income to all revenues of the mentioned business entities. The relationship can be represented by the formula:

$$\pi_{DOT} = \frac{\sum \alpha_t - \sum \beta_t}{\sum y_t} \quad (2)$$

where: π_{DO^t} represents the turnover tax rate in year t, $\sum\alpha_t$ represents the amount of budgeted VAT revenue in year t, $\sum\beta_t$ represents the amount of budgeted VAT receipts of the Customs Office in year t, $\sum y_t$ represents the theoretical sum of all taxable transactions of taxable entities in year t.

The reason why we opted for turnover tax as a substitution tax is that it does not allow tax subjects to apply input tax, on the contrary, there is only output tax for turnover tax - tax liability. In other words, the tax proposed by us will make it possible to eliminate tax evasion from the applied input tax to absolute zero.

In order to determine the theoretical turnover tax rate, it is necessary to determine the theoretical total turnover of taxpayers. Taking into account the fact that we know the total amount of tax liability of value-added taxpayers of the relevant year and at the same time the rate of value-added tax of the relevant year, we can determine the theoretical tax base of these entities. For almost the entire period from 2005 to 2018, there are 2 rates of value-added tax - basic, respectively standard and reduced tax rate. The reduced tax rate applies to a relatively small range of taxable transactions and at the same time the total tax revenue of this component is minimal compared to the total tax revenue from the standard rate. For this reason, we will abstract from the reduced VAT rate and consider only the standard rate. The mathematical relationship for the calculation of the theoretical amount of total revenues of taxable entities can be expressed as follows:

$$\sum y_t = \frac{\sum DV_t}{\pi_{DPH^t}} \tag{3}$$

where: $\sum y_t$ represents the theoretical sum of all taxable transactions of taxable entities in year t, $\sum DV_t$ represents the sum of the actual revenues of the tax administration in year t from the tax obligations of taxable entities, π_{DPH^t} represents the standard rate of value added tax in year t.

Regarding turnover tax mechanism, our main speculation is that there would not be any possibility to claim any tax from the Tax Office. That means that every taxable subject would have a duty to pay tax and Tax Office would not refund tax to any subject. This would lead to frauds´ prevention as well.

Developing the speculation, in 2018 estimated turnover tax rate would be equal to 5,60%. Testing the theoretical rate of turnover tax for the period under review, we can say that the rate of turnover tax after averaging and rounding to an integer is equal to 8%. The following figure shows the theoretical rate of turnover tax for the period.

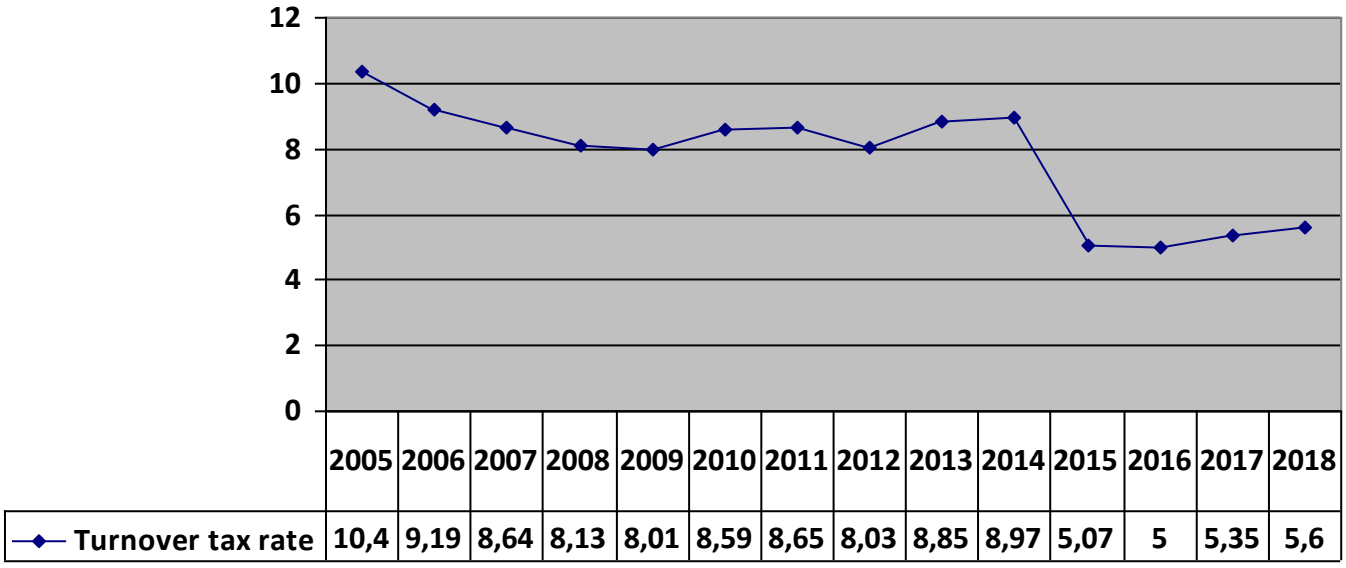

Figure 2 **The theoretical rate of turnover tax in the conditions of the Slovak Republic**
Source: Authors´ own elaboration

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4. Conclusions

To conclude, the main objective of the paper is to describe the current situation regarding VAT, its system, defects, and frauds. The importance of a need for a new tax system is highly actual, based on data collected from the European Commission. Due to the lack of the VAT mechanism about € 150 billion is annually stolen by tax frauds, such as the carousel and so on.

The possible better international trade could be if the current tax system in EU is changed. Therefore, the article reflected the potential of the turnover tax, its rate. Based on data provided by The Financial Administration of the Slovak republic the calculations were made, especially the turnover tax rate. In the condition of the Slovak Republic, the turnover tax rate could be equal to app. 8%.

The main benefits of the turnover tax are lower tax rate, better control provided by the tax authority, significant elimination of the tax frauds and helping the domestic suppliers being more competitive towards the foreign suppliers. To conclude we propose to change the current VAT system into the turnover tax system.

References

Act no. 222/2004 Coll. - Value Added Tax Act
Act no. 455/1991 Coll. - Trade Licensing Act
Act no. 740/2004 Coll. - Act on the State Budget for 2005
Act no. 655/2005 Coll. - Act on the State Budget for 2006
Act no. 681/2006 Coll. - Act on the State Budget for 2007
Act no. 608/2007 Coll. - Act on the State Budget for 2008
Act no. 596/2008 Coll. - Act on the State Budget for 2009
Act no. 497/2009 Coll. - Act on the State Budget for 2010
Act no. 498/2010 Coll. - Act on the State Budget for 2011
Act no. 511/2011 Coll. - Act on the State Budget for 2012
Act no. 438/2012 Coll. - Act on the State Budget for 2013
Act no. 473/2013 Coll. - Act on the State Budget for 2014
Act no. 411/2015 Coll. - Act on the State Budget for 2016
Act no. 357/2016 Coll. - Act on the State Budget for 2017
Act no. 333/2017 Coll. - Act on the State Budget for 2018
Act no. 370/2018 Coll. - Act on the State Budget for 2019
Act no. 468/2019 Coll. - Act on the State Budget for 2020
Act no. 73/1952 Coll. – Turnover tax Act
ALLINGHAM, Michael G.; SANDMO, Agnar. Income tax evasion: A theoretical analysis. *Journal of public economics*, 1972, 1.3-4: 323-338.
ALM, James. What motivates tax compliance?. *Journal of Economic Surveys*, 2019, 33.2: 353-388.
ALM, James; MARTINEZ-VAZQUEZ, Jorge; MCCLELLAN, Chandler. Corruption and firm tax evasion. *Journal of Economic Behavior & Organization*, 2016, 124: 146-163.
ALSTADSÆTER, Annette; JOHANNESEN, Niels; ZUCMAN, Gabriel. Tax evasion and inequality. *American Economic Review*, 2019, 109.6: 2073-2103.
BURMAN, Leonard E., et al. Financial transaction taxes in theory and practice. *National Tax Journal*, 2016, 69.1: 171-216.
BUYDENS, Stéphane: *Consumption Tax Trends 2008*, OECD Publishing, pg. 23
CARFORA, Alfonso; PANSINI, Rosaria Vega; PISANI, Stefano. Regional tax evasion and audit enforcement. *Regional Studies*, 2018, 52.3: 362-373.
Center for Social and Economic Research: Study and Reports on the VAT Gap in the EU-28 Member States: 2019 Report (2019) In: TAXUD/2015/CC/131 s.8, s.54
CLAESSENS, Stijn; KEEN, Michael; PAZARBASIOGLU, Ceyla. Financial sector taxation: The IMF's report to the G-20 and background material. *Washington: International Monetary Fund*, 2010.
COLBJØRNSEN, Terje. What is the VAT? The policies and practices of value added tax on ebooks in Europe. *International journal of cultural policy*, 2015, 21.3: 326-343.
DOBROVIČ, Ján; GOMBÁR, Miroslav; BENKOVÁ, Eva. SUSTAINABLE DEVELOPMENT ACTIVITIES AIMED AT COMBATING TAX EVASION IN SLOVAKIA. *Journal of Security & Sustainability Issues*, 2017, 6.4.
GO, Delfin S., et al. *An analysis of South Africa's value added tax*. The World Bank, 2005.
IHS, Institute for Advanced Studies: Study and Reports on the VAT Gap in the EU-28 Member States: 2018 Final Report (2018) In: TAXUD/2015/CC/131 [online]: https://ec.europa.eu/taxation_customs/sites/taxation/files/2018_vat_gap_report_en.pdf

IMMORDINO, Giovanni; RUSSO, Francesco Flaviano. Cashless payments and tax evasion. *European Journal of Political Economy*, 2018, 55: 36-43.

JOHANSSON, A., et al. Tax and Economic Growth-Working Paper No. 620. 2008.

KEEN, Michael. Rethinking the taxation of the financial sector. *CESifo Economic Studies*, 2011, 57.1: 1-24.

KEEN Michael, KRELOVA Russell, NORREGAARD John: The Financial Activities Tax (2010) In Claessens, Stijn, Michael Keen, and Ceyla Pazarbasioglu (eds.), Financial Sector Taxation: The IMF´s Report to the G-20 and Background Material, Chapter 7, pg. 118–143. International Monetary Fund, Washington, DC

LI, Lixing; MA, Guangrong. Government Size and Tax Evasion: Evidence from C hina. *Pacific Economic Review*, 2015, 20.2: 346-364.

LÓPEZ-LABORDA, Julio; PEÑA, Guillermo. A New Method for Applying VAT to Financial Services. *National Tax Journal*, 2018, 71.1: 155-182.

Ministry of Finance of the Slovak Republic: Public Administration Budget 2005-2022 [online]: https://www.mfsr.sk/sk/financie/verejne-financie/rozpocet-verejnej-spravy/

NARITOMI, Joana. Consumers as tax auditors. *American Economic Review*, 2019, 109.9: 3031-72.

NORREGAARD, John; KHAN, Tehmina S. *Tax policy: Recent trends and coming challenges*. International Monetary Fund, 2007.

OECD: An International Perspective on VAT (2010) In: Tax Notes Int´l. s. 943-954 [online]: https://www.oecd.org/ctp/consumption/46073502.pdf

OLSEN, Jerome, et al. Income tax versus value added tax: A mixed-methods comparison of social representations. *Journal of Tax Administration*, 2017, 3.2: 87-107.

PAPPA, Evi; SAJEDI, Rana; VELLA, Eugenia. Fiscal consolidation with tax evasion and corruption. *Journal of International Economics*, 2015, 96: S56-S75.

POMERANZ, Dina. No taxation without information: Deterrence and self-enforcement in the value added tax. *American Economic Review*, 2015, 105.8: 2539-69.

PONIATOWSKI, Grzegorz, et al. Study and Reports on the VAT Gap in the EU-28 Member States: 2018 Final Report. *Available at SSRN 3272816*, 2018.

SCHNEIDER, Friedrich; RACZKOWSKI, Konrad; MRÓZ, Bogdan. Shadow economy and tax evasion in the EU. *Journal of Money Laundering Control*, 2015, 18.1: 34-51.

SCHNEIDER, Friedrich. Size and measurement of the informal economy in 110 countries. In: *Workshop of Australian National Tax Centre, ANU, Canberra*. 2002.

SEMERÁD, Pavel; BARTŮŇKOVÁ, Lucie. VAT control statement as a solution to tax evasion in the Czech Republic. *Procedia-Social and Behavioral Sciences*, 2016, 220: 417-423.

STAVJAŇOVÁ, Jana, et al. Value added tax gap in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 2015, 62.6: 1427-1436.

Analysis and prediction of the development of private banking in the Slovak Republic

Simona Juhásová[1]

[1]*Technical University of Košice, Department of Finance, Faculty of Economics, Slovakia*
simona.juhasova@tuke.sk

Abstract

The purpose of the paper was to analyze the progress of private banking sector in commercial banks in the Slovak republic. The position of private banking sector and products and services provided by commercial banks (including product portfolio) were analyzed. Seven most important commercial banks in the Slovak republic were observed for the reference period 2010 – 2019. The following indicators which evaluate the level of private banking sector were analyzed: assets under private banking management, percentage change in assets, number of private clients, volume of assets per client, number of private bankers, number of clients per private banker, volume of assets managed by individual banker, threshold for entry into private banking. The results of the analysis showed that the private banking has been developing positively since 2010. Although offers of the commercial banks seems to be different at the first sight, they offer very similar products and services and their main aim is to satisfy the requirements of clients. We also found that the highest volume of assets per client belongs to the bank that managed the lowest volume of assets in the long-term.

Keywords: Banking, commercial banking, private banker, private client, asset management, wealth management.

1. Introduction

Accumulation of wealth is result of the rapid economic development of the latest years. Because of this new financial situation, at market there was the need emerged for professional management of this wealth so many banking institutions started to offer a series of specialized services through private banking (Mylonakis, 2009). Private banking is an exclusive service, which is nowadays providing by most commercial banks in the Slovak republic.

Typical aspect of private banking is confidential relationship between the private banker and the private client. Another characteristics of the private banking are high quality, careful, meticulous, personalized and precise consulting, privacy and confidentiality of private bankers and private clients (Dzhaparov, 2019).

Deposits received from private clients in sector of private banking could be considered as main building block of financial mediation, notably in the euro area investors show a mighty bias towards those bank deposits which are relative to other forms of financial investment and these deposits are often considered as factor determining developments of allocation and accumulation of economic resources (Ramirez, 2009).

2. Literature Review

Private banking is analyzed and discussed in many papers and by many authors. Private banking comprises of personalized services and products offered to the high-net-worth individual clients. It includes a wide range of wealth management services, and this is all provided under one roof. Services, for example, include investing and portfolio management, insurance, and trust and estate planning and many other standard and above-standard services. This offering is usually through special departments, entitled as private banking or wealth management sector (Chen, 2020).

Dvořák (2005) considers the factual aspect of private banking to be the result of personnel, technical and material factors. The current functional definition of private banking, portfolio management of very wealthy individuals, took shape for several years (Cassis et al., 2009). Collardi (2012) claimed that specifically for private banks, when a strategy has been established, it is needed to determine which composition is best suited to the core value proposition – namely serving needs of clients and help them to achieve their requirements. The purpose of private banking sector is to bridge the gap between private client and the whole market,

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which means that it is perquisite to have a well personal relationship with client, understanding the client needs, and then find the balance between of clients' investments (Bachmann et al., 2018). Private banking is the conscious interconnection of some products in an effort to provide better services (Medveď et al.).

Private clients are clients to whom are the professional services offered (Hilton, 2006). Private banking is a comprehensive asset management based on the client's mandate, which respects his previously identified individual needs and expectations (Chovancová, 2008). Private bankers are close to the real needs of clients. More important, the opinion of private bankers is crucial when it comes to the decision whether to implement new methodologies to advise wealthy clients. Private bankers play important role in adaptation of new methods and concepts of investments, because only if private bankers are convinced about their benefits, can theoretical proposes generate benefits in practice (Amenc et al., 2009).

3. Data and Methods

Private banking is not only about investing funds of private clients, but also about advising in all areas related to the client's assets. Primary, it is about trust, a good relationship, advise and only then about banking services and products. The basic assumptions are individual solutions. The research object is seven most important commercial banks providing private banking in the Slovak republic:

- Tatra banka;
- J&T banka;
- Privatbanka;
- ČSOB;
- VÚB banka;
- Erste Private Banking;
- UniCredit Bank.

Being a private banking client means access to products that are not available to the general public. An important role is also played by the decision to what extent and who to entrust the management of easier or harder acquired assets. Private banking clients and the composition of the client portfolio are affected by many situations that occur in the financial markets. In this paper, the following indicators, which evaluate the level of private banking sector, were analyzed:

- assets under private banking management;
- percentage change in assets;
- number of private clients;
- volume of assets per client;
- number of private bankers;
- number of clients per private banker;
- volume of assets managed by individual bankers;
- threshold for entry into private banking sector.

Trends are constantly reversing, stock markets or commodities are once profitable, other times their profitability decreases. The risk profile of clients, who are becoming more cautious, is also changing. Each bank manages a certain amount of funds that its private banking client entrust. Within the private banking segment, similar products and services are provided, as well as narrowly specialized products and services that are specific to a banks, and this can be a decisive factor for the client in deciding which bank to entrust its assets. Each bank has a different value of assets in its management, which are invested here by private clients.
To achieve main goals in this paper were used data provided by mentioned commercial banks in the Slovak republic for the reference period 2010 – 2019 obtained from the annual reports of each bank. We used analysis and methods of comparison and observation.

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4. Results and Discussion

The research object is seven most important commercial banks providing private banking in the Slovak republic. Table 1 shows the volume of private banking assets managed by banks in the Slovak republic from 2010 – 2019 that were analyzed.

Table 10. Assets under private banking management

Bank		Assets (mil. €)									
		2019	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
1.	**Tatra banka**	2743	2500	2400	2270	2017	1804	1720	1700	1503	1457
2.	**J&T banka**	1924	1901	1893	1853	1558	1256	965	n	n	n
3.	**Privatbanka**	1400	1260	1000	1020	898	787	758	677	619	548
4.	**ČSOB**	1047	994	991	973	894	828	785	779	695	686
5.	**VÚB banka**	891	833	744	734	689	657	603	n	n	n
6.	**Erste Private Banking**	950	900	842	783	666	584	507	n	n	n
7.	**UniCredit Bank**	784	718	691	682	509	410	382	394	382	352
	Summary	**9638**	**8733**	**7399**	**8315**	**7231**	**6326**	**5720**	**-**	**-**	**-**

Source: own processing (based on data provided by banks).
Notes: n – unavailable data

The analysis in the Table 1 allowed us to compare the assets under management of individual banks for the observed period in private banking. The highest volume of assets was managed by banks in 2019. Private clients in 2019 entrusted the highest volume of assets to Tatra banka, which is one of the largest bank in the Slovak republic. On the contrary, UniCredit Bank managed the least volume of assets under review. The increase in the volume of assets is determined by various factors. It depends on the investment profile of clients and specific products in a given portfolio. The volume of assets varies depending on developments in the financial, capital and foreign exchange markets, the economic situation of the country, the efficiency of client portfolios and other factors. It is influenced, for example, by the development of bonds, stocks, commodities or gold. Investing is a way in which client's assets can be realistically valued. In the long run, it is an ideal solution. The longer horizon, the more likely it is that the money invested will bring clients a positive return. As we can see in the Table 1, the volume of assets for each banks in the observed period increased. This is proof that private banking really brings the possibility of a real appreciation of assets. The growing trend in the volume of assets under the management of banks is the result of effectively functioning investment opportunities.

Table 11. Percentage change in assets

Bank		Change in assets (%)								
		2019 - 2018	**2018 - 2017**	**2017 - 2016**	**2016 - 2015**	**2015 - 2014**	**2014 - 2013**	**2013 - 2012**	**2012 - 2011**	**2011 - 2010**
1.	**Tatra banka**	9,72	4,16	5,73	12,54	11,81	4,88	1,18	13,11	3,16
2.	**J&T banka**	1,21	0,42	2,16	18,93	24,04	-	-	-	-
3.	**Privatbanka**	11,11	26,00	-1,96	13,59	14,10	3,83	11,96	9,37	12,96
4.	**ČSOB**	5,33	0,30	1,85	8,84	7,97	5,48	0,77	12,09	1,31
5.	**VÚB banka**	6,96	11,96	1,36	6,53	4,87	8,96	-	-	-
6.	**Erste Private Banking**	5,56	6,89	7,54	17,57	14,04	15,19	-	-	-
7.	**UniCredit Bank**	9,19	3,91	1,32	33,99	24,15	7,33	-3,05	3,14	8,52

Source: own processing (based on data provided by banks).

In almost all of cases in individual banks for the observed period in Table 2, we can see an increase in the volume of assets under management compared to the previous year. The year-on-year decrease in the volume of assets under management was recorded only by UniCredit Bank between years 2012 and 2013 and Privatbanka between years 2016 and 2017. Based on this analysis we could claim that private bankers succeeded in valuing the assets of their clients.

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Table 12. Number of private clients

Bank		Number of private clients									
		2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
1.	Tatra banka	3348	3229	3223	3178	3060	3060	3300	3650	3253	2972
2.	J&T banka	4489	4461	4448	4000	3500	3000	2600	n	n	n
3.	Privatbanka	2855	2596	2506	2489	2242	2008	1743	1443	1290	1062
4.	ČSOB	2242	2149	2140	2180	2102	2052	2037	1937	1755	1567
5.	VÚB banka	604	598	585	572	551	556	505	n	n	n
6.	Erste Private Banking	1596	1557	1539	1533	1434	1428	1246	1060	889	514
7.	UniCredit Bank	2318	1318	1209	1252	1090	917	n	n	n	n
	Summary	**17452**	**15908**	**15254**	**15204**	**13979**	**13021**	-	-	-	-

Source: own processing (based on data provided by banks).
Notes: n – unavailable data

Table 3 shows that the highest number of clients was at J&T Bank in 2019, same as in 2018, 2017, 2016 and 2015. The lowest number of clients for the entire observed period was recorded by VÚB banka. Tatra banka during the period considered was maintained a stable number of clients. In the case of the number of private clients, we can clearly state that their number was growing every year. The fluctuation of private clients between banks is most often caused by the fact that private clients look for the bank that best suits their requirements. This is the main reason for the disparity in the number of clients between banks. The wishes of private clients are constantly changing. Banks that have a low number of clients are unlikely to provide sufficiently interesting investment opportunities. Private clients are looking for investment opportunities, especially outside of banking products. Such an investment is possible in banks that apply an open architecture.

Table 13. Volume of assets per client

Bank		Volume of assets per client (thousand €)					
		2019	2018	2017	2016	2015	2014
1.	Tatra banka	819	774	744	714	659	590
2.	J&T banka	428	426	425	396	445	419
3.	Privatbanka	490	485	399	410	400	392
4.	ČSOB	467	463	462	446	425	404
5.	VÚB banka	1475	1392	1271	1283	1250	1182
6.	Erste Private Banking	595	578	547	510	464	409
7.	UniCredit Bank	338	545	571	545	467	447
	Average	**552**	**550**	**485**	**547**	**517**	**486**

Source: own processing (based on data provided by banks).

Analysis in Table 4 provided us with an interesting view of the amount of assets per client in 2019. While the highest volume of assets under management this year was managed by Tatra banka, in the case of looking at the assets per one client, the situation is different. The highest volume of assets per client belonged to VÚB banka, which was one of the bank with the lowest volume of assets under management in this year. While in Tatra banka there was 819 thousand euros per client, in VÚB Bank it was more than one million euros. Compared to Tatra banka, a private client of VÚB banka had 80% more funds in its account.

Table 14. Number of private bankers

	Bank	Number of private bankers									
		2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
1.	Tatra banka	40	38	38	38	40	38	39	40	36	35
2.	J&T banka	36	36	36	37	38	39	39	n	n	n
3.	Privatbanka	30	28	23	22	22	22	25	28	24	22
4.	ČSOB	25	25	25	25	25	25	24	24	24	24
5.	VÚB banka	14	13	13	14	14	14	13	n	n	n
6.	Erste Private Banking	23	20	20	20	19	19	15	14	11	n
7.	UniCredit Bank	21	21	21	21	n	n	n	n	n	n

Source: own processing (based on data provided by banks).
Notes: n – unavailable data

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The number of private bankers in individual banks in the observed period mostly did not change significantly, which can be observed in Table 5. Their number is adapted to the number of private clients. Banks seek to employ a sufficient number of bankers to ensure the required efficiency in the management of client's cash resources.

Table 15. Number of clients per private banker

	Bank	Number of clients per private banker									
		2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
1.	Tatra banka	84	85	85	84	77	81	85	91	90	85
2.	J&T banka	125	124	123	108	92	77	67	-	-	-
3.	Privatbanka	95	93	109	113	102	91	70	52	54	48
4.	ČSOB	90	86	86	87	84	82	85	81	73	65
5.	VÚB banka	43	46	45	41	39	40	39	-	-	-
6.	Erste Private Banking	69	78	77	77	75	75	83	76	81	-
7.	UniCredit Bank	110	63	58	60	-	-	-	-	-	-

Source: own processing (based on data provided by banks).

The number of clients per private banker depends on the total number of clients in individual banks. According to Table 6, we could state that in the observed period, the bankers in J&T banka had the most clients in the three last years of observed period and the least clients in VÚB banka during the whole observed period.

Table 16. Volume of assets managed by individual bankers

	Bank	Volume of assets managed by individual bankers (mil. €)									
		2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
1.	Tatra banka	69	66	63	60	50	47	44	43	42	42
2.	J&T banka	53	53	53	50	41	32	25	-	-	-
3.	Privatbanka	47	45	43	46	41	36	30	24	26	25
4.	ČSOB	42	40	40	39	36	33	33	32	29	29
5.	VÚB banka	64	64	57	52	49	47	46	-	-	-
6.	Erste Private Banking	41	45	42	39	35	31	34	-	-	-
7.	UniCredit Bank	37	34	33	32	-	-	-	-	-	-

Source: own processing (based on data provided by banks).

Analysis of volume of assets managed by individual private bankers in Table 7 showed how many assets maintained one private banker. It depends on assets under private banking management and number of private bankers. As we can see, the largest volume of assets maintained the bankers in the last three years of observed period and almost in every bank this volume increased every year. The highest volume of assets managed by individual banker is maintained in Tatra banka and curiously in VÚB banka.

Table 17. Threshold for entry into private banking sector

	Bank	Threshold for entry into private banking (thousand €)									
		2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
1.	Tatra banka	300	300	300	400	400	400	400	400	400	400
2.	J&T banka	300	300	300	300	300	300	300	300	300	300
3.	Privatbanka	50	50	50	50	50	50	50	50	50	50
4.	ČSOB	200	200	200	200	200	200	200	200	200	200
5.	VÚB banka	250	250	250	250	250	300	300	300	300	300
6.	Erste Private Banking	200	200	200	200	200	200	200	200	200	200
7.	UniCredit Bank	100	100	100	400	400	400	300	300	300	200

Source: own processing (based on data provided by banks).

The amount of resources required for entry into private banking sector varies from bank to bank, which could be seen in Table 8. The bank determines the amount of the deposit that is needed for entry into private banking. The standard volume for entering private banking is determined. However, there are some exceptions to this entry. The stated volume of resources is generalized.

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Even a client with a lower volume can become a client of private banking and obtain above-standard products and services. For example, in J&T Bank, the limit for term deposit is set at 10 thousand euros. Upon entry, the overall potential for further growth of the client is also evaluated, therefore the growth potential of the client´s funds with a view to the future.

The results of the analysis clearly indicate an increase in clients with above-average financial resources. According to rating companies, there is an increase in the number of clients entering into private banking. The growth rate is comparable to the increase in this area, for example, with the USA. Unlimited access to financial markets, a wide range of products and services, know-how are comparable to global services for Slovak private clients, which is due to the fact that most Slovak banks are owned by foreign banks. Therefore, we can say that the services provided are comparable to global, despite the fact that private baking in the Slovak republic began to develop only few years ago. The development of private banking is growing in direct proportion to the requirements of creditworthy clients for the appreciation of private property. Private banking is one of the most prosperous and at the same time the promising areas of banking sector in the Slovak republic, which subject to dynamic development. High professionalism, above-standard care, individual approach, complexity and discretion are the basic attributes of the success of every bank. Table 9 provides an overview of the basic products and services provided by observed banks.

Table 18. Products and services provided by observed banks

Products and services	Wealth Management	Gold trading	All Exclusive	Private Exclusive Fund	Deposits	Payment cards	Club Magnus	Women´s business club	Active managed portfolio	Financial market products	Private banker services	Asset management	Diamond trading	Concierge
Tatra banka	✓	✓	✓	✓	✓	✓	×	×	✓	✓	✓	✓	✓	×
J&T Banka	✓	×	×	×	✓	✓	✓	×	✓	✓	✓	✓	×	✓
Privatbanka	✓	×	×	×	✓	✓	×	×	✓	✓	✓	✓	×	×
ČSOB	✓	✓	×	×	✓	✓	×	×	✓	✓	✓	✓	×	✓
VÚB banka	✓	✓	×	×	✓	✓	×	×	✓	✓	✓	✓	×	×
Erste Private Banking	✓	✓	×	×	✓	✓	×	✓	✓	✓	✓	✓	✓	✓
UniCredit Bank	✓	×	×	×	✓	✓	×	×	✓	✓	✓	✓	×	✓

Source: own.

In the light of the results of the analysis carried out we can claim that private banking in the Slovak republic is showing a positive development, especially in the area of the rising trend in the number of clients or the growing volume of assets under bank management. Therefore, any bank offering private banking services must focus on maximizing the use of human potential in order to maintain this trend. It must also pay sufficient attention to individual segments and use their potential. Sufficient attention must be also paid to product portfolios. We have made a number of recommendations in these three most important areas of private banking.

If the client is better earning or wealthier, his banking opportunities are much wider than those available to the general public. The bank offers such clients a personal private banker and above-standard products and services that are adapted to their requirements. Private banking is not provided by all banks and the composition of the portfolio in individual banks is at different level. The bank and the client cooperate in this area as financial partners, with the long-term priority to secure the clients´ satisfaction, which results from first-class service, professionalism, discretion and trust. The requirements of private clients are constantly changing, which cause the continuous development of private banking. High demands are placed on private bankers, whose task is no longer only to enhance clients´ assets, but first and foremost experience in various fields. And it is a fact that leads them to education in the field of finance and they require first-class service from the banks. At next three figures we can see what banks should do in the field of human potential. In Figure 1 we can see the determinants influencing the success of a private banking.

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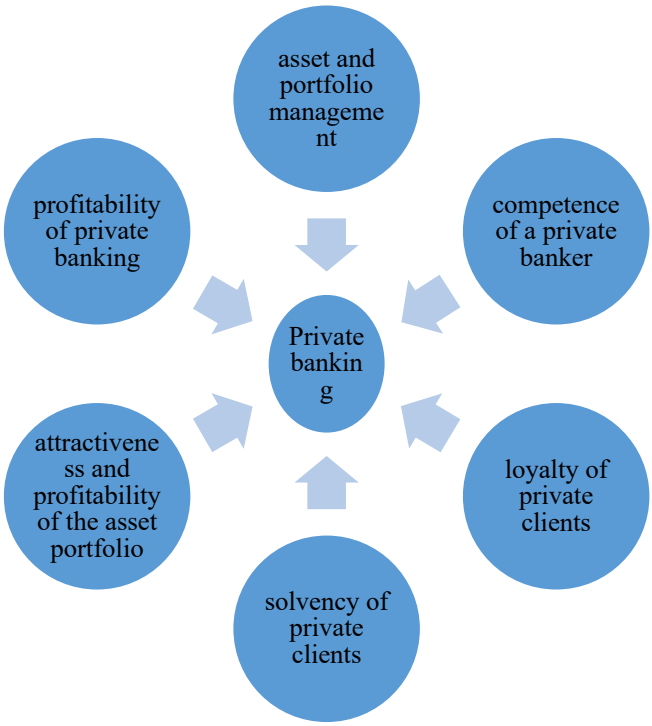

Figure 4. Determinants influencing the success of private banking
Source: own.

Making the most of human potential is an effective tool for increasing the number of clients and consequently the volume of assets managed by banks. Before entering private banking, a private client must know what he expects from his portfolio in the future. It must focus not only on its current situation and wishes, but also assess its needs in the future. It is very important that every private client is able to answer several question according to Figure 2. Answering these questions is key in creating its products portfolio.

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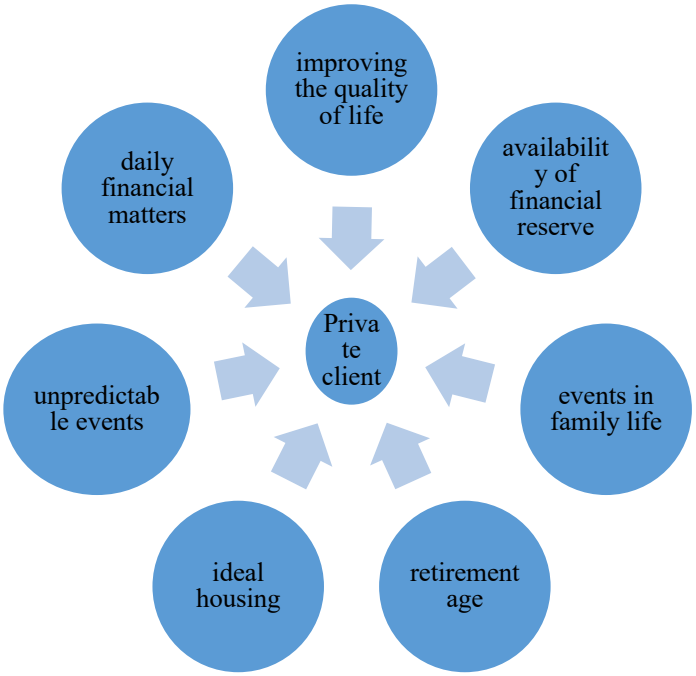

Figure 5. Systematization and priority of client need

Source: own.

Each client must be clear about his wishes to improve the quality of his life. He needs to know answer questions about availability of his financial reserve, events in family life, retirement age, ideal housing, unpredictable events or daily financial matters. Answering all these questions is key in building an effectively functioning of clients´ portfolio.

Personality traits and professional requirements for a private banker are proposed in Figure 3. Typical features of each banker should be providing of above-standard services, expertise, discretion, creativity, communication skills, responsibility, cooperation with a team of financial analysts, overview of financial markets and a good private banker should be an intermediator of financial and non-financial services.

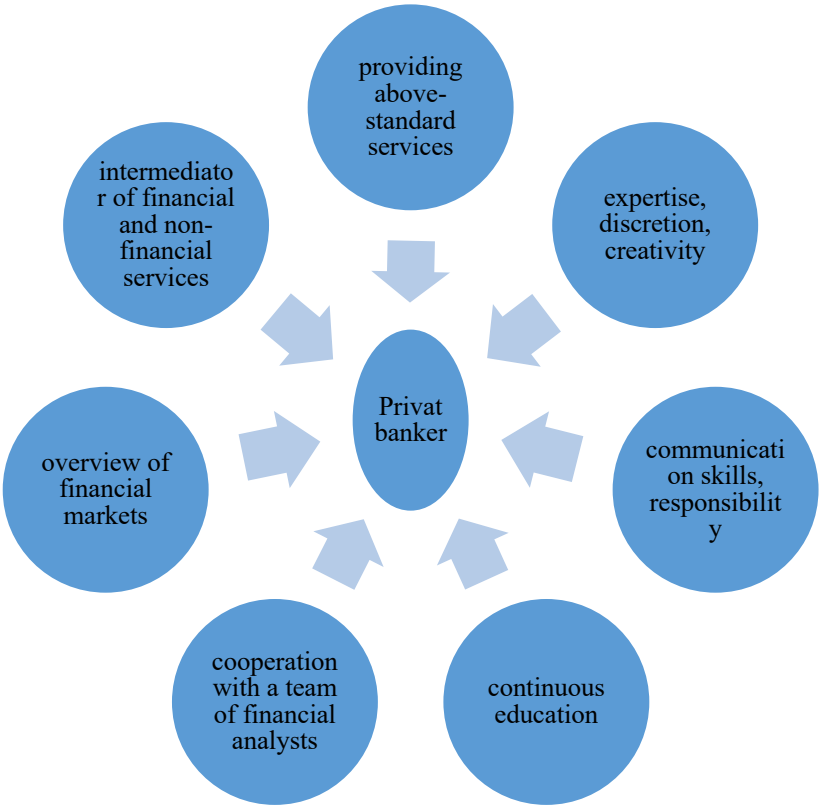

Figure 6. Personality traits and professional requirements for a private banker
Source: own.

The situation on financial and non-financial market, as well as requirements of clients is constantly changing. Therefore, a private banker must be constantly educated. Its ambition and efficiency are key in the client´s relationship with the bank. The quality of a private banker ensures the satisfaction and loyalty of clients, what enabling the bank to maintain a stable number of clients, the volume of managed funds and a good reputation.

The basic goal of every process is to increase the volume of assets under management. Despite the fact that this goal unites all banks, we still see significant differences in the volume of assets they manage. In order to close these differences and bring banks with lower assets closer to those more in maintain, they can take several steps in the area of segment potential. By acquiring new clients, they could achieve a higher accumulation of assets in management. Banks with a higher entry threshold should lower this limit. Reducing the limit for entry should bring them more clients. More clients would bring them an increase in the volume of assets and better market position. Another solution to gain a higher number of clients is to connect corporate clients with private clients. In the effort to increase the number of clients, private bankers should constantly directly address various important personalities, successful athletes or politicians to enter into private banking and thus would provide the bank with an increase in the volume of assets. This creates the possibility of further interconnection within the bank´s segment. The area of private banking could be connected with the area of marketing. The bank could provide sponsorship to successful Slovak athletes, to whom it would then propose entry into private banking. Rising awareness of the existence of private banking among potential clients is also an important prerequisite. Advertising can also increase the number of clients and the volume of assets. As private banking is considered as discreet area and banks do no prefer its advertising at every step, we recommend to banks improve indirect marketing. By improving indirect marketing, we mean encouraging clients to talk about private banking. A private banker plays an important role in this process. During the meeting with the client, he should leave such a positive impression that the client will need to share his experience with, for example, his best friend or business partner.

In the field of product portfolio, we have compiled a list of the most profitable investments according to the prediction of banks analysts for this year. We recommend introducing next forms of investments into the product portfolio of each bank in order to increase the volume of client's assets. The most interesting appreciation is expected from investments in share of foreign companies. Alternative investments are also considered to be highly profitable. Alternative investments include the purchase of works of art, paintings, veterans, jewellery and coins. The highest appreciation is also expected in investing to the agricultural land

and in building land, real estate, bills and exchange. Mutual funds are also becoming increasingly profitable, which is due to the growth of economy, the growth of corporate profits and currently the lowest inflation in the last three years in Slovakia. Private bankers need to focus on which of the mentioned investment opportunities are missing in the portfolios of clients and to suggest them to include the investment to their portfolio. Each bank, through its private banker, should constantly inform clients about investment opportunities and bring them the latest information from each area. Banks must always keep in mind that a new products or service will not give them market uniqueness in the long run. Private banking must focus primarily on profitability. This means that banks must constantly monitor the economy as a whole and offer clients such products that are among the most profitable in terms of investment in a given period. Another proposal to improve the efficiency of private banking is cooperation on the acquisition of clients with other professional departments of the bank and intermediaries. A private banker should know each other of his clients well, he should know what he is dealing with. For example, if client wants to buy a house, a private banker can contact him with his other private client who sells real estate. The funds would not leave the bank in this way, they would just transfer from one client account to another client account.

The results of our analysis have provided an interesting insight into the development of private banking sector for selected commercial banks in period 2010 – 2019 in the Slovak republic. We see the pragmatic application of the conclusions in personal consultations with private bankers about the possibilities of cooperation with clients and a view of private banking after analyzing the structure and potential of clients. It is only up to the banks how they can use the recommendations we proposed to their advantages.

4. Conclusions

The main objective of this paper was to evaluate private banking sector in commercial banks in the Slovak republic and to indicate possible developments and changes in these banking transactions and the corresponding processes. Based on the analysis and comparison of selected commercial banks providing private banking services, we came to the clear conclusion that the sector of private banking has been developing positively since 2010.

Although the product portfolio of commercial banks seemed to be different at the first sight, the products and services were very similar and they had one the most significant mark – client satisfaction. We observed significant differences in the development of selected commercial banks providing private banking. We observed differences in the assets under private banking management, percentage change in assets, number of private clients, volume of assets per client, number of private bankers, number of clients per private banker, volume of assets managed by individual bankers or threshold for entry into private banking.

The most unexpected result was obtained by monitoring the volume of assets per client. This analysis showed that the highest volume of assets per client belongs to the bank (VÚB banka) that managed one of the lowest volume of assets in the long-term.

By implementing suggested recommendations like intensive use of human potential, segments, as well as private banking product portfolios, we formulated, the whole private banking sector in the Slovak republic may continue in positive development. If banks pay enough attention to the systematization and priorities of clients´ needs, they will accumulate a higher number of clients and acquire a higher volume of assets into their management. For the efficient function of private banking it is necessary to have enough experts. Therefore, it is important to pay attention to personality traits and professional requirements for private bankers. The processes taking place in the bank significantly affect the development of cash deposits. It is necessary to examine and monitor the potential of individual segment in the bank. Acquisition of clients within segments can bring into private banking a higher number of clients and higher volume of assets. Last, but not least, the success of private banking depends on the development of products and services that are offered to clients. That is why it is important for banks to compile product portfolios correctly. It is necessary to monitor the situation on the markets and adjust the offer of investments options according to which investments offer the most interesting appreciation.

References

Amenc, N., Goltz, F., Schröder, D. (2009). Private Bankers on Private Banking: Financial Risks and Asset/Liability Management. *The Journal of Wealth Management Winter 2009*, *12*, (3), 39-50. DOI: 1,.39,5/jwm.2009.12.3.039.

Bachmann, K. K., Giorgi, E. G., Hens, T. (2018). Behavioral Finance for Private Banking: From the Art of Advice to the Science of Advice. New Yersey: Wiley, Second edition. 235 p. ISBN 978-1119453703.

Chen, J. (2020). Private Banking. [cited 10.10.2020]. Available online at: <https://www.investopedia.com/terms/p/privatebanking.asp>.

Chovancová, B. et al. (2008). Investičné a hypotekárne bankovníctvo.First edition. Bratislava: Iura Edition, spol. s.r.o., 2008. p. 42. ISBN 978-80-8078-223-8.

Collard, B. F. J. (2012). World Class Private Banking: Building and Culture of Excellence. New Yersey: Wiley, 256 p. ISBN 978-0470824375.

Cassis, Y., Cottrell, P., Fraser, I. L. (2009). The World of Private Banking. New York: Ashgate Publishing, First edition. 328 p. ISBN 978-1859284322.

Dzhaparov, P. (2019). Private Banking and Wealth Management between opportunities and threats. *Economics 21*, vol. IX, no. 1, pp. 67-86. ISSN 2534-9457.

Dvořák, P. (2005). Bankovnictví pro bankéře a klienty. Praha: Linde Praha, a.s., 2005. 688 p. ISBN 80-7201-515-X.

Hilton, T. (2006) Comparing Commercial and Private Client Dependency Upon Relationships with Lawyers, Services Marketing Quarterly, 27:4, pp. 1-26. DOI: 10.1300/J396v27n04_01.

Medveď, J. – Tkáč, M. et al. (2013). Banky – história, teória a prax. Bratislava: Sprint 2 s.r.o., 2013. 649 p. ISBN 978-80-89393-73-2.

Mylonakis, J. (2009). Private banking services, private banking customers´ profile and their investment behavioral preferences. *Journal of Banks and Bank Systems*, 4, (1), 37-44.

Ramirez, C. D. (2009). Bank fragility, "money under the mattress", and long-run growth: US evidence from the "perfect" Panic of 1893. *Journal of Banking & Finance*, 33, 2185-2198.

Impact of external circumstances on risk management in banks

Ivana Rađenović[1]

[1]PhD student, Ekonomski fakultet Subotica, Univerzitet u Novom Sadu, Republika Srbija

iradjenovic@cfu.co.rs

Abstract

In the financial world, risk management is a complex process that involves identifying, analyzing, accepting, or reducing business uncertainty. Similarly, in banking, any action that involves the analysis and quantification of potential losses due to the effects of risk, as well as the appropriate response to the new situation is precisely risk management.

The subject of this research is to identify the impact of external circumstances on risk management in banks, primarily caused by the COVID 19 virus pandemic. The reactions of central and commercial banks to changed business conditions were analyzed. The research aims to give a comprehensive view of the specifics of risk management, which is otherwise immanent to banks, in the changed business conditions with a focus on measures applied to manage it efficiently and mitigate the economic consequences of the virus COVID-19 pandemic.

Keywords: banks, risk management, external circumstances, impact.

1. Introduction

Since the 2000 recession that hit developed countries, leaving the most impact on the European Union and the United States, through the 2003 oil crisis that lasted six years, to the 2007 U.S. market mortgage crisis that transferred to the rest of the world and whose consequences are still felt in some parts today, and consequently, the insolvency of several European countries which caused the instability of the entire European Union and the question of its survival in its original form as an economic and monetary union before risk management sectors.

However, judging by current analyzes and the already visible consequences, one of the most severe crises affecting the global economy is the emerging socio-economic crisis caused by the COVID 19 virus pandemic. Consequently, the impacts on the world economic system are among the most catastrophic ever.

A rapid increase in the number of unemployed, job losses, falling interest rates, the collapse of tourism and transport, a blow to the fastest growing economy in the world and later the world itself, falling stock market indices, falling oil prices and unprecedented rising gold prices are just some of the visible consequences.

Also, the current pandemic shows the adequacy of health systems of countries around the world to respond to the situation, but also the real readiness to assist in interstate relations and thus indicate the sustainability of specified macroeconomic structures whose functioning has been endangered in normal circumstances.

Considering the above, the aim of this paper is to analyze the impact of specific circumstances on risk management in banks, by systematizing and presenting visible consequences of the new pandemic on the global economic system as a characteristic situation for which the economy of today was not ready, while still recovering from the 2008 global economic crisis.

The paper is structured in three chapters. The first chapter is dedicated to the issue of risk management in banks in specific business conditions. The reactions of central banks to the changed business conditions are the subject of the second chapter. The third chapter deals with the consideration of significant issues related to commercial banks to the changed business conditions, followed by concluding remarks and used literature.

The paper uses the method of content analysis and the comparative method. Relevant academic sources and internet sources referenced for the observed research topic were used.

2. Risk management in banks in specific business conditions

Nowadays, half a year after the beginning of the epidemic in China, which then grew into a global pandemic caused by the COVID - 19 virus, it has become understandable than ever that certain situations cannot be prevented. However, it is possible to prepare for them. This is the role of the risk management function in banks, which should neutralize the negative effects so that the consequences would be less catastrophic.

How much the banks were ready for such a development of the situation cannot be expressed with precision. Nevertheless, online business through electronic and mobile banking has greatly facilitated everyday life during a pandemic. Central banks around the world agree on the measures they adopt to help banks establish business stability that directly affects the movements of the entire market. By preserving the security of monetary policy, central banks have enabled the implementation of fiscal policy. In this situation, there is a clear need for cooperation between these two sides of the same economy.

However, not every part of the economy reacted negatively to this epidemiological shock. Some branches of the economy have flourished, the owners of social networks are getting even wealthier, and everyday things have become more significant. Interestingly, Facebook Inc. chose this very moment to create an underwater canal that will allow 1.2 billion inhabitants of the African continent to connect to the Internet.

Although this is not the first health crisis to affect the economy, and despite the consequences of war diseases such as malaria and HIV / AIDS, the epidemiological impact on the stability of economics operations remains underestimated. There are not many studies and analyzes that can testify to the consequences of such situations in history.

Certainly, coronavirus has changed the history of the modern age, allowing a short break from the capitalist organization of the world economy. The consumer society, unaccustomed to saving, was now forced to do so. It is precisely these savings, as a positive item in the household budget, that had an extremely negative impact on the earnings of businessmen, causing a crisis in almost all sectors. What the real effects of this situation will be, remains to be seen in some future period, after the hotspots are extinguished and impressions are summed up.

While economic and medical experts believe that China emerged victorious from the battle with the "invisible enemy" and cite it as an example of success, they, although more experienced than the rest of the world in winning the pandemic, are gradually feeling a new fear with a constant question. , for now, no answer: how ready we are. Due to all the above and special circumstances in the world economy, it can be stated that within the range of different risks that banks face and that they control with more or less success, credit risk, strategic risk, and country risk dominate in the current conditions.

The closure of some of the industries, the suspension of activities and the massive loss of jobs will cause difficulties in repaying loans and reduce the possibility of new debts. Banks will have to adjust their business strategies and develop other products and services that will enable new revenues in the face of falling interest rates and capital shocks due to aggravated collection. Trade-in collateral will be very difficult due to the global decline in demand and the reduction of payment capacity at the level of the world economy. The development of a partnership between creditors and debtors can be expected with certainty because classic collection measures in these conditions cannot give good results.

3. Reactions of central banks to changed business conditions

Even before the official announcement of the beginning of the pandemic, the central banking institutions of some countries began to take specific measures to mitigate the effects of the crisis. At first glance, fiscal policy may seem to have a more difficult role at the moment given that it is now necessary to allocate available resources in an optimal way to cover all government expenditures. However, monetary policy measures can by no means be negligible, given that their actions alone can currently facilitate the management of already limited resources.

Although the cause of the crisis in 2020 is significantly different from the crisis in 2008, central banks around the world use the same instruments to respond to the new situation. The scope and speed of central banks' business policies have reached, and

perhaps even exceeded, the 2008 framework. Central banks have reduced interest rates, repurchased assets, formed loan programs, and modified financial regulations to help financial markets and minimize long-term economic damage.[1]

The European Central Bank, as the leading central banking institution of the European Union, has divided its activities into six groups to support the eurozone economy. Namely, the ECB applies the following measures[2]:

1. Assistance in minimizing the effects of the crisis,
2. Maintaining credit conditions at the most accessible level,
3. Support to companies and households in taking loans,
4. Mitigation of short-term effects that could potentially jeopardize lending operations,
5. Increasing the possibilities of banks for loan approval,
6. Maintaining financial stability through international cooperation.

Also, the European Central Bank has established the PEPP program (Pandemic Emergency Purchase Program) worth 750 million euros, which aims to minimize the effects of the crisis by buying assets from the market. Through this program, the total amount of assets purchased by the ECB in 2020 will be € 1.1 trillion[3]. Central banks in developed countries around the world, such as the Bank of England and the Bank of Japan, have similar strategies.

However, special attention should be given to the measures taken by the Federal Reserve together with the President of the USA, Donald Trump. So far, the Fed has placed about $ 2.3 trillion in aid to U.S. citizens. Interest rates have been reduced to a minimum of about 0% to 0.25%, the purchase of securities of about $ 700 billion is planned, the possibility of direct lending by the Fed for the largest companies in the US market is introduced, special incentives are introduced to help small and medium-sized businesses, as well as $ 100 billion in household assistance. Also, the rates at which the Fed collects currency swaps between the USA and other countries, with Canada, England, the countries of the European Union and Switzerland, have been reduced, and the possibility of swap transactions with other countries has been introduced.[4]

However, according to eminent analysts, these impressive amounts will not be enough to mitigate the effects of the new situation on the US economy. Driven by their views, President Trump, in cooperation with Congress, is planning additional aid of about 2 billion dollars based on fiscal policy measures.

At the extraordinary meeting of the Executive Board of the National Bank of Serbia, on March 11, 2020, simultaneously with the first measures of the Government of the Republic of Serbia, a decision was made to reduce all basic interest rates of the National Bank of Serbia. The reference interest rate was reduced to 1.75%, the rate of deposit facilities to 0.75%, and the rate on credit facilities to 2.75%. In this way, even before the introduction of the state of emergency in the Republic of Serbia, the National Bank of Serbia provided significantly more favorable conditions for financing the domestic economy and citizens, which gives impetus to economic activity in our country.

The same as central banks around the world, the National Bank of Serbia has taken certain measures to stabilize the crisis. According to the NBS, basic interest rates have been further reduced, and financing conditions have become even more favorable. At the regular meeting of the Executive Board of the National Bank of Serbia on April 9, all three basic interest rates were reduced by an additional 0.25 percentage points, so that they now amount to - RKS 1.50%, the rate on deposit facilities 0.50% and the rate on credit relief 2.50%.

Additionally, timely and adequate measures of the National Bank of Serbia enabled the domestic financial sector to obtain additional dinar and foreign currency liquidity to be able to continue lending to the domestic economy and citizens. Since the first extraordinary foreign exchange swap auction (March 23, 2020), the National Bank of Serbia has provided banks with additional:

[1] Haas, J., Neely J., C., Central Bank Responses to COVID 19, Federal Reserve Bank of St. Louis, https://research.stlouisfed.org/publications/economic-synopses/2020/04/21/central-bank-responses-to-covid-19 (21.04.2020)

[2] Lagard, C., Our response to the coronavirus pandemic, European Central Bank, https://www.ecb.europa.eu/home/search/coronavirus/html/index.en.html (21.04.2020)

[3] European Central Bank, Interview with Luis de Guindos, Vice-President of the ECB, conducted by João Silvestre on 15 April 2020, https://www.ecb.europa.eu/press/inter/date/2020/html/ecb.in200418~928531cc96.en.html (21.04.2020)

[4] Based on: Cheng, J., Skidmore, D., Wessel D., What's the Fed doing in response to the COVID-19 crisis? What more could it do?, Brookings, https://www.brookings.edu/research/fed-response-to-covid19/ (21.04.2020)

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through additional monetary policy instruments (additional and regular foreign exchange swap auctions and repo auctions for the purchase of securities):

- RSD 41.1 billion in liquidity and
- EUR 48.0 million in foreign currency liquidity[5]

The domestic banking system is liquid. The mentioned measures of the National Bank of Serbia provided additional liquidity to the banking system. Although it had previously operated in the conditions of surplus dinar liquidity, now it has been increased to record high levels. Deposited surpluses (funds that banks deposit with the National Bank of Serbia on an overnight basis) reached 272.5 billion dinars on April 10, 2020, which is their highest level so far. Together with the funds of banks in the repo portfolio of the National Bank of Serbia (RSD 20 billion), the total surplus of dinar liquidity on April 10, 2020 amounted to RSD 292.5 billion.[6]

It is estimated that economic measures within the Program for reducing the negative effects caused by the Kovid-19 virus pandemic and supporting the Serbian economy will be at the level of around 608.3 billion dinars. Below, in a table, is an overview of economic measures:

[5] National Bank of Serbia, Monetary Policy Measures, https://www.nbs.rs/internet/latinica/15/Covid19/Covid19_1.html (April 25, 2020)
[6] Ibid.

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Table 1. Program of economic measures to reduce the negative effects caused by the Kovid-19 virus pandemic and support the Serbian economy

Tax policy measures	Postponement payment of taxes on salaries and contributions for the private sector, during the state of emergency, with the subsequent repayment of the incurred obligations in installments starting at the earliest from 2021.
	Postponement of payment of advance income tax in the second quarter
	Exemption of donors from the obligation to pay VAT
Direct funding	Direct assistance to entrepreneurs who are taxed at a flat rate and who pay real income tax, micro, small and medium enterprises in the private sector - payment of assistance in the amount of the minimum (during the state of emergency - 3 minimum wages)
	Direct assistance to large companies in the private sector - payment of assistance in the amount of 50% of the net minimum wage (during the state of emergency) for employees whose decision determined the termination of work (Articles 116 and 117 of the Labor Law)
Measures to preserve liquidity in the private sector	Program of financial support to the economy in the conditions of the Covid-19 crisis of the Development Fund of the Republic of Serbia
	Guarantee scheme to support the economy in the conditions of the Covid-19 crisis
Other	Moratorium on dividend payments until the end of the year, except for PEs
	Fiscal stimulus - direct help to all adult citizens

Based on: Program of economic measures to reduce the negative effects caused by the Kovid-19 virus pandemic and support the Serbian economy, National Bank of Serbia, p. 1.

4. Reactions of commercial banks to changed business conditions

Although banks were more prepared for the pandemic than the financial crisis in 2008, the impact of the new situation on their business is significant. The issue of sufficient levels of liquidity and capital has become crucial to combat one of the most dramatic crises ever.

The first measure taken by all banks around the world was the closure of branches and sub-branches with the constant promotion of internet and mobile banking services. In this way, banks have shown their level of social responsibility, primarily towards their employees.

In cooperation with state institutions, banks offer lending opportunities on more favorable terms than they were before the pandemic. Large banks at the international level have special programs formed in order to lend to different types of entities. An example of this is BNP Paribas, one of the largest banks in Europe, which has divided its lending offer into three groups[7]:

1. Lending to the public sector,
2. Lending to the financial sector,
3. Lending to the "real economy" sector.

However, no matter how much banks tried to offer lending with interest rates at a reasonable level, there was a significant decline in demand for loans. Given that a large number of companies have closed, banks are facing not only a decline in income from lending interest rates but also a decline in income from neutral banking operations.

Unlike in 2008, when banks were the initiators of the crisis, now the situation is completely different. Banks are now sharing the fate of everyone else, trying to optimally overcome the crisis caused by the pandemic.

Following the instructions of the central banks, the banks introduced a moratorium on their claims. The same measures were implemented in Serbia. According to the instructions of the National Bank of Serbia, clients who accept a delay (moratorium) in repayment have no obligation to pay their credit obligations, neither based on interest nor the basis of principal, in the next 90 days.[8]

Conclusion

The current crisis will force banks to revise their business and sales capacities, reduce costs and concentrate on those products and services that have perspective. In this part, strategic risks are gaining in importance. The same applies to bank clients, sectors and branches, regardless of whether they are now more or less endangered, so they require significant incentives for recovery.

The flexible business policy of banks with adequate risk assessment is the only possible strategy for further business. Otherwise, capital erosion and reduction of placements will follow, which will be partially mitigated by the measures of some countries. State incentive measures have their limitations and specific requirements, and they also carry certain risks for banks.

At the same time, globalization will increase the country's risk because negative influences are transmitted from the environment, but it will also increase the chances of some governments for international assistance, sometimes through new borrowing. The illusion of rehabilitation and stability of the national economy will be created, but with skewed influences and a dose of uncertainty regarding the possibility of repaying the national debt. Wise and responsible governments should certainly be oriented towards national resources and reserves, and that the funds obtained on the international market should be directed directly to the economic and vital sectors, and not for the rehabilitation of banks.

On the other hand, banks need to recognize this indirect chance and adjust the way they do business to the new conditions. The constant conflict between interests and risks will escalate, and professionalism and a precise risk management strategy in banks will gain in importance. Rigidity will be replaced by controlled flexibility to preserve users of banking services, save the capital of banks and securing further business and market place.

One thing is for sure: nothing will be the same as it used to be, so everyone should be ready for changes, both banks in terms of sales and risk control, and clients within their needs and possibilities of using banking products.

[7] BNP Paribas, Development banks launch financial response to Covid-19 pandemic, https://cib.bnpparibas.com/sustain/development-banks-launch-financial-response-to-covid-19-pandemic_a-3-3473.html (02.05.2020)

[8] National Bank of Serbia, Delay in loan repayment, https://www.nbs.rs/internet/latinica/15/mediji/Primeri-moratorijum-1.pdf (03.05.2020)

By IAI ISSN 2671-3179

Literature

BNP Paribas, Development banks launch financial response to Covid-19 pandemic, https://cib.bnpparibas.com/sustain/development-banks-launch-financial-response-to-covid-19-pandemic_a-3-3473.html (02.05.2020)

Cheng, J., Skidmore, D., Wessel D., What's the Fed doing in response to the COVID-19 crisis? What more could it do?, Brookings, https://www.brookings.edu/research/fed-response-to-covid19/ (21.04.2020)

European Central Bank, Interview with Luis de Guindos, Vice-President of the ECB, conducted by João Silvestre on 15 April 2020, https://www.ecb.europa.eu/press/inter/date/2020/html/ecb.in200418~928531cc96.en.html (21.04.2020)

Haas, J., Neely J., C., Central Bank Responses to COVID 19, Federal Reserve Bank of St. Louis, https://research.stlouisfed.org/publications/economic-synopses/2020/04/21/central-bank-responses-to-covid-19 (21.04.2020)

Lagard, C., Our response to the coronavirus pandemic, European Central Bank, https://www.ecb.europa.eu/home/search/coronavirus/html/index.en.html (21.04.2020)

National Bank of Serbia, Delay in loan repayment, https://www.nbs.rs/internet/latinica/15/mediji/Primeri-moratorijum-1.pdf (03.05.2020)

National Bank of Serbia, Monetary Policy Measures, https://www.nbs.rs/internet/latinica/15/Covid19/Covid19_1.html (25.04.2020).

Program of economic measures to reduce the negative effects caused by the Kovid-19 virus pandemic and support the Serbian economy, National Bank of Serbia

Importance of introduction and application of financial management and control in the public sector in BiH

Antonio Vukoja[1]*
Matea Antonela Vukoja[2]

[1]Director of Audit Company UHY REVIDENT doo Mostar Certified Accountant and Certified and Internal and Forensic Auditor
[2]Revident doo Grude asistent audit
*Corresponding Author: bozo.vukoja@tel.net.ba

Abstract

The introduction and implementation of FUK in FBiH aims to incorporate a modern public internal financial control system (PIFC) into traditional public resources management models. This area is one of the reform areas in which Bosnia and Herzegovina is obliged to harmonize the legislative framework and practices with the good practices and regulations recommended by the European Commission. The establishment and development of the PIFC is also an obligation of Bosnia and Herzegovina established by the Stabilization and Association Agreement between the European Community and the member states, of the one part, and Bosnia and Herzegovina, of the other part.
The Public Internal Financial Control (PIFC) system focuses on enhancing transparency, financial discipline and dedicated use of public resources, that is, transparent, economical, efficient and effective management of public resources, and control of the use of those resources. The topic of this paper is "Financial Management and Control in the Public Sector", where the aim is to show through the conducted theoretical research the level of achievement of the establishment of this system in public sector institutions in BiH. The European Union wants to direct all potential member countries towards development of internal controls in the use of their own resources, but also to create a control environment that would ensure the dedicated use of EU funds.
In Bosnia and Herzegovina, there is no single legal framework in terms of a single law governing public internal financial controls. The contents of the applicable legal provisions at all three levels (BiH, FBiH, RS) are largely congruent thanks to the Coordination Committee of Central Harmonization Units in Bosnia and Herzegovina, through which the harmonization of regulations and practices in the development of public internal financial controls is ensured.

Keywords: public sector, finance, control

1. INTRODUCTION

Financial management and control in the public sector is a comprehensive system of internal management of public finances in the form of control of revenues, expenditures and other monetary transactions, rational asset management, and successful project management, which is preceded by a business process approach with continuous management of risks that may appear in business operations.
Financial management and control has two main lines of reporting to competent authorities, which is an additional form of enforcement control.
Reporting is done on an annual basis by the submission of the Annual Report on the Financial Management and Control System (GIFUK). Financial management and control guarantees transparency and legality of public administration operations.
The very process of establishing Financial Management and Control begins with the appointment of the persons responsible for the implementation of the system.
The budget user is obliged to appoint a manager for Financial Management and Control. Budget users may appoint, as needed, the Financial Management and Control Coordinator, the Financial Management and Control working group, as well as the person responsible for creating the risk register, but these appointments are not mandatory but are left to the choice of the budget users and are made due to the specific nature of the organization (large organization, lots of administrative departments).
The most important reporting mechanism on the functioning of the Financial Management and Control System and the transparency of public administration is the submission of the Annual Report (GIFUK).
The Head of budget users is responsible for establishing the Financial Management and Control System.

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The introduction of a system of internal financial controls in public sector organizations has the effect of reducing irregularities in public sector operations.
The need to introduce a system of internal financial controls in the public sector of Bosnia and Herzegovina has been imposed by the European Commission. In this way, the European Commission wants to help countries that wish to join the European Union to incorporate higher standards of control into their governance processes.
This paper gives an overview of financial management and internal control and internal audit systems known as PIFC (Public Internal Financial Control), that is, the importance of financial management and control systems, basic features, and public sector establishment at all three levels of government. The Public Internal Financial Control (PIFC) system focuses on enhancing transparency, financial discipline and dedicated use of public resources, that is, transparent, economical, efficient and effective management of public resources, and controlling the use of those resources.
It consists of three basic elements:

1. Financial management and control
2. Internal audit
3. Central Harmonization Unit.

The main objective of financial management and control is to ensure:

1. Successful achievement of all goals and tasks of the institution,
2. Strategy for Implementation of Public Internal Financial Control in the Institutions of Bosnia and Herzegovina and the Council of Ministers of BiH,
3. Security, reliability, timeliness and completeness of information, especially financial information,
4. Compliance with the laws, regulations, policies, plans and procedures,
5. Property protection,
6. Economical, efficient and effective use of resources.

In order to achieve the goals of the internal control system, they need to be related to the information circulating within the organization, and to control the timely preparation of up-to-date, reliable and relevant information presented through various reports, both to internal and external users.
Unlike operational and information goals, compliance goals are that the internal control system must ensure that the overall business of the organization must comply with the relevant legal regulations, rule books, decisions and other applicable acts within the organization.
The system of internal control in the organization should be set up so that through the principle of self-control, all employees, at all levels, from executors to executives, are monitored, which is the only correct and right way to achieve efficiency and effectiveness of business.
Control is an integral part of every organization, and its implementation is the responsibility of each employee according to the authority and description of their workplace, and the basis is certainly the written acts in the form of instructions and procedures, which clearly distinguish the powers and responsibilities of both managers and employees.[1]

Internal control is primarily focused on achieving the following goals in an organization:

- Ensuring the reliability and integrity of the data and information generated
- Ensuring compliance with business policies, plans, work programs, legal and other regulations, and other restrictions
- Keeping assets
- Economical and efficient use of all types of resources
- The realization of the formulated plans, programs, and set goals and tasks.
-

The purpose of introducing FMC into the public sector is as follows:

- Business in a proper, ethical, economical and efficient way,
- Business compliance with the laws, regulations, policies, plans and procedures,
- Protection of property and other resources from losses caused by mismanagement of public resources, unjustified and non-transparent spending, and protection against irregularities and fraud,
- Strengthening responsibility of executives for successful achievement of set business goals
- Timely and transparent financial reporting as well as monitoring of business results.[2]

[1] Tušek, B.: Audit in the Function of Business Decision-Making and Management, Doctoral dissertation, Faculty of Economics and Business Zagreb, Zagreb, 2000

[2] . B. Vukoja Corporate Audit and Analysis Management, Grude Graphic Design 2016.

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PHASE	FLOW DIAGRAM	ACTIVITIES
PREPARATION PHASE I PHASE II PHASE III PHASE IV PHASE V	HEADS DECISION ON ESTABLISHMENT APPOINTMENT OF THE FMC MAKING A MISSION VISION AND OBJECTIVES STATEMENT LIST OF BUSINESS PROCESSES AND MAKING OF ORGANIZATION SCHEME MAKING OF DESCRIPTION OF BUSINESS PROCESSES (AUDIT TRACK) MAKING OF PROCESS BOOK (MAP) RISK REGISTRATION AND RISK MANAGEMENT STRATEGY STAFF EDUCATION AND SYSTEM IMPLEMENTATION PAYMENT, ESTIMATION AND UPDATE OF THE SYSTEM	ORGANIZATION HEAD APPOINTS FUK COORDINATOR AND TEAM LEADER THIS STATEMENT DETERMINES THE PURPOSE OF THE EXISTENCE OF THE ORGANIZATION AND ITS LONG-TERM ROAD IT IS ESSENTIAL TO WRITE DOWN ALL BUSINESS PROCESSES AND DETERMINE ORGANIZATIONAL STRUCTURE THE RISK REGISTER CONTAINS A LIST OF ALL THE RISKS IN THE ORGANIZATION THAT ARE MADE AS A MULTIPLE OF THE POSSIBILITY OF OCCURRENCE AND THE POSSIBILITY OF DAMAGE RISK MANAGEMENT STRATEGY SHOWS US THEIR TREATMENT STAFF MUST BE EDUCATED IN ACCORDANCE WITH NEEDS AND TASKS DOCUMENTATION MANAGEMENT ASSUMES MONITORING, ASSESSMENT AND UPDATING OF THE SYSTEM TO MAINTAIN FUNCTIONING

Picture 1 Activity flow in the FUK system

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2. FINANCIAL MANAGEMENT AND CONTROL

Financial management and control (abbreviated FMC), as one of the elements of PIFC, encompasses the overall system of financial and all other controls within a public sector institution, that is, all those controls that are integrated into any of the activities of the institution.

Financial management and control includes methods, organizational structure, procedures that apply not only to the financial system but also to the strategic and operational systems of budget users.

Public Internal Financial Control (PIFC) System

Improving transparency, financial discipline and the dedicated use of public money.

The goal of PIFC is to ensure the compliance of legislation, the transparent, economical, efficient and effective management of public resources and the control of their use.

The term "internal financial control in the public sector" means the complete, unified system established by governments to control, audit and report on the use of budgetary resources

- The development and strengthening of the system is an important segment in public sector reform.
- The public sector internal financial control system consists of the following basic elements:
  - financial management and internal control (FUK),
  - functionally independent internal audits (IR), and
  - central unit for the harmonization and coordination of financial management and control systems and internal audit methodology.

Financial Management and Control (FUK) = PIFC's first pillar.

1. A comprehensive system of policies, procedures and activities established and under the responsibility of the institution's manager.
2. It is based on risk management and provides a reasonable assurance that the goals of the institution will be achieved in a proper, economical, efficient and effective way.
3. Internal controls are procedures implemented by executives and employees of an organization that are designed to provide reasonable assurance of achieving the organization's goals.
4. Effective control systems are designed to provide reasonable assurance to management that resources are being used in accordance with laws, regulations and policies, and are protected from waste, loss and misuse

Numerous regulations have defined the way of management and control in the institutions of BiH.

a) Financial management and control refers to all financial and non-financial aspects of an institution's business operations
b) It implements in all organizational units and covers all resources, including foreign funds.
c) The assumptions for establishing an efficient FUK system are a clearly defined mission and goals of the institution, the organizational structure
d) For the success of establishing an efficient FUK, established control over the realization of the goals of the institutions is also crucial, which will enable the financing decisions (program budget) to be made based on the realization of the goals of the institution

The second pillar of the PIFC is internal audit.

Internal audit is an independent, objective persuasion and consulting activity designed to add value and improve the organization's operations.

Establishing and strengthening internal financial controls in the public sector is a BiH obligation set out in Article 90 of the Stabilization and Association Agreement.

The goal of PIFC is to ensure the compliance of legislation, the transparent, economical, efficient and effective management of public resources and the control of their use.

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h) For the success of establishing an efficient FUK, established control over the realization of the goals of the institutions is also crucial, which will enable the financing decisions (program budget) to be made based on the realization of the goals of the institution

The second pillar of the PIFC is internal audit.
Internal audit is an independent, objective persuasion and consulting activity designed to add value and improve the organization's operations.
Third pillar = Central Harmonization Unit
 It is an integral part and is a necessary condition for successful access and development of the public internal financial control system.
 The Central Harmonization Unit is responsible for the development and application of methodology and standards for the financial management and control system, as well as for internal audit in the public sector
 It is responsible for coordinating and providing appropriate training to public sector management and officials in the area of financial management and control and internal audit in the public sector.

3. FINANCIAL MANAGEMENT AND CONTROL SYSTEM IN THE PUBLIC SECTOR OF BOSNIA AND HERZEGOVINA

The system of financial management and control in the public sector of Bosnia and Herzegovina is established by the heads of public sector organizations in order to successfully accomplish the tasks set by the budget user.
This means that the heads of public sector institutions are directly responsible for establishing procedures for the functioning of the internal control system and internal audit departments in order to create added value, and to carry out any activity in the public sector economically, efficiently and effectively, in accordance with legal regulations.
This system in Bosnia and Herzegovina was launched back in 2005 with the adoption of Instructions for development and maintenance of the internal control system by the Ministry of Finance and Treasury of BiH.

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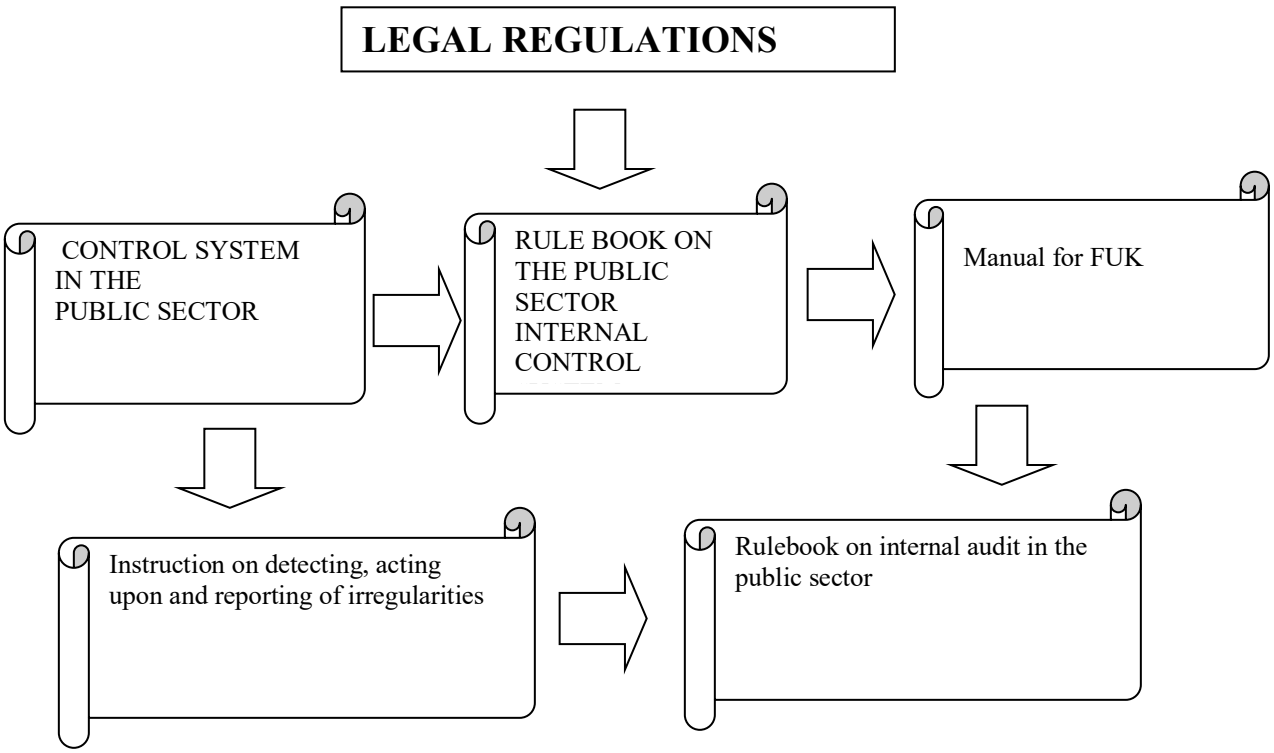

Picture 2 Law on Financial Management and Control in the Public Sector in the Federation of Bosnia and Herzegovina

FBiH Official Gazette

The Central Harmonization Unit of the MFT BiH is the central body for coordination and harmonization of activities on the establishment and development of the system of public internal financial controls in the institutions of Bosnia and Herzegovina.

The establishment and development of the PIFC system by CHJ MFT BiH entails two areas:

A. establishment and development of financial management and control
B. establishment and development of a system of functional and independent internal audit.

The basic law governing the establishment and development of financial management and control in the institutions of Bosnia and Herzegovina is the Law on Financing of the Institutions of BiH[3]
This law sets the principles, standards, methodological framework and basic rules for financial management and control in BiH institutions.
The law introduces an obligation for the heads of institutions to submit, in addition to the annual budget execution reports, a Statement of Responsibility for achieving the institution's goals.
With this Statement, the Head of the Public Sector Institution confirms that they have ensured:

- earmarked, purposeful and lawful use of resources appropriations for the achievement of set objectives,
- economical, efficient and effective functioning of the financial management and control system for making internal regulations on financial management and control in all units within the institution.
- In addition to the aforementioned Law, a number of by-laws were adopted that regulate this area, and those are:
  - internal control standards in BiH institutions,
  - manual for Financial Management and Control in the Institutions of BiH,
  - guidelines for implementing the risk management process in BiH institutions,
  - rulebook on Annual Reporting in the System of Financial Management and Control in the Institutions of BiH,

[3] *Official Gazette of BiH, No. 32/13*

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- decision to publish the form and content of the annual report on the system of financial management and control in the institutions of BiH.

4. FINANCIAL MANAGEMENT AND CONTROL SYSTEM IN THE PUBLIC SECTOR OF THE FEDERATION OF BOSNIA AND HERZEGOVINA

The regulations of the Law apply to users of public resources of the first and second levels of the budget of the Federation of Bosnia and Herzegovina, cantons, cities, municipalities and extra-budgetary funds, and to those legal entities in which the FBiH or the canton has a majority ownership interest. Also, this Law applies to those public sector organizations and bodies that are funded by EU funds and programs.

Financial control and management focuses on all business transactions in public sector organizations, with particular emphasis on revenues and receipts, expenditures and outlays of resources, public procurement procedures, contracting, and repayment of amounts wrongly paid, assets and liabilities.[4]

According to this Law, users of public resources, ie budget users are obliged to prepare an annual report on the functioning of the FUK system, and submit this report to the federal or cantonal ministry of finance, depending on what level of government the organization belongs to.

The Head of the public resources users is responsible for establishing, developing and implementing appropriate, efficient, effective and economical FUK in the organization concerned.

Responding that the goals of the users of public resources are achieved by managing those resources in a lawful, economical, efficient and effective way.

Also, the head of the public resources users is responsible for making internal regulations on the FUK and for implementing the FUK system in all organizational units within the organization, in relation to all programs and processes that are executed, respecting the principles of legality, financial management and transparency in accordance with internal control standards. The following users of public resources are obliged to produce the annual report on the functioning of the FUK system:[5]

- users of first-level public resources and extra-budgetary funds to the federal level, who submit the report to the Federal Ministry of Finance;
- users of first level public resources and extra-budgetary funds to the cantonal level, who submit the report to the competent cantonal ministry of finance;
- local self-government units with city status that submit the report to the competent Cantonal Ministry of Finance and
- legal entities in which the Federation or the canton have a majority ownership share, and which submit the report to the competent line ministry.

The Cantonal Ministry of Finance consolidates reports for the canton and submits to the CHJ FMF a consolidated report on the functioning of the FUK system for the canton.

Based on the submitted report, the CHJ FMF prepares an annual consolidated report on the functioning of the FUK system in organizations and submits it to the Federal Minister of Finance, who then submits it to the Government of the Federation of Bosnia and Herzegovina for review and approval. The form, deadlines and content of the annual consolidated report are regulated by a by-law.

Federal Ministry of Finance. The Financial Control and Management Act prescribes action to be taken against irregularities and fraud. The head of the public resources users is responsible for managing the risks of irregularities and frauds and carrying out actions to prevent and eliminate irregularities and frauds in their organization.

Each user of public resources is obliged to implement the Financial Management and Control System and to appoint a Financial Management and Control Coordinator, whose data is submitted to the Central Harmonization Unit. In the register of the FBiH CHJ, concluded on 04/30/2018, there are a total of 146 coordinators proposed by obligors for establishing FUK.

The task of the Financial Management and Control Coordinator is reflected in the following:

- ❖ list and description of business processes,
- ❖ creation of a map of business processes (process and procedure codes),
- ❖ identifying business goals,
- ❖ risk identification, risk assessment and risk management,
- ❖ monitoring the achievement of planned activities
- ❖ compilation of the annual FUK report and submission to the CHJ.

The implementation of financial management and control and internal audit was greatly influenced by the adoption of the new Budget Law in the Federation of Bosnia and Herzegovina, which was adopted in December 2013.

[5] *Law on Financial Management and Control in the Public Sector in FBiH, Official Gazette of FBiH, No. 38/16*

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However, in addition to all the aforementioned activities carried out by the CHJ of the Federation of BiH and the adopted legal and institutional solutions, there are nevertheless problems and difficulties in the practical implementation of the internal financial control system in the public sector management process. The shortcomings and omissions in the management of budgetary resources are highlighted here, as evidenced year by year by the reports submitted by the Audit Office of the FBiH Institutions, which constantly point out the inadequate functioning of the internal control, management and internal audit systems, and the worryingly high percentage of reported negative audit opinions.

5. FINANCIAL MANAGEMENT AND CONTROL SYSTEM IN THE PUBLIC SECTOR OF THE REPUBLIC OF SRPSKA

In Republic of Srpska The Law on the System of Internal Financial Controls in the Public Sector of Republic of Srpska was also entered into force on 10/28/2016, and was published in the Official Gazette of the RS No. 91/16.

The following public sector organizations are considered to be the public sector of the Republic of Srpska: users of Republic of Srpska resources, local self-government units and users of budget funds of local self-government units, extra-budgetary funds, agencies and other institutions, public enterprises, institutions and organizations in which Republic of Srpska is majority owner.

The system of internal financial controls in the public sector of the Republic of Srpska includes the organizational structure, methods and procedures of internal controls, established by the entity's responsible person, with the aim of successfully managing and accomplishing the tasks of the entity in a public, lawful, economical, efficient and effective way.

The system of public financial controls in the public sector consists of:

1. Financial management and control,
2. Internal audit,
3. Central Harmonization Unit for Financial Management and Control, and Internal Audit at the Ministry of Finance.

The entity manager is responsible for establishing a financial management and control system in each entity's organizational unit, monitoring and evaluating the adequacy of functioning and timely updating to achieve the entity's goals. They are also obliged that the CHJ submit semi-annual, annual reports on the implementation of the planned activities on the establishment and development of the financial management and control systems, by the end of July of the current year at the latest, or by the end of January.

A.

The list of business processes is an overview of the business processes that take place in an organizational unit, that is, an overview of the procedures that determine the way in which a particular business process is conducted, as well as the supporting documentation used in their implementation.

An overview of the identified business processes

This law regulates internal audit in the public sector of Republic of Srpska, the role and tasks of internal audit, the establishment and independence of internal audit, standards, rights and responsibilities of managers, the audit committee and the Central Harmonization Unit.

With the entry into force of this law, the Law on Internal Audit in the Public Sector of Republic of Srpska (Official Gazette of the Republic of Srpska, No. 17/08) has ceased to apply, unlike the Federation of Bosnia and Herzegovina, where these areas are governed by individual laws.

5. CONCLUSION

As a candidate for EU accession, Bosnia and Herzegovina has been subject to a series of reforms that it needs to implement, one of them being the introduction of an internal control system in the public sector.

Namely, the European Commission recommended Bosnia and Herzegovina, in order to help candidates for EU membership, to strengthen the control over the spending of public resources, that is, unintended, embezzlement and the similar, to introduce a system of internal financial control in the public sector.

This system works through three elements, and those are: financial management and internal control, internal audits, and the Central Harmonization Unit.

Establishment of financial management and control in the public sector at all three levels of government in Bosnia and Herzegovina has been moving to a deadlock in the last two years, and significant changes have been seen regarding the adoption of laws and regulations related to this area.

Concerning the establishment and functionality of financial management and control in the public sector, it can be concluded that the process is very slow and spontaneous, and the fact is that we do not yet have consolidated annual financial management and control reports for 2017 published, from which we could see the degree of establishment and functionality of FUK.

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Given that the establishment of financial management and control in the public sectors at all levels of government is quite spontaneous and slow, a number of appropriate measures should be taken to speed up the process and achieve business quality, such as:

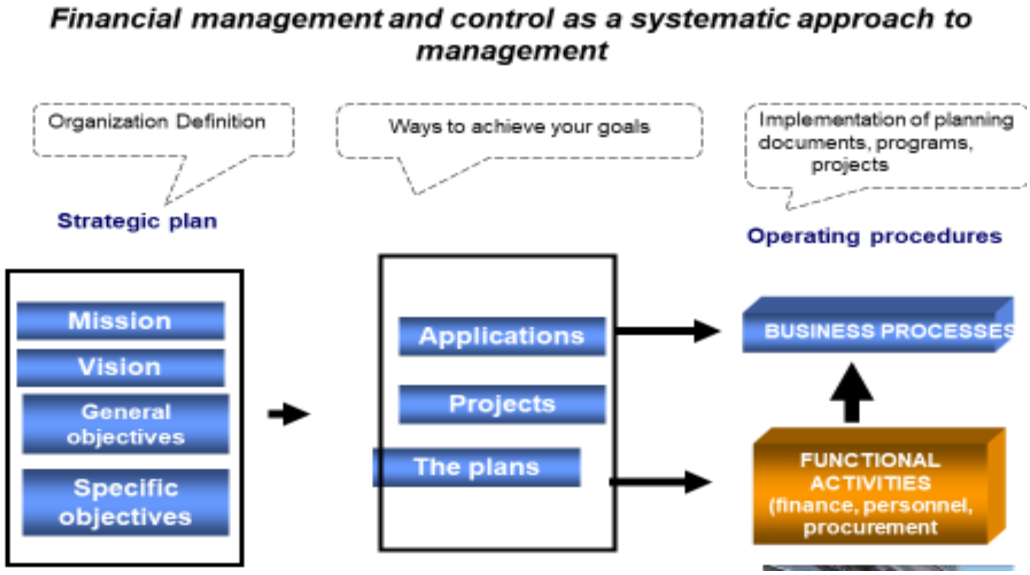
Raise awareness among public sector executives of the importance of financial management as an integral part of the public sector management process. Executives need to understand what the role of financial management and control is, and that they are solely responsible for its establishment and functionality.

Work to develop the coordination role of current sectors or public sector finance services in such a way that they take on the role of coordinator of financial management and control development,
Work on improving the accounting system within the organization, in a way to timely provide all the necessary information concerning the business, ie information on income, expenses, assets, liabilities, results of operations and the similar. Such a system provides a good basis for planning and executing budgets / budgets, controlling costs, finding ways to make some savings, dedicated use of public resources, all for the purpose of a more economical, efficient and effective business.

Attention should be paid to business risks in a way to approach to the risk management with better quality by constantly identifying potential risks. The identified risk must be constantly monitored, kept under control and timely reported.

Continuous education of financial management and control coordinators appointed by public sector executives

Maps process



3.Figure 3.Designing a process book / folder

However, given that this obligation has been imposed by the European Commission, as well as the obligation to establish a functional internal audit in the public sector, it can be expected in the future to improve the public sector business, to raise public sector managers' awareness of the importance, significance and need of financial management, controls and internal audits in the public sector.
As soon as public sector managers recognize the importance of this system, when it is not in their minds that it is merely a formal obligation to fulfil their statutory obligations, only then this system will be able to develop properly and act adequately on public sector managers in a more economical way, manage public resources more efficiently, effectively, and provide better public services.

REFERENCES:

1. Tušek, B.: Audit in the Function of Business Decision-Making and Management, Doctoral dissertation, Faculty of Economics and Business Zagreb, Zagreb, 2000.
2. B. Vukoja Corporate Audit and Analysis Management, Grude Graphic Design 2016.
3. Strategy for the Implementation of public internal financial control in the Institutions of Bosnia and Herzegovina, Council of Ministers of BiH, Sarajevo 2017.
4. Law on Financing the Institutions of BiH, Official Gazette of BiH, No. 32/13
5. Law on Financial Management and Control in the Public Sector in FBiH, Official Gazette of FBiH, No. 38/16
6. Law on the System of Internal Financial Controls in the Public Sector of Republika Srpska, published in RS Official Gazette No. 91/16.
7. Official Gazette of BiH, No. 61/14
8. BiH Official Gazette, No. 98/14
9. BiH Official Gazette, No. 29/15
10. Official Gazette of BiH, No. 77/15
11. https://www.mft.gov.ba
12. www.vijeceministara.gov.ba

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Analysis of Financial Performance of Commercial Banks in Serbia

Ivana Rađenović[1]

[1] *PhD Student, Faculty of Economics, University of Novi Sad, Republic of Serbia*
ivana.radjenovic.i@gmail.com

Abstract

The constant dynamics of the Serbian banking sector is largely conditioned by macroeconomic developments and the political situation in the country. With the arrival of foreign banks, the structure of the sector itself has changed greatly. From the former typical socialist political system when banks were precisely concentrated in certain territories and with traditionally defined areas of banking products and services, the banking sector has experienced a complete reorganization of its business with the entry of foreign capital into the domestic market.

Today, more than twenty banks, mostly foreign, operate on the territory of Serbia, and their operations set the conditions for providing banking services. Overall, the role of the National Bank of Serbia as the central regulatory unit of the banking system of Serbia is extremely important, which, with its regulations and recommendations, largely dictates the way credit and deposit institutions operate.

The business performance of commercial banks directly affects the Serbian market as a whole. Considering that market fluctuations are frequent and the prospect of business stability is uncertain, there is a clear need to analyze the performance of the banking sector as one of the key measures of the market success of Serbia as a whole. Therefore, this topic was chosen in order to analyze and define the basic parameters of the banking sector of Serbia. Methodologically, the analysis of financial performance indicators was performed with special reference to the key parameters of bank performance, but also the structure of the banking sector in order to facilitate understanding of the complexity of the issue itself.

Keywords: bank, financial performance, banking sector, National Bank of Serbia

1. Introduction

The banking sector of the Republic of Serbia consists of twenty-six banks. This number of banks for a country with 6.982 million inhabitants is at the level of the European Union average for this number of inhabitants. However, whether banks serving an average of 268,538 inhabitants of Serbia can achieve target goals as well as ensure their existence is only visible through quantitative analysis of key indicators of banking performance.

A set of mandatory financial statements gives the basis for the analysis of the success of each banking institution. Therefore, the financial statements are the starting point for the banks' financial assessment. Financial statements are financial sources of information. They report on the financial performance of commercial banks and provide a basis for assessing their achievements as a basis for projecting future business and economic performance. Financial statements are not the only ones, but certainly are the primary source of information for analysis.

Financial statements are based on generally accepted accounting principles (GAAP). A key objective of financial statements prepared under GAAP is to match revenues and expenses. Two significant conventions arise from this objective: the accrual

method of accounting and depreciation. These two conventions are significant in our intended use of financial statements for economic evaluation and business valuation purposes since they result in differences between accounting income and cash flow.[1]

Liquidity and profitability certainly are the main parameters for defining the performance of the banking system banking sector. Within profitability, we look at the return on assets (ROA) and return on equity (return on equity - ROE). It is also important to mention the importance of capital adequacy as one of the main determinants of compliance of the operations of the banking sector of Serbia and internationally prescribed standards.

The analysis of fundamental indicators developed during the observation period from 2016 to 2019 after publishing the last analytical data. How much did the pandemic of the COVID-19 virus with the accompanying economic crisis affect the stability of the banking sector and its financial performance will be visible after summarizing the effects at the end of 2020.

2. Structure of the banking sector of the Republic of Serbia

The growing dynamics of the Serbian banking sector is largely conditioned by the change in the structure of majority capital in banks from the aspect of origin. In early 2001, the first foreign bank, Raiffeisen Zentralbank Osterreich, was given a work permit from the central bank and thus started the process of changing the ownership structure of the Serbian banking sector. Consequently, foreign banking capital very quickly began to come to Serbia, which directly affected the restructuring, but also the downfall of many domestic banks.

In the transition economies of Central and Eastern Europe (CEE), financial sectors are dominated by banks rather than equity markets, even though financial systems were not functional when Communism collapsed and the banks were not able to provide intermediary services in these countries.[2] The transition of the CEE banking system started in the late 1980s and early 1990s with the emergence of a banking sector in the planned economies, which included the processes of bank privatization. In the late 1990s and early 2000s, foreign banks played a dominant role in the banking sector in the region, and capital transfer, mainly from European countries to the CEE banking sector, was accelerated.[3]

In general, foreign banks expanded their operations to Serbia by purchasing local banks. As an example of this, the Hungarian banking group OTP Group, based in Budapest, which started its operations in the territory of the Republic of Serbia in 2007, with the purchase of three banks: Niška Banka a.d. Nis, Zepter Bank a.d. Belgrade, and Kulska Banka a.d. Novi Sad. With this procedure, OTP Banka Srbija a.d. Novi Sad, which, ten years later, is building a new one large acquisition venture by taking over Vojvodjanska Banka a.d. Novi Sad - a member of the NBG group from Athens. So, one of the largest banking systems from the period of Yugoslavia with over 3000 employees, after being taken over by the National banks of Greece, today belongs to the Hungarian capital.

The diversity of the banking sector of Serbia in terms of its structure based on the origin of capital is shown not only by the number of banks with foreign capital in our country but also with their participation in the market. The fact that seven banks owned by domestic companies also operate in the banking market of Serbia should not be overlooked. For ease of understanding and further analysis:

[1] Alexander J., (2018), Financial Planning & Analysis and Performance Management (Wiley Finance), Wiley, New Jersey, USA, pg. 14

[2] Bonin, J., Hasan, I., & Wachtel, P. (2015). Banking in transition economies. In A. Berger, P. Molyneux, & J. Wilson (Eds.), The Oxford handbook of banking Oxford: Oxford University Press, pg. 746–768

[3] Antoun R., Coskun A., Georgievski B., (2018), Determinants of the financial performance of banks in Central and Eastern Europe, BEH - Business and Economic Horizons, Volume 14, Issue 3, pg. 513

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Table 1. Structure of the banking sector of the Republic of Serbia

(in billions RSD, in %)

	Number of banks	Assets		Liabilities		Network		Employees	
		Amount	%	Amount	%	Number of units	%	Number	%
Domestic Banks	**7**	**991**	**24.27%**	**181**	**25.64%**	**558**	**34.92%**	**6666**	**28.87%**
Owned by Republic of Serbia	4	686	16.80%	109	15.44%	445	27.85%	5219	22.61%
Private banks	3	305	7.47%	72	10.20%	113	7.07%	1447	6.27%
Foreign Banks	**19**	**3093**	**75.73%**	**525**	**74.36%**	**1040**	**65.08%**	**16421**	**71.13%**
Italy	2	1094	26.79%	186	26.35%	235	14.71%	4385	18.99%
Austria	2	550	13.47%	90	12.75%	186	11.64%	2749	11.91%
France	1	119	2.91%	12	1.70%	82	5.13%	933	4.04%
Hungary	2	551	13.49%	82	11.61%	239	14.96%	3284	14.22%
Other	12	779	19.07%	155	21.95%	298	18.65%	5070	21.96%
TOTAL	**26**	**4084**	**100.00%**	**706**	**100.00%**	**1598**	**100.00%**	**23087**	**100.00%**

Based on: National Bank of Serbia, Banking Supervision Department (2020), Banking Sector of Serbia - Report for the fourth quarter of 2019, Belgrade, Republic of Serbia, pg. 3

In the previous table, it is evident that as many as 73% of banks in Serbia are of foreign origin with a share in total assets sector of 75.73%, while banks with the domestic capital account are with only 24.27% of total assets. It is similar to the capital where the ratio of participation of domestic and foreign banks is almost identical. Observing the business network and the number of business units, the percentage share is somewhat different. In the structure of domestic banking capital, there are four state-owned banks as well as Komercijalna Banka AD Beograd which has actively expanded its business network during its fifty years of operation, makes up the vast majority in the number of branches and affiliates which increased the percentage in the total share. Also, a large number of employees in the banking sector continue to work for domestic owners.

Looking at the category of assets in the balance sheet, the ten largest banks in Serbia are as follows:

Table 2. Ranking list of the ten largest banks according to the criteria of balance sheet assets in the Republic of Serbia on 31/12/2019

(in billions RSD, in %)

No.	Bank	31.12.2019.	
		Amount	%
1	Banca Intesa AD Beograd	653	16.00%
2	Unicredit Bank Srbija AD Beograd	442	10.80%
3	Komercijalna banka AD Beograd	432	10.60%
4	OTP Banka Srbija AD Beograd (ex.Societe Generale banka AD Srbija)	336	8.20%
5	Raiffeisen Bank AD Beograd	319	7.80%
6	Erste Bank AD Novi Sad	231	5.70%
7	Banka Poštanska štedionica AD Beograd	228	5.60%
8	Agroindustrijsko komercijalna banka AIK banka AD Beograd	224	5.50%
9	Vojvođanska banka AD Novi Sad	215	5.30%
10	Eurobank AD Beograd	177	4.30%
	TOTAL	**3257**	**79.80%**

Based on: National Bank of Serbia, Banking Supervision Department (2020), Banking Sector of Serbia - Report for the fourth quarter of 2019, Belgrade, Republic of Serbia, pg. 5

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The first ten banks according to the category of balance sheet assets include three banks with the domestic origin of capital, two in-state, and one in private ownership. These ten banks account for 79.80% of the total balance sheet assets of the banking sector of the Republic of Serbia.

According to the table above, it is clear that OTP Banka Srbija, with the takeover of Societe Generale Banka AD Srbija, which ceased to operate in the Republic of Serbia, Vojvodjanska Banka AD Novi Sad, and its existing assets, became one of the largest banks in the sector. Considering that the stated situation is from December 31, 2019, it remains to be seen how much the structure of the Serbian banking sector will be changed at the end of 2020, a year that was turbulent for the financial sector as a whole. This structure of the banking sector indicates the fact that capital and business volume are concentrated in one-third of the banks that make up the entire sector. Consequently, there is a disappearance of small banks that are unable to respond to the challenges of much stronger competition.

3. Key financial performance indicators of commercial banks in Serbia

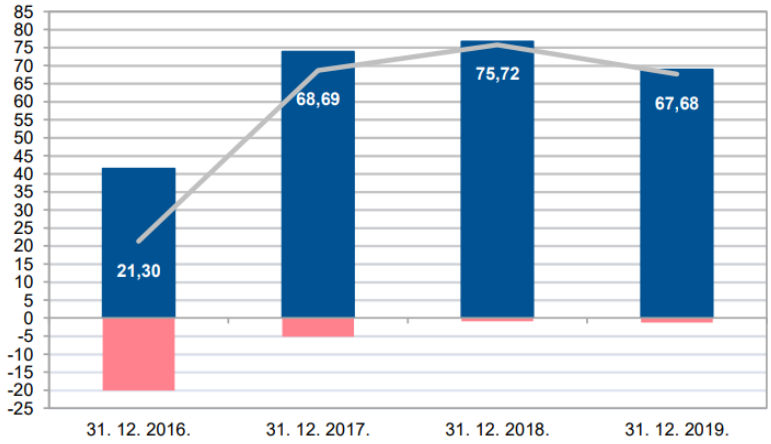
3.1. Profitability

The profitability of the banking sector is often one of the main observation parameters in defining the performance of banks. Higher profitability not only allows banks to generate funds to grant more credit to the economy but is also important for regulators as it guarantees more flexible capital ratios, even in a riskier business environment.[4]

Observing the banking sector of Serbia in the last few years, through profit before tax, it is evident that banks at the end of 2019 profited in a lower amount compared to the previous year, which is shown in the following chart:

Figure 1. Profit before taxation of the banking sector of Serbia in the period from 2016 to 2019

(in billions RSD)



Based on: National Bank of Serbia, Banking Supervision Department (2020), Banking Sector of Serbia - Report for the fourth quarter of 2019, Belgrade, Republic of Serbia, pg. 6

Unlike in 2016, when a certain number of banks made a loss in a slightly smaller amount than the sum of the profits of other banks, the situation in 2018 and 2019 is significantly different. Namely, at the end of 2019, banks in Serbia made a profit before taxes of 67.88 billion dinars.

The main parameters of the profitability of the banking sector are two rates of return - the rate of return on assets (ROA) and the rate of return on capital (return on equity - ROE). The rate of return on assets is calculated by relating net income to total assets,

[4] Trujillo-Ponce A., (2013), What determines the profitability of banks? Evidence from Spain, Accounting and Finance 53, Wiley, pg. 562

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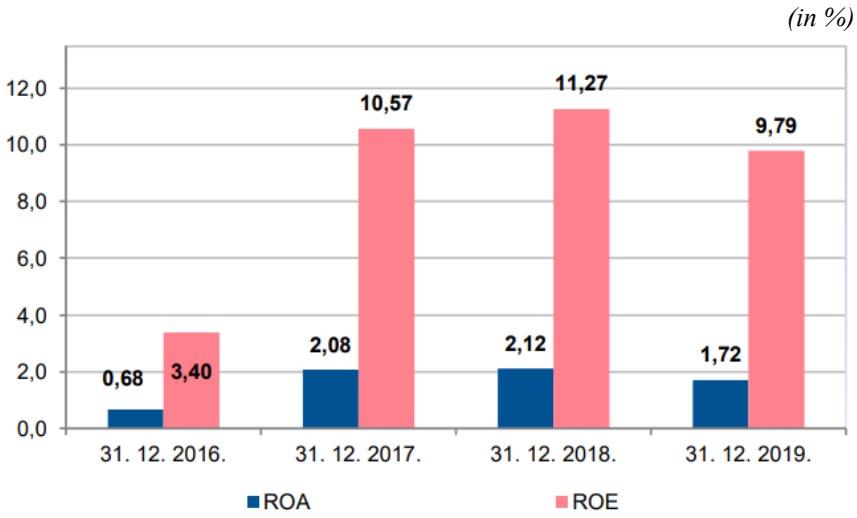
while the rate of return on capital is calculated by dividing net profit by capital. These indicators are realistic parameters of profitable business performance.

The movement of ROA and ROE in the banking sector of the Republic of Serbia in the period from 2016 to 2019 can also be graphically displayed:

Figure 2. Profitability indicators of the banking sector



Based on: National Bank of Serbia, Banking Supervision Department (2020), Banking Sector of Serbia - Report for the fourth quarter of 2019, Belgrade, Republic of Serbia, pg. 7

The figure shows that the observed rates of return on assets and capital since 2017 are at a relatively stable level, which means that the banking sector of Serbia, as a whole, earns more than it invests and successfully manages its business. The situation was somewhat different in 2016 when these percentages were at a significantly lower level, which explains the general prosperity of Serbian banking in the previous three years.

3.2. Liquidity

One of the main parameters of banks' success is the bank's ability to respond to its short-term liabilities as soon as possible. The concept of bank liquidity is often given special attention because long-term illiquidity, for example, insolvency is one of the main reasons for initiating bankruptcy over a bank, which can affect the stability of the financial system of the state as a whole.

Well-functioning financial institutions are essential for economic growth, while poorly functioning financial institutions can contribute to economic losses, leading to poverty in developing countries. Central banks also depend on financial markets and institutions for their monetary policy operations to stimulate or cool down economies and to help control inflation and prevent deflation.[5]

According to the National Bank of Serbia, the banking sector of Serbia has significant surpluses of liquid assets in a longer period, if the reference values of liquidity indicators are taken into account. Looking at the data from 2019, the average monthly liquidity ratio of banks at the end of the first quarter of 2019 is 2.18 and is twice as higher than the regulatory minimum of 1.0.

Starting from January 1st, 2018, banks are required to maintain this indicator at a level not lower than 100% (prescribed minimum values are the same as in the European Union). As of 31st March 2019, the coverage ratio with liquid assets at the level of the banking sector was 209.76%.

[5] Cooperman E.S, (2016), Managing Financial Institutions: Markets and Sustainable Finance, Routledge, Part I, Module 1

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3.3. Capital adequacy

The liquidity parameter, as well as the capital adequacy of the bank, are especially relevant in the harmonization of domestic regulations and recommendations of the central bank with international regulatory bodies. The banks' capital adequacy is highly important in the analysis of the banks' exposure to different types of risks. Currently, the banking sector of Serbia is adequately capitalized and is in the phase of introducing the Basel III standard.

Financial risk covers credit risk, liquidity risk and operational risk, which banks face during their operations and these risks have a severe impact on the profitability of banks. The Basel Committee for Banking Supervision (BCBS) introduces Capital Adequacy Ratio (CAR) to overcome uncertainties/ losses (Risk) to the banks.[6]

According to the Decision on Capital Adequacy of the National Bank of Serbia and following Basel Standards, the Bank is obliged to maintain basic capital adequacy ratios at levels not lower than:

1) 4.5%, for the Bank's share capital adequacy ratio;
2) 6%, for the indicator of the capital adequacy of the bank;
3) 8% for the bank's capital adequacy ratio.

Basel standards form the backbone of modern banking. The importance of applying the Basel Standards is most obvious in the business of international banks, for whose, uniform operations and equality of business regulation in different countries are very important because, although financial markets are essentially global and international, their control systems remain within the competence of individual states. With the introduction of the Basel standards, the regulation of the banking sector of Serbia gained an international dimension, and foreign banks the opportunity to expand their business to this territory.

4. Conclusion

The constant dynamics of the macroeconomic environment of the banking sector of the Republic of Serbia has caused, to a large extent, the need for constant analysis of the performance of Serbian banking as a whole. The high percentage of foreign capital in the ownership structure directly affected the adjustment of the domestic sector to foreign regulations and recommendations of regulatory bodies.

The stability and success of the banking system and the entire economy of a country largely depends on reliable risk management process. An unstable banking sector directly threatens the macroeconomic system, and the consequences of this can be felt outside the home territory. Also, the efficiency of the country's banking system is an adequate parameter for assessing the dynamics of the country's economy.

Although there are a large number of banks operating in a relatively small area, the ones operating here are satisfied with the current distribution of Serbian "banking cake" and have a business perspective. However, we should not ignore the fact that almost 80% of the total balance sheet assets of the banking sector belong to the ten largest banks, which are mostly of foreign origin.

Constant racing across a wide range of products and services, focusing on digital banking, setting high targets for employees, and respecting measures and regulations of the National Bank of Serbia as the central regulatory unit of the observed sector, are directly related to business performance indicators in Serbia.

Based on key performance indicators, the general conclusion is that commercial banks in Serbia operate profitably with high levels of liquidity and capital adequacy to respond to all unforeseen circumstances, as well as to neutralize the negative (side) effects.

The extent to which this trend of success of the Serbian banking sector will continue, given the market shock in 2020 when the viral pandemic caused global market fluctuations and when more developed economies are struggling to restore stability, remains to be seen in the coming period.

[6] Rafique A., Quddos M.U., Akhtar M.H., Karim A., (2020), Impact of Financial Risk on Financial Performance of Banks in Pakistan; the Mediating Role of Capital Adequacy Ratio, Journal of Accounting and Finance in Emerging Economies, CRSC Publishing, Center for Sustainability Research and Consultancy

By IAI ISSN 2671-3179

Literature

Alexander J., (2018), Financial Planning & Analysis and Performance Management (Wiley Finance), Wiley, New Jersey, USA

Antoun R., Coskun A., Georgievski B., (2018), Determinants of the financial performance of banks in Central and Eastern Europe, BEH - Business and Economic Horizons, Volume 14, Issue 3

Bonin, J., Hasan, I., & Wachtel, P. (2015). Banking in transition economies. In A. Berger, P. Molyneux, & J. Wilson (Eds.), The Oxford handbook of banking Oxford: Oxford University Press

Cooperman E.S, (2016), Managing Financial Institutions: Markets and Sustainable Finance, Routledge

Dukić Mijatović, M., (2009), Harmonization of banking legislation of the Republic of Serbia in the light of the impact on the development of the mortgage and financial market, Law and Economy, no. 5-8 / 2009

Knežević S., Živković A., (2017), Financial raid for commercial banks and decision making, Proceedings of EKONbiz, Faculty of Business Economics Bijeljina, University of East Sarajevo

National Bank of Serbia, Banking Supervision Division (2020), Banking Sector of Serbia - Report for the fourth quarter of 2019, Belgrade, Republic of Serbia

National Bank of Serbia, Decision on Capital Adequacy of the National Bank of Serbia ("Official Gazette of RS", No. 103/2016, 103/2018, 88/2019, 67/2020 and 98/2020

Rafique A., Quddos M.U., Akhtar M.H., Karim A., (2020), Impact of Financial Risk on Financial Performance of Banks in Pakistan; the Mediating Role of Capital Adequacy Ratio, Journal of Accounting and Finance in Emerging Economies, CRSC Publishing, Center for Sustainability Research and Consultancy

Trujillo-Ponce A., (2013), What determines the profitability of banks? Evidence from Spain, Accounting and Finance 53, Wiley