# АНАЛИ

## ЕКОНОМСКОГ ФАКУЛТЕТА У СУБОТИЦИ

## THE ANNALS OF THE FACULTY OF ECONOMICS IN SUBOTICA

Vol. 58
ISSN 2683-4162 (online)
УДК 330

48
2022

ЕКОНОМСКИ
ФАКУЛТЕТ
У СУБОТИЦИ
Универзитет
у Новом Саду

# Анали
## Економског факултета у Суботици

број 48

Суботица, 2022. године

Назив издања:
Journal:

# Анали Економског факултета у Суботици

The Annals of the Faculty of Economics in Subotica

**Vol. 58, број 48/2022, ISSN 0350-2120, e-ISSN 2683-4162, УДК 330**

За издавача:
For Publisher:

**Небојша Гвозденовић,** Декан - Dean
nebojsa.gvozdenovic@ef.uns.ac.rs

Редакција:
Editorial Office:

**Агнеш Славић,** главни и одговорни уредник - Editor in Chief
agnes.slavic@ef.uns.ac.rs

**Марко Алексић,** секретар редакције – Journal Secretary
anali@ef.uns.ac.rs

Техничка подршка:
Technical support:
**Александар Вугделија,** Универзитет у Новом Саду, Економски факултет у Суботици

Језичка редакција:
Language lector:
Лектор и коректор за енглески језик:
**Жељко Буљовчић**

Издавач:
Publisher:
**Универзитет у Новом Саду**
**Економски факултет у Суботици**
http://www.ef.uns.ac.rs

Корице:
Front cover:
**Економски факултет у Суботици**

Тираж:
Issue:
100 примерака

Штампа:
Press:
Епоха д.о.о., Пожега

ISSN: 0350-2120
e-ISSN: 2683-4162

По решењу Министарства за информације Републике Србије бр. 651-576/96-03

Адреса редакције:
Editorial Office:
Економски факултет у Суботици
Сегедински пут 9-11, 24000 Суботица
Телефон: 024/628-000

CIP - Каталогизација у публикацији
Библиотека Матице српске, Нови Сад

378.633(497.113 Subotica)
330
**ANALI Ekonomskog fakulteta u Subotici** = The Annals of the Faculty of Economics in Subotica / glavni i odgovorni urednik Agneš Slavić. – 1965, 1 – 1976, 6 ; 1981, 7 ; 1996, 1 – . – Subotica : Ekonomski fakultet, 1965-1976; 1981; 1996–. – 24 cm

Dva puta godišnje.
ISSN 0350–2120

COBISS.SR–ID 16206850

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**Оригинални научни рад**
Original scientific article

UDC: 659.113.25:631.147(497.11)
DOI: 10.5937/AnEkSub2248003G
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 003-014
Received: 24/08/2021
Accepted: 07/03/2022

# Socio-demographic profile of organic food consumers in the Republic of Srpska

## Социо-демографски профил потрошача органске хране у Републици Српској

**Jovana Galić**

PhD student, University Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia, jovana.galic@gmail.com

**Abstract:** The aim of this research is to determine the profile of organic food consumers in the Republic of Srpska according their socio-demographic characteristics and to analyse if there is a significant relation between consumer education level and intention to purchase organic food. For this purpose, a questionnaire was developed and a survey was conducted on a random representative sample. Consumers were segmented according to their purchase habits and a profile was developed for each segment. The results show that different socio-demographic characteristics partly determine each profile and that education level has a positive and low significant relation with intention to purchase organic food.
**Keywords:** organic food, consumer behaviour, education, socio-demographic profile, the Republic of Srpska
**JEL classification:** M30, M31

**Сажетак:** Циљ овог истраживања је да утврди профил потрошача органске хране у Републици Српској и његове социо-демографске карактеристике и да утврди да ли постоји значајна релациона веза између нивоа образовања потрошача и намјере за куповину органске хране. За ову сврху израђен је упитник и извршено испитивање на случајном и репрезентативном узорку. Потрошачи су сегментирани у складу са њиховим куповним навикама и израђен је профил потрошача за сваки сегмент. Резултати показују да социо-демографске карактеристике дјелимично одређују различите профиле потрошача и да ниво образовања има позитивну и слабу релацију са намјером куповине органске хране.

**Кључне речи:** органска храна, понашање потрошача, образовање, социо-демографски профил, Република Српска
**ЈЕЛ класификација**: M30, M31

## Introduction

Food safety is considered as one of the most important issues in food production and processing. For that purpose, organic products are produced based on the use of renewable resources and protection the quality of land and water (Tankosić & Hanić, 2019). In

Republic of Srpska, organic production rules are set up by law in 2013[1] to regulate the production of agricultural and other products by organic production methods, define goals and principles of organic production, control and certification, as well as all other actions and issues necessary for this type of production (processing, marking and packages, storage, transport, trade, import, export, etc.) Additionally, a set of rulebooks in the form of a bylaws was adopted with the purpose of defining organic production in more detail.

Data for 2018 show that 28 producers of organic food are registered in Republic of Srpska, the largest number of which is the collective production of forest fruits, medicinal herbs and mushrooms. Large producers with a wide range of organic food offerings are not registered. In the same year, eight organic producers and processors exported to the European Union countries, Switzerland and Canada. Considering geographical position, climate and land quality, the Republic of Srpska has a significant potential for organic production, but the current volume of production shows its initial phase of development. In the same phase of the development are market, supply and demand, implementation of certificates and declarations, as well as educating consumers about the importance of organic food in healthy eating. The aim of this paper is to perform consumer segmentation through empirical research based on a representative sample, to determine the consumer profile based on their socio-demographic characteristics and examine the impact of consumer education level on organic food consumption frequency. Attitudes about the reasons why consumers buy organic food, the organic food consumption frequency and the level of price they are willing to pay for organic food will be also examined. The research results are applicable in practice and can be used in marketing strategies or managerial decision making.

## 1. Literature review

The Research Institute of Organic Agriculture in Switzerland (FIBL) publishes reports with status and capacities of organic agriculture worldwide. According to the data, organic production is in progress and in 2018 includes 2.8 million producers. Most producers are located in Asia (47%), followed by Africa (28%), Europe (15%) and Latin America (8%). The countries with the most producers are India. Uganda and Ethiopia (FIBL, 2020). There are 71.5 million hectares of land under organic agricultural production in 2018 and the region with the largest areas of agricultural land for organic production is Oceania (36 million hectares, which is half of the world's agricultural land for organic production), then Europe (22 million hectares, 22%), Latin America (11%) and Asia (9%). At the level of Europe, Spain has the most agricultural land for organic production, followed by France, Italy and Germany, while Bosnia and Herzegovina ranks the 40$^{th}$ place (FIBL, 2020).

According to FIBL data, organic production in Bosnia and Herzegovina in 2016 was present on 659ha, which makes 0.03% of the total arable land, while the collection of wild plant species took place on 50.250 ha (Ministry of Foreign Trade and External relations of BiH, 2018). Data for 2018 shows that the area of organic agricultural land is 896ha, which

[1] The Organic Production Law, *The Official Gazette of the Republic od Srpska*

is 26.5% more than in 2016 (FIBL, 2020). 546ha out of 896ha have been fully converted and 350ha are currently under conversion (FIBL, 2020). The value of exported organic products from Bosnia and Herzegovina in 2017 to foreign markets was valued in the amount of EUR 4 million, which is 14% more than the value of export in the previous year, but doubled compared to the value of export in 2015 (Ministry of Foreign Trade and External relations of BiH, 2018). In 2018, Bosnia and Herzegovina had 251 registered organic producers. The trend of growth is present in both production and export, but it is still below the limit of its possibilities. Global sales of organic food and beverages have had significant growth in the last 15-20 years, and the demand for organic food products is higher than supply (Tankosić & Hanić, 2019). Organic food consumption is brought to a connection with socio-demographic characteristics of consumers in a number of studies. Profiling organic food consumers using such characteristics has significant repercussions when determining other elements of marketing strategy (Đokić & Milićević, 2016, p. 66).

According to previous research, consumers who use traditional and organic food in Bosnia and Herzegovina are most often women aged between 36 and 55, with secondary education who live in large households (with two children) and with average income (Nikolić et al., 2014). Women are more frequent producers of organic food, too (Mujčinović et al., 2017). The most consumers in the Republic of Srpska buy fresh fruits and vegetables in markets and supermarkets (53.7%), then in grocery stores (35.6%) and fresh produce markets are in the last place (25.7%) (Sudarević & Galić, 2021). Consumers in Croatia most often purchase organic fruits and vegetables compared to the other organic products (Radman, 2005).

In Serbia, organic food market is dominated by female consumers, aged under 40, university-educated respondents that live in household up to four members, with monthly income between EUR 500 and EUR 1,000, and the most numerous are those living in the city (Tankosić & Hanić, 2019, p. 189-190). Women who prefer organic food are most often married and have children; they strongly value the importance of diet for health and many of them encountered the disease of a close person, which is believed that could have been prevented by proper diet (Grubor & Djokic, 2016). Of the total number of respondents, 78.1% already use organic agricultural products, 85.2% live in cities, 74.6% buy products for the whole family once or several times a month and they are willing to pay between 10% and 20% higher price if they estimate that the nutritional value of organic products is higher (Kranjac et al., 2017; Tankosić & Hanić, 2019). Consumers buy organic products because they are generally estimated to have a positive effect on the health of consumers (and their families) and because of belief that organic food has no pesticide residues of has very few (Sudarević & Radojević, 2018).

Some studies point that the gender of the respondents has no influence on the propensity to consume organic food or provides completely different consumer profile than previously mentioned, as it is most often a middle-aged or older, well-educated family man (Peric et al., 2017). The differences are result of sampling primarily from different sources and then due to application of different research instruments and methods, so there is no unique conclusion about who are actually consumers of this type of food (Grubor, Đokić, et al., 2018).

H1: Profile of organic food consumers in the Republic of Srpska is dependent on their socio-demographic characteristics.

With the growth of variables such as the amount of income (Witek & Kuźniar, 2021) and level of education (Radman, 2005; Grubor, Milicevic, et al., 2018) the frequency of using organic food products in the diet is also growing (Sudarević & Radojević, 2018). Both actual and potential organic food consumers can be associated with the increased income and especially with a higher level of education (Đokić & Milićević, 2016). Consumers with higher education point out friends and relatives as the most common source of information about organic products and engage in conversation with the retail staff (Peric et al., 2017). Therefore, consumer education must become one of the first goals of organic producers (Radman, 2005).

H2: The level of education is in a positive and significant relation with intention to purchase organic food products.

A number of studies emphasize the importance of geographical origin labels and organic production certificates (Končar et al., 2019; Mujčinović et al., 2016; Končar et al., 2018; Filipovic et al., 2021). More than half consumers in Bosnia and Herzegovina are familiar with the labels that indicate organic (Mujčinović et al., 2016) and express a high probability that they would buy more often at the fresh produce markets if the stalls with domestic and organic food would be labelled and if products would have declarations of origin and health certificates (Sudarević & Galić, 2021).

Also there are consumers who are either not sufficiently familiar with the labelling of organic origin products or they are familiar, but give more confidence to their own assessment and procurement from safe sources (such as local farms – well known small producers) (Filipovic et al., 2019). Some consumers state that there is no significant confidence in the conversation with the seller of organic food (Peric et al., 2017). Related to this, it could be assumed that consumers made their own assessment that purchased products were organically grown (Radman, 2005).

## 2. Methodology

A survey based on questionnaire has central role in this research and it consists of several parts. Most of the questions are closed with one option answer, but some of them are combined giving space to respondents to choose multiple answers or write their own answers.

The analysis of the results was performed by mathematical and statistical calculations, and the conclusions were drawn by the methods of synthesis and induction. Descriptive analysis was performed to describe the used sample. Then, consumers were segmented into 3 segments according to previous buying behaviour related to organic food purchase. All segments were tested with Chi-Square Test and Kruskal-Wallis Test, depending on variable types. To examine importance of past and future purchase behaviour, segments were tested with Chi-Square Test and Mann-Whitney Test depending on variable

types. Spearman's Correlation Coefficient Test was used for testing H2. Significance is p=0.05. Calculations were done in IBM SPSS Statistics 20.

The research was conducted in the period from 21st January to 1st February 2021. Answers were collected online and the sample contains answers from the Republic of Srpska respondents only. The sample is random and contains 564 respondents that can be considered as representative sample. Of the total number of respondents, 66.7% are female and 33.3% are male. All age groups are represented and the largest part of the sample (37.9%) are respondents between 30 and 40 years old. Geographically, all regions from the Republic of Srpska are not equally represented, the most of respondents are from the city of Gradiška (53.0%) and Banja Luka (24.9%). The respondents were questioned about different socio-demographic variables and the most common answer based on employment – mostly employed in the private sector 49.8%; education – 53% secondary and 44.3% higher education; household size – with four members 33% and with three members 24.1%; 42.40% of all respondents have a total household income between BAM 1,000 and BAM 2,000.

Disadvantages and limitations of the sample are reflected in the fact that a large part is respondents with higher level of education, due to the way that the research was conducted (online) and computes are most often used by educated people.

## 3. Data analysis and discussion

Based on attribute characteristics and the answer to the question: "Do you buy organic food products?" respondents are segmented into three clusters The survey showed that 88.12% of respondents know what organic products are, 11.70% have heard of organic products but do not fully know what organic products are and 0.18% of all respondents said they do not know what organic products are (Table 1):

- S1 – the first segment consists of respondents who buy organic food products,
- S2 – the second segment consists of respondents who occasionally buy organic food products and
- S3 – the third segment consists of respondents who stated that they do not buy organic food products.

*Table 1: Segmentation of respondents*

| | **S1** | **S2** | **S3** |
|---|---|---|---|
| Segment population: | 176 | 333 | 55 |
| Percentage in total number of respondents: | 31.04% | 58.73% | 9.70% |

*Source: the authors' research*

The most numerous segment is S2 with a share of 58.73% of the total number of respondents. In line with this is research conducted in Croatia, where about 35% of respondents claimed to buy organically-grown foods either "often" or "very often", 43%

buy such products "rarely" and 22% of respondents either did not buy or they buy organic food very rarely (Radman, 2005).

*Table 2: The results of socio-demographic variables that differ by segments*

| variable | S1 | | S2 | | S3 | | Tests |
|---|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent | |
| Gender: | | | | | | | Chi-Square Test |
| Female | 121 | **68.75%** | 228 | **68.47%** | 27 | 49.09% | $\chi^2$ (df=2) =8.476; **p=0.014** |
| Male | 55 | 31.25% | 105 | 31.53% | 28 | **50.91%** | **significant** |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | |
| Age | | | | | | | |
| less than 20 years | 5 | 2.84% | 5 | 1.50% | 2 | 3.64% | Kruskal-Wallis Test |
| | | | | | | | $c^2$ (2, n=564) = 3.735; |
| 20-30 years | 35 | 19.89% | 62 | 18.62% | 5 | 9.09% | **p=0.154** |
| 30-40 years | 63 | **35.80%** | 134 | **40.24%** | 17 | 30.91% | S1: Md=3 |
| 40-50 years | 43 | 24.43% | 90 | 27.03% | 23 | **41.82%** | S2: Md=3 |
| 50+ years | 30 | 17.05% | 42 | 12.61% | 8 | 14.55% | S3: Md=4 |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | **Not significant** |
| Education level | | | | | | | Kruskal-Wallis Test |
| | | | | | | | $c^2$ (2, n=564) = 4.307; |
| Primary | 3 | 1.70% | 6 | 1,80% | 0 | 0.00% | **p=0.116** |
| Secondary | 84 | 47.73% | 179 | **53.75%** | 36 | **65.45%** | S1: Md=3 |
| University | 86 | **48.86%** | 145 | 43.54% | 19 | 34.55% | S2: Md=2 |
| Scientific titles | 3 | 1.70% | 3 | 0.90% | 0 | 0.00% | S3: Md=2 |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | **Not significant** |
| Household size: | | | | | | | Kruskal-Wallis Test |
| | | | | | | | $c^2$ (2, n=564) =1.173; |
| 1 member | 12 | 6.82% | 18 | 5.41% | 1 | 1.82% | **p=0.556** |
| 2 members | 30 | 17.05% | 54 | 16.22% | 8 | 14.55% | S1: Md=4 |
| 3 members | 42 | 23.86% | 78 | 23.42% | 16 | **29.09%** | S2: Md=4 |
| 4 members | 53 | **30.11%** | 119 | **35.74%** | 14 | 25.45% | S3: Md=4 |
| 5 or more members | 39 | 22.16% | 64 | 19.22% | 16 | **29.09%** | **Not significant** |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | |
| Frequency of food purchase | | | | | | | Kruskal-Wallis Test |
| | | | | | | | $c^2$ (2, n=564) =5.413; |
| Every day | 67 | 38.07% | 131 | **39.34%** | 14 | 25.45% | **p=0,067** |
| 1 time a week | 29 | 16.48% | 64 | 19.22% | 15 | 27.27% | S1: Md=2 |
| 2-3 times a week | 75 | **42.61%** | 128 | 38.44% | 23 | **41.82%** | S2: Md=2 |
| rare or never | 5 | 2.84% | 10 | 3.00% | 3 | 5.45% | S3: Md=2 |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | **Not significant** |

*Source: the authors' research*

In order to obtain a consumer profile, socio-demographic variables were associated with each segment to which respondents belong and out of eight total variables, five gave different results by segments (Table 2) and three gave the same results in all three segments (Table 3). Segments S1, S2 and S3 provided three consumer profiles P1, P2 and P3, which differ by gender, age, level of education, number of household members in which they live, as well as frequency of food purchases, while the results of following variables are identical: employment status, the amount household income and percentage of utilization of the household budget for the purchase of foodstuff.

The first profile – P1 – is a consumer who buys organic food products. According to the results it is a female person with age between 30 to 40 and high education level, lives in four-member household and buys food 2-3 times a week. The second profile – P2 – is a consumer who occasionally buys organic food products. According to the results it is a female person with age between 30 to 40 and secondary school education, lives in a four-member household and buys food every day. The female is most often organic food buyer according to previous research (Witek & Kuźniar, 2021; Tankosić & Hanić, 2019). It is shown that age have effect on shopping decisions and that occasional and frequent buyers of organic food are younger and middle-aged people (Tankosić & Hanić, 2019). Members of Generation Y are aware of the importance of environmental and social characteristics of products (Marić & Milovanov, 2015).

The third profile – P3 – is a consumer who does not buy organic food products. According to the results it is a male person with age 40 to 50 and secondary school education who lives in large family and buys food 2-3 times a week.

The common feature of all three profiles is that a consumer is employed (works in the private sector), their monthly income of household is between BAM 1,000 and BAM 2,000, and they spend from 31% to 50% of the household budget on food. According to the test results (Table 2 and Table 3) the gender has significance as socio-demographic variable, but age, education, household size and frequency of food purchase do not have statistical significance, as well as employment status, the amount of household income and utilization percentage of the household budget for the purchase of foodstuffs. Variables do differ by segments, but its differences are not statistically significant in all variables.

Hypothesis H1: Profile of organic food consumers in the Republic of Srpska is dependent on their socio-demographic characteristics is partly confirmed.

Past organic food purchase behaviour and consumers intention related to organic food purchase are also analyzed by segments (Table 4). For this part of the research, only two segments, S1 and S2, were tested. Segment S3 was not considered because these consumers stated that they do not buy organic food. Both consumer profiles (P1 and P2) stated that the most common reason for purchasing organic food is health (P1: 44.54%, P2: 49.73% of the segment population).

The variability of the answers to this question is 47.90%. The Chi-Square Test showed that there is no statistically significant difference between segments regarding the reasons why consumers purchase organic food. Health is the most common reason for

consuming organic food, which is confirmed in numerous previous studies (Aertsens et al., 2009; Sudarević & Radojević, 2018; Thøgersen et al., 2015).

*Table 3: The results of socio-demographic variables that do not differ in segments*

| variable | S1 | | S2 | | S3 | | Tests |
|---|---|---|---|---|---|---|---|
| | N | Percent | N | Percent | N | Percent | |
| Employment status: | | | | | | | |
| Unemployed | 34 | 19.32% | 51 | 15.32% | 8 | 14.55% | Chi-Square Test |
| Student | 5 | 2.84% | 19 | 5.71% | 2 | 3.64% | $\chi^2$ (df=8) =8.150; **p=0.419** |
| Employed/private sector | 84 | **47.73%** | 167 | **50.15%** | 30 | **54.55%** | S1: Md=3 |
| Employed/government | 38 | 21.59% | 82 | 24.62% | 12 | 21.82% | S2: Md=3 |
| Retired | 15 | 8.52% | 14 | 4.20% | 3 | 5.45% | S3: Md=3 |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | **Not significant** |
| Household income: | | | | | | | |
| up to BAM 1,000 | 44 | 25.00% | 90 | 27.03% | 19 | 34.55% | Kruskal-Wallis Test |
| BAM 1,001-2,000 | 77 | **43.75%** | 138 | **41.44%** | 24 | **43.64%** | $c^2$ (2, n=564) =2.288; **p=0.318** |
| BAM 2,001-3,000 | 39 | 22.16% | 64 | 19.22% | 6 | 10.91% | S1: Md=2 |
| BAM 3.001 and more | 16 | 9.09% | 41 | 12.31% | 6 | 10.91% | S2: Md=2 S3: Md=2 |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | **Not significant** |
| Percentage of budget used for food purchase | | | | | | | Kruskal-Wallis Test |
| up to 30% | 52 | 29.55% | 92 | 27.63% | 20 | 36.36% | $c^2$ (2, n=564) =3.437; **p=0.179** |
| 31%-50% | 71 | **40.34%** | 168 | **50.45%** | 26 | **47.27%** | S1: Md=2 |
| 51%-70% | 44 | 25.00% | 64 | 19.22% | 8 | 14.55% | S2: Md=2 |
| 70% and more | 9 | 5.11% | 9 | 2.70% | 1 | 1.82% | S3: Md=2 |
| | **176** | **100%** | **333** | **100%** | **55** | **100%** | **Not significant** |

*Source: the authors' research*

Consumers from S1 stated that it is necessary that all food in diet should have organic origin (55.68% of the segment, Md=1), while consumers from S2 stated that it is desirable to eat organic food products as much as possible (66.07% of the segment, Md=2). Mann-Whitney Test showed that there is statistically significant difference between segments regarding consumers' opinion how many organic products should be included in daily diet.

*Table 4: Past organic food purchase behaviour and purchase intentions*

| **The reason why you purchase organic food.** | S1 | | S2 | | |
|---|---|---|---|---|---|
| better taste | 57 | 16.38% | 77 | 13.97% | Chi-Square Test |
| health | 155 | **44.54%** | 274 | **49.73%** | $\chi 2$ (df=5) =10.102; **p=0.072** |
| freshness | 37 | 10.63% | 59 | 10.71% | |
| nutrition | 65 | 18.68% | 75 | 13.61% | |
| environment | 34 | 9.77% | 60 | 10.89% | **Not significant** |
| other | 0 | 0.00% | 6 | 1.09% | |
| variability | | 47.34% | | 47.39% | |
| | | 47.90% | | | |
| **Your intention to purchase organic food is:** | | | | | Mann-Whitney Test Z=-5.096; **p=0,001** |
| Yes, it is necessary that all diet is organic | 98 | **55.68%** | 108 | 32.43% | S1: Md=1 S2: Md=2 |
| Yes, it is preferable to consume organic products in diet as much as possible | 78 | 44.32% | 220 | **66.07%** | **Significant** |
| no, it is not necessary | 0 | 0.00% | 5 | 1.50% | |
| variability | | 34.42% | | 27.94% | |
| | | 32.69% | | | |
| **Your intention to pay higher price for organic food?** | | | | | Mann-Whitney Test Z=-4.244; **p=0.001** |
| No | 5 | 2.84% | 17 | 5.11% | S1: Md=3 |
| Yes, up to 10% higher | 60 | 34.09% | 153 | **45.95%** | S2: Md=2 |
| Yes, up to 20% higher | 43 | 24.43% | 100 | 30.03% | |
| Yes, no matter how high price | 68 | **38.64%** | 63 | 18.92% | **Significant** |
| variability | | 30.68% | | 32.16% | |
| | | 33.53% | | | |

*Source: the authors' research*

S1 consumers are willing to purchase organic food regardless the price (38.64% of the segment, Md=3), while S2 are usually willing to pay up to 10% higher price compared to the price of commercial products (45.95% of the segment, Md=2). Mann-Whitney Test showed that there is statistically significant difference between segments regarding consumers' willingness to pay higher price for organic food. This results are in line with previous research, indicating that there is a niche on every market where consumers are willing to pay higher price for organic products (Sudarević & Radojević, 2018).

For testing hypothesis H2, education level of the total number of respondents (n=564) was compared with intention to purchase organic food and to pay higher price for organic products. In previous testing, these variables showed significant differences in segments. Spearman's Correlation Coefficient Test resulted in positive weak and

statistically significant correlation between variables “education level” and “intention to pay higher price for organic products” $\rho=0.162$, $n=564$, $p<0.05$ and no statistically significant correlation between variables “education level” and “intention to purchase organic products” $\rho=0.007$, $n=564$, $p>0.05$. The level of consumer education has proven to be significant descriptor in a way that people with higher education are more prone to frequent purchases of organic food (Đokić & Milićević, 2016; Peric et al., 2017; Vapa-Tankosić et al., 2018; Radojević et al., 2021; Radman, 2005), but there are also research results that contradict this (Nikolić et al., 2014).

Hypothesis H2: The level of education is in a positive and significant relation with intention to purchase organic food products is partly confirmed.

## Conclusion

Constant changes in our environment impose the need for frequent research in consumer behaviour. Most of the consumers in the Republic of Srpska purchase organic food occasionally and mostly for health. Pandemic caused by COVID-19 virus and increasing climate change is the cause for changes in certain consumer habits. In order to reduce contamination risks, consumers avoided markets during lock-down (Akdemir et al., 2020). In Serbia, home cooking (Lazarević & Marinković, 2021) and online purchase of organic food is increased (Ćirić et al., 2020), but consumers are not prone to keep diet during a pandemic (Lazarević & Marinković, 2021). There are no many research on this topics in the Republic of Srpska, so this paper may be a departure point for all future research. In order to obtain more complete profile, it is necessary to expand the variables as well as examine their further interaction. This paper is also practically applicable for marketing decisions.

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UDC: 666.946:061(497.11)
DOI: 10.5937/AnEkSub2248015M
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 015-033
Received: 25/10/2021
Accepted: 29/03/2022

# Cross-border acquisitions and profitability of acquired companies in Serbian cement industry

## Међународне аквизиције и профитабилност преузетих компанија у цементној индустрији Србије

**Dušan Marković**
University of Belgrade, Faculty of Economics, Belgrade, Republic of Serbia, dusan.markovic@ekof.bg.ac.rs
**Slađana Savović** *
University of Kragujevac, Faculty of Economics, Kragujevac, Republic of Serbia, ssladjana@kg.ac.rs

**Abstract:** Transition to market economy in the Republic of Serbia started with one decade of delay compared to most former socialist countries. The transition has implied liberalization of economic policies in the area of foreign direct investments, even in some industries that have been previously considered strategic. Multinational companies have used new business opportunities and acquired some of the most important and largest domestic companies. This paper analyses the impact of cross-border acquisitions on the profitability of targets in Serbian cement industry during the period 2000-2020. Serbian cement industry includes three cement plants, all of which were acquired in the process of privatization during 2002. The study analyses changes of ROA (return on assets), ROE (return on equity) and ROS (return on sale) of targets in the short term and in the long term after the acquisitions. The research results show that profitability of all companies improved both in the short term and in the long term after acquisitions. These improvements were achieved through higher cost efficiency and more efficient business asset management.
**Keywords:** cross-border acquisitions, profitability, cement industry, transitional economies
**JEL classification**: G34, L25, L61

**Сажетак:** Транзиција ка тржишној привреди је у Републици Србији отпочела са једном деценијом закашњења у односу на већину бивших социјалистичких земаља. Транзиција је подразумевала либерализацију економских политика у области страних директних инвестиција, чак и у неким секторима који су се раније сматрали стратешким. Користећи указане пословне прилике мултинационалне компаније су у почетним фазама приватизације преузеле неке од најзначајнијих и највећих домаћих предузећа. Овај рад анализира утицај међународних аквизиција на профитабилност преузетих компанија у цементној индустрији Србије у периоду 2000-2020. године. Цементна индустрија Србије обухвата три цементаре, а све три су биле преузете у процесу приватизације током 2002. Године. У раду се анализирају промене стопе приноса на имовину (*return on asset* – ROA), стопе приноса на капитал (*return on equity* – ROE) и нето профитне стопе (*return on sale* – ROS) у кратком и дугом року након аквизиција. Резултати истраживања показују да је профитабилност свих компанија унапређена у кратком року након аквизиција, као и у дугом року, услед унапређења трошковне ефикасности и ефикасности управљања пословном имовином.
**Кључне речи:** међународне аквизиције, профитабилност, цементна индустрија, транзиционе економије
**ЈЕЛ класификација:** G34, L25, L61

* Corresponding author

## Introduction

The collapse of the socialist state system in the 1990s, along with economic liberalization and technological innovations, are some of the most important drivers of globalization. Formerly closed markets in Europe, with over 300 million potential consumers, became available for multinational companies (MNCs) from developed countries. By entering the market of transition economies, the MNCs faced a business environment that largely differed from the ones in domestic markets. Market institutions in transition economies were not efficient, while some market institutions had not been formed yet (Peng, Wang & Jiang, 2008). Besides, certain stakeholders, such as the unions and local governments, had much greater influence than in developed markets, which has to be considered when entering these markets (Rondinelli & Black, 200). Striving to use new business opportunities, and at the same time deal with the threats stemming from the specific business environment, MNCs frequently use cross-border acquisitions as entry strategy in transition and emerging markets (Lebedev, Peng, Xie & Stevens, 2015).

MNCs use cross-border acquisitions in transition markets to gain the access to rapidly growing demand and resources that are unavailable in domestic markets (cheap labour, strong local brands and local marketing knowledge) (Langestain, et al, 2018). MNCs combining the acquired resources with the existing capabilities, such as advanced technology, brands, managerial and marketing knowledge, which enables them to improve the market position. However, most targets in transition economies did not possess the competences necessary to compete in the new business environment, so new owners had to restructure them radically. Consequently, such acquisitions often had the characteristics of brownfield investments (Estrin & Meyer, 2011). The targets could not be restructured successfully in the short run due to a large number of stakeholders with conflicting interests (Domanović et al., 2020), necessity of high investments in post-acquisition period, and non-efficient institutional environment (Meyer, 2002; Paik, 2005).

We analysed the impact of cross-border acquisitions on the profitability of targets in Serbian cement industry for several reasons. Firstly, cement industry is capital intensive and technology intensive. Therefore, the industry is predominated by large MNCs, which have been the key acquirers in Serbia. Second, the industry is characterized by low ratio of added value and the product weight. Consequently, MNCs operate in local markets through production subsidiaries which are often acquired through cross-border acquisitions. Third, Serbian cement industry is characterized by high degree of concentration, i.e. oligopolistic structure, due to which micro economic approach to the analysis, which we apply in this paper, is adequate for identifying trends in the cement industry. Finally, the cement industry has a strategic importance for the development of related industries such as construction and investment in road infrastructures, which are currently the drivers of the accelerated growth of Serbian economy. This way, we analyse the indirect effects of cross-border acquisitions on industries that are closely related to the cement industry.

The relevance of this paper is reflected in the expansion of knowledge about the effects of cross-border acquisitions on business performance. There are numerous papers that analyse the impact of cross-border acquisitions on business performance in developed countries (Moeller, et al, 2005; Chang & Tsai, 2013) whereas the research in developing economies is still limited (Changqui & Ningling, 2010; Nicholson & Salaber, 2013). The success of cross-border acquisitions in transition economies, especially during the process of privatization, became a topical research question at the beginning of 2000s (Uhlenbruck & De Castro, 2000). Considering that the transition in Serbia started later, there was no large number of such studies. In the past few years, there has been a limited number of papers that analyse the performance of cross-border acquisitions in Serbia (Savović, 2016; Marković & Azdejković, 2016). This paper differs from previous similar papers in the length of time series (over two decades) and in the fact that it focuses on all companies operating in one industry.

The paper is structured as follows. The first part gives a literature review on measuring acquisition performance. Then, the methodology used in the paper is described. Further, the research results and discussion are presented. The last part of the paper includes the conclusion, with limitations and suggestions for further research.

# 1. Theory and hypotheses

## 1.1. Measurement of acquisition performance

The literature offers several approaches to measuring acquisition performance. The first approach uses the stock-market-based measures to assess acquisition performance. The researchers compare the results for shareholders after the acquisition with “normal returns” that would have been achieved if the acquisitions had not been realized (Sudarsanam, 2003, p. 65). This method is mainly short-term oriented, because the long-term stock price is affected by a large number of factors, although there are some studies that tend to quantify the impact of acquisitions on long-term stock price (Thanos & Pappadakis, 2012). This method is mostly used for analysis in developed countries, while in transition economies it is not adequate, as the financial markets are not efficient and a large number of transactions includes acquisitions of companies that are not listed on stock-markets.

Another approach uses accounting-based measures to evaluate acquisition performance. The most commonly used indicators of profitability are: return on assets (ROA), return on equity (ROE) and return on sale (ROS). The main argument for applying this approach is that it measures realized synergetic effects in the long term, rather than investors' expectations, and that it can be applied on acquisitions both in developed and developing countries. This approach is often used in combination with stock-market-based method, which measures short-term effects, while long-term effects are measured using accounting-based indicators (Ding, et al, 2021). However, the accounting approach has some disadvantages. Accounting indicators largely depend on the local tax policy.

Furthermore, individual companies use different accounting policies, which makes it difficult to compare the results.

The third approach uses subjective performance measures to assess the success of acquisitions. This means that managers and experts familiar with the acquisition assess the financial and non-financial performance of the acquired companies (Papadakis and Thanos, 2010). Subjective performance measures are significant when researchers have a problem with obtaining data for the application of objective performance measures. However, this approach involves the issue of managers' personal bias, especially when only one manager evaluates company performance. Overcoming this problem can be achieved by including a large number of managers from one company in performance evaluation (Savović, 2016).

## 1.2. Impact of international acquisitions on target profitability

Most studies use accounting-based measures for evaluating acquisition performance, comparing profitability of companies several years before and after acquisitions (Table A1 is given in the Appendix). Research results of these studies are not uniform, meaning that some studies have shown a positive impact of cross-border acquisitions on performance (Guest et al., 2010; Rakita and Marković, 2013; Zhan and Wang, 2020; Cui and Leung, 2020), in some studies the impact has not been completely clear (Golubov and Xiong, 2020; Pereira et al., 2021), while some studies have shown that cross-border acquisitions have negative impact on profitability (Lu, 2004; Martynova et al. ,2007; Agyei-Boapeah, 2019).

Guest et al. (2010) used a sample of 303 acquisitions carried out in the UK in the period 1985-1996 to analyse the impact of these acquisitions on profitability and share returns. The study showed that the targets' profitability improved in post- acquisition period, whereas the impact on share returns was negative. Rakita and Marković (2013) analysed the impact of cross-border acquisitions in Serbia on targets' profitability. The study was based on 78 acquisitions carried out in the period 2006-2011. They used return on assets, return on equity and operating profit margin to measure the targets' profitability. The study found out that many targets improved profitability after the acquisition. Zhan and Wnag (2020) researched the impact of acquisitions on companies' profitability in developing economies. The authors based their research on 12 Chinese pharmaceutical companies that realized acquisitions during the period 2008-2016. They compared the rate of return on assets (ROA) one year prior to acquisition and two years after the acquisition. Research results showed that the companies which used acquisitions to expand the supply chain or obtain new technology improved their ROA. Analysis of US acquisitions during the period 2000-2012 showed that the acquirers with better managerial capabilities achieved superior business performance (Cui and Leung, 2020).

Some studies have not discovered a clear relation between cross-border acquisitions and profitability, emphasizing that the impact of cross-border acquisitions can be both positive and negative, depending on the level of analysis and used indicators (Golubov and Xiong, 2020; Pereira et al., 2021). Analysing 8,803 US acquisitions realized during the

period 1997-2014, Golubov and Xiong (2020) found out that, on average, the private operating acquirers experienced improved operating performance, while the public acquirers experienced lower performance in post-acquisition period. More specifically, the private operating acquirers increased their ROA by 3-8% three years after the deal completion, while the public acquirers decreased their ROA between zero and 2%. Pereira et al. (2021) analysed 8,078 companies from 43 developing markets that carried out cross-border acquisitions in the period 2006-2015. The results showed that the impact of cross-border acquisitions on profitability is an inverted U-shaped. The advantages provided by cross-border acquisitions are greater when acquisitions are realized in developed economies than when they are realized in developing economies.

Some studies showed that acquisitions have negative impact on profitability (Lu, 2004; Martynova et al., 2007; Agyei-Boapeah, 2019). Lu (2004) compared profitability of 596 US companies 60 months prior to and after acquisitions, and found out that acquisitions had negative impact on profitability. Martynova et al. (2007) analysed 155 acquisitions realized in Europe and the UK in the period 1997-2001 to assess the profitability of companies in long-term. Research results showed that acquisitions had negative impact on profitability in long-term period. A sample of 9,419 acquisitions realized by 1,443 UK companies in the period 1988-2014 was used to analyse the impact of cross-border acquisitions on corporate performance (Agyei-Boapeah, 2019). The following four key performance measures were used in the study: 1) accounting-based measure of performance – ROA 2) market-based measure of performance - Tobin's Q 3) the operating cash-flow, and 4) the operating costs measure. The research results showed that, on average, cross-border acquisitions had negative impact on corporate performance. However, the negative impact of cross-border acquisitions was not identified when cross-border acquisitions were conducted by: 1) domestic companies and 2) highly experienced multinational companies.

The literature review shows that there are no consistent conclusions on how acquisitions affect companies' profitability. However, considering the specific context of our research – privatization of cement companies in transition market, radical restructuring of targets' operations, transfer of knowledge and technologies – the following two research hypothesis have been set:

Hypothesis 1: Cross-border acquisitions in Serbian cement industry increase profitability of acquired companies in the short term.

Hypothesis 2: Cross-border acquisitions in Serbian cement industry increase profitability of acquired companies in the long term.

## 2. Methodology and data

The paper analyses the effects of cross-border acquisitions on profitability of acquired companies in cement industry, in the short and long term. To do this properly, it is necessary to consider the structure of the industry and the factors that created such

structure. Serbian cement industry is characterized by oligopolistic structure, with only three competitors, all of which were acquired in the process of privatization during 2002, by large MNCs: Titan (Greece), Holcim (Switzerland) and Lafarge (France).

Holcim and Lafarge merged in 2014. To ensure compliance with national competition regulations, the companies had to sell off some business units in the markets where the merger would harm market competition. Accordingly, Holcim Serbia was sold to Irish company CRH in 2015. In spite of this divestment, a high degree of market concentration has remained in Serbia. The value of Harfindal-Hirschman index for the industry is 3.576, and all values above 2.500 imply high concentration (Commission for Protection of Competition, Republic of Serbia, 2018). Table 1 shows basic data on the analysed companies.

*Table 1: Companies in Serbian cement industry*

| Targets | Acquirers | Acquirers' country of origin | Year of acquisition | Company name after acquisition |
|---|---|---|---|---|
| Popovac Cement Plant | Holcim | Swiss | 2002 | Holcim Srbija/Moravacem* |
| Beočin Cement Plant | Lafarge | French | 2002 | Lafarge Srbija |
| Kosjerić Cement Plant | Titan | Greek | 2002 | Titan Srbija |

* *Note: Holcim Serbia was taken over in 2015 by the Irish company CRH and operated under the name CRH Serbia. In 2021, it changed its name to Moravacem*

In this paper we analyse short-term and long-term profitability of acquired companies in Serbian cement industry in the period 2000-2020. Since we analyse cross-border acquisitions in Serbia, tax policy will not have an impact on profitability indicators, while the effects of different accounting policies will be negligible due to long time series.

To measure the impact of acquisitions on the targets' profitability, we used three indicators, as follows: return on assets (ROA), return on equity (ROE) and return on sale (ROS). The same approach was used by Cording et al (2010), since this is the best way to include the effects of changes of profit margins, the assets management efficiency and the effects of financial leverage. In this paper we calculate ROA as the ratio of net income to the book value of total assets, ROE as the ratio of net income to the equity value, and ROS as the ratio of net income to the net sales.

In order to identify the short-term effects, we compared the average value of the indicators three years prior to the acquisition with their average value three and five years after the acquisition. The long-term effects were measured through comparison of the average value of the indicators three years prior to the acquisitions and their average value

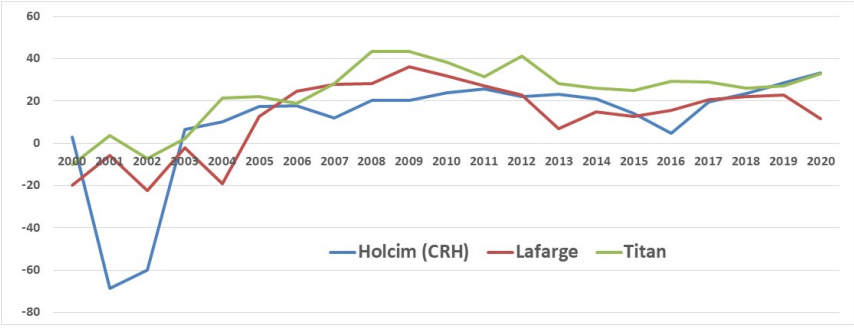
in the whole post-acquisition period. The data necessary for the calculation of the indicators were taken over from the financial reports of the analysed companies.

## 3. Results and discussion

In order to adequately consider the effects of cross-border acquisitions on companies' profitability in cement industry, it is necessary to analyse the development of cement market in Serbia. The industry is characterized by high fixed costs, due to which it is necessary to achieve economies of scale in all activities of supply chain. Positive market trends after the privatization helped to achieve economies of scale in the industry. In its natural form, the demand grew continuously until the Great recession in 2008, when the demand plunged. Starting from 2014, the amount of concrete produced in Serbian market has been growing, so in 2019 almost 2,1 million $m^3$ of fresh concrete was produced, which is the increase of almost 200% compared to the period before the crisis (Statistical Office of the Republic of Serbia, 2021). In addition to this, there is a change in demand structure. Sales of traditional products (such as Portland cement) are stagnating, while the sale of new and innovative products (such as cement mortar) are on the rise (Savović & Marković, 2021). The rising amount of sold cement products boosted sales income of the cement companies, which grew from 20 billion RSD in 2008, to almost 26 billion RSD in 2020. It is significant to mention that, in spite of COVID-19 pandemic, the industry's sales income reached the historical maximum in 2020, which is a result of a sharp rise of construction industry and large public investments in infrastructure even during the crisis.

The sales trends strongly correlated to the trends in ROS ratio for the analysed companies. Figure 1 shows trends in ROS for all three companies in the period 2000-2020.

*Figure 1: ROS (%) of acquired companies during the period 2000 – 2020*




*Source: Financial statements of the analysed companies*

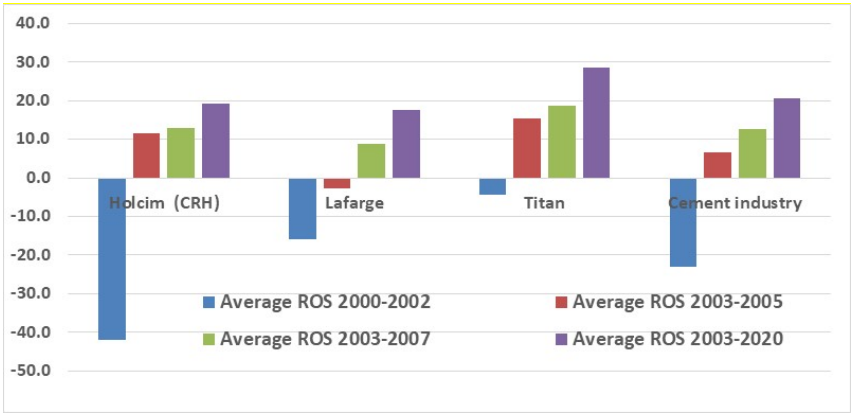
The data from Figure 1 show that the companies had insufficient profit margins before privatization, and that the results changed after the acquisitions. Before the acquisitions the companies were largely in the red, which resulted in negative values of ROS, being especially high in case of company Holcim (CRH). After the change of ownership and business restructuring, these companies started operating in the black.

Consequently, the value of their ROS ratios increased considerably and reached the peak in the year before the Great recession. This increase was driven by a sharp employee downsizing (Savović & Marković, 2021), and a faster growth of employee productivity compared to the growth of cost of salaries (Azdejković & Marković, 2016). Implementation of the human resource management activities, such as communication and information flow, better defined training needs, employee empowerment, contributed to increasing employee commitment and, on that basis, increasing employee productivity (Grubor et al., 2020). Employee productivity in the acquired companies increased by changing the existing weak corporate culture and adopting a new strong one based on greater employee commitment and motivation (Miletić et al., 2021).

It is important to notice that the improvement of ROS does not depend completely on the size of a company and productivity of employees. As the smallest analysed company measured by the sales incomes and with the least productive workforce in almost entire analysed period (Savović & Mimović, 2020), Titan had the highest value of ROS ratio in the industry since 2007. According to all this, we can conclude that, apart from the economies of scope in production and low labour costs, other types of costs, such as logistic costs, impact the profitability in cement industry as well. Obviously, Titan controls these costs more efficiently than other competitors in the industry. It is significant to emphasize that after the Great recession, all three companies experienced a decrease in ROS value, although all of them were in the black, and that all of them had a different dynamics of ROS value recovery after the recession.

In order give a more precise analysis of the effects of the acquisitions on ROS value, we have compared the value of three-year average indicator before the acquisition, from 2000 to 2002, with the average value of the same indicator, three years, five years and in the entire analysed period after the acquisition. Figure 2 shows long-term and short-term ROS change after the acquisitions in the Serbian cement industry. We can see that in pre-acquisition period company Holcim (CRH), on average, had the highest negative value of ROS, over 40%, while Titan had the lowest negative value of this indicator. In a three-year period after the acquisition Holcim (CRH) and Titan managed to achieve positive average ROS values, of 12% and 15% respectively, while Lafarge had negative ROS value on average, due to prolonged business restructuring. In the period of five years after the acquisition, all three companies had positive average ROS value, which was the highest in the case of Titan, reaching 19%, and the lowest with Lafarge of only 9%. In the long term, all three companies have improved ROS value significantly. In the whole post-acquisition period, Titan recorded the largest average value of this indicator of 29%, while the lowest average value was recorded by Lafarge, 18%. We can conclude that the management of Titan, as the smallest in the industry, focused their resources on optimization of business process and growth in more profitable market segments, which led to superior value of ROS compared to its competitors.

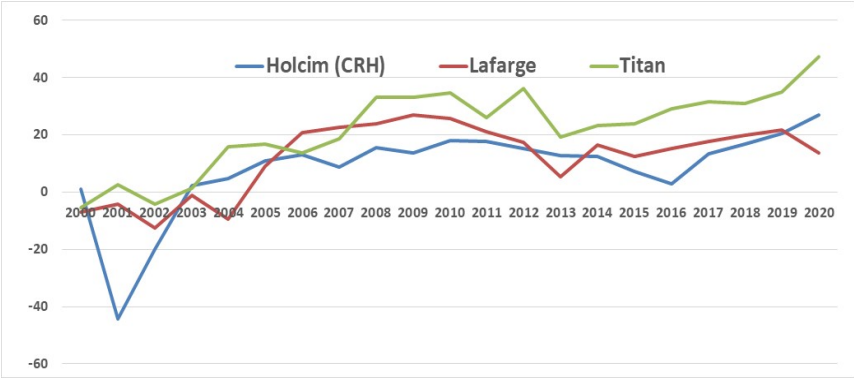
*Figure 2: Comparative analysis of ROS of acquired companies during the period 2000 – 2020*




*Source: Financial statements of the analysed companies*

In order to obtain a more detailed insight into business performance of cement industry, we analysed the change of ROA value in the industry after the acquisitions. Besides the profit margins, this indicator also includes asset management efficiency. Figure 3 shows the change of ROA value in Serbian cement industry during the period 2000-2020.

*Figure 3: ROA (%) of acquired companies during the period 2000 – 2020*



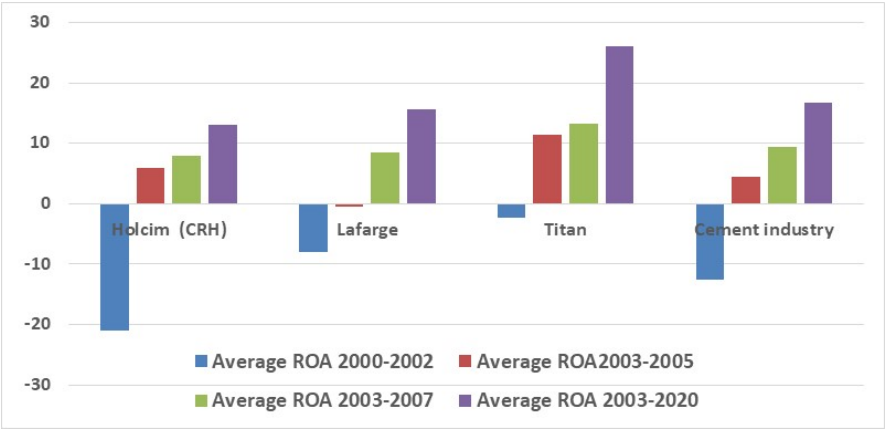

*Source: Financial statements of the analysed companies*

The data from Figure 3 show that there was a considerable rise of ROA value in all three companies after the acquisitions. However, the rise was not linear and it was hindered by the Global recession in 2008, due to which it started to fall. Although it seems that this decrease was sharp, it is interesting to notice that even in the period of crisis the value of

ROA in Serbian cement industry exceeds the value of the same indicator in cement industry in some developing markets, which means that cement industry of Serbia is highly profitable (Rezina, et al, 2020; Muslumov, 2005). Recovery of Serbian construction industry and intense investments in road infrastructure resulted in growth of ROA value in all analysed companies. In 2020, the year of COVID-19 pandemic, ROA value in two these companies reached the historical maximum, while Titan achieved the level of 48%. It is significant to notice that, the same as in case of ROS, the size of a company does not determine the value of ROA. Accordingly, Titan as the smallest analysed company had superior ROA performance in the post-crisis period.

To get a more detailed insight into the effects of cross-border acquisitions on the ROA value change, we compared the average value of this ratio in pre-acquisition period with the average values in the whole post-acquisition period, and three and five years after the acquisitions. Figure 4 shows long-term and short-term change of ROA value of Serbian cement companies after the privatization. The data show that only Titan had negligibly negative ROA value, while the other two companies had a considerably negative average ROA value before the acquisitions. Titan and Holcim had a positive average ROA value three years after the acquisitions, 11% and 6% percent respectively. On the other hand, Lafarge had a slightly negative average ROA value in the same period. The trends in this indicator five years after the acquisitions show that all companies improved their average ROA values, which amounted to 8-13%. This leads to a conclusion that all three companies improved their ROA values significantly in the short period after the acquisitions. The improvement of ROA after privatization in transition economies is not only the result of improved business efficiency. Divestment from non-business assets, which were often owned by state-owned companies (e.g. resorts, flats, etc.), also contribute to it. The data on average ROA value show that even in the long term there was an improvement in the indicator value. The companies' ROA average values for the whole post-acquisition period were between 13% and 25%, and Titan had the highest average value of the ratio in the period. We emphasize that average ROA values in the industry are higher in the long term than in the short term, which implies that post-acquisition restructuring is time-consuming and full synergy effects can be achieved only in the long term.

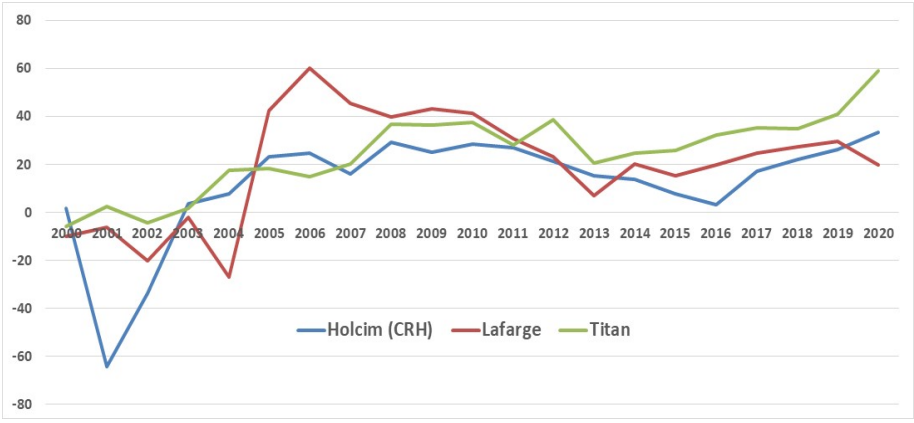
*Figure 4: Comparative analysis of ROA of acquired companies during the period 2000 – 2020*




*Source: Financial statements of the analysed companies*

The last indicator in our analysis is ROE, which introduces the impact of financial leverage on company's profitability. Figure 5 shows trends in ROE value in Serbian cement industry during the period 2000-2020.

*Figure 5: ROE (%) of acquired companies during the period 2000 – 2020*



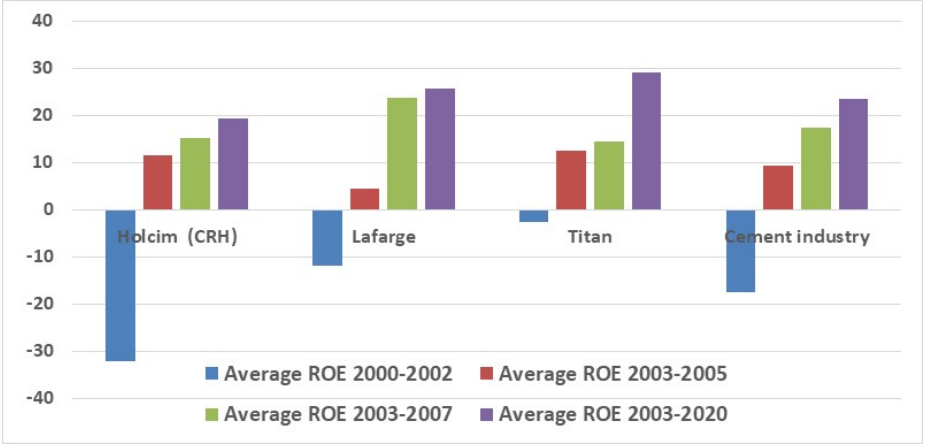

*Source: Financial statements of the analysed companies*

Data from Figure 5 show that the companies had negative ROE before the privatization. All companies were in the black throughout almost whole post-acquisition period, and their ROE values were two-digit numbers in almost all analysed years, reaching

up to 60%, which is an extremely high level in this industry. It is interesting to notice that Lafarge did not have superior ROE values, in spite of its size and high labour productivity. As the smallest and least productive competitor in the industry Titan had the highest ROE values after the Great recession.

To measure short-term and long-term changes of ROE value after the acquisitions, we used the same approach as in the case of the other two indicators. We compared the average ROE value in the period of three years prior to the acquisitions, with its average values three and five years after the acquisitions, and in the whole period after the acquisition. Figure 6 shows short-term and long-term trends in ROE values of acquired companies in Serbian cement industry.

*Figure 6: Comparative analysis of ROE of acquired companies during the period 2000 – 2020*




*Source: Financial statements of the analysed companies*

State-owned cement companies had negative average ROE value three years before the acquisitions, which is in compliance with the prior studies that imply weak business performance of state-owned companies in transition countries (Estrin, et al, 2009). The new owners improved the targets' ROE values in short term. However, it is evident that full synergy effects and the effects of changed financial structure required a longer period, of five years and more, to be achieved. It is also important to mention that the positive trends in ROE values continued in the long term, with Titan having especially high increase in this indicator. The acquisitions caused a radical improvement in average ROE value on the level of the whole cement industry. Furthermore, the average value of this indicator is significantly higher in Serbia than in the same industry in some developing markets (Rezina, et al, 2020; Muslumov, 2005). We can conclude that the acquisitions of Serbian cement companies have been very profitable investment projects for the foreign investors, measured by return on equity, both in the short and long term.

## Conclusion

Globalization, transition to market economy and the liberalization of economic policies have created a new business environment in transition economies, which stimulates foreign direct investments. Many MNCs have used the emerging business opportunities in transition economies and conducted a larger number of acquisitions during the process of privatization. MNCs conduct cross-border acquisitions in transition economies aiming to additionally exploit their own strategic non-material assets (such as technology, brands, knowledge management, etc.), obtain the access to cheap labour, natural resources, local marketing knowledge and achieve financial synergy. State-owned companies in transition economies are often characterized by outdated technology, a lack of marketing and management knowledge, and poor employees' skills. Consequently, foreign investors have to restructure targets quickly and radically, in order to improve targets' business performance.

Cement industry is characterized by low ratio of added value to weight of products, high share of logistic costs in product price, and high investments in fixed assets. Therefore, cement companies often use acquisitions as entry strategies in foreign markets. Serbian cement industry is characterized by oligopolistic market structure, and all three competitors in the industry were acquired by foreign MNCs in 2002. The effects of the aforementioned cross-border acquisitions on the targets' short-term and long-term profitability were analysed in this paper. Three commonly used accounting-based indicators, ROS, ROA and ROE, were used for the purpose of the analysis.

The analysis shows that foreign ownership contributes to the improved profitability of the targets in short term. This is in accordance with the previous similar studies that analysed the impact of acquisitions in general (Guest et al., 2010; Zhan and Wnag, 2020) and the impact of cross-border acquisitions (Rakita and Marković, 2013) on companies' profitability. The analysis shows that the targets' short-term profitability, three and five years after the acquisitions, was improved due to higher cost efficiency, entry into innovative and more profitable market segments, increased asset management efficiency and more adequate financial structure. The research results confirmed the first hypothesis. The results also show an improvement in the targets' long-term profitability, measured by all three indicators, which confirms the second hypothesis. It is significant to point out that the average values of the analysed indicators in the long term are significantly higher than in the short term. This shows that post-acquisitions business and financial restructuring need time to improve business performance. Furthermore, the analysis shows that the size of the targets and their labour productivity do not have a significant impact on the restructuring effects in the long term. Accordingly, Titan as the smallest and at least productive company in the industry had superior values of the analysed indicators.

The paper has a few limitations. Firstly, although the analysis includes all the competitors in the industry, the number of the analysed companies is too small, which affects the relevance of the obtained conclusions. Additionally, there have not been any domestic acquirers, and therefore we could not compare profitability of domestic and cross-

border acquisitions. However, this paper could be a base for further research that would compare the impact of cross-border acquisitions in the cement industry in Serbia and other transition economies in the region, or analyse business performance of cross-border acquisitions and green field projects in this industry on regional level.

This paper contributes to expansion of knowledge on the effects of cross-border acquisitions on target performance in transition economies. This allows comparison between numerous previous studies undertaken in developed economies and the results obtained in a specific business environment, such as transition market. Besides, the study has practical implications for managers, because it emphasizes the importance of quick and efficient restructuring of a target for improvement of business performance in post-acquisition period. Finally, it is shown that long-term profitability in the cement industry does not depend exclusively on the size of a company and its labour productivity, but predominantly on the efficiency of the entire supply chain.

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## Appendix:

**Table A1.** A review of empirical studies on the impact of cross-border acquisitions on profitability

| Studies | Sample | Period | Measures | Research results | Impact |
|---|---|---|---|---|---|
| Lu (2004) | 592 US acquisitions | | Profitability | Results show that acquisitions have a negative effect on profitability | Negative |
| Martynova et al. (2007) | 155 acquisitions implemented in Europe and UK | 1997-2001 | Profitability | Acquisitions have a negative impact on profitability in long term. | Negative |
| Guest at al. (2010) | 303 UK acquisitions | 1985-1996 | Profitability<br><br>Share returns | Acquisitions improve profitability.<br><br>Effect of acquisitions on share returns is significantly negative. | Positive |
| Rakita and Marković (2013) | 78 acquisitions in Republic of Serbia | 2006-2011 | Return on assets, return on equity and operating profit margin. | Cross-border acquisitions improve performance of many acquired companies. | Positive |
| Agyei-Boapeah (2019) | 9419 cross-border acquisitions implemented by 1443 UK companies | 1988-2014 | Return on assets, Tobin' s Q , operating cash-flow, operating cost | Cross-border acquisitions have a negative impact on performance. | Negative |
| Zhan and Wnag (2020) | 127 Chinese pharmaceutical companies | 2008-2016 | Return on assets | Acquisitions motivated by expanding the value chain and accessing new technologies have a positive impact on ROA. | Positive |
| Cui and Leung (2020) | US acquisitions | 2000-2012 | Return on assets (ROA), cash flow from operations (CFO), and market-to-book ratios (MTB | Acquiring companies with better managerial skills achieve better performance in long term. | Positive |

| | | | | | |
|---|---|---|---|---|---|
| Golubov and Xiong (2020) | 8803 US acquisitions | 1997-2014 | Return on assets | Private acquiring companies experience greater operating performance, while public acquiring companies experience lower performance in post-acquisition period. | Positive /Negative |
| Pereira et al. (2021) | 8078 companies involved in cross-border acquisitions | 2006-2015 | Return on assets | Impact of cross-border acquisitions on profitability is an inverted U- shaped. The advantages provided by cross-border acquisitions are greater when acquisitions are realized in developed economies than they are realized in developing economies. | an inverted U - shaped |

UDC: 330.322(4)
DOI: 10.5937/AnEkSub2248035Z
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 035-049
Received: 06/12/2021
Accepted: 14/04/2022

# Determinants of foreign direct investment in Central and Eastern Europe: panel data analysis results

## Детерминанте директних страних инвестиција у Централној и Источној Европи: резултати панел анализе

**Snježana Zarić**
University of East Sarajevo, Faculty of Economics Brcko, Brcko, Bosnia and Herzegovina,
snjezana.zaric.efb@gmail.com

**Abstract:** The diffusion of technology and the knowledge spillover that accompanies foreign direct investment have made all countries, especially those in transition, interested in this type of capital inflow. Accordingly, in this paper, we have applied econometric panel models to identify determinants of foreign direct investment in Central and Eastern European countries. Our results indicate that differences in foreign direct investment flow in the analysed countries can, to a large extent, be explained by traditional factors such as the availability of skilled labour force, labour costs, infrastructure quality, and market size. In addition, the quality of institutions, primarily democratic government, an independent judiciary, and the absence of corruption, also significantly influence foreign companies' decisions about where to invest in countries in the region.
**Keywords:** OLI paradigm, foreign direct investment, transition economies, locational determinants, quality of institutions
**JEL classification**: F21, F23, F12

**Сажетак:** Дифузија технологије и преливање знања које прате директне стране инвестиције учиниле су да све земље, а посебно оне у процесу транзиције, буду заинтересоване за овај вид прилива капитала. Сходно томе, у овом раду примјенили смо економетријске моделе панела како би идентификовали детерминанте директних страних инвестиција у земљама Централне и Источне Европе. Наши резултати указују да разлике у токовима директних страних инвестиција у анализираним земљама, у великој мјери, могу да се објасне традиционалним факторима као што су расположивост квалификоване радне снаге, трошкови рада, квалитет инфраструктуре и величина тржишта. Додатно, квалитет институција, прије свега демократска влада, независно правосуђе и судство и одсуство корупције, такође значајно утичу на одлуке страних компанија о томе гдје да инвестирају у земље региона.
**Кључне речи:** ОЛИ парадигма, директне стране инвестиције, транзицијске земље, локацијске детерминанте, квалитет институција
**ЈЕЛ класификација:** F21, F23, F12

## Introduction

Foreign direct investments are real investments in factories, capital goods, land, and inventories, which, in addition to the investment element, also contain a management element, since the investor retains control over the use of invested capital. They occur mainly in the form of establishing a subsidiary or taking control of a company in another country, for example by purchasing a majority share (Salvatore, 2013, p. 368). It is

generally accepted that foreign direct investment occurs if three conditions are met simultaneously: a multinational company has ownership-specific advantages (O), there are internalization advantages (I) and there are locational advantages in the host country. Ownership benefits mainly occur in the form of property rights and intangible assets (production innovation, production management, organizational system, innovation capacity, accumulated marketing, and financial experience, ability to reduce transaction costs within or between firms, etc.), and the benefits that arise as a result of joint management and coordination of the cross-border process of creating added value (benefits from economies of scale and specialization, obtaining inputs on privileged terms, diversification and risk reduction, etc.). Instead of selling these ownership advantages to an independent foreign company, the multinational company decides to exploit them, that is, internalize them, if it brings greater profits. These gains or advantages are a reflection of greater organizational efficiency or ability to use monopoly power and include, for example, avoiding the costs of search and negotiation, avoiding moral hazard and negative selection, protecting the company's reputation, protecting the quality of semi-finished and finished products, using cross-subsidization practices, predatory prices and transfer prices as competitive strategies, etc. The location advantages of the host country result from a larger market, lower resource costs (labour, energy, materials and intermediate products), better infrastructure, investment incentives, etc. It is assumed that the spatial distribution of these advantages is uneven, which provides comparative advantages to the country that has them compared to other countries. Thus, the first two conditions for the emergence of foreign direct investment are related to the level of the company, while the third condition has a key impact on the choice of the country in which to invest. This approach to foreign direct investment is known as Dunning's eclectic paradigm or OLI paradigm, because, according to the author, it combines several complementary theories to explain the activities of companies engaged in the cross-border process of creating value added. (Dunning & Lundan, 2008, pp. 99-102).

By linking locational advantages with the motives of foreign direct investment, the determinants of foreign direct investment can be identified from the aspect of the host country. If the investment is motivated by expansion into new markets (market seekers) then potentially significant determinants are market size, per capita income, economic growth, access to regional and global markets, consumer preferences and market structure. Furthermore, multinational companies invest abroad in order to gain access to resources that are better or cheaper than those in the country of origin (resource/asset seekers). This primarily refers to raw materials, components and parts, land and construction costs, low-paid unskilled labour, quality skilled labour, technological and managerial skills (whether embodied in an individual, company, or cluster), physical infrastructure, entrepreneurial and educational capacity, etc. If multinational companies undertake foreign direct investment to increase efficiency (efficiency seekers) then the main locational determinants are the costs of the aforementioned assets and resources adjusted for labour productivity, the costs of other inputs (such as communication and transport costs to/from and within the host country and costs of other intermediate products), and membership in regional agreements suitable for achieving a more cost-effective and international division of labour and specialization. It should be noted that the inflow of foreign direct investment in a

country, in addition to the above factors, is conditioned by the liberalization of national policies consisting of removing barriers to entry and operate for foreign investors, non-discriminatory treatment of foreign companies, ensuring proper market functioning and opening for trade. Recently, these policies have been increasingly complemented by proactive measures aimed at facilitating the business of foreign investors in the host country (Dunning, 2003, pp. 282-285; UNCTAD, 1998, pp. 90-91).

Understanding the process of foreign direct investment is extremely important for European countries in transition since one of the problems they face is the lack of capital needed to modernize their industrial structures. This is all because foreign direct investment flows are less volatile than other capital flows and imply a long-term commitment to a business venture in a foreign country. Also, this type of investment leads to the creation of new and/or preservation of existing jobs and generates spillover effects, such as transfer of technology, knowledge, innovation, which are all necessary for the successful transformation of the economies of these countries. No less important is the contribution of foreign direct investment to the balance of payments, especially if they are focused on sectors that produce goods for export. In general, in the countries of Central and Eastern Europe, there has been a significant increase in the inflow of foreign direct investment with the removal of barriers to capital movements, as well as with the acceleration of the transition process. However, these countries are neither close to homogeneous in terms of their transition success and membership in the European Union, nor in terms of attracting investment. For this reason, this paper aims to examine the importance of certain traditional determinants of foreign direct investment inflows in fourteen transition countries of Central and Eastern Europe - Bulgaria, Bosnia and Herzegovina, Czech Republic, Croatia, Hungary, Northern Macedonia, Poland, Romania, Serbia, Slovenia, Slovakia, Estonia, Lithuania, and Latvia. For this purpose, static panel models will be used, which will allow us to analyze variations in foreign direct investment not only between countries but also over time. In addition, these models are generally appropriate for identification the determinants of foreign direct investment. The first part will present an overview of the results of previous empirical research that has dealt with this topic. After that, the applied econometric research method will be explained, as well as the data used, and their sources. The third part of the paper contains the results of the research with appropriate discussion.

## 1. Literature review

From the beginning of the transition process in the countries of Central and Eastern Europe, foreign direct investment was seen as the main driving force of the process of reconstruction and modernization of the economic structure, as well as integration into the world economy. Precisely because of the positive expectations about the impact of this type of investment on economic development and competitiveness, European countries in transition have adopted a number of policy measures aimed at attracting multinational companies. Despite this, their success in attracting foreign capital was rather uneven, with a clear dominance of Poland, the Czech Republic, and Hungary. This has interested many researchers to try to identify the factors that influenced the inflow of foreign direct investment in the region of Central and Eastern Europe.

One of the early papers on the determinants of foreign direct investment was published by Lansbury, Pain, and Smidkova in 1996. In this paper, they tried to use panel analysis to determine the factors that influenced the trajectory of investments from OECD countries in four Central European countries - the Czech Republic, Slovakia, Hungary, and Poland during 1991-1993. The variables they considered were private sector share of GDP creation (as an indicator of the level of privatization), trade openness, number of registered patents in the host country, country risk, relative labour costs, and energy consumption (as an indicator of infrastructure development). Based on the results of the analysis, the authors concluded that the timing and form of privatization programmes had the most significant impact on attracting investment during this period, but relative labour costs, ability to innovate, and earlier trade links were also significant. Considering privatization, Lansbury, Pain, and Smidkova (1996) state that after its completion, investment inflows are likely to depend on market growth rates and relative costs, as in other European countries (pp. 104-114).

Furthermore, Carstensen and Toubal applied dynamic panel models in a paper published in 2003 to examine the determinants of foreign direct investment in seven Central and Eastern European countries - the Czech Republic, Hungary, Poland, Slovakia, Slovenia, Bulgaria, and Romania. On that occasion, they divided the explanatory variables into two groups - traditional determinants which included market size, trade costs (customs), company costs, and relative factor endowment, and transition-specific determinants which included private sector participation, privatization method, and host country risk. The results of empirical research have shown that most of these factors are important in explaining the different attractiveness of individual Central and Eastern European countries for foreign investors, but that market size, low relative unit labour costs, skilled workforce and relative factor endowment are more important than transition determinants (pp. 3-22).

Bevan and Estrin also dealt with the factors that affect the flow of foreign direct investment from Western Europe to Central and Eastern Europe. Analysing the period from 1994 to 2000 using a random-effects model, these authors found that market size in both the country of origin and the host country has a positive impact on the inflow of foreign direct investment into European countries in transition, while the distance between countries and relative unit costs have a negative impact. In addition, the results showed that announcements of the European Union accession lead to an increase in investment in countries that were rated positively. Bevan and Estrin described this as worrying, as countries that are less successful in implementing the transition process are generally given longer deadlines to join the European Union, which in turn further discourages the inflow of foreign direct investment and increases their falling behind (pp. 775-787).

Bellak, Leibrecht, and Riedl (2007) paid special attention to labour costs when identifying the determinants of net foreign direct investment inflows into the Central and Eastern European region. For the purposes of the analysis, they used a gravity panel model and data for the period 1995-2003. The results are quite similar to the previous ones, in the sense that the size of the host country market and the distance between the countries have been singled out as the main factors influencing the investment decision. Considering

labour cost variables, higher unit and total labour costs have a negative impact, while higher labour productivity has a positive impact on attracting foreign direct investment. In this sense, the authors conclude that the countries of Central and Eastern Europe must improve labour productivity through investment in production infrastructure in the future in order to compensate for the projected growth of wage costs (pp. 17-37).

In his paper "Determinants of Foreign Direct Investment in Central and South-eastern Europe: New Empirical Tests", Miroslav Mateev (2009) came to slightly different results compared to previous. Analysing the period from 2001 to 2006 using a panel model, this author found that gravitational factors such as distance, population size and GDP, and transition factors such as country risk, labour costs, and levels of corruption largely determine the size of flows of direct foreign investment in countries in transition. However, he argues that there is no longer evidence of a significant role for the level of privatization and the timing of EU accession in explaining investment inflows (pp. 133-149).

In his 2013 study, Tintin linked traditional factors and institutional variables to find what determines foreign direct investment flows in transition countries. Based on the model of fixed effects for the period 1996-2009, the author concluded that there is a positive and statistically significant relationship between host country GDP size, trade openness, and membership in the European Union and the inflow of investment in six Central and Eastern European countries. The quality of institutions was measured using the Heritage Foundation Index, the Center for Systemic Peace Index, and the Freedom House Index, all of which were reduced to a scale of 0 to 100, with 0 being the worst, and 100 best results. The results confirmed that these institutional variables, in addition to the mentioned traditional variables, determine the inflow of foreign direct investment in the region, since each of them has a positive sign. (pp. 287-298). On the other hand, Günther and Kristalova (2016) got the opposite result. They also applied panel analysis, but a somewhat longer period of time was taken into account - from 1994 to 2013 as well as a larger number of countries (14). Their results suggest that low risk is not enough, and high risk is not necessarily a barrier to foreign direct investment. In addition, they confirm the crucial importance of location variables such as market growth rates and low labour costs, and trade openness to attract foreign investors (pp. 95-99).

Finally, we will mention the significant paper by Stack, Ravishankar, and Pentecost (2017) in which they took into account the difference between the horizontal and vertical types of integration of multinational companies. With the help of a panel analysis of foreign direct investment stocks from Western European countries in 10 new EU member states, they established the coexistence of vertical and horizontal foreign direct investment during the period 1996-2007. At the same time, horizontal investments dominate between countries with similar characteristics, especially between high-income countries (measured by the GDP of two countries), countries of similar size (measured by the square of GDP differential), similar relative factor availability (measured by the difference in skilled labour) and combinations of the last two. High trade costs are also significant in the case of horizontal foreign direct investment, as investors opt for local production of goods to avoid transport costs and trade barriers. On the other hand, since the motive for vertical investment is the different availability of skilled labour, high trade costs together with

similar relative availability of skilled labour (measured by interaction between trade costs in the host country and the square of the skilled labour differences) reduce vertical foreign direct investment, as well as high transport costs (measured by geographical distance between countries) and high costs of re-importation of goods into the country of origin (measured by trade costs in the country of origin). Finally, based on comparison of the pre- and post-European Union accession subsamples, the authors concluded that a shift towards a horizontal type of integration occurs over time, suggesting that market size and economies of scale become dominant motives for foreign direct investment instead of trade barriers (pp. 86-97).

Based on a review of previous research, it can be concluded that, in the early years of the transition process, factors such as the time and method of conducting the privatization process, private sector participation, and speed of accession to the European Union played an important role in attracting foreign direct investment. However, with the completion of the privatization process, these determinants lose their significance, and the focus shifts to the traditional locational advantages of the host country, primarily market size, total and unit labour costs, productivity level, skilled labour, and trade openness. Also, we can notice that in recent papers, institutional determinants are taken into account in the form of various indices that measure the quality, primarily of political institutions. The results generally confirm that transition countries that have made more progress in the democratization of political institutions have higher inflows of foreign direct investment.

Given that today, according to OECD estimates, about 70% of world trade takes place within global value chains (2020), it is not surprising that the number of papers dealing with foreign direct investment is constantly increasing. Nevertheless, from the papers related to the region of Central and Eastern Europe, it can be seen that they are generally focused on EU member states and countries that have progressed faster during the transition process. In addition, the flows of foreign direct investment from other European countries to Central and Eastern European countries are predominantly analysed, thus neglecting the significant volume of investment originating from other parts of the world, which can lead to distorted conclusions and incomplete recommendations for economic policy measures. In this paper, we will try to overcome these shortcomings by taking into account some peripheral European countries in transition, and overall foreign direct investment flows, as is the case in growth models.

## 2. Data and empirical specification

### 2.1. Data

For the purposes of the research, we used panel data for fourteen countries of Central and Eastern Europe during the period 2005-2018. When choosing the determinants that we will include in the analysis, we started primarily from the OLI theory of foreign direct investment, i.e. location advantages that are crucial for choosing the country in which to invest, but also from the results of previous research. In this sense, the determinants of foreign direct investment that will be analysed in this paper are market size, trade openness, availability of natural resources, quality of infrastructure, availability of skilled labour,

wages, and quality of institutions. In this way, we included three main motives of companies for investing abroad: expanding on new markets, access to resources, and increasing efficiency.

The dependent variable in the model is presented in the form of net inflows of foreign direct investment (new investment inflows less outflows) expressed as a share of GDP for each of the countries. These inflows are recorded in the balance of payments and represent the sum of equity capital, reinvested earnings, and other long-term and short-term capital flows. According to the recommendation of the International Monetary Fund, in order for foreign investments to be classified as direct, they need to include the purchase of at least 10% of voting shares. The movement of foreign direct investment inflows in the analysed countries is shown in Figure 1.

*Figure 1: Net inflows of foreign direct investment as a share of GDP*


*Source: the author's research*

The GDP variable approximates the size of the market, i.e. the demand for goods and services in the host country, as well as the achieved level of economic development. In addition, a higher level of GDP may indicate higher productivity and greater innovation capacity of a given country, which can also contribute to attracting foreign investors.

Therefore, we expect that this variable will have a positive impact on the inflow of foreign direct investment.

The openness of the economy is usually measured as the share of exports and imports in GDP. This indicator primarily indicates the level of integration of the host country into regional trade flows. In general, companies create through trade the basis for foreign direct investment and international production which later serve as substitutes or complements for trade. However, since the analysed countries are relatively open to trade, we expect a positive sign.

Companies often invest abroad to access cheap natural resources (resource seekers). Moreover, developing countries often complain about the exploitation of their natural resources at low prices by multinational companies. Therefore, we will include them in the model as an explanatory variable in the form of rent for the use of natural resources (as a share of GDP). Following the above logic, this variable should have a positive effect on attracting foreign investors.

The next determinant we have included in the model is the quality of infrastructure, which is an important prerequisite for successful business. The availability and quality of infrastructure are important for attracting foreign direct investment since multinational companies try to manage production activities that take place in different countries. However, it is difficult to find an adequate indicator of infrastructure quality. Early research used the number of fixed telephone subscribers per 1000 inhabitants (UN, 2002), and later for example the number of mobile phone users per 100 inhabitants. However, none of these indicators behaves well in the model, which is why we opted for the indicator number of fixed internet subscribers per 100 inhabitants. This indicator is gaining importance due to activities such as e-government and online commerce. For this reason, we expect a positive sign with this regressor.

The availability of skilled labour is very important for multinational companies investing abroad to increase efficiency. In addition, foreign direct investment is usually associated with the transfer of technology, the implementation of which requires a skilled workforce. Moreover, some research has shown that foreign direct investment contributes to economic growth only if the host country has enough human capital to absorb advanced technology (Borensztein, De Gregorio & Lee, 1998, p. 115). Therefore, we will include in the model the share of the labour force with tertiary education in the total labour force as an explanatory variable and we expect that it has a strong positive impact on the inflow of foreign direct investment.

Given that the countries of Central and Eastern Europe have relatively low labour costs, foreign companies can have a strong incentive to locate their production in this region in order to reduce costs. Unfortunately, unit labour cost data are not available for the entire region, which is why we will use average wage as a variable in the model.

Finally, the transition process implies not only the transformation of the economy but also the transformation of the political system. Therefore, we will expand our model by another variable, and that is the quality of political institutions. Acemoglu and Robinson

wrote in detail about the importance of political institutions for creating investment opportunities in the book "Why Nations Fail: The Origins of Power, Prosperity and Poverty" (2012). Through examples from history, they have shown how inclusive political institutions create constraints against the exercise and usurpation of power and further tend to create inclusive economic institutions and, ultimately, economic prosperity, the so-called virtuous circle. Of course, the opposite is true in the case of extractive political institutions that start vicious circles. Many authors such as Bevan and Estrin (2004), Busse and Hefeker (2007), and Tintin (2013) have confirmed empirically that institutions are a significant determinant of foreign direct investment inflows. In our model, we will include the quality of political institutions through the subjective indicator of Freedom House. In its annual report "Nation in Transit", this organization provides a numerical ranking of countries on a scale from 0 to 100 (0 indicates the worst and 100 the best result) based on their scores achieved in seven categories that together represent the institutional foundations of liberal democracy. These are the following categories: national democratic governance, local democratic governance, judicial framework and independence, electoral process, corruption, civil society, and independent media. We expect that the worse the country's political institutions, the less attractive it will be for foreign investors.

The sources of data for the selected variables are World Bank statistics (World Bank Indicators), United Nations statistics, International Labor Organization statistics, and Freedom House databases. The data used are annual and cover the period from 2005 to 2018. We log transform original values of the data, to ensure that the slope coefficients are not sensitive to different measuring scales, but also to normalize the residuals.

## 2.2. Panel data models

Panel data is a combination of cross-sectional data and time series, which allows tracking of the same observation units over time. The use of panel data achieves numerous benefits: 1) the number of observations in the sample increases; 2) heterogeneity between observation units is taken into account; 3) greater informativeness, greater variability, less collinearity among the variables, more degrees of freedom, and more efficient estimation of regression parameters are achieved; 4) effects that are not detectable in pure cross-section or pure time-series data can be identified and measured; 5) more complicated behavioural models can be constructed and tested (Baltagi, 2005, pp. 5-6).

In this paper, we used static linear panel models that have the following general form:

$$y_{it} = \beta_{1it} + \sum_{k=2}^{K} \beta_{kit} x_{kit} + u_{it}, \quad i = 1,2,\dots,N; t = 1,2,\dots,T \qquad (1)$$

where *i* denotes the units of observation, and *t* time, so the value of the dependent variable $y_{it}$ for the *i* unit of observation at time *t*, $x_{kit}$ is the value of the *k* explanatory variable for the *i* unit of observation at time *t*, $\beta_{1it}$ is an intercept term varying by both dimensions, $\beta_{kit}$ regression parameters that vary across units and across time, $u_{it}$ is an error term of the model with zero mean value and constant variance

We first estimated the pooled model which characterizes the constancy of all regression parameters in the model. This actually implies that the error term includes all variations across units and time, so $\beta_{kit} = \beta_k$ for all *i, t* and *k* = 2,…., K. The model contains K regression parameters that can be estimated with ordinary least squares method. If any of the assumptions about the model error term are violated then the model can be estimated with generalized least squares method.

We also estimated the model with individual and time effects (in both variants), which implies the heterogeneity of the intercept both over individuals and time with the constancy of regression parameters with regressors ($\beta_{kit} = \beta_k$ for each *i, t* and *k* = 2,…, K). In this case, in the fixed specification (two-way fixed effects model) heterogeneity is directly included in the model via intercept term, i.e.

$$y_{it} = \beta_{1it} + \sum_{k=2}^{K} \beta_k x_{kit} + u_{it} = (\beta_1 + \mu_i + \lambda_t) + \sum_{k=2}^{K} \beta_k x_{kit} + u_{it} \qquad (2)$$

Thus, here the intercept term represents the sum of constant $\beta_1$, unobservable individual effects, $\mu_i$ and unobservable time effects $\lambda_t$, where $\mu_i$ and $\lambda_t$ are fixed parameters. On the other hand, in the stochastic specification, individual and time effects are not directly included in the model, since they are components of composite error term (random-effects model or two-way error component model):

$$y_{it} = \beta_1 + \sum_{k=2}^{K} \beta_k x_{kit} + v_{it} = \beta_1 + \sum_{k=2}^{K} \beta_k x_{kit} + (\mu_i + \lambda_t + u_{it}) \qquad (3)$$

In this model, the composite error term $v_{it}$, in addition to the part that varies by both dimensions $u_{it}$, also contains the part that varies only by individuals $\mu_i$ and the part that varies only over time $\lambda_t$. Since they represent components of error term, individual and time effects are stochastic in nature. (Jovičić & Dragutinović-Mitrović, 2011, pp. 218-219)

The presence of individual and time effects in the model was confirmed by the F test, while the specification tests, Hausman's and Mundlak's, showed that these effects are fixed parameters. It should be noted that the model of fixed effects is also in line with the nature of the data since observation units are states and they are not a random sample selected from a larger population. So, our final model has the following form:

$$\begin{aligned}\log(fdi)_{it} = {} & (\beta_1 + \mu_i + \lambda_t) + \beta_2 \log(gdp)_{it} + \beta_3 \log(tradeopennes)_{it} \\ & + \beta_4 \log(naturalresources)_{it} + \beta_5 \log(internetsubscribers)_{it} \\ & + \beta_6 \log(teritarylabourforce)_{it} + \beta_7 \log(wage)_{it} + \beta_8 \log(democracyindex)_{it} \\ & + u_{it}\end{aligned}$$

However, the paper will present the results of all estimated models, as a comparison of different estimates can give us information about the nature of the bias in case of omission of individual and time effects from the model, or if we ignore the violation of some error term assumptions.

## 3. Empirical results

Table 1 provides a comparative overview of the regression parameter estimates for the different panel models considered. We can notice that, either by applying the ordinary least squares methods or generalized least squares method on the pooled model, obtained estimates are biased and inconsistent, and not in accordance with economic theory. On the other hand, in the case of models with fixed individual and time effects with White's or Driscoll-Kraay's robust standard errors (due to the violation of the assumption of homoskedasticity of error term, and a small sample and therefore the limited power of tests for cross-sectional dependence), independent variables have the expected direction of influence. In addition, both Hausman's non-robust specification test and Mundlak's robust test confirmed that the covariance approach of the fixed effects model should be used.

*Table 1: Determinants of foreign direct investment inflows in Central and Eastern Europe*

| Dependent variable: logfdi | | | | | |
|---|---|---|---|---|---|
| Independent variable | OLS | xtgls | FE | RE | xtscc |
| loggdp | -0.0487043 | 0.097367* | 2.581499* | -0.0998561 | 2.581499* |
| logtrade | 0.2369844 | 0.789108*** | 1.159524 | -0.1698434 | 1.159524 |
| lognatresource | 0.3214665** | 0.1913933* | 0.0676918 | 0.2412488 | 0.0676918 |
| loginternets | -0.2679079* | -0.2823313*** | 0.2970711** | 0.1613371 | 0.2970711** |
| logteritarylf | -0.2584288 | -0.0401435 | 2.677361*** | -0.2290255 | 2.677361** |
| logwage | -0.5708601** | -0.6011905*** | -1.608613** | -0.7861646* | -1.608613*** |
| logdemocracyi | 1.562283*** | 0.274403 | 4.658405*** | 1.65729 | 4.658405** |
| Time dummies | No | No | Yes | Yes | Yes |
| Number of observation | 196 | 196 | 196 | 196 | 196 |
| Number of groups | 14 | 14 | 14 | 14 | 14 |
| R-squared | 0.1923 | | 0.3950 | 0.3125 | 0.3950 |
| Wald chi2 | | 87.65 | | | |

*Note: ***, ** and * indicate significance of coefficients at 1, 5 and 10 per cent, respectively.*

*Source: the author's calculations*

Finally, based on the selected specification, we can draw conclusions about the importance of certain determinants of foreign direct investment. The results of our research indicate that the inflow of foreign direct investment in European countries in transition is significantly affected by the availability of skilled labour and labour costs. Obviously, a skilled workforce (from engineers, technicians to managers and accountants, etc.) is crucial for the implementation of innovative production technology, but also for the adoption of a new organizational culture. If we were to follow the industrial-organization approach to trade developed primarily by Markusen (2002), then the above would point to the predominant participation of vertical multinational companies. According to this approach,

companies can benefit from geographically separating production by stages, so that intermediate inputs would be produced in a country with skilled labour, and the final phase of production would take place in a country with an abundance of unskilled cheap labour. (Markusen, 2002, pp. 256-257). This approach has also received some empirical confirmation (e.g. Markusen & Maskus, 2001; Amiti & Wakelin, 2003) and may explain the statistical insignificance of trade openness in our model. Namely, there is a possibility that the relationship is reversed, that, in fact, vertical direct investments stimulate trade, as suggested by Markusen. This is supported by the fact that contemporary international trade is predominant for production in global value chains, which means that raw materials and intermediate products are exchanged between countries before they are incorporated into the final product. Therefore, direct investments will probably precede trade and not the other way around.

The third determinant that is highly statistically significant in our model is the quality of political institutions. It is obvious that factors such as democratic governance and the rule of law significantly influence the decisions of foreign companies where to invest in the countries of the region. Furthermore, our model also suggests that differences in infrastructure quality may explain why some countries attract more and some less direct investment. It should be emphasized that the low estimate of this regression parameter may be due to the difficulty of finding the right variable that would represent the quality of infrastructure. Namely, we used an indicator based on the number of internet subscribers, but infrastructure is a broad term and includes not only telecommunications but also transport infrastructure and additional utilities. Finally, at a 10% significance level in both, model with White's and model with Driscoll-Kraay's robust standard errors, the market size determinant is also significant, indicating that countries with larger markets are likely to record higher foreign direct investment inflows. It seems that the availability of natural resources in the analysed countries did not significantly affect the attraction of foreign direct investment in the period from 2005 to 2018. When it comes to time effects in the fixed effects model with White's standard errors, the significant years are 2005, 2006, 2007, and 2008. This could be related to the fact that capital flows, on the eve of the great global economic crisis of 2008-2009, reached their maximum. Namely, in 2007, foreign direct investments in the world reached 1979 billion dollars, and that is still the historical peak (UN, 2009, p. 3). However, in the model with Driscoll-Kraay's robust standard errors, a larger number of time variables is statistically significant. There are no significant changes in results when alternative specifications are applied.

## Conclusion

Location determinants that affect the inflow of foreign direct investment in Central and Eastern European countries have been identified within this research. For this purpose, a model with fixed individual and time effects with robust standard errors was used. Foreign companies have been shown to invest in the region primarily in search of cheap resources and increased efficiency, as the availability of skilled labour and low labour costs have emerged as significant determinants. The quality of political institutions is also of great importance for the inflow of foreign direct investment. This confirms the widely held thesis

in the economic literature that where they function well, these institutions can encourage investment and growth. In addition, market size and the quality of infrastructure also appear to be factors that may influence investment in European countries in transition. Finally, trade openness as a traditional determinant of foreign direct investment is not significant in the case of countries in the region. This could be attributed to the fact that in the observed period all Central and Eastern European countries either became members or were preparing for membership in the European Union, which is why they eliminated most restrictions on the movement of goods, services, and capital, so direct investment ceased to be a substitute for trade. In addition, changes in the structure of international trade in the form of the predominant participation of global value chains, have led to the fact that direct investment actually stimulates trade and not vice versa.

The above points to the conclusion that economic policymakers in the region should work on improving the education system, diffusion of technology, and innovation and training of the workforce. This is especially significant, so that in the future wage growth could be offset by productivity growth and thus prevent discouragement of investment inflows. In addition, governments need to work on improving infrastructure, primarily in the areas of transport and communications, which would make it easier for the countries analysed to be included in global value chains and ultimately improve their trade balances. Last but not least is building inclusive political institutions, to prevent abuse of power, ensure the rule of law, and adopt policies and regulations that promote investment and private sector development. In other words, without democratic freedoms, free market institutions cannot be expected to function.

In theoretical terms, this paper builds on previous research on the determinants of foreign direct investment in European countries in transition. Namely, in previous research, the focus was on the countries of Central Europe, while the countries of Southeast Europe were mostly neglected. As the latter were less successful in the transition process, their exclusion could not provide a precise picture of the impact of certain factors on attracting foreign direct investment to the region.

At the end of this research, there is one serious limitation, and that is the insufficient length of time series in the model. If longer time series were available, additional variables could be included in the analysis, which would provide a broader picture of the determinants of foreign direct investment in the region of Central and Eastern Europe. However, most researchers in the field of economics face these and similar problems, especially in the countries of Southeast Europe.

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UDC: 331.101.31:004(497.11)
DOI: 10.5937/AnEkSub2248051S
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 051-064
Received: 07/12/2021
Accepted: 12/05/2022

# Conceptual framework of remote working in Serbia: towards gender differences

## Концептуални оквир рада на даљину у Србији: разлике у односу на пол запослених

**Stefan Sretenović***
University of Kragujevac, Faculty of Economics, Kragujevac, Republic of Serbia, st.sretenovic@gmail.com
**Marko Slavković**
University of Kragujevac, Faculty of Economics, Kragujevac, Republic of Serbia, mslavkovic@kg.ac.rs
**Vesna Stojanović-Aleksić**
University of Kragujevac, Faculty of Economics, Kragujevac, Republic of Serbia, vesnasa@kg.ac.rs

**Abstract:** With the outbreak of the pandemic caused by the virus COVID-19, companies all around the world were affected and faced a new reality. In such circumstances, remote working was a necessary organizational response to the forthcoming crisis, to provide business continuity and protect their employees. For many companies, remote working is a completely new experience without any preparation period. The subject of the research is to reveal the perception and correlation between different variables, which are crucial for successful remote working implementation, within two groups of remote workers, male and female. This research highlights the differences and provides guidelines for successful remote working implementation for different genders. An original empirical research was conducted on a sample of companies that are doing business activities in Serbia and were deployed remote working for their employees during the COVID-19 pandemic to analyze the differences between male and female respondents toward five defined variables important for remote working: social support (SP), autonomy (A), monitoring (M), job performance (JP) and work engagement (WE) during remote working. The relationships between the indicated variables were tested by correlation analysis of 121 collected surveys.
**Keywords:** work design, remote working, Covid-19, human resource management
**JEL classification**: M12, M51

**Сажетак:** Након појаве пандемије изазване вирусом Ковид-19, компаније широм света су погођене и суочене са новом стварношћу. У таквим околностима, рад на даљину је био неопходан организациони одговор на надолазећу кризу, како би се обезбедио континуитет у пословним процесима и заштитили запослени. За многе компаније, рад на даљину је био потпуно ново искуство без икаквог припремног периода. Предмет истраживања је утврђивање перцепције и корелације између различитих варијабли, које су кључне за успешну имплементацију рада на даљину, у оквиру две групе радника на даљину, мушкараца и жена. Циљ истраживања је да укаже на разлике и пружи смернице за успешну имплементацију рада на даљину у односу на пол запослених. За потребе рада, спроведено је оригинално емпиријско истраживање на узорцима компанија које обављају пословне активности у Србији и које су током пандемије Ковид-19 примењивале рад на даљину за запослене, а у циљу анализе разлика између испитаника мушког и женског пола према пет дефинисаних варијабли важних за рад на даљину: социјална подршка, аутономија, праћење, радни учинак и радно ангажовање. Однос између наведених варијабли је тестиран корелационом анализом на основу 121 прикупљене анкете.
**Кључне речи:** дизајн посла, рад на даљину, Ковид-19, управљање људским ресурсима

* Corresponding author

**ЈЕЛ класификација:** M12, M51

## Introduction

Remote working refers to performing business activities outside business offices, and in many cases it refers to working from home. The phenomenon of remote working cannot be considered a completely new concept, because before the industrial revolution, many people used to work in their craft workshops or engaged in agriculture activities near their homes. After the industrial revolution, numerous people switched to work in factories and offices, and today there is an opposite trend and re-transition to remote working, either in the form of freelancers or full-time employees in companies (Baruch, 2000).

In the last few decades, companies have been faced with numerous challenges, such as globalization, growing competition, the emergence of new information and communication technologies (ICT). Transition to the digital business environment has influenced the establishment of a flexible organizational structure and the implementation of a flexible approach of conducting business activities (Wojcak, 2016). After 2000, there was a significant trend of leaving office and doing business at a distance. Until the outbreak of the pandemic caused by the virus COVID-19, the percentage of employees working remotely was increased in sectors of services, health, finance and insurance, manufacturing and education. However, after the outbreak of the pandemic, most employees completely switched to remote working, while the future trend of development of this concept of work, and how it will develop further around the world, remains unclear (Contreras, et al. 2020).

Following the proclamation of the pandemic caused by the virus COVID-19 on March 11, 2020 by the World Health Organization (WHO), the remote working was not an option but a necessary to respond to the crisis in many companies. Additionally, in their guidelines, WHO advises implementation of remote working to reduce the risk of spreading the virus among employees. Remote working helps keep the social distance, aiming to protect employees and maintain business activities (World Health Organization, 2020) and supply chain activities (Milovanović, et al. 2021). During the period 2009–2019, the percentage of the remote workers in the European Union (EU) was increased from 5% up to 9% in a 10-year period. However, according to the study by Eurofound, almost 40% of employees were remote workers in the EU at the pandemic appearance (Eurofound, 2021).

There are opponent conclusions about the impact of remote working on the effectiveness and performance of employees. While some research shows that effectiveness and creativity is higher during remote working than in traditional way of work from business offices and execution of face-to-face meetings (DeRosa, et al. 2007), some other research revealed that the absence of personal interaction within the colleagues has a negative effect on personal creativity (Allen, et al. 2015). Even though a lot of research concluded that set up of work/life balance as one of the greatest advantages of remote working (Bryant, 2000), research conducted by Harris (2003) shows that more than 60% of 40 interviewed remote workers had a problem in managing work and private life during the remote working (Harris, 2003).

Considering all mentioned above, the subject of our research is to reveal the perception and correlation between different variables, which are crucial for successful remote working implementation, within two groups of remote workers, male and female. Based on the defined subject of research, the study highlights the differences and provides guidelines for successful remote working implementation for different genders. Apart from the introduction and literature review, the paper presents the results of the research conducted through a survey in which employees of companies from different sectors operating in Serbia participated. Correlation analysis was used to understand the strength and direction of correlation between the identified variables important for successful remote working implementation. The results were analyzed separately for the male and female groups of remote workers, and presented in the conclusion.

## 1. Literature review

The concept of remote working, at that time also called telework, was developed during the 1970s. According to Nilles (1970), there are three groups of factors that supported the development of such working concept: development of "informational industry", expansion of low-cost communication and information technology and an increasing number of employees who are ready and support decentralization in large organizations (Nilles, 1970). Even though there is no unique accepted definition of remote working, it refers to the execution of business activities outside the business offices. Remote working provides flexibility to workers in terms of usage of various locations such as home offices, shared locations, or any other platforms that support the usage of required technologies (Belzunegui-Eraso & Erro-Garcés, 2020). According to the International Labor Organization, remote working is defined as the usage of information and communication technology (ICT) for executing work outside the employers' offices (ILO, 2017).

Several synonyms are used for remote working in literature. The most ones used are teleworking, work from home, agile working, telecommuting, home-work, etc. These words are often used as synonyms, with notable differences among them. Work from home often refers to the specific job activities and it is related to the freelancers and people that work in their own business, remote working is a much wider concept of work, which can be applied to the jobs and activities in various industries. However, it must be underlined that during the concept of remote working, official employment contract or law agreements have a little importance, while the flexibility related to the way of the organization of work activities takes priority. Remote working provides flexibility to the employees to work on their own time, instead of official working hours in the office (Kłopotek, 2017).

Remote working can be divided into three conceptual themes (Gajendran & Harrison, 2007). The first one is related to controlled/provided autonomy, which such a working concept brings to the employees. It refers to the availability of remote workers, how and when they deal with their assigned tasks. Such concept provides to employee's autonomy in terms of working location, way and means of work (Standen et al., 1999). The second theme concerns the impact of remote working on work/life balance. As presented in the introduction of this paper, there are opponent conclusions from various studies on the

impact of remote working on work/life balance. Even though, some studies show a positive impact and improved the integration between work and family (Duxbury et al., 1998), the other one shows the negative one due to the destruction of the boundaries between work and private life (Standen et al., 1999). The third conceptual theme concerns the social isolation and absence of physical interaction within the remote workers. The absence of physical presence in the same office with the other colleagues and face-to-face meetings, negative impact on interpersonal relationships and leads to the problems in communication and knowledge sharing issues with other colleagues and managers. This problem applies especially to employees which major part of their time work remotely (Nardi & Whittaker, 2002; Gajendran & Harrison, 2007).

The mentioned conception themes confirm the necessity for proper remote working management during the implementation in the company. No unique and established flow must be followed by the company, which can guarantee a proper implementation and minimization/elimination of side effects of such a working concept. A different variable has a significant impact on proper concept implementation such as organizational culture, working processes and procedures, leadership style, communication flow. To be properly implemented, remote working concept must be adopted and presented to the employees adequately, while the organizations have to execute the necessary transformations in terms of organizational culture, work design, leadership and communication ways.

Challenges are faced in terms of individual, organizational and environmental factors that determinates successfully of remote working implementation. For employees, remote working affects both work and non-work life aspects, productivity, stress, health (George, et al., 2021). Remote working does not mean only performing business activities outside the business offices but also providing flexibility to the employees. Time spent in an office used to be relevant for the conventional work organization, while the evaluation of remote workers is mostly oriented toward specific goals achievements (Steward, 2000). During the remote working implementation, companies should adopt their organizational culture, while managers must govern their virtual teams of remote workers in an adequate way. Additionally, proper remote working implementation requests changes in job design, evaluation methods and company culture, while managers must be aware of all potential side effects of the remote working implementation, such as isolation, stress, procrastination. Several aspects are considered as crucial for the adaptation of the employees to the remote working, such as commitment, productivity, job satisfaction and work/life balance (Van Zoonen, et al., 2021).

Without a previous preparation period, upon the pandemic appearance, remote working was a completely new experience for many companies. In such circumstances, trust between managers and employees becomes the most valuable conception to maintain business continuity, considering that during the crisis, many companies are focused on costs, productivity, work efficiency. Apart from the organizational and technical support, leadership style is considered as one of the most critical variables for successful implementation. It is suggested the following steps for properly team management during the crisis caused by the virus COVID-19: describe to the remote workers a new circumstance, establish and develop a new concept of trust with employees, provide

efficient communication, support shared leadership and perform periodical audit and revision activities (Newman & Ford, 2021).

A different research confirmed the positive impact of remote working. Those positive impacts can be analyzed from two prospective: advantages for employees and for companies. A company that offers remote working for its employees has a better corporate image and reputation. Also, the jobs where remote working is applied are considered as more attractive than the one without that possibility. Outcomes of remote working implementation are considered as environmentally friendly. It has a positive impact on air contamination and commuting due to the less usage of transportation to go to work. A reduction in real estate rental costs can be a significant saving for the companies that deploy remote working. For employees, remote working can improve job satisfaction, reduce turnover rate, provide better work/life balance and increase productivity (Giovanis, 2018). However, such working concepts also have potential risks and side effects. The most important issues are social isolation and demotivation, knowledge sharing issue, working hours and pressures, issues related to the carrier prospective (Pyoria, 2011). Additionally, special attention must be paid to the conclusions of some studies that show that the mentioned advantages can also be also largest potential risks, such as increasing rate of turnover intention, work/family conflict and lower performance rate (Golden et al., 2008; Contreras, et al. 2020).

## 2. Methodology

For the purpose of this paper, original empirical research was conducted on the samples of companies that are doing business activities in Serbia and were deploying remote working for their employees during the COVID-19 pandemic. The research included both the public and the private sector, where the companies were from various industries, such as wholesalers, logistics, ICT services, food and beverage companies, automotive, and furniture industries. In the official letter provided to all potential participants, it is clearly indicated that the research was conducted for academic purposes, while the anonymous was guaranteed to all respondents by using a web tool, for collecting responses. The link for accessing the survey was sent by e-mail. The data collection was executed from March to June 2021. The aim of the research was to analyze the differences between male and female respondents toward five defined variables important for remote working: social support (SP), autonomy (A), monitoring (M), job performance (JP) and work engagement (WE) during remote working.

The focus for the respondent's selection was on employees who had experienced remote working in the past. The formula proposed by Green (1991) was used as a criterion for determining the size of the required sample. Based on the number of observed variables, it was determined that the minimum required number of units in the sample is at least 90. Out of 156 distributed surveys, it received 121 validated responses, which confirms the voluntary participation. Each variable was assessed using defined statements, while all respondents were requested to express their perception on the 5-point Likert scale on each statement from 1 ("strongly disagree") to 5 ("strongly agree"). The 5-point Likert scale is

used to measure attitudes (agree / disagree) and intensity (completely agree / completely disagree). Due to ease of response, it explained the popularity of using the scale in numerous studies (Albaum, 1997). The survey contained 19 statements. The following indicated items were translated into Serbian with language adjustments into Serbian context. For the purpose of measurement of social support variable, the 5 following items were used: "During the period of working from home, people I worked with were friendly", "I have the opportunity to develop close friendships in my job", "I have the chance in my job to get to know other people", "My supervisor gives advice on how to handle my work and family responsibilities" and "My supervisor allows for flexibility in my working arrangements to enable me to handle my family responsibilities". All items are developed and used from Work Design Questionnaire (Morgeson & Humphrey, 2006). The three items used related to the variable autonomy are as follows: "I have the freedom to decide what I do on my job", "It is basically my own responsibility to decide how my job gets done" and "I have a lot of say about what happens on my job". The indicated items were developed and used from Wang et al (Wang et al., 2021). The three items linked to the monitoring variable are related to "Providing daily reports", "Clocking in/out via APPs, phone, video calls, etc." and "Keeping cameras switched on during working time.". The mentioned items were developed by Wang et al. (Wang et al., 2021). The following four items related to the job performance variable were used: "During the period of working from home, I adequately completed my assigned duties", "Fulfills responsibilities specified in job description", "Performs tasks that are expected" and "Time flies when I am working remotely". The items were developed by Williams and Anderson. (Williams & Anderson, 1991). The items defined for the fifth variable, work engagement, were measured using the Utrecht Work Engagement Scale (Schaufeli et al., 2006). The following items are used: "I am enthusiastic about my job", "My job inspires me", "I am proud of the work that I do" and "To me, my job is challenging".

Additionally, the survey contained questions about demographic characteristics such as gender, age, level of education, family status, information about the company where are working and experience with remote working before and during the pandemic caused by the virus COVID-19. All the data were analyzed using SPSS statistical software. The usage of the created scale was justified by measuring Cronbach's alpha coefficient, whose calculated value of 0.82 shows that the proposed scale is reliable.

The major part of respondents were males, 55 percent, while the females remained 45 percent. Out of 121 respondents, 25 were under the 30 years old, 68 respondents were between 31 and 40, 21 were between 41 and 50 years old, while the remaining 7 respondents were above 50 years old. Considering the level of education, the dominated respondents had a higher level of education (Faculty, MSc or PhD), 81% in total, around 8% had high school, while the rest of 11 percent had College degree. The presented various categories of respondents give support to the observed conclusions toward various types of employees.

## 3. Results and analysis

The following table contains 19 statements used in the survey, which is distributed to the respondents. Additionally, it is presented the mean (M) and standard deviation (SD) of all 121 respondents for each statement.

According to the values shown in Table 1, it can be noticed that the highest level of agreement is related to the statements that assigned tasks are performed successfully during remote working, with a mean value of 4.45. Additionally, a very high level of the agreement was noticed to the items related to the execution of the assigned duties in the appropriate way during remote working, communication within colleagues and fulfillment of the requirements foreseen by job description. However, the lowest level of the agreement was noticed in the items related to monitoring through video calls or cameras during remote working, value 1.09, then with the check in/out activities daily via different applications and support of the supervisors regarding work/life balance during remote working. Based on the presented results, it can be concluded that remote workers in the companies that operate in Serbia manage their assigned job tasks successfully and that there is open and frequent communication among colleagues, even though there is no physical interaction between them. The lowest level of agreement regarding monitoring implies a high level of the confidence between managers/supervisors and employees due to the absence of check in/out activities. However, the low level of manager/supervisor support regarding work/life balance can enhance the work/life balance issues, which is defined as one of the biggest potential threats of remote working concept.

Considering the presented values of standard deviation (SD), it can be noticed that the highest values are related to statements on daily reports and supervisor support about work/life balance during the remote working, with the values 1.355 and 1.244, respectively. The highest level of SD regarding daily reports during remote working led to the conclusion that there is no unique approach and level of confidence among various companies in Serbia that adopt remote working for their employees. It is especially interesting the high level of SD for the statement on supervisor support of work/life balance, which means that some companies realize the potential negative effects of remote work on their employees, and that managers/supervisors provide the necessary support to maintain the balance between the business and private life of their employees.

*Table 1: Statements, mean and standard deviation for the items used in the survey*

| Items | Mean | Std. Dev. |
|---|---|---|
| During the period of working from home, people I worked with were friendly. | 4.26 | 0.761 |
| Remote working provides opportunity to develop close friendships in my job. | 2.49 | 0.976 |
| I have the chance in my job to get to know other people while working remotely. | 2.51 | 1.156 |
| Supervisor gives advice on how to handle my work and family responsibilities, during the remote working. | 2.44 | 1.244 |
| During the remote working, supervisor allows for flexibility in working arrangements to enable me to handle my family responsibilities. | 3.74 | 1.189 |
| I had considerable autonomy in determining how I did my job while working remotely. | 3.89 | 1.031 |
| It is basically my own responsibility to decide how my job gets done while performing my activities remotely. | 3.75 | 0.933 |
| A lot of unusual things happened on my job when I worked remotely. | 2.60 | 1.085 |
| Providing daily reports are a common activity during remote working. | 2.50 | 1.355 |
| Clocking in/out via APPs (e-mail, video calls, etc.) to the supervisor are daily activities during remote working. | 1.58 | 1.063 |
| It is an obligation to keep cameras switched on during remote working time. | 1.09 | 0.342 |
| Assigned duties are completed adequately while working from home. | 4.38 | 0.777 |
| I fulfil responsibilities specified in my job description while working remotely. | 4.21 | 0.887 |
| All assigned tasks are successfully performed when working remotely. | 4.45 | 0.695 |
| Time flies during remote working. | 3.62 | 1.097 |
| There is a high level of enthusiasm during remote working. | 3.22 | 1.114 |
| Remote working inspires people. | 2.78 | 1.099 |
| I am proud of the work that I do when working remotely. | 3.59 | 1.062 |
| Remote working is challenging. | 3.54 | 1.088 |

*Source: the authors' research*

Based on the defined topic and research goal, the relationships between the given variables were tested through correlation analyses summary results are presented in Table 2.

*Table 2: Summary results of correlation analysis*

| Gender | | | SP | A | M | JP | WE |
|---|---|---|---|---|---|---|---|
| Female | SP | Spearman's rho | 1.000 | | | | |
| | | Sig. (2-tailed) | 0 | | | | |
| | | N | 54 | | | | |
| | A | Spearman's rho | .334* | 1.000 | | | |
| | | Sig. (2-tailed) | .014 | 0 | | | |
| | | N | 54 | 54 | | | |
| | M | Spearman's rho | .180 | .078 | 1.000 | | |
| | | Sig. (2-tailed) | .194 | .573 | 0 | | |
| | | N | 54 | 54 | 54 | | |
| | JP | Spearman's rho | .188 | .049 | -.268* | 1.000 | |
| | | Sig. (2-tailed) | .173 | .725 | .050 | 0 | |
| | | N | 54 | 54 | 54 | 54 | |
| | WE | Spearman's rho | .349* | .204 | -.054 | .588** | 1.000 |
| | | Sig. (2-tailed) | .010 | .140 | .700 | .000 | 0 |
| | | N | 54 | 54 | 54 | 54 | 54 |
| Male | SP | Spearman's rho | 1.000 | | | | |
| | | Sig. (2-tailed) | 0 | | | | |
| | | N | 67 | | | | |
| | A | Spearman's rho | .398* | 1.000 | | | |
| | | Sig. (2-tailed) | .001 | 0 | | | |
| | | N | 67 | 67 | | | |
| | M | Spearman's rho | .185 | -.006 | 1.000 | | |
| | | Sig. (2-tailed) | .135 | .963 | 0 | | |
| | | N | 67 | 67 | 67 | | |
| | JP | Spearman's rho | .268* | .242* | .040 | 1.000 | |
| | | Sig. (2-tailed) | .028 | .049 | .748 | 0 | |
| | | N | 67 | 67 | 67 | 67 | |
| | WE | Spearman's rho | .373* | .309* | .124 | .729** | 1.000 |
| | | Sig. (2-tailed) | .002 | .011 | .317 | .000 | 0 |
| | | N | 67 | 67 | 67 | 67 | 67 |

*Source: the authors' research*

Based on the research results, for female respondents, it can be noticed that the correlation was weak between autonomy and social support (rs = 0.334; p = 0.014), and between work engagement and social support (rs = 0.349; p = 0.010). A weak correlation, but negative, was registered in the relationship between job performance and monitoring (rs = -0.268; p = 0.050), while a moderate correlation was identified among job performance and work engagement (rs = 0.588; p = 0.000). Analyses of the male group of respondents

revealed that a moderate correlation was registered between job performance and work engagement (rs = 0.729; p = 0.000), as in the female respondents. Weak and positive correlations within this group of respondents were noticed between autonomy and social support (rs = 0.398; p = 0.001), job performance and social support (rs = 0.268; p = 0.028), work engagement and social support (rs = 0.373; p = 0.002), and work engagement and autonomy (rs = 0.309; p = 0.011), which is not the case in the female group of respondents. In other pairs of comparisons, no statistically significant correlation was observed between the variables in any group of respondents.

According to the presented values, there is a moderate correlation in the whole sample between work engagement and job performance. Both groups of respondents, female and male, registered a weak correlation between autonomy and social support and work engagement and social support. Only female respondents indicated a statistically significant and negative correlation between job performance and monitoring. However, weak correlation, but statistically significant, was found between job performance and social support as well as work engagement and autonomy within male respondents. The presence of a statistically significant correlation between different pairs of named variables within the two observed groups supports the starting point of the research that there is a significant difference between the perception of remote working concept between male and female groups of remote workers.

## 4. Discussion

As presented in the literature review, successful implementation of the remote working concept depends from the various variables, such as company culture, job characteristics, work design, or leadership style (Vasic, 2020). A very positive effect linked to such a working concept can be easily offset with a negative one, and might have numerous negative impacts on both on companies and employees, such as losses, inefficiencies, turnover intention, burn out, etc. For such reasons, successful implementation of the remote working concept presents at the same moment the important potential for a competitive advantage, but also an evaluated risk of the companies.

The opposite conclusions of various studies on the impact of remote working on job stress and work-life balance presented in the first part of the paper lead to the necessity for customization of such working concept toward the various types of job activities, companies and employees. Following a unique approach in the implementation may expose the company to the potential risks of unsuccessful implementation and could efface the negative effects of such a working concept.

The study analyzed the correlation between five observed variables between two groups of remote workers, male and female. We identified the same correlation direction and statistically significant results between 3 pairs of analyzed variables, while some differences are noted in the other pairs of observed variables. The moderate correlation between work engagement and job performance was registered in the male and female groups, but results showed that this relationship differs among the two groups and female respondents recorded a weaker correlation than male respondents. Additionally, the

presence of a statistically significant correlation between variables related to the autonomy and work engagement in the male group of respondents and absence in the female confirms necessity to the proper adjustment of the remote working concept toward the different groups of employees.

Because the latest research shows an increasing trend of remote working implementations and that such working concepts will be applied and developed even after the pandemic caused by the virus COVID-19, the future studies should address the question of how companies can properly adapt their business activities and processes to enhance the positive and minimize or even mitigate the negative impacts. The proper management of challenges which remote working concept brings to the companies and employees features as a strategic question that requests specific and structural company responses. Successful management of such working concept can bring a strategic advantage to the company, in terms of human resource management and consequently of business results (Đorđević et al., 2020).

## Conclusion

Based on the obtained results, it is possible to interpret certain conclusions in a theoretical context, as well as with managerial implications. The presented results show that in both female and male respondents the improvement of work engagement (WE) is positively related to the enhancement of job performance (JP), which indicates the possibility that creating conditions for better work engagement creates prerequisites for improving job performance during remote working. Additionally, the results of the analysis for both groups of respondents showed that strengthening the perception of the presence of social support (SP) can be positively associated with a better perception of work autonomy (A), as well as increased work engagement (WE). A significant result of the research refers to the negative correlation between monitoring during remote work (M) and job performance (JP) in women, which indicates that increased monitoring can lead to reduced performance. The results of male respondents also showed that the better perception of social support (SP) is positively related to job performance (JP), while the growth of feelings of autonomy during remote work can be accompanied by improved work engagement (WE). These theoretical implications may be important for the design of a managerial approach to effective remote working, and based on the above, several practical implications can be identified. First, the managerial approach to remote working should consider the fact that there are certain differences between women and men that need to be taken into account to obtain the expected work outcomes. Second, in both groups of respondents, the performance increase is positively associated with work engagement, while work engagement is positively associated with social support, which indicates that social support in an indirect or direct way for a positive impact on job performance. Third, strengthening immediate supervision during remote working in women can lead to a decline in performance.

These conclusions indicate certain limitations of this research. First, the interpretation of the relationship between the observed variables is based on correlation analysis. In this way, clear indications of the strength and direction of the relationship

between the variables were obtained, but the influence between the variables was not determined through a more complex research model. Second, the sample size may be a limitation in such a study, regardless of the confirmed internal consistency of the statements used. These limitations also represent guidelines for future research that will go toward creating a more complex research model based on regression analysis and determining the potential mediator or moderator role of some variables, as well as increasing the number of units in the sample to achieve additional validity of results and their interpretation.

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UDC: 331.101.31:004]:159.9
DOI: 10.5937/AnEkSub2248065T
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 065-082
Received: 17/12/2021
Accepted: 21/08/2022

# Job satisfaction in the conventionally employed and teleworkers: the impact of gender, age and education

## Задовољство послом код конвенционално запослених и запослених на даљину: утицај пола, година старости и образовања

**Srđana Taboroši** *
University of Novi Sad, Mihajlo Pupin Technical Faculty, Zrenjanin, Republic of Serbia, srdana.taborosi@gmail.com
**Jovanka Popović**
Union - Nikola Tesla University, Belgrade, Faculty of Management, Sremski Karlovci, Republic of Serbia, jobajcetic@gmail.com
**Jasmina Poštin**
Union - Nikola Tesla University, Belgrade, Faculty of Management, Sremski Karlovci, Republic of Serbia, famzr.edu@gmail.com
**Marko Konjikušić**
Union - Nikola Tesla University, Belgrade, Faculty of Management, Sremski Karlovci, Republic of Serbia, markozr1979@yahoo.com
**Milan Nikolić**
University of Novi Sad, Mihajlo Pupin Technical Faculty, Zrenjanin, Republic of Serbia, e-mail: mikaczr@sbb.rs

**Abstract:** This paper examines and analyses the differences in job satisfaction among the conventionally employed and teleworkers. Differences were examined for three control variables: gender, age and education of the respondents. The research was conducted in West Balkan countries (Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia and Serbia), and included 313 respondents (conventionally employed and teleworkers). Teleworkers are more satisfied than conventionally employed. This is most evident through satisfaction with all forms of compensation, procedures and associates. Job satisfaction is higher in men, both those who work conventionally and who telework. Men are significantly more appreciative of opportunities for advancement, as well as achieving additional benefits and rewards. Younger respondents have greater job satisfaction than older respondents, but this only applies to the conventionally employed. There are no differences in job satisfaction among teleworkers in terms of dependence on age. Job satisfaction does not depend on the respondents' level of education of, and this applies to both conventionally employed and teleworkers. Companies that apply telework evaluate the results of their employees' work and the contribution they provide to the company more objectively, and accordingly, they reward and promote employees adequately. Thus, all age groups and educational categories of employees see their chance in teleworking conditions.
**Keywords:** job satisfaction, teleworkforce, employees, West Balkan.
**JEL classification**: M540, O320, M210

* Corresponding author

**Сажетак:** Овај рад испитује и анализира разлике у задовољству послом између конвенционално запослених и радника на даљину. Разлике су испитиване за три контролне варијабле: пол, старост и образовање испитаника. Истраживање је спроведено у земљама Западног Балкана (Босна и Херцеговина, Хрватска, Црна Гора, Северна Македонија и Србија), а обухватило је 313 испитаника (конвенционално запослених и радника на даљину). Радници на даљину су задовољнији него конвенционално запослени. То се највише види кроз задовољство свим облицима накнада, процедурама и сарадницима. Задовољство послом је веће код мушкараца, и оних који раде конвенционално и оних који раде на даљину. Мушкарци знатно више цене могућности за напредовање, као и остваривање додатних бенефиција и награда. Млађи испитаници имају веће задовољство послом од старијих, што се односи само на конвенционално запослене. Не постоје разлике у задовољству послом међу радницима на даљину, у зависности од њиховог узраста. Задовољство послом не зависи од степена образовања испитаника, а то се односи и на конвенционално запослене и на раднике на даљину. Компаније које примењују рад на даљину објективније оцењују резултате рада својих запослених и допринос који дају компанији, те у складу са тим адекватно награђују и унапређују запослене. Дакле, све старосне и образовне категорије запослених своју шансу виде у условима рада на даљину.
**Кључне речи:** задовољство послом, запослени на даљину, запослени, Западни Балкан.
**ЈЕЛ класификација:** M540, O320, M210

## Introduction

Teleworking is a relatively recent method of work, in which employees perform their work using information technology outside corporate offices, from home or some other location that meets the conditions required (Baruch, 2000). The popularity of this way of working has grown with the development of information technologies, and teleworking employees were mostly employed in the IT industry, but teleworking has suddenly emerged in recent years with the emergence of the COVID-19 pandemic. Many companies were conditionally forced to apply this method of work in order to protect the employees and survive on the market. In this way, other industries have experienced telework, and thus its advantages and disadvantages. Teleworking has transformed the labour market and, like modern management, has contributed to greater flexibility, efficiency and sustainability. Conventional method of working and controlling is no longer necessary and is not the only option for efficient employee management and business success. But, like any other big change, this method of work, in addition to the advantages, also brings great challenges.

The impact of teleworking can be viewed from the perspective of the company and the employee. This method of work enables companies to expand the labour market and hire certain groups of employees, such as people with disabilities, single parents and others. Also, companies can outsource employees from other countries without complications in the form of work permits, which they would have to provide in case of "labour importing" for the conventional method. Companies can achieve great savings by hiring employees from developing countries, but also by reducing office expenses (Baruch, 2000). In addition, there is increased productivity, quality of work, as well as reliability among teleworkers. This enables better use of human capital in the company, which can have a positive impact on business. Teleworking employees often show higher values of organizational commitment and trust at work (Taboroši, et al., 2020), less often take sick leave and have a lower degree of rumination (Nolen-Hoeksema, 2000). When talking about the benefits that employees achieve remotely, the literature most often mentions the

flexibility of organizing free time, saving time on commuting, as well as better work-life balance (Mahfood, 1992). Likewise, teleworking is associated with increased work performance, motivation, job satisfaction, as well as stress reduction (Allen et al., 2015). However, depending on the personal identity, skills, context and role of the employee, teleworking employees may have difficulty adapting to this method of work, and in the absence of quality management, may be prone to stress, overwork, isolation and depression (Tavares, 2017).

Teleworking does not imply job satisfaction, but has the ability to provide more value to certain conditions that can affect job satisfaction positively. Of course, the effect of these influences depends on the employees themselves, both their jobs and characters, values, age, gender and level of education. People who value socializing with colleagues will certainly not have the same values of job satisfaction as people who value autonomy and flexibility (Petcu, et al., 2021). There are different influences of gender, age, work experience, and social status on job satisfaction in teleworkers. Scientists cannot agree on which of the above factors have the strongest influence, because satisfaction itself is a very individual need of the employee. The gender gap that exists in the workplace can also have a strong impact on teleworkers and their job satisfaction. As women are more committed to housework and raising children than men (Geist, 2020), some negative impact of teleworking on job satisfaction among female employees can be assumed. According to Feng and Savannah (2020), female teleworkers showed a lower level of satisfaction during COVID-19 lockdowns. Also, the age of the employed person can have a strong influence on career choices in general (Fonner and Roloff, 2010), so the influence on teleworking can be assumed.

According to Brunelle and Fortin (2021), based on three factors – need for autonomy, competence and relatedness – teleworkers have higher job satisfaction values. The introduction of telework can provide significant positive effects on the company if employees are selected for whom meeting these psychological needs is important. This also means that teleworkers and the conventionally employed show different job satisfaction, precisely because the method of work itself meets their different physical and psychological needs. This is also important for companies that have difficulties in doing business due to exhaustion from social interactions, so they can combine working methods to overcome this problem. With properly conducted telework, employees can have a good "rest" from work-related stress without negative impact on business (Windeler, Chudoba and Sundrup, 2017).

Research into teleworkforce is very significant, especially in the light of current global circumstances caused by the Covid-19 pandemic. This paper examines and analyses the differences in job satisfaction among conventionally employed and teleworking persons. Differences were also examined for three control variables: gender, age and edition of the respondents. The research was conducted in West Balkan countries (Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia and Serbia). In theoretical terms, the significance of the work is that it enables the deepening of existing research, as well as the acquisition of missing knowledge. This especially refers to the fact that job satisfaction

is viewed here through individual dimensions, which has not been done enough in the context of teleworking, as well as the impact of given control variables on individual job satisfaction dimensions. In practical terms, this research is important because it allows the management to see all the impacts of telework and create working conditions properly, focusing on taking full advantage of this method, as well as timely prevention and mitigation of negative effects. HR specialists can use the findings from this paper to develop more efficient decision-making models that they can use when hiring teleworkers. This can be particularly useful for companies in the West Balkan region, where teleworking was underrepresented before the Covid-19 pandemic.

# 1. Theory and hypotheses

## 1.1. Job satisfaction

Although the concept has been researched for a long time, there is still no definition that the authors agree on when it comes to job satisfaction. According to Hoppock (1935), job satisfaction is a set of psychological, physical and environmental elements that lead an employee to say that he is satisfied with his job. Therefore, job satisfaction can be influenced by many different factors, and yet it represents the emotional state in which the employee finds himself. Vroom (1964) defines job satisfaction as an individual's emotional relationship to the role they play in the workplace.

Job satisfaction is primarily a set of positive and negative feelings that an individual cultivates towards their job. Every employee has certain desires, needs and expectations, and based on the degree of their fulfilment, can develop a certain level of job satisfaction. An individual feels fulfilled if they are satisfied with their job. Also, every organization must find its own way to achieve this (Miletić, Ćurčić & Simonović, 2021). Adequate HR management can have a strong impact on job satisfaction among employees (Dosenovic & Zolak Poljašević, 2021). In addition to a positive emotional state, the employee then feels that they are doing his job well, that they are appreciated and justly rewarded for it, and all this gives them a sense of fulfilment (Kaliski, 2007). This concept is multidimensional and can mean different things to different people, but it is one of the most influential factors on the efficiency, effectiveness and success of a company (Aziri, 2011). A happy employee is also successful in their work.

Dissatisfaction increases the possibility of disloyalty, absence from work, reduced efficiency and more frequent mistakes. Spector (1997) highlights 3 important characteristics of job satisfaction:

1. Organizations must be guided by humane values such as respect and fair treatment – in this way job satisfaction has a positive impact on effectiveness.

2. The behaviour of employees will depend on the level of job satisfaction, which results in a strong impact on the companies' performance.

3. Job satisfaction is an indicator of organizational activities.

As the concept of job satisfaction is complex, so is its impact. According to Luthans (1998), job satisfaction does not only lead to an increase in individual performance, but also to an increase in organizational performance as a whole. As job satisfaction reduces absenteeism and the possibility of error, and increases loyalty (Sweney & McFarlin, 2005), caring for employees is the most efficient and long-term way to reduce the costs of these phenomena. In addition, job satisfaction develops a strong and positive impact on the emotional and mental state of employees, leading to greater organizational commitment, productivity and efficiency. It should certainly be borne in mind that factors such as age, work experience, education and gender strongly influence job satisfaction in the general sense (Tang and Cousins, 2005), so it can be assumed that these relationships also exist among teleworkers. Job satisfaction is a concept that every organization must plan, which plans in the long run and wants to be successful.

## 1.2. Job satisfaction and telework

The strong impact of job satisfaction has long been researched. Mayo (1949) and Maslow (1954) state that, among other things, employees, can be motivated by social interaction in the workplace. Relevant relationships at work, such as opportunities for feedback, interconnectedness, and friendship, can increase employee satisfaction and stand out as irreplaceable (Olson et al., 2002). Such interactions can indeed enhance closeness among employees and lead to a significant flow of information which can have extremely beneficial effects on job satisfaction, work performance and, ultimately, company success.

Recent research shows a positive relationship between job satisfaction and telecommuting. In companies that apply part-time telework, an increase in job satisfaction has been observed with an increase in teleworking hours (Golden & Veiga, 2005). Employees are satisfied with the autonomy and flexibility provided by teleworking, and the absence of uncertainty and stress caused by sudden interruptions in work, meetings and organizational policies contributes to teleworking employees being more productive and efficient in their work (Nardi & Whittaker, 2002).

Managers have often been reluctant to apply teleworking, however, modern technologies and digitalization allow superiors to track the work performance of their employees much more accurately and efficiently (Meier, 2017). In addition, the positive impact of teleworking can be seen on society as a whole, especially given the reduced environmental pollution due to less use of vehicles. The popularity and application of teleworking has slowly grown with the development of information technology, but only with the advent of the Covid-19 pandemic, companies have massively applied this method of work. In the case of companies that have previously applied this way of working, they continued their processes without hindrance and without difficulty, unlike those for whom this was the first encounter with teleworking (Karacsony, 2021).

In addition to increased productivity, efficiency, better work discipline, and reduced

absenteeism, teleworking also contributes to increasing a company's overall performance (Smith et al., 2015). It is natural to conclude that this method of work also leads to increased job satisfaction, but some research shows the opposite. According to Windeler et al. (2017), loneliness and boredom brought by working from home can contribute to making employees more dissatisfied with their work when working remotely. Also, employees who work from home can come into conflict with their family members and find it harder to separate private life from work, and overworking can occur. Nevertheless, numerous authors cite a positive relationship between teleworking and job satisfaction (Smith et al., 2015; Golden & Veiga, 2005). In their research, Golden & Veiga (2005) go a step further and examine the correlation between teleworking and job satisfaction. Research conducted in Slovakia confirms these claims, and it is found that teleworking has a positive effect on job satisfaction and the significant proportion of respondents will continue to telework even after the Covid-19 pandemic is over (Karacsony, 2021). The multidimensionality of the concept of job satisfaction also requires a multidimensional approach to research, especially when it comes to teleworking. Teleworking has a strong positive impact on job satisfaction, but also work-life balance, significantly reduces work-related stress, as well as burnout (Baert et al., 2020).

When employees are viewed by gender, certain research proves that women are less prone to the negative effects of teleworking (Charalampous et al., 2019). This way of working enables employed women to better balance responsibilities in the home and around the family, because women are still in most cases responsible for family care (Queisser, Adema & Clarke, 2020). According to (Petcu, et al., 2021), men who work remotely highly value the sense of control and independence that this method of work gives them, as well as the quality business environment that provides them with support and resources for work and training. According to the same authors, women value the opportunity for self-organization more, as well as greater opportunities for the integration of women into teleworkforce. Older teleworkers generally feel the positive effects of teleworking, especially when it comes to work-related stress and efficiency (Baert et al., 2020), and show higher values of organizational commitment and trust at work (Taboroši et al., 2020), which can also contribute to higher job satisfaction values. These results are consistent with the findings of Aguilera et al. (2016), where it was shown that telework is often performed in a quiet and stress free environment, which enables older people to have better concentration and stress management. This environment can also result in greater commitment of employees regardless of age and gender, because the modern way of life already has a stressful effect on all employees.

The role of employees in the overall business and success of the company is growing, and companies must take care of employees' well-being. Flexibility of working-hours, as well as a high level of autonomy increase creativity and productivity in employees (Davidescu et al., 2020), and this can have a positive impact on job satisfaction, as well as on greater organizational commitment. According to Giovanis (2019), teleworkers show higher values of job satisfaction and loyalty, and this is especially important in times of crisis, because it significantly reduces the companies' costs when hiring new people.

Interestingly, according to Nakrošienė, Bučiūnienė, and Goštautaitė (2019), the possibility of working during health problems within teleworkers has a positive effect on job satisfaction, which implies that teleworkers really value their work and method of work more. And Makarius and Larson (2017) point out the strong influence of superiors' trust on job satisfaction with teleworkers. This relationship between employees and management also enables positive feelings of the employee towards his own future in the company.

Considering that two basic groups of respondents (the conventionally employed and teleworkers) are observed in the paper, with three control variables (gender, age and education) introduced, in this paper, seven hypotheses are set:

H1: There is a statistically significant difference in the average scores of job satisfaction dimensions, for conventionally employed and teleworking employees.

H2: There is a statistically significant difference in the average scores of job satisfaction dimensions, for conventionally employed men and women.

H3: There is a statistically significant difference in the average scores of job satisfaction dimensions, for teleworking men and women.

H4: There is a statistically significant difference in the average scores of job satisfaction dimensions, for conventionally employed younger and older respondents.

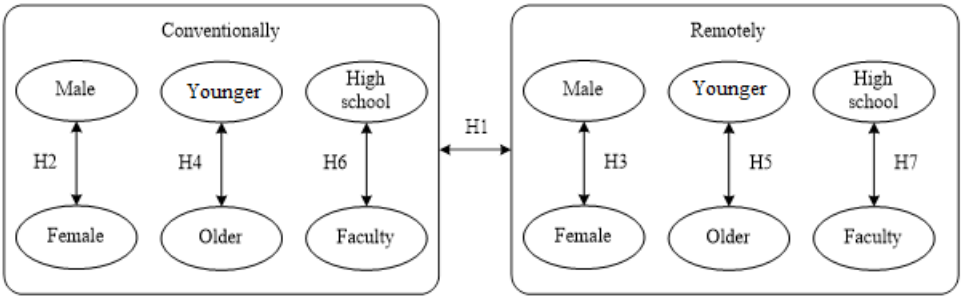
H5: There is a statistically significant difference in the average scores of job satisfaction dimensions, for teleworking younger and older respondents.

H6: There is a statistically significant difference in the average scores of job satisfaction dimensions, for conventionally employed high school and faculty respondents.

H7: There is a statistically significant difference in the average scores of job satisfaction dimensions, for teleworking high school and faculty respondents.

The hypotheses are introduced visually in order to facilitate follow up (Figure 1).

*Figure1: Visual portrayal of the hypotheses*




*Source: the authors' research*

# 2. Method

## 2.1. Survey instrument

The Job Satisfaction Survey (JSS) (Spector, 1985) was used to measure job satisfaction. Each of the respondents was able to form their answers on the seven-point Likert scale, and the questionnaire contains 36 items and 9 dimensions.

## 2.2. Participants and data collection

This research was conducted in companies from five West Balkan countries: Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia and Serbia. The sample includes teleworkers and conventionally employed, who are employed in these organizations. Data was collected online by filling out questionnaires using Google form tool, and 313 valid questionnaires were collected from respondents, 162 (51.76%) of which were teleworkers and 151 (48.24%) were conventionally employed.

# 3. Results

## 3.1. Descriptive statistics

The results of descriptive statistics for job satisfaction are given in Table 1. In addition, the names of dimensions, abbreviation, mean, standard deviation and Cronbach's alpha for each of the dimensions can be found in the same table. The merits of these Cronbach's alpha are between 0.740 up to 0.928.

*Table 1. Descriptive statistics*

| Dimensions | Abbr. | N | Min | Max | Mean | Std. Deviation | Cronbach's alpha |
|---|---|---|---|---|---|---|---|
| Pay | JS1 | 313 | 1.000 | 6.000 | 3.65256 | 1.495750 | 0.904 |
| Promotion | JS2 | 313 | 1.000 | 6.000 | 3.85703 | 1.602947 | 0.928 |
| Supervision | JS3 | 313 | 1.000 | 6.000 | 4.42572 | 1.464002 | 0.900 |
| Fringe Benefits | JS4 | 313 | 1.000 | 6.000 | 3.98003 | 1.592312 | 0.921 |
| Contingent Rewards | JS5 | 313 | 1.000 | 6.000 | 3.88099 | 1.581143 | 0.926 |
| Operating Procedures | JS6 | 313 | 1.000 | 6.000 | 3.77955 | 1.123987 | 0.740 |
| Coworkers | JS7 | 313 | 1.000 | 6.000 | 4.30032 | 1.244887 | 0.855 |
| Nature of Work | JS8 | 313 | 1.000 | 6.000 | 4.64137 | 1.298183 | 0.912 |
| Communication | JS9 | 313 | 1.000 | 6.000 | 4.41294 | 1.199713 | 0.836 |
| Valid N (listwise) | | 313 | | | | | |

*Source: the authors' calculations*

## 3.2. Job satisfaction in the conventionally employed and teleworkers

A t-test was used to compare average scores of job satisfaction dimensions. The results of

the t-test are presented in three Tables (Table 2, Table 3, and Table 4). In these tables, results with a statistically significant difference in the mean ratings of the observed dimensions are shown in bold font. The results of the t-test over the average job satisfaction dimensions, for the conventionally employed and teleworkers are given in Table 2.

*Table 2. T-test over average values of job satisfaction dimensions, depending on the working method (1 - Conventionally; 2 - Telework)*

| JS | Working method | N | Mean | Std. Deviation | Std. Error Mean | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | F | Sig. | t | df | Sig. (2-tailed) |
| **JS1** | **1 Conv.** | **151** | **3.45530** | **1.500579** | **.122115** | **.317** | **.574** | **-2.267** | **311** | **.024** |
| | **2 Telework** | **162** | **3.83642** | **1.472133** | **.115662** | | | **-2.266** | **308.519** | **.024** |
| JS2 | 1 Conv. | 151 | 3.75166 | 1.584429 | .128939 | .214 | .644 | -1.123 | 311 | .262 |
| | 2 Telework | 162 | 3.95525 | 1.618724 | .127179 | | | -1.124 | 310.251 | .262 |
| JS3 | 1 Conv. | 151 | 4.35762 | 1.449859 | .117988 | .232 | .630 | -.794 | 311 | .428 |
| | 2 Telework | 162 | 4.48920 | 1.478718 | .116179 | | | -.795 | 310.198 | .427 |
| JS4 | 1 Conv. | 151 | 3.81623 | 1.612116 | .131192 | .860 | .354 | -1.763 | 311 | .79 |
| | 2 Telework | 162 | 4.13272 | 1.563156 | .122813 | | | -1.761 | 307,839 | .079 |
| **JS5** | **1 Conv.** | **151** | **3.67550** | **1.650453** | **.134312** | **4.442** | **.036** | **-2.234** | **311** | **.026** |
| | **2 Telework** | **162** | **4.07253** | **1.493433** | **.117335** | | | **-2.226** | **302.286** | **.027** |
| **JS6** | **1 Conv.** | **151** | **3.55464** | **1.107134** | **.090097** | **.428** | **.514** | **-3.478** | **311** | **.001** |
| | **2 Telework** | **162** | **3.98920** | **1.102069** | **.086587** | | | **-3.478** | **309.254** | **.001** |
| **JS7** | **1 Conv.** | **151** | **4.07285** | **1.298906** | **.105704** | **3.119** | **.078** | **-3.166** | **311** | **.002** |
| | **2 Telework** | **162** | **4.51235** | **1.156538** | **.090866** | | | **-3.153** | **300.644** | **.002** |
| JS8 | 1 Conv. | 151 | 4.67715 | 1.291185 | .105075 | .356 | .551 | .470 | 311 | .639 |
| | 2 Telework | 162 | 4.60802 | 1.307787 | .102749 | | | .470 | 309.965 | .638 |
| JS9 | 1 Conv. | 151 | 4.28146 | 1.224508 | .099649 | 1.230 | .268 | -1.880 | 311 | .061 |
| | 2 Telework | 162 | 4.53549 | 1.166586 | .091656 | | | -1.876 | 306.667 | .062 |

*Source: the authors' calculations*

The results of the t-test over average ratings of job satisfaction dimensions, for conventionally employed men and women, as well as for teleworking men and women, are given in Table 3.

*Table 3. T-test over average values of job satisfaction dimensions, for conventionally employed men and women, and for teleworking men and women*

| Working method | JS | Gender | N | Mean | Std. deviation | Std. error Mean | Levene's Test for Equality of Variances | t-test for Equality of Means |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | F | Sig. | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Conv. | **JS1** | **1 Male** | **58** | **3.90517** | **1.346558** | **.176812** | **3.044** | **.083** | **2.985** | **149** | **.003** |
| | | **2 Fem.** | **93** | **3.17473** | **1.529948** | **.158648** | | | **3.075** | **132.512** | **.003** |
| | **JS2** | **1 Male** | **58** | **4.17672** | **1.390766** | **.182616** | **4.459** | **.036** | **2.655** | **149** | **.009** |
| | | **2 Fem.** | **93** | **3.48656** | **1.646128** | **.170695** | | | **2.761** | **135.859** | **.007** |
| | JS3 | 1 Male | 58 | 4.62069 | 1.302192 | .170986 | 3.646 | .058 | 1.773 | 149 | .078 |
| | | 2 Fem. | 93 | 4.19355 | 1.518513 | .157462 | | | 1.838 | 134.667 | .068 |
| | **JS4** | **1 Male** | **58** | **4.22845** | **1.499477** | **.196891** | **1.891** | **.171** | **2.525** | **149** | **.013** |
| | | **2 Fem.** | **93** | **3.55914** | **1.634129** | **.169451** | | | **2.577** | **128.897** | **.011** |
| | **JS5** | **1 Male** | **58** | **4.13362** | **1.489153** | **.195535** | **2.051** | **.154** | **2.752** | **149** | **.007** |
| | | **2 Fem.** | **93** | **3.38978** | **1.688944** | **.175135** | | | **2.834** | **132.361** | **.005** |
| | JS6 | 1 Male | 58 | 3.73276 | 1.109036 | .145624 | .269 | .605 | 1.569 | 149 | .119 |
| | | 2 Fem. | 93 | 3.44355 | 1.097260 | .113781 | | | 1.565 | 120.105 | .120 |
| | **JS7** | **1 Male** | **58** | **4.37069** | **1.125113** | **.147735** | **2.817** | **.095** | **2.255** | **149** | **.026** |
| | | **2 Fem.** | **93** | **3.88710** | **1.369562** | **.142017** | | | **2.360** | **138.006** | **.020** |
| | JS8 | 1 Male | 58 | 4.86207 | 1.021880 | .134179 | 7.555 | .007 | 1.394 | 149 | .165 |
| | | 2 Fem. | 93 | 4.56183 | 1.426961 | .147969 | | | 1.503 | 146.082 | .135 |
| | JS9 | 1 Male | 58 | 4.42672 | 1.098253 | .144208 | 1.628 | .204 | 1.153 | 149 | .251 |
| | | 2 Fem. | 93 | 4.19086 | 1.294532 | .134237 | | | 1,197 | 135.531 | .233 |
| 2 Tele. | JS1 | 1 Male | 40 | 4.16250 | 1.300333 | .205601 | 2.839 | .094 | 1.622 | 160 | .107 |
| | | 2 Fem. | 122 | 3.72951 | 1.513913 | .137063 | | | 1.752 | 76.498 | .084 |
| | **JS2** | **1 Male** | **40** | **4.44375** | **1.429416** | **.226010** | **3.401** | **.067** | **2.226** | **160** | **.027** |
| | | **2 Fem.** | **122** | **3.79508** | **1.650199** | **.149402** | | | **2.394** | **75.862** | **.019** |
| | JS3 | 1 Male | 40 | 4.75625 | 1.285381 | .203237 | 3.944 | .049 | 1.319 | 160 | .189 |
| | | 2 Fem. | 122 | 4.40164 | 1.531541 | .138659 | | | 1.441 | 78.289 | .153 |
| | **JS4** | **1 Male** | **40** | **4,57500** | **1,388137** | **,219484** | **1,536** | **,217** | **2,083** | **160** | **,039** |
| | | **2 Fem.** | **122** | **3,98770** | **1,595077** | **,144411** | | | **2,235** | **75,515** | **,028** |
| | **JS5** | **1 Male** | **40** | **4,50000** | **1,362266** | **,215393** | **2,274** | **,134** | **2,108** | **160** | **,037** |
| | | **2 Fem.** | **122** | **3,93238** | **1,513041** | **,136984** | | | **2,224** | **73,075** | **,029** |
| | JS6 | 1 Male | 40 | 4,18750 | 1,081236 | ,170958 | ,000 | ,984 | 1,314 | 160 | ,191 |
| | | 2 Fem. | 122 | 3,92418 | 1,105438 | ,100082 | | | 1,329 | 67,747 | ,188 |
| | JS7 | 1 Male | 40 | 4,65625 | 1,031068 | ,163026 | ,902 | ,344 | ,906 | 160 | ,366 |
| | | 2 Fem. | 122 | 4,46516 | 1,194995 | ,108190 | | | ,977 | 76,156 | ,332 |
| | JS8 | 1 Male | 40 | 4,78750 | 1,100044 | ,173932 | 1,906 | ,169 | 1,000 | 160 | ,319 |
| | | 2 Fem. | 122 | 4,54918 | 1,368038 | ,123856 | | | 1,116 | 81,801 | ,268 |
| | **JS9** | **1 Male** | **40** | **4,85000** | **,991632** | **,156791** | **1,955** | **,164** | **1,983** | **160** | **,049** |
| | | **2 Fem.** | **122** | **4,43238** | **1,204347** | **,109036** | | | **2,187** | **79,826** | **,032** |

*Source: The authors' calculations*

The results of the t-test over average ratings of job satisfaction dimensions, for conventionally employed younger and older respondents, as well as for teleworking older and younger respondents, are given in Table 4.

*Table 4. T-test over average values of job satisfaction dimensions, for conventionally employed younger and older respondents, and for teleworking younger and older respondents*

| Working method | JS | Age | N | Mean | Std. deviation | Std. error mean | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | F | Sig. | t | df | Sig. (2-tailed) |
| 1 Conv. | **JS1** | **1 Youn.** | **67** | **3.75000** | **1.503783** | **.183716** | **.055** | **.814** | **2.182** | **149** | **.031** |
| | | **2 Older** | **84** | **3.22024** | **1.464646** | **.159806** | | | **2.176** | **139.950** | **.031** |
| | **JS2** | **1 Youn.** | **67** | **4.07463** | **1.565499** | **.191256** | **.096** | **.757** | **2.268** | **149** | **.025** |
| | | **2 Older** | **84** | **3.49405** | **1.560997** | **.170319** | | | **2.267** | **141.450** | **.025** |
| | JS3 | 1 Young. | 67 | 4.55970 | 1.468153 | .179363 | .008 | .931 | 1.537 | 149 | .127 |
| | | 2 Older | 84 | 4.19643 | 1.423274 | .155292 | | | 1.531 | 139.640 | .128 |
| | **JS4** | **1 Youn.** | **67** | **4.12313** | **1.546240** | **.188903** | **.647** | **.423** | **2.113** | **149** | **.036** |
| | | **2 Older** | **84** | **3.57143** | **1.630642** | **.177918** | | | **2.126** | **144.569** | **.035** |
| | JS5 | 1 Young. | 67 | 3.95522 | 1.666245 | .203564 | .263 | .609 | 1.876 | 149 | .063 |
| | | 2 Older | 84 | 3.45238 | 1.612954 | .175988 | | | 1.869 | 139.542 | .064 |
| | JS6 | 1 Young. | 67 | 3.69403 | 1.152090 | .140750 | .937 | .335 | 1.386 | 149 | .168 |
| | | 2 Older | 84 | 3.44345 | 1.063745 | .116064 | | | 1.374 | 136.198 | .172 |
| | JS7 | 1 Young. | 67 | 4.20149 | 1.258485 | .153748 | .673 | .413 | 1.088 | 149 | .279 |
| | | 2 Older | 84 | 3.97024 | 1.328785 | .144982 | | | 1.094 | 144.628 | .276 |
| | JS8 | 1 Young. | 67 | 4.45896 | 1.401837 | .171262 | 2.926 | .089 | -1.870 | 149 | .063 |
| | | 2 Older | 84 | 4.85119 | 1.175246 | .128230 | | | -1.833 | 128.603 | .069 |
| | JS9 | 1 Young. | 67 | 4.20522 | 1.319956 | .161258 | 2.192 | .141 | -.682 | 149 | .496 |
| | | 2 Older | 84 | 4.34226 | 1.147141 | .125163 | | | -.671 | 131.519 | .503 |
| 2 Tele. | JS1 | 1 Young. | 94 | 3.98670 | 1.417710 | .146226 | 3.234 | .074 | 1.534 | 160 | .127 |
| | | 2 Older | 68 | 3.62868 | 1.530470 | .185597 | | | 1.515 | 137.755 | .132 |
| | JS2 | 1 Young. | 94 | 3.98138 | 1.604865 | .165529 | .329 | .567 | .241 | 160 | .810 |
| | | 2 Older | 68 | 3.91912 | 1.648971 | .199967 | | | .240 | 142.183 | .811 |
| | JS3 | 1 Young. | 94 | 4.36702 | 1.550105 | .159881 | 3.475 | .064 | -1.238 | 160 | .217 |
| | | 2 Older | 68 | 4.65809 | 1.367196 | .165797 | | | -1.264 | 153.757 | .208 |
| | JS4 | 1 Young. | 94 | 4.21011 | 1.546025 | .159460 | .208 | .649 | .740 | 160 | .460 |
| | | 2 Older | 68 | 4.02574 | 1.591805 | .193035 | | | .736 | 142.002 | .463 |
| | JS5 | 1 Young. | 94 | 4.06383 | 1.457709 | .150351 | .935 | .335 | -.087 | 160 | .931 |
| | | 2 Older | 68 | 4.08456 | 1.552328 | .188247 | | | -.086 | 138.995 | .932 |
| | JS6 | 1 Young. | 94 | 4.13032 | 1.054769 | .108791 | .594 | .442 | 1.932 | 160 | .055 |
| | | 2 Older | 68 | 3.79412 | 1.143559 | .138677 | | | 1.907 | 137.363 | .059 |
| | JS7 | 1 Young. | 94 | 4.48138 | 1.131917 | .116748 | .016 | .899 | -.400 | 160 | .690 |
| | | 2 Older | 68 | 4.55515 | 1.196891 | .145144 | | | -.396 | 139.634 | .693 |
| | JS8 | 1 Young. | 94 | 4.53457 | 1.346841 | .138916 | .888 | .347 | -.840 | 160 | .402 |
| | | 2 Older | 68 | 4.70956 | 1.254552 | .152137 | | | -.849 | 150.118 | .397 |
| | JS9 | 1 Young. | 94 | 4.55053 | 1.190565 | .122797 | .078 | .780 | .192 | 160 | .848 |
| | | 2 Older | 68 | 4.51471 | 1.141061 | .138374 | | | .194 | 147.969 | .847 |

*Source: the authors' calculations*

The results of the t-test over average ratings of job satisfaction dimensions, for conventionally employed high school and college educated respondents, as well as for teleworking high school and college educated respondents, are not shown because there is no statistically significant difference in the average values of the job satisfaction dimension, both for conventionally employed and teleworkers.

# 4. Discussion

## 4.1. Discussion of average job satisfaction dimensions, for the conventionally and remotely employed

Table 2 shows that teleworking employees are generally more satisfied with their job than conventionally employed. All dimensions of job satisfaction have higher mean values for teleworkers, and these differences are statistically significant for four dimensions: JS1 - Pay, JS5 - Contingent rewards, JS6 - Operating procedures and JS7 - Coworkers. In addition, the differences in average scores are close to statistically significant in two other dimensions: JS4 - Fringe benefits and JS9 - Communication. This shows that teleworkers are, in the first place, more satisfied with all aspects of compensation, such as salary, benefits and rewards. Also, teleworkers are more satisfied with aspects related to the procedural and personal work environment, which includes: operational procedures, work organization, accompanying organizational communication, as well as quality associates. In organizations that prefer telework, more attention is paid to these aspects of work, relationships are clearer, everyone knows what their tasks and responsibilities are and this is respected. Hence the greater satisfaction with the procedures, the associates, and finally all the forms of compensation. In this way, hypothesis H1 was confirmed.

The obtained results are consistent with the findings of most existing research, which confirms increased job satisfaction in teleworkers (Allen et al., 2015; Baert et al., 2020; Brunelle, Fortin, 2021; Davidescu et al., 2020; Giovanis, 2019; Golden, Veiga, 2005; Karacsony, 2021; Nardi, Whittaker, 2002; Smith et al., 2015).

## 4.2. Discussion of average job satisfaction dimensions, for conventionally employed and teleworkers, influence of control variables

When the sample is divided into men and women (Table 3), it is noticeable that the average job satisfaction dimension values have higher values in men. This applies to both conventionally employed and teleworkers. For conventionally employed, statistically significant differences occur for the following dimensions: JS1 - Pay, JS2 - Promotion, JS4 - Fringe benefits, JS5 - Contingent rewards and JS7 - Coworkers. For teleworkers, statistically significant differences occur for the following dimensions: JS2 - Promotion, JS4 - Fringe benefits, JS5 - Contingent rewards and JS9 - Communication. In both cases (conventionally and teleworking), men are better at assessing opportunities for

advancement, as well as achieving additional benefits and rewards. It is obvious that women have additional responsibilities in the home and family, which can significantly slow down their careers and reduce income and potential benefits. Men have more room for business in their lives, which they use. This, in general, results in greater job satisfaction in men, and this can be seen, to a greater or lesser extent, in other dimensions as well. In this way, hypotheses H2 and H3 were confirmed.

Similar results and explanations can be found in some other research (Geist, 2020; Feng, Savani, 2020; Petcu, et al., 2021). However, it should be noted that some researchers, for example Charalampous et al., (2019); Queisser, Adema & Clarke, (2020), point out the opposite, and that is that women are actually more receptive to teleworking and that this way of working suits them better.

When the sample is divided into younger and older respondents (Table 4), it is noticed that statistically significant differences in the average values of job satisfaction dimension exist only among conventionally employed. This occurs in three dimensions: JS1 - Pay, JS2 - Promotion and JS4 - Fringe benefits, with greater satisfaction expressed by younger respondents. Older conventionally employed believe that they deserve more, and that, in the first place, refers to a higher salary, a higher position in the organizational structure and greater benefits. On the other hand, there are no statistically significant differences in the average values of job satisfaction dimensions among teleworkers, for both younger and older respondents. In remote conditions, obviously compensation of employees and opportunities for advancement are not based on past work and years, but on the results and contribution of the company they work for. All teleworking employees are aware of that, regardless of age. Thus hypothesis H4 can be accepted and hypothesis H5 must be rejected.

One phenomenon should be noted, which was not considered within some of the hypotheses, but can be interesting and significant: older teleworking employees are noticeably more satisfied than older conventionally employed. This result is in line with the previous findings: telework provides opportunities for all employees to express themselves, to achieve results and to be adequately rewarded for it. Older teleworking employees are aware of this, and hence their greater satisfaction compared to their peers who work conventionally.

When the sample is divided into high school and college educated respondents there is no statistically significant difference in the average values of job satisfaction dimension, both for the conventionally employed and teleworkers. This suggests that job satisfaction does not depend on the level of education. Probably everyone is aware of their real positions in the organization, knowledge, expertise, and thus their capabilities in terms of compensation, promotion, etc. Thus hypotheses H6 and H7 must be rejected.

Here, too, one phenomenon should be pointed out, which was not considered within some of the hypotheses, but can be interesting and significant: high school educated teleworkers are noticeably more satisfied than high school educated conventionally

employed. This is especially pronounced in job satisfaction dimensions related to benefits and promotions. It has already been stated that telework provides significantly greater opportunities for all employees, so this is also true when it comes to the level of education: in remote conditions even the high school educated school employees have the opportunity to achieve significant results and be rewarded and promoted accordingly.

## 4.3. Research limitations

The limitation of the research is that it was realized in the West Balkan countries, so the results are valid for this region. It can be assumed that similar results may occur in some other regions and countries, especially those with similar economic development and living standards.

## 5. Conclusion

Generally, teleworking employees are more satisfied with their job than the conventionally employed. This was shown in all job satisfaction dimensions, and statistically significant in JS1 - Pay, JS5 - Contingent rewards, JS6 - Operating procedures and JS7 - Coworkers. Thus, remote employees are most satisfied with all forms of compensation, procedures and people they work with.

Job satisfaction is higher in men, both those who work conventionally and those who telework. In both cases, men are significantly more appreciative of advancement opportunities, as well as achieving additional benefits and rewards. Younger respondents have greater job satisfaction than older respondents, but this only applies to the conventionally employed. There are no differences in job satisfaction within teleworkers, depending on the age of the respondents. Finally, job satisfaction does not depend on the level of education of the respondents, and this applies to both conventionally employed and teleworkers.

The results of the research point to another important conclusion: companies that apply telework more objectively value the results of their employees and the contribution they provide to the company, and accordingly, adequately reward and promote employees. At the same time, the influence of age and level of education of employees is in the background and not so important. It follows that all age and educational categories of employees see their chance in teleworking conditions. Therefore, with teleworking employees, there are no significant differences in job satisfaction for younger and older respondents, nor for high school and faculty respondents. Also, older teleworkers are significantly more satisfied than older conventionally employed and high school teleworking employees are significantly more satisfied than high school conventionally employed.

As stated, differences in job satisfaction exist for men and women, with men being more satisfied with work. This is probably due to the fact that men have more time for work, compared to women, who spend a lot of energy on responsibilities around the house and family.

The theoretical significance of the paper is that the differences in the average job satisfaction dimensions between conventionally employed and teleworkers were determined, as well as the same differences, depending on the gender, age and level of education of the respondents. All impacts are determined for individual job satisfaction dimensions, which deepens existing research related to teleworkers job satisfaction. This is especially important in the current circumstances of life and work, which are shaped by the impact of the Covid-19 pandemic, so there is a need to study the effects of these new conditions on various aspects of organizational behaviour. The practical significance of the work is that it provides insight to leaders and managers in what they can expect from their employees, in terms of job satisfaction. Thanks to that, managers can better understand the phenomena examined here and, accordingly, take appropriate corrective actions in order to improve employee job satisfaction. For example, regardless of the type of work (conventionally/teleworking), it is important to provide fair compensation to all employees, provide equal opportunities for advancement, and provide women with appropriate support and understanding.

## Acknowledgement

This paper was supported by the Provincial Secretariat for Science and Technological Development, Autonomous Province of Vojvodina; Project number: 142-451-2706/2021; Project name: Analysis of entrepreneurial activity aspects in the context of society 5.0 - the possibility of implementation in AP Vojvodina; Project manager: Sanja Stanisavljev, PhD, Assistant Professor.

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UDC: 336.5(4)
DOI: 10.5937/AnEkSub2248083G
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 083-099
Received: 08/01/2022
Accepted: 21/03/2022

# Public revenues and public expenditure nexus: evidence of Eurozone heterogeneity

## Веза између јавних прихода и јавне потрошње: докази о хетерогености Еврозоне[♦]

**Olgica Glavaški**[*]
University of Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia,
olgica.glavaski@ef.uns.ac.rs

**Emilija Beker Pucar**
University of Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia,
emilija.beker.pucar@ef.uns.ac.rs

**Stefan Stojkov**
University of Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia,
stefan.stojkov@ef.uns.ac.rs

**Abstract:** After the global economic crisis, a broad consensus has emerged that membership in the Eurozone exerts a strong pressure on fiscal policy, since it is characterized by the dichotomy of common monetary policy and heterogeneous fiscal policies. This paper analyzes the performance of fiscal policies, highlighting the nexus between the public revenues and public expenditure from the angle of 19 Eurozone economies in the period 2010q1-2020q4. The research is based on Dumitrescu & Hurlin (2012) and Juodis, Karavias & Sarafidis (2021) Granger non-causality tests in macro panels in order to test causality direction, as well as Westerlund error-correction-based panel cointegration test to analyze fiscal sustainability. Having in mind the heterogeneity and divergency of the Eurozone members, sub-samples were estimated, concerning the core, the periphery and the emerging Eurozone economies. The results imply that all Eurozone economies achieve weak fiscal sustainability, while all economies from the group of Eurozone periphery applied "*tax and spend*" hypothesis. The empirical finding could be related to the fact that Eurozone periphery economies were hit harder by the global and sovereign debt crisis, and that implemented austerity and bail-out programs were adequate, thus resulting in sustainable fiscal position, reducing heterogeneity of fiscal performance within the Eurozone economies.
**Keywords:** Eurozone, public revenues and expenditure, causality, heterogeneity, macro panel.
**JEL classification**: C33, H50, H61.

**Сажетак:** После глобалне економске кризе, широк консензус је постигнут да је чланство у Еврозони оставило снажан притисак на фискалну политику, узимајући у обзир да је карактерише дихотомија у вези са јединственом монетарном политиком и хетерогеним фискалним политикама. Овај рад анализира перформансе фискалне политике, наглашавајући везу између јавних прихода и јавне потрошње из угла 19 економија Еврозоне у периоду 2010q1-2020q4. Истраживање је базирано на радовима Dumitrescu & Hurlin (2012) и Juodis, Karavias, & Sarafidis (2021) Granger-ове не-узрочности у макро панелима са циљем тестирања правца каузалности, као и на Westerlund панел коинтеграционом тесту са корекцијом равнотежне грешке како би се анализирала фискална одрживост. Услед хетерогености и дивергенције у

[♦] **Acknowledgements:** The research is funded by the Provincial Secretariat for Higher Education and Scientific Research, Autonomous Province of Vojvodina, Republic of Serbia within the project: Coordination of Economic Policies in the Function of European Integration, number 142-451-2650/2021-01/2.

[*] Corresponding author.

економијама Еврозоне, подузорци се оцењени за језгро, периферију и емергентне економије Еврозоне. Иако све економије Еврозоне имају *слабу* фискалну одрживост, специфично је да све економије из групе периферије Еврозоне примењују хипотезу „*опорезуј па троши*". Овај резултат се може довести у везу са чињеницом да су земље периферије Еврозоне биле снажније погођене глобално кризом и суверeном дужничком кризом, те да су програми штедње и спасавања у периферним земљама Еврозоне били адекватни и да су довели до одрживе фискалне позиције, конвергирајући ка земљама језгра Еврозоне.
**Кључне речи:** Еврозона, јавни приходи и јавна потрошња, узрочност, хетерогеност, макро панели.
**ЈЕЛ класификација:** C33, H50, H61.

## Introduction

The architecture of the Economic and Monetary Union (EMU) is based on single currency area and represents one of the most important accomplishments of European integrations. However, sharing the same currency is not easy and enough to achieve desired macroeconomic goals, such as low inflation and greater employment, investments, public expenditure levels, in the circumstances of low level of fiscal integration. EMU is characterized by dichotomy in relation to common monetary policy and heterogeneous fiscal policies (Dan, 2014). Dichotomy in the EMU could have divergent and negative macroeconomic effects due to difficulties in coordination of independent European Central Bank providing monetary policy and national governments directing fiscal policy. In order to take initial steps in potential coordination of the two macroeconomic instruments, it is necessary to identify common points of fiscal policies in the EMU economies, as well as sources of their heterogeneity. Common factors are related to fiscal policy framework in the European Union (EU) and Eurozone[1] based on Maastricht Treaty (1992), Stability and Growth Pact (1997), Fiscal Compact (2012), and independent fiscal institutions established to monitor fiscal rules implementation, such as European Fiscal Board (established in 2015). The success of common fiscal rules in the EMU and common monetary policy were checked during the global financial crisis, and results showed divergence within Eurozone economies, and possibilities for the Eurozone periphery economies to either leave EMU or to negotiate bail-out programs (Beljić & Glavaški, 2020). The idea of this paper is to analyze fulfillment of criteria for fiscal sustainability achievements in Eurozone economies after the global crisis, taking into a consideration the direction of causality between public expenditure and public revenues (nexus). Namely, identification of the causal direction between public expenditure and public revenues is very important, because it provides useful insights into how each economy and Eurozone as a whole could manage their unsustainable budget deficits in the future (Richter & Dimitrios, 2013). Since the vulnerability of the Eurozone is partially the result of heterogeneity and economic divergence of its members, the analysis in this paper is based on sub-samples of the Eurozone economies, namely core, periphery and emerging Eurozone economies. The main hypotheses in the paper are:

*H1*: The Eurozone economies achieve fiscal sustainability in the period after the global crisis, 2010q1-2020q4;

[1] EMU, Eurozone and Euro area will be used interchangeably in the paper, since they are synonyms.

$H_2$: Causality in relation public revenues – public expenditure differs in groups of the Eurozone economies;

$H_3$: Most of the Eurozone economies use hypothesis "*tax and spend*", after the global crisis and austerity measures, therefore, heterogeneity in fiscal policies in Eurozone economies is reduced.

In order to shed more light into these beliefs, an empirical study is based upon descriptive analysis and macro panel models covering all the Eurozone economies in the period after global financial crisis 2010q1-2020q4 (quarterly data from Eurostat database are used). Dumitrescu & Hurlin (2012) and Juodis, Karavias & Sarafidis (2021) Granger non-causality tests are used to detect direction of causality and Westerlund (2007) test is use to estimate cointegration relationship, in this case, fiscal sustainability. The research has confirmed significant heterogeneity in fiscal policy of Eurozone economies, and detected causality nexus in each Eurozone economy, suggesting often use of "*tax and spend*" hypothesis, especially in Eurozone periphery economies.

The paper is structured as follows. After the Introduction section, Section 1 reviews existing evidence in the empirical literature, Section 2 deals with theoretical background of public expenditure – public revenues nexus. In Section 3, divergences and heterogeneity within EZ are emphasized, while Section 4 discusses estimation results based on causality and cointegration analysis, and final section outlines concluding remarks.

## 1. Literature review

Vast literature deals with the question of fiscal sustainability, using different econometric techniques for estimation, different groups of countries and different periods of time in studies. Two traditional approaches of fiscal sustainability exist, first, based on stationarity analysis, and second, based on cointegration analysis. Hamilton & Flavin (1986) and Wilcox (1989) approach are related to the empirical analysis of public debt and primary deficit stationarity. On the other hand, approach based on papers by Hakkio & Rush (1991) and Quintos (1995) are related to cointegration analysis between public expenditure and public revenues. Quintos (1995) distinguished *strong* sustainability condition (when cointegration parameter is b=1), from *weak* sustainability condition (when cointegration parameter is in the range from 0 to 1). Otherwise, fiscal policy is unsustainable.

Beside the methodological definition of *strong* / *weak* fiscal sustainability and fiscal unsustainability, causality in relation public expenditure - public expenditure were often been addressed. Namely, nexus in this relation provides diversity in defined hypotheses used in different economies. Many economists (Friedman, 1978; Darrat, 2002; Afonso & Rault, 2009) argued that it is very important to investigate whether the public expenditure determines the revenues and / or whether public revenue determines public expenditure. In empirical scientific papers, the cointegration relationship was most often tested under the assumption of Barrow's (1979) hypothesis that public expenditure determines public revenues ("*spend and tax*" hypothesis). This pattern is defined by Hakkio and Rush in the context of fiscal sustainability analysis (1991), and has been empirically implemented in most papers analyzing fiscal sustainability (Westerlund & Prohl, 2007; Campo-Robledo &

Melo-Velandia, 2015; Afonso & Rault, 2015, Pešić & Miljković, 2020). On the other hand, some papers confirm Musgrave's hypothesis ("*tax and spend*" hypothesis) on the determination of public expenditure by public revenues (Bravo & Silvestre, 2002). Alfonso & Jalles (2012, 2015) present two-way results, i.e. for the case when public expenditure causes public revenue and when public revenue causes public expenditure, referring to "*fiscal synchronization*" hypothesis. Narayan and Narayan (2006) gave three reasons why causality between public expenditure and revenue is very important: (1) if the "*tax and spend*" hypothesis is supported, budget deficits can be avoided by implementing policies that stimulate public revenue; (2) if the "*spend and tax*" hypothesis is valid, it means that the government spends first and pays for this expenditure later by raising taxes; and (3) if the simultaneous causality does not hold, it means that government revenue decisions are made independent from expenditure decisions, which could cause high budget deficits.

This analysis becomes especially interesting in the group of economies that are part of the Eurozone, that is, in economies that work closely together, and which have renounced their monetary sovereignty. Monetary policy was changed during the global crisis circumstances (Đorđević & Perović, 2016). In the Eurozone economies, there is an additional pressure on fiscal policy that is not unified, and becomes increasingly important how fiscal sustainability is determined and whether it is achieved. Since within the EMU any national monetary changes or exchange rates policies are not available, the main alternative actions of the EMU countries are to make the labour and product market more flexible (Richter & Dimitrios, 2013). According to Beker Pucar & Glavaški (2020), EMU was not initiated as an Optimum Currency Area (OCA), and through functioning (despite visible shifts) the fulfilment of key OCA criteria was still not ensured. Krogstrup (2002) showed that cross-country differences in public debts are found to lead to asymmetries in taxes and primary expenditures across the EU countries – high-debt countries having lower expenditures and higher taxes than low debt countries. Analyzing nexus for the period 1960-2006 in EU economies, Afonso & Rault (2009) found "*spend and tax*" causality in Italy, France, Spain, Greece, and Portugal, while "*tax and spend*" hypothesis evidence in Germany, Belgium, Austria, Finland and the UK, and for several EU New Member States. Moreover, Greece, Italy and Portugal are shifting away from a "*spend and tax*" strategy implying adjustments of fiscal behavior due to the run-up to the EMU. Vamvoukas (2011) analyzed 12 EMU economies for the period 1970-2006 using Generalized Two-Stage Least Squares (GTSLS) and Generalized Method of Moments (GMM), and results strongly supported the "*fiscal synchronization*" hypothesis. Kollias & Makrydakis (2010) were focused on periphery Eurozone economies, showing heterogeneous results in pre-global crisis period: Greece and Ireland tax and expenditure decisions are taken simultaneously, the "*tax and spend*" hypothesis is supported in the case of Spain, while absence of any causal ordering between public expenditure and tax revenues has been established for Portugal. Stanišić (2012) evaluated income convergence in the EU, between "old" and "new" member states from Central and East Europe, and among the countries within these two groups. covering the period from 2000 to 2020. The results in paper by Kostin, Runge & Adams (2021) provide evidence that emerging markets do not perform in a better way than developed markets in the period 2000-2020. The idea of this paper is to fill the gap that exists in the literature regarding fiscal sustainability in the context of the direction of

causality in Eurozone economies, given the obvious scarcity of scientific papers dealing with this topic after the global crisis.

## 2. Theoretical background: the nexus between public revenues and public expenditure

It seems simple to determine the causality between public expenditure and public revenue. On one hand, as much as the state revenues are, so much can be spent, meaning that causality goes in the direction from public revenues to public expenditure. However, we can look at the same problem from the other angle: how much the state spends, so much revenue it must provide (opposite causality: form public expenditure to public revenue). Finally, some theories show that there is no link between these two variables. Therefore, the nexus between public revenue and public expenditure is the subject of the debate that follows.

Dynamics of public expenditure growth in the period 1890-1955 in the United Kingdom showed that there was a significant increase in public expenditure, from an initial value of 9% of GDP to 37% of GDP in 1955. This public expenditure growth is the consequence of the First and Second World Wars and the Great Depression, i.e. exogenous factors according to which public expenditure grew, and then public revenues were adjusted to them. In this way, "*spend and tax*" hypothesis means that public expenditure is generated first, and then, public revenues are adjusted to increased public expenditure (public expenditure → public revenues), meaning incomplete control of the budget. However, Barro (1979) supplemented this hypothesis with an explanation related to rational expectations. If economic agents have rational expectations, the current increase in public expenditure for them means worsening the budget position in the future and consequently tax growth to ensure sufficient inflows. Therefore, they are adjusting their spending today by reducing personal spending. The idea is to increase personal savings, with the goal of servicing growing liabilities in the future. It is about the intertemporal effect of substitution that ensures the fulfillment of the "*Ricardian equivalence hypothesis*". The hypothesis of Ricardian equivalence starts from the assumptions: 1) that the movement of public expenditure over time is the same; 2) that the capital market is perfect; and 3) that individuals behave in accordance with intergenerational altruism. Namely, they are aware that if they spend more now, their descendants will have to pay the current consumption through future higher taxes. According to the hypothesis of Ricardian equivalence, it turns out that todays or future higher taxes do not have a direct impact on the size of private investments nor on the interest rate.

Contrary to the "*spend and tax*" hypothesis, the "*tax and spend*" hypothesis is defined based on the assumption that it is possible to curb the growth of public expenditure share in GDP by limiting the share of public revenues in GDP. Given the growth of public expenditure if it is not limited by public revenues and borrowing opportunities, economic theory draws a parallel between causality public revenue → public expenditure, with the phrase "starving the Leviathan", meaning that public expenditure can be curbed only by starvation, that is, tax cuts. Tax control, according to this theory, leads to adjustment of the

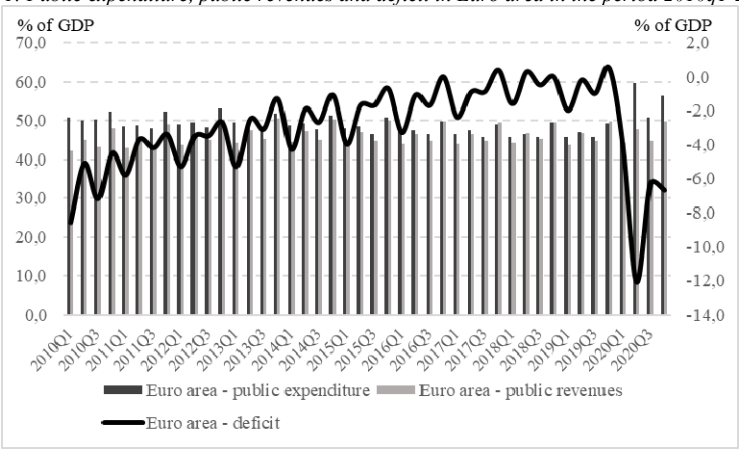
public expenditure levels to available public revenues. Also, according to this theory, it is believed that tax cuts will encourage economic growth and reduce crowding-out effects.

Contrary to the previously presented theories on the positive relationship between public expenditure and public revenues (with different causality), the hypothesis of "*fiscal illusion*" (James Buchanan) is formed. In comparison to rational expectations, irrational expectations of individuals arise from a complicated system of taxation according to which the individual is not fully aware of how much tax he pays and which part of the state costs. This situation leads to the assumption that budget variables are politically determined. Namely, it is easier for the political elite to provide higher public expenditure through new borrowings to be re-elected, than to increase taxes. Therefore, the same taxes or reduction of taxes are actually related to the growth of public expenditure (↓ public revenues → ↑ public expenditure) according to the hypothesis of fiscal illusion. The next theory starts from the assumption of two-way causality, according to which policy makers simultaneously make decisions on the side of public revenues and public expenditure. The idea is that it is possible to maximize the utility function based on equality of marginal costs and marginal revenues. There is a positive link between public expenditure and public revenue, which is the essence of the "*fiscal synchronization*" hypothesis. There are opinions that there is neither simultaneity nor harmonization between the movement of public revenues and public expenditure, due to institutional separation, that is, the separation of the state's allocative function from the taxation function. The hypothesis of "*institutional separation*" of public expenditure and public revenues indicates that political leaders, according to their interests, influence changes in parts of the revenue and expenditure side of the budget, independently of each other. Based on the review of causality in the relation public expenditure - public revenues, it turns out that the hypotheses are very diversified because they focus on budget movements in different periods and in different deadlines. In the short run, discretionary changes on the revenue side seem most feasible if the political elite assumes that tax cuts cost them less than the new indebtedness in terms of the likelihood of re-election.

## 3. Fiscal divergences of the Eurozone members

Although similarity of economies in the Eurozone justifies "one-size-fits-all" monetary policy, fiscal policy is under attack due to its decentralization. The divergences of key macro indicators in Eurozone economies put pressure on fiscal policy, and therefore, fiscal policy functioning is becoming heterogeneous. Especially, after the global crisis outbreak, all Eurozone economies went into recession, so it was expected that monetary and fiscal policy measures would be implemented to overcome the crisis. Fiscal policy has faced a challenge of post-crisis adjustments. In different Eurozone economies, heterogeneous fiscal measures were implemented with different effects in the post-crisis period. Figure 1 reveals average position in Eurozone economies of public revenues and public expenditure in the quarters of the period 2010-2020, pointing to the improvement of the budgetary position till 2020, namely pandemic crisis.

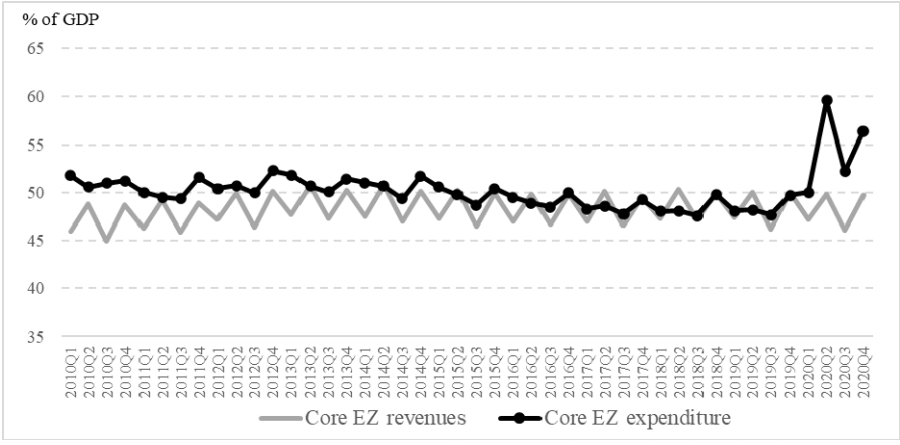
*Figure 1: Public expenditure, public revenues and deficit in Euro area in the period 2010q1-2020q4*




*Source: Authors using Eurostat quarterly data (https://ec.europa.eu/eurostat/web/main/data/database, 2021).*

Although it seems that there has been an improvement in all Eurozone economies, economies of the Eurozone periphery were particularly affected by the crisis. Therefore, we separated in our analysis economies on: the core, the periphery and the emerging Eurozone economies. The core countries are Austria, Belgium, Germany, Finland, France, Luxembourg and Netherlands, while the periphery Eurozone economies are Greece, Ireland, Italy, Spain and Portugal. The emerging part of Eurozone consists of Estonia, Cyprus, Latvia, Lithuania, Malta, Slovakia and Slovenia.

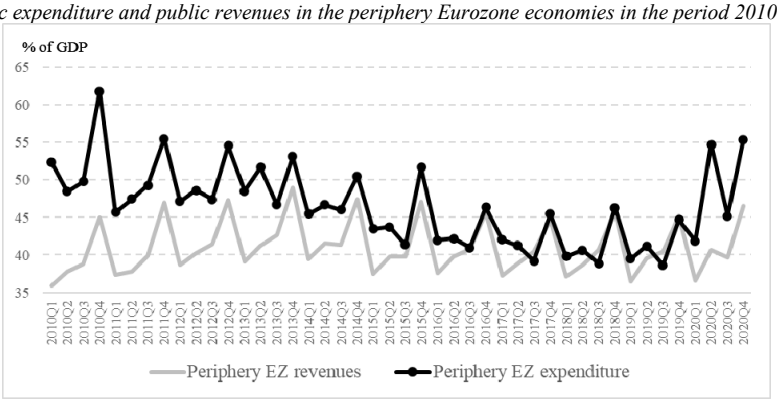
*Figure 2: Public expenditure and public revenues in the core Eurozone economies in the period 2010q1-2020q4*




*Source: Authors using Eurostat quarterly data (https://ec.europa.eu/eurostat/web/main/data/database, 2021)*

Figure 2 shows public revenues and public expenditure in the core Eurozone economies, indicated slightly higher public expenditure in comparison to public revenues in 2010-2015, and rapid increase of public expenditure since the beginning of the pandemic crisis.

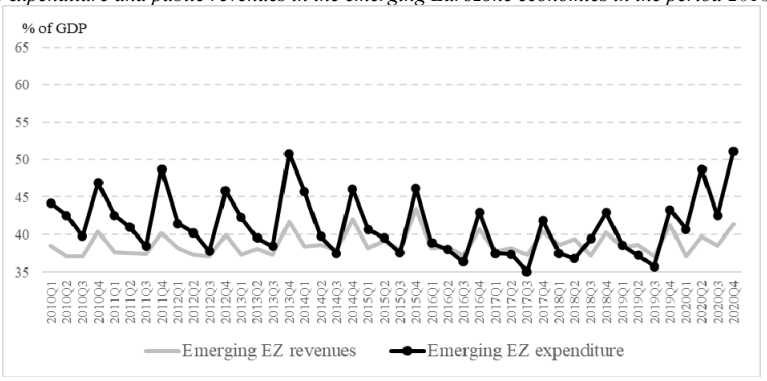
*Figure 3: Public expenditure and public revenues in the periphery Eurozone economies in the period 2010q1-2020q4*




*Source: Authors using Eurostat quarterly data (https://ec.europa.eu/eurostat/web/main/data/database, 2021)*

Opposite to the core Eurozone economies, Figure 3 shows that gap between public expenditure and public revenues was higher in the periphery Eurozone economies after the global crisis. Governments were forced to take very strict fiscal adjustments measures achieved as combination of measures on both revenues and expenditure side. Implementation of fiscal adjustments, bail-out programs in all periphery economies except Italy, conditioned more favorable fiscal situation, after 2015, finance by the European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM). Finally, divergence is recognized in the group of the emerging Eurozone economies, usually small open economies with more efficient public sector in comparison to the core and the periphery Eurozone economies (Figure 4).

*Figure 4: Public expenditure and public revenues in the emerging Eurozone economies in the period 2010q1-2020q4*



*Source: Authors using Eurostat quarterly data (https://ec.europa.eu/eurostat/web/main/data/database, 2021)*

## 4. Empirical results: causality and cointegration analysis

Econometric framework for fiscal sustainability estimation is determined by potential problems of causality, heterogeneity, (non)stationarity and cross-sectional dependency (CSD) in the macro panel (T>N). Although focus in this paper is related towards causality, namely, estimation of the nexus in relation public revenues – public expenditure, other potential problems in macro panels have also been addressed.

In the beginning, CSD in key variables is tested using Pesaran CD test (Table 1). CSD is estimated in public revenues and public expenditure in the whole sample of Eurozone, and due to detected divergency and heterogeneity within the Eurozone, in selected sub-samples: Eurozone core, Eurozone periphery and emerging Eurozone economies. Results indicated that in all cases null hypothesis of CSD has to be rejected. Detected dependency is expected, due to the fact that all economies in the sample are members of the EMU, linked by strong institutional framework. Primary, due to unique monetary policy, and then dependency is supported by other economic policy synchronisation: customs union, common market and tax harmonization.

*Table 1: Cross-sectional dependency test*

| **Pesaran CD test** | **CD-test** | **p-value** | **Corr.** | **Aps. (corr.)** | **CD-test** | **p-value** | **Corr.** | **Aps. (corr.)** |
|---|---|---|---|---|---|---|---|---|
| ***Eurozone*** | N=19; T=40 | | | | ***Eurozone periphery economies*** | | N=5; T=40 | |
| Public expenditure | 63.27 | 0.000 | 0.509 | 0.510 | 10.71 | 0.000 | 0.510 | 0.510 |
| Public revenues | 17.63 | 0.000 | 0.142 | 0.335 | 9.21 | 0.000 | 0.439 | 0.488 |
| ***Eurozone core economies*** | N=7; T=40 | | | | ***Emerging Eurozone economies*** | | N=7; T=40 | |
| Public expenditure | 17.61 | 0.000 | 0.579 | 0.579 | 16.07 | 0.000 | 0.529 | 0.529 |
| Public revenues | 8.65 | 0.000 | 0.285 | 0.413 | 6.83 | 0.000 | 0.225 | 0.359 |

*Source: the authors' calculations*

After the diagnose of CSD in the sample, panel unit root tests have to be oriented towards second generation panel unit root test – Pesaran CIPS test (2007). According to Westerlund and Prohl (2007) in cases when variables are represented in the form of share in GDP, inclusion of trend is redundant, so decisions are made on the basis of models with constant and no trend. Taking into consideration Akaike information criterion that optimal leg number in variables is 4, Pesaran CIPS test results indicated that variables are nonstationary (Table 2, level of variables). Once again, results showed Pesaran CIPS test for the whole sample and sub-samples. With the intention to identify stationary representation of variables, the stationarity of first differences of variables is tested (Table 2, first difference). The results of Pesaran CIPS test indicated that all variables in the model are integrated of order 1, namely, variables are stationary in first differences.

*Table 2: Pesaran unit root test*

| **Pesaran CIPS test** $H_o$: I(1) $H_1$: I(0) | Lags | **Level of variables** | | **First difference** | | **Level of variables** | | **First difference** | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Eurozone** | | | | ***Eurozone periphery*** | | | |
| | | *Z*(t)-stat. | p-values | *Z*(t)-stat. | p-values | *Z*(t)-stat. | p-values | *Z*(t)-stat. | p-values |
| **Public expenditure** | 0 | -18.142 | 0.000 | -24.433 | 0.000 | -6.360 | 0.000 | -10.490 | 0.000 |
| | 1 | -11.060 | 0.000 | -24.046 | 0.000 | -2.208 | 0.014 | -10.490 | 0.000 |
| | 2 | -5.711 | 0.000 | -22.224 | 0.000 | -2.776 | 0.003 | -9.295 | 0.000 |
| | 3 | -2.911 | 0.000 | -15.025 | 0.000 | -2.920 | 0.002 | -6.982 | 0.000 |
| | **4** | **-1.772** | **0.083** | **-8.233** | **0.000** | **-1.546** | **0.061** | **-4.420** | **0.000** |
| **Public revenues** | 0 | -18.333 | 0.000 | -23.580 | 0.000 | -6.538 | 0.000 | -10.490 | 0.000 |
| | 1 | -15.279 | 0.000 | -24.348 | 0.000 | -0.728 | 0.233 | -10.490 | 0.000 |
| | 2 | -5.472 | 0.000 | -22.715 | 0.000 | -0.053 | 0.479 | -10.376 | 0.000 |
| | 3 | 2.128 | 0.983 | -16.784 | 0.000 | 0.866 | 0.807 | -8.346 | 0.000 |
| | 4 | **1.945** | **0.974** | **-9.299** | **0.000** | **0.689** | **0.755** | **-5.002** | **0.000** |
| | | ***Eurozone core*** | | | | ***Emerging Eurozone*** | | | |
| **Public expenditure** | 0 | -8.353 | 0.000 | -12.413 | 0.000 | -8.514 | 0.000 | -12.413 | 0.000 |
| | 1 | -6.193 | 0.000 | -12.413 | 0.000 | -4.934 | 0.000 | -12.387 | 0.000 |
| | 2 | -2.339 | 0.010 | -11.965 | 0.000 | -2.486 | 0.006 | -11.106 | 0.000 |
| | 3 | -0.067 | 0.473 | -9.038 | 0.000 | -1.268 | 0.102 | -7.538 | 0.000 |
| | **4** | **-0.115** | **0.454** | **-3.438** | **0.000** | **-0.460** | **0.323** | **-4.117** | **0.000** |
| **Public revenues** | 0 | -10.212 | 0.000 | -12.413 | 0.000 | -9.012 | 0.000 | -12.342 | 0.000 |
| | 1 | -8.578 | 0.000 | -12.413 | 0.000 | -8.343 | 0.000 | -12.413 | 0.000 |
| | 2 | -4.378 | 0.000 | -12.413 | 0.000 | -3.071 | 0.001 | -11.684 | 0.000 |
| | 3 | 1.719 | 0.957 | -9.593 | 0.000 | -0.682 | 0.248 | -8.476 | 0.000 |
| | **4** | **1.023** | **0.847** | **-4.470** | **0.000** | **0.442** | **0.671** | **-4.128** | **0.000** |

*Source: the authors' calculations*

The results of Pesaran's unit root test are the base for cointegration analysis, which is a useful method to test for fiscal sustainability. According to the results of cross-sectional dependency, the cointegration analysis could be continued using Westerlund (2007) cointegration test, between variables integrated of order 1, public revenues and public expenditure. However, in the application of Westerlund (2007) cointegration test, an important assumption is related to the causality of variables, namely, assumption of regressor exogeneity. It is necessary to satisfy the assumption about the direction of relationship, that is, if *x* causes *y*, *x* is weakly exogenous. However, the question which

precedes the cointegration analysis is causality testing in relation public revenues – public expenditure.

In order to check causality nexus, Dumitrescu-Hurlin (2012) test and Juodis, Karavias & Sarafidis (2021) Granger non-causality tests were undertaken (Table 3). In order to check the homogeneity vs. heterogeneity of influences in Eurozone economies, Dumitrescu & Hurlin (2012) panel heterogeneous causality test was applied. The null hypothesis refers to the assumption of homogeneous non-causality (HNC) according to which there is no causality in any unit of the panel from exact direction, as opposed to the alternative hypothesis, according to which there is causality at least in one panel unit, i.e. there is a heterogeneous effect per panel unit. According to Lopez and Weber (2017), Dumitrescu and Hurlin test could implement an extension of the test based on Bayesian information criteria (BIC), and compute robust p-values using bootstrap procedure (in our case 400). However, this test could suffer from substantial size distortions since their test statistic is theoretically justified only when $T$ is sufficiently smaller than $N$ (Xiao et al. 2021). On the other hand, Juodis, Karavias & Sarafidis (2021) Granger non-causality test has a number of advantages relative to existing causality approaches, using polled estimator with faster convergence rate. This test is valid in models with heterogeneous and homogeneous coefficients, and it is based on Wald test statistic and Half Panel Jackknife (HPJ) bias-corrected pooled estimator.

*Table 3: Dumitrescu-Hurlin (2021) and Juodis, Karavias & Sarafidis (2021) non-causality testing*

| **Dumitrescu & Hurlin (2012) Granger non-causality test** | | | | | | |
|---|---|---|---|---|---|---|
| **Public expenditure → Public revenues**<br>$H_0$: expenditure does not Granger-cause revenues<br>$H_1$: expenditure does Granger-cause revenues for at least one economy | | | | **Public revenues → Public expenditure**<br>$H_0$: revenues do not Granger-cause expenditure<br>$H_1$: revenues do Granger-cause expenditure for at least one economy | | |
| Groups of economies | W-stat. | $\bar{Z}$- stat. | $\tilde{Z}$- stat. Tilde | W-stat. | $\bar{Z}$- stat. | $\tilde{Z}$- stat. Tilde |
| **Eurozone core** | **7.332** | **1.951 (p-value=0.317)** | **0.331 (p-value=0.327)** | **8.767** | **8.952 (p-value=0.000)** | **7.862 (p-value=0.000)** |
| | Optimal number of lags (BIC): 5 | | | Optimal number of lags (BIC): 2 | | |
| **Eurozone periphery** | **5.374** | **1.086 (p-value=0.4850)** | **0.734 (p-value=0.542)** | **23.778** | **18.968 (p-value=0.000)** | **16.378 (p-value=0.000)** |
| | Optimal number of lags (BIC): 4 | | | Optimal number of lags (BIC): 3 | | |
| **Emerging Eurozone** | **7.871** | **3.621 (p-value=0.000)** | **2.846 (p-value=0.004)** | **17.939** | **13.038 (p-value=0.000)** | **10.814 (p-value=0.000)** |
| | Optimal number of lags (BIC): 4 | | | Optimal number of lags (BIC): 4 | | |
| **Juodis, Karavias and Sarafidis (2021) Granger non-causality test** (Optimal number of lags: 4) | | | | | | |
| | **HPJ Wald test** | | **p-value** | **HPJ Wald test** | | **p-value** |
| **Eurozone core** | **9.574** | | 0.0582 | **62.915** | | 0.000 |
| **Eurozone periphery** | **47.063** | | 0.000 | **10038.324** | | 0.000 |
| **Emerging Eurozone** | **32.631** | | 0.000 | **19.843** | | 0.005 |

*Source: authors' calculations*

In Eurozone core economies, results of both Granger non-causality tests indicated that in context of hypothesis "*spend and tax*" (Public expenditure → Public revenues) null hypothesis has to be accepted, namely public expenditure did not cause public revenues. However, causality testing from another direction (Public revenues → Public expenditure)

referred that "*tax and spend*" hypothesis was valid in some of the Eurozone core economies. Namely, alternative hypothesis has to be accepted meaning that public revenues caused public expenditure in at least one of the core Eurozone economies. A similar conclusion could be drawn for periphery Eurozone economies relying on Dumitrescu-Hurlin (2012) test. However, according to Juodis, Karavias & Sarafidis (2021) test, alternative hypothesis could be accepted in both cases, suggesting that "*spend and tax*" hypothesis was identified in at least one Eurozone periphery economy in the observed period, and "*tax and spend*" hypothesis in at least one economy.

Emerging Eurozone economies are heterogeneous in comparison to core and periphery Eurozone economies. While in the core Eurozone economies there were no economies that use "*spend and tax*" hypothesis, in emerging Eurozone economies public expenditure Granger-caused public revenues for at least one economy ("*spend and tax*"), and public revenues Granger-caused public expenditure for at least economy ("*tax and spend*") according to both tests: Dumitrescu-Hurlin (2012) and Juodis, Karavias & Sarafidis (2021) test. The conclusion could be twofold: 1) heterogeneity of nexus in periphery Eurozone economies if different economies use different hypothesis, or 2) fiscal synchronization hypothesis if the same economy use both hypotheses. This result has two implications: (a) the possibility of an exact causality check per panel unit; (b) the need to apply heterogeneous panel techniques in estimation of cointegration relationship, namely, fiscal sustainability. Therefore, Westerlund (2007) test is a good solution for cointegration testing, due to the fact that one of the assumptions of Westerlund test is existence of heterogeneous panels.

*Table 4: Westerlund cointegration test in groups of Eurozone economies*

| | **Eurozone core economies** | | | | **Eurozone periphery economies** | | | |
|---|---|---|---|---|---|---|---|---|
| Test | Value | Z-value | p-value | Bootstrapped p-value | Value | Z-value | p-value | Bootstrapped p-value |
| | Public revenues → Public expenditure | | | | | | | |
| $H_0$: no cointegration; $H_1$: at least one panel unit is cointegrated | | | | | | | | |
| Gt | -2.399 | -3.618 | 0.000 | 0.000 | -2.330 | -2.910 | 0.002 | 0.005 |
| Ga | -23.69 | -11.57 | 0.000 | 0.000 | -12.32 | -4.188 | 0.000 | 0.005 |
| $H_0$: no cointegration; $H_1$: all panel units are cointegrated | | | | | | | | |
| Pt | -5.077 | -3.193 | 0.001 | 0.005 | -4.987 | -3.295 | 0.001 | 0.005 |
| Pa | -18.91 | -16.33 | 0.000 | 0.000 | -10.342 | -7.195 | 0.000 | 0.005 |
| AIC selected lag length: 1; AIC selected lead length: 2 | | | | | AIC selected lag length: 1; AIC selected lead length: 2 | | | |
| **Emerging Eurozone economies** | | | | | | | | |
| Public revenues → Public expenditure | | | | | Public expenditure → Public revenues | | | |
| Gt | -2.467 | -3.791 | 0.000 | 0.000 | -3.290 | -5.883 | 0.000 | 0.000 |
| Ga | -10.37 | -3.826 | 0.000 | 0.005 | -19.167 | -8.938 | 0.000 | 0.000 |
| Pt | -5.762 | -3.780 | 0.000 | 0.028 | -9.007 | -6.560 | 0.000 | 0.000 |
| Pa | -8.972 | -7.261 | 0.000 | 0.018 | -21.422 | -18.638 | 0.000 | 0.000 |

*Source: the authors' calculations*

Westerlund (2007) cointegration test is used to test fiscal sustainability in groups of Eurozone economies, taking into a consideration the results of CSD, stationarity analysis and causality testing. Results of Westerlund cointegration test is based on four error-

correction panel-based tests, which could allow for a large degree of heterogeneity, short-run dynamics, long-run cointegration relationship and CSD. Null hypothesis in Westerlund test is "no cointegration", while alternative hypothesis is related to the homogeneous vs. heterogeneous assumption: "all panel units are cointegrated" in homogeneous assumption (Pt and Pa), and "at least one panel unit is cointegrated" in heterogeneous assumption (Gt and Ga). Due to identified different hypotheses in groups of Eurozone economies, application on Westerlund test is based on "*tax and spend*" hypothesis in Eurozone core and periphery economies, and "*tax and spend*" and "*fiscal synchronization*" hypotheses in emerging Eurozone economies. CSD in the panel is handled by bootstrap method (400 replications). Robust p-values related to Westerlund test using group mean tests (Gt and Ga) and pooled panel tests (Pt and Pa) indicated that at least one panel unit is cointegrated or all panel units are cointegrated in groups of core, periphery and emerging Eurozone economies (Table 4). Therefore, we estimated heterogeneous coefficients in Westerlund cointegration test with the intention to find out in which panel units (countries) exist cointegration, and in which countries not.

*Table 5: Westerlund cointegration test in each Eurozone economy and hypotheses*

| **Eurozone core economies** | Coef. | Std. Error | Z | P>\|z\| | Hypothesis |
|---|---|---|---|---|---|
| Belgium | 0.708 (rev) | 0.282 | 2.51 | 0.012 | "*tax and spend"* |
| Germany | 0.282 (rev) | 0.173 | 1.63 | 0.103 | - |
| France | 0.494 | 0.268 | 1.84 | 0.065 | - |
| Luxemburg | 0.819 | 0.189 | 4.32 | 0.000 | "*tax and spend"* |
| Netherlands | 0.156 | 0.127 | 1.22 | 0.222 | - |
| Austria | 0.467 | 0.240 | 1.95 | 0.052 | - |
| Finland | 0.584 | 0.229 | 2.54 | 0.011 | "*tax and spend"* |
| **Eurozone periphery economies** | | | | | |
| Ireland | 0.412 | 0.154 | 2.68 | 0.007 | "*tax and spend"* |
| Greece | 0.373 | 0.182 | 2.04 | 0.015 | "*tax and spend"* |
| Spain | 0.413 | 0.205 | 2.01 | 0.044 | "*tax and spend"* |
| Italy | 0.771 | 0.295 | 2.66 | 0.008 | "*tax and spend"* |
| Portugal | 0.424 | 0.198 | 2.13 | 0.033 | "*tax and spend"* |
| **Emerging Eurozone economies** | | | | | |
| Estonia | 1.114 (rev)<br>0.791 (exp) | 0.224<br>0.136 | 4.96<br>5.80 | 0.000<br>0.000 | "*fiscal synchronization"* |
| Cyprus | 1.024 (rev)<br>0.354 (exp) | 0.253<br>0.132 | 4.03<br>2.68 | 0.000<br>0.007 | "*fiscal synchronization*" |
| Latvia | 0.777 (rev)<br>0.232 (exp) | 0.229<br>0.134 | 3.39<br>1.73 | 0.001<br>0.084 | "*tax and spend*" |
| Lithuania | 0.674 (rev)<br>0.104 (exp) | 0.212<br>0.108 | 3.17<br>0.96 | 0.002<br>0.336 | "*tax and spend*" |
| Malta | 0.358 (rev)<br>0.546 (exp) | 0.181<br>0.171 | 1.98<br>3.19 | 0.048<br>0.001 | "*fiscal synchronization*" |
| Slovenia | 0.662 (rev)<br>0.053 (exp) | 0.224<br>0.055 | 2.95<br>0.97 | 0.003<br>0.332 | "*tax and spend*" |
| Slovakia | 0.342 (rev)<br>0.183 (exp) | 0.139<br>0.092 | 2.45<br>1.98 | 0.014<br>0.047 | "*fiscal synchronization*" |

*Source: the authors' calculations*

Since Westerlund test is based on structural rather than residual dynamics, it is possible to use completely heterogeneous specification of both short-run and long-run

relationship of the error-correction model (Persyn & Westerlund, 2008). Table 5 shows long-run relationship for each panel unit (country), according to identified direction of causality in groups of Eurozone economies, using Dumitrescu & Hurlin (2012) and Juodis, Karavias & Sarafidis (2021) Granger non-causality tests. Results indicated "*weak* fiscal sustainability" in all Eurozone economies, except Estonia with "*strong* fiscal sustainability". Namely, after fiscal consolidation started in 2008, using stronger tools and techniques for planning and monitoring, Estonia obtained a small and efficient government sector. Results showed that in the group of core Eurozone economies, Musgrave's "*tax and spend*" hypothesis is heterogeneously fulfilled, namely the cointegration relationship is significant in Belgium, Luxemburg and Finland. "*Tax and spend*" hypothesis is homogeneously fulfilled in Eurozone periphery economies, namely, Greece, Portugal, Spain, Ireland and Italy have significant cointegration relationship. This result could be surprising due to expectations that core Eurozone economies have more restricted fiscal policy in comparison to periphery Eurozone economies. On the other hand, taking into a consideration bail-out programs undertaken in periphery Eurozone economies and implemented austerity methods, this result become expected. Emerging Eurozone economies are the most heterogeneous group, and it could be characterized as the furthest from the core of the Eurozone. Cointegration relationships in Latvia, Lithuania and Slovenia are significant and indicate application of "*tax and spend*" hypothesis. On other hand, simultaneous relationships are estimated in Estonia, Cyprus, Malta and Slovakia, indicated application of "*fiscal synchronization*" hypothesis.

According to empirical findings, hypotheses are supported, namely, the Eurozone economies achieve fiscal sustainability in the period after the global crisis ($H_1$), although causality in relation public revenues – public expenditure differs in groups of the Eurozone economies ($H_2$). Most of the Eurozone economies used "*tax and spend"* hypothesis, namely, heterogeneity of fiscal performances within the Eurozone economies have been reduced since the impact of the global crisis ($H_3$).

## Concluding remarks

The paper highlights the nexus between the public revenues and public expenditure from the angle of 19 Eurozone economies with the intention to estimate fiscal sustainability after the global crisis. The results of macro panel based on Eurozone economies for the period 2010q1-2020q4 suggested different direction of causality in relation of public expenditure-public revenues in groups of Eurozone economies. Therefore, sub-samples were estimated, concerning core, periphery and emerging Eurozone economies. According to Dumitrescu & Hurlin (2012) and Juodis, Karavias & Sarafidis (2021) Granger non-causality tests indicated that in core and periphery Eurozone economies causality went from public revenues to public expenditure, while in group of emerging Eurozone economies simultaneous relationship existed. With respect to the results of Granger non-causality tests, Westerlund error-correction-based panel cointegration test for each sub-sample indicated "*weak* fiscal sustainability" in all Eurozone economies (except Estonia with "*strong* fiscal sustainability"). Further, the results pointed to heterogeneity of sub-sample of core Eurozone economies, namely, only Belgium, Luxemburg and Finland used "*tax and spend*"

hypothesis, while all Eurozone periphery economies applied "*tax and spend*" hypothesis. This result could be related to the fact that Eurozone periphery economies were hit harder by the sovereign debt crisis in the year 2009, and that austerity and bailout programs implemented in the periphery economies (Ireland 2010-2013; Portugal 2011-2014; Greece 2011-2019; Spain 2012-2013) financed by ESM and EFSF were adequate. Previously guided irresponsible fiscal policy in Eurozone periphery economies has been replaced by "*tax and spend*" fiscal policy.

These results are in line with the authors' expectations that membership in the monetary union exerted a stronger pressure on fiscal policy due to the renunciation of sovereign monetary policy, especially in the crisis period. However, the results showed that austerity measures and bail-out programs, especially in Eurozone periphery economies, have outgrown in "*tax and spend*" hypothesis. "Starvation of the Leviatan" hypothesis in the short and medium-run, after the global crisis, created sustainable fiscal policy in vulnerable Eurozone economies. Therefore, according to empirical findings, the heterogeneity of fiscal performances within the Eurozone economies has been reduced since the impact of the global financial crisis.

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UDC: 005.412
DOI: 10.5937/AnEkSub2248101M
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 101-118
Received: 03/02/2022
Accepted: 04/10/2022

# Big data analytics as a management tool: an overview, trends and challenges

## Аналитика велике количине података као менаџмент алат: преглед стања, трендови и изазови

**Branislav Mašić**
University of East Sarajevo, Faculty of Economics, Pale, Republic of Srpska, Bosnia and Herzegovina, masicbranislav@gmail.com
**Milenko Dželetović***
University of Belgrade, Faculty of Security Studies, Belgrade, Republic of Serbia, milenkodz@telekom.rs
**Sandra Nešić**
Singidunum University, Faculty of Media and Communication, Belgrade, Republic of Serbia, sandra.nesic@fmk.edu.rs

**Abstract:** Innovative digital technologies and ever-changing business environment have and will continue to transform businesses and industries around the world. This transformation will be even more evident in view of forthcoming technological breakthroughs, and advances in big data analytics, machine learning algorithms, cloud-computing solutions, artificial intelligence, internet of things, and the like. As we live in a data-driven world, technologies are altering work and work-related activities, and everyday activities and interactions. This paper is focused on big data and big data analytics (BDA), which are viewed in the paper from organisational perspective, as a means of improving firm performance and competitiveness. Based on a review of selected literature and researches, the paper aims to explore the extent to which big data analytics is utilized in companies, and to highlight the valuable role big data analytics may play in achieving better business outcomes. Furthermore, the paper briefly presents main challenges that accompany the adoption of big data analytics in companies.
**Keywords:** big data, big data analytics, technological change, firm performance, competitive advantage
**JEL classification**: C550, L210, O31, O390

**Сажетак:** Иновативне дигиталне технологије и стално променљиво пословно окружење су трансформисали, и тек ће трансформисати, компаније и привредне гране широм света. Имајући у виду предстојећа технолошка достигнућа, и развој аналитике велике количине података (енгл. big data analytics), алгоритама машинског учења (енгл. machine learning algorithms), решења у оквиру рачунарства у облаку (енгл. cloud computing), вештачке интелигенције (енгл. artificial intelligence), интернета ствари (енгл. internet of things), ова трансформација ће постати још очигледнија. Будући да живимо у свету који је све више оријентисан, односно који се све више ослања на податке (енгл. data-driven), технологије уносе промене како у пословне и активности везане за посао, тако и у активности и интеракције које обављамо свакодневно. Овај рад је усредсређен на „велике“ податке (енгл. big data) и на аналитику велике количине података чије усвајање, посматрано са становништва организација, може допринети побољшању пословних перформанси и конкурентности. Циљ рада је да, на основу прегледа одабране литературе и истраживања, испита у којој мери је аналитика велике количине података заступљена у компанијама, као и да нагласи важну улогу коју аналитика велике количине података може играти у постизању бољих пословних резултата. Поред тога, сажето су представљени важнији изазови и потешкоће који се јављају приликом усвајања програма аналитике велике количине података у компанијама.
**Кључне речи:** „Велики“ подаци, аналитика велике количине података, технолошке промене, пословне

* Corresponding author

перформансе, конкурентска предност
**ЈЕЛ класификација:** C550, L210, O31, O390

## Introduction

Digital transformation, or digitisation, is well under way. New technologies, environmental and climate concerns, globalisation, shifts and uncertainties caused by the global pandemic, are all disrupting, reshaping, and transforming today's business environment. In addition, as we live and work in the digital era, we create enormous amount of data every day. This data comes from a wide variety of sources – websites, applications, social media, smartphones, embedded systems, "smart", connected devices, sensors, customer databases, online transactions, and others (Davenport, 2014; Hagiu & Wright, 2020). To meet the challenges of such business environment, organisations need management tools that will "best help them make the business decisions that lead to enhanced processes, products and services - and deliver superior performance and profits" (Rigby 2015, p. 10).

The amount of generated data has increased greatly over the past few years: according to a recent report published by Statista, it hit another all-time peak in 2020, when the amount of globally produced, captured, consumed data reached 64.2 zettabytes; due to its impressive, continued growth, the amount will likely reach 181 zettabytes in 2025 (von See, 2021). Furthermore, according to IDC's study (sponsored by Seagate), there will be more than 6 billion people interacting with data on a daily basis by 2025, and each of them will generate no less than one data interaction every 18 seconds (Reinsel, Gantz & Rydning, 2018, p. 5). It seems that we are already "creating oceans of data as businesses, government agencies, and individuals interact across public and private networks around the globe" (Open Data Center Alliance, 2012, p. 5). However, while data is unquestionably constantly growing in volume, the focus of this paper is on data analysis, i.e., on obtaining valuable insights that could produce desired business outcomes.

As early as 1954, UPS (United Parcel Service) launched its analytics group and began introducing the idea of operational research, which meant using analysis for achieving greater efficiency in the company's operation. Still, although numerous businesses were already using different (yet traditional) tools and techniques to analyse data, aiming to improve their performance and to increase their competitive advantage (applying data analysis for decision-making, OLAP, business intelligence, analytics), it was not until the last quarter of 2010 that the term "big data" came into much wider use (Davenport, 2014, pp. 3-10). For example, as explained by Hagiu and Wright (2020), collecting and analysing customer information to improve products and services is certainly not a new realm – the concept was used by companies for a long time, but the overall process was too slow, time-consuming, and hard to scale up. It is the emergence of new technologies, cloud computing, connected products and the like that has profoundly influenced the way that data is gathered, analysed, processed, and converted into valuable information, enabling companies to obtain insights from big data quickly (Hagiu & Wright, 2020, p. 96). Apparently, with new technologies came new, big data.

Data and analytics have thus become a significant "differentiating factor in industry competition", since high-performing companies make the most of data and analytics to boost revenue growth, enter ("or even create") new markets, strengthen and improve customer relationships, and enhance organisational efficiencies (Henke et al., 2016, p. 25). Therefore, it is not "regular", but rather "big" data that has received much attention in recent years. The term "big data" refers to those data sets that are "too large or too complex for traditional data processing applications" (Liu, 2020), i.e., "too big to fit on a single server, too unstructured to fit into a row-and-a column database, or too continuously flowing to fit into a static data warehouse" (Davenport, 2014, p. 1).

Many authors have discussed the suitability of the term "big data", though. According to Davenport (2014, pp. 1–2), the term itself does not seem to give a fitting description of the big data phenomenon – although being "undeniably big", big data is less about the volume, and more about the lack of structure; it is about much needed analysis, transforming data into insights, deriving value, producing business outcomes. It is also worth noting that "big data", "big data analytics", and even "advanced analytics" are, as terms, often used interchangeably. Furthermore, it was noticed that the term "big data" frequently refers to predictive analytics or other methods and techniques of extracting value from data (Liu, 2020). Still, as Sherman (2014) have concluded, "most agree that advanced analytics is the umbrella term" (p. 375). Accordingly, big data analytics refers to the "use of advanced analytic techniques against very large, diverse big data sets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabytes" (IBM, 2021).

This paper focuses on big data and big data analytics (BDA) which, as could be noted, have experienced a surge of interest in recent years among researchers and practitioners. Although the area of big data analytics covers numerous techniques, methods, tools, algorithms, and the like, this paper aims to explore big data analytics from a broader, organisational perspective. For that purpose, BDA is in this paper viewed as a management tool that can pave the way for enhanced business performance and stronger competitive position. The paper consists of selected literature review of big data and BDA, and a review of selected studies that have highlighted the role of BDA in improving firm performance and competitiveness. The paper therefore contributes to enriching the existing literature on big data analytics and its impact on business productivity, performance, competitiveness. Furthermore, even though companies that aim to excel at their performance acknowledge the significance of BDA, they are also aware that various challenges need to be considered when adopting BDA initiatives. In this paper, key (previously identified) challenges associated with the deployment and adoption of BDA in a company are outlined briefly.

## 1. Main characteristics of big data

Researchers and practitioners have recognised several key features of big data. It is widely accepted, though, that (1) volume, (2) velocity, and (3) variety (also known as "3Vs") are three dominant characteristics of big data, first identified by Douglas Laney some twenty years ago (Diebold, 2012). Soon after, these became a part of Gartner's big data definition,

which was recently slightly modified: "big data is *high-volume, high-velocity and/or high-variety* information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation" (Gartner, 2021). Three key characteristics of big data are briefly described below.

*Volume*. Vast amount of data comes from numberless sources, including internet, social media, connected devices. To illustrate, there were 4.66 billion internet users around the world as of January 2021, and huge majority of these users (92.6 per cent) were accessing the internet through any type of mobile device (Johnson, 2021). What is more, numerous forms and types of social media are becoming extremely popular. The number of monthly active social media users is projected to reach 3.43 billion by 2023 (Statista Research Department, 2021). In addition, the number of IoT (internet of things) connected devices will likely reach 30.9 billion units by 2025 (Vailshery, 2021). Anyhow, the summation of all data, whether it is created, captured, consumed, and/or stored, will likely reach 120 zettabytes (ZB) in 2023, a rise from 33 ZB in 2018, and 9 ZB in 2013 (von See, 2021). *Velocity*. Incredible speed of data generation, combined with advanced analytics, enable real-time or at least near real-time processing of data. As described by Gressel, Pauleen & Taskin (2020, p. 27), accessing (and analysing) data in real-time or near real-time enhances businesses' flexibility and provides quicker responses, hence radically affecting the decision-making process. *Variety*. Big data takes various forms and types (structured, unstructured, semi-structured data) (Taleb, Serhani & Dssouli 2018, p. 70), captured from countless sources. These forms include texts, numbers, sensor-generated data, click-stream data, audio and video data, social networks posts, all sorts of industrial big data, and others. It is estimated that as much as 80 per cent of all generated and collected data could be characterized as unstructured data (data with no/unknown structure) (Taleb et al., 2018, pp. 70-74). Still, even though these data are mostly unstructured, there is "a huge amount of signal in the noise, simply waiting to be released", and it is analytics that makes big data "simpler and more powerful" (McAfee & Brynjolfsson, 2012, p. 63).

The above three, widely recognised (and originally used) big data attributes (volume, velocity, variety; also "3Vs", or "3Vs model"), have provided a starting point for many researchers focused on identifying additional distinctive big data features, also known as big data traits (Wook et al., 2021, p. 4). For example, IBM added "veracity" to emphasise data uncertainty ("4Vs" model); this model was followed Demchenko's "5Vs" ("volume, velocity, variety, veracity, value"), while Microsoft used Laney's model to point out the importance of three additional features, by forming its "6Vs" model ("volume, velocity, variety, variability, veracity, visibility") (Sassi, Anter & Bekkhoucha, 2019, pp. 240–241). It was explained that "variability" was used to highlight numerous variables within the sets of data, "veracity" was added to draw attention to the importance of data trustworthiness and accuracy, while "visibility" underlined the necessity of using an overall perspective as to make any data-based decisions (Sassi et al., 2019, pp. 239–241).

An interconnection between big data characteristics and data quality has been found in several studies, while others have looked into data quality and its potential for BDA application (Wook et al., 2021, p. 2). Moreover, by surveying students familiar with BDA, Wook et al. (2021) have explored how big data characteristics (velocity, veracity, value,

and variability were used as indicators of big data traits) and data quality could affect the application of BDA, viewed from the perspective of individuals. They have found that big data characteristics have a significant effect on all data quality dimensions (in this study: accuracy, believability, completeness, timeliness, as well as ease of operation), which is in line with findings from similar studies. Interestingly, their findings have also shown that of these five quality dimensions, only "ease of operation" has a considerable effect on BDA application – an (unexpected) insight which could be useful for organisations, as it reflects an individual-level point of view from novice users (Wook et al., 2021, pp. 8-12).

## 2. Big data analytics (BDA): turning data into value

As noted previously, big data allow for extraction of new insights, or creation of new "forms of value, in ways that change markets, organizations, the relationship between citizens and governments, and more" (Mayer-Schönberger & Cukier, 2013, p. 6). Therefore, a particular attention should be paid to data analysis, as an effective means of gaining insights and innovations, and achieving value (Davenport, 2014, p. 2).

Big data analytics employs advanced techniques to analyse big data sets for (hidden) patterns, and to derive valuable knowledge from these extremely large data sets (Elragal & Klischewski, 2017, p. 4; Seyedan & Mafakheri, 2020, p. 9). Still, systems need to "not only perform data analysis, but then also communicate the results that they find in a clear, concise narrative form": the real value of big data lies in converting data into a story (i.e., a narrative) that enables providing a context to data, thus ensuring that companies gain meaningful insights from numbers (Hammond, 2013). Therefore, BDA is not only about the (big) data and the analytics (that is applied to the data), but it is also about finding effective ways of presenting analytics results, in order to enable value creation for organisations and their customers (Maroufkhani, Wagner, Wan Ismail, Baroto, Nourani, 2019, p. 2). BDA consists of descriptive, predictive, and prescriptive analytics; predictive and prescriptive analytics could be particularly important for organisations, as these techniques support decision-making processes at various levels, help with building the right strategies, identify and/or propose new strategic and business opportunities, etc. (Atta, 2020, p. 199). It was also suggested that prescriptive analytics could help incumbents to reduce the threats from new (digital) entrants, by leveraging huge amount of existing customer data (du Toit, Anderson & Hatherall, 2020).

Data-derived insights provide numerous opportunities. As McKinsey's (MGI and McKinsey Analytics) 2016 research has shown, data has become a "critical corporate asset" (p. 6), and analytics capabilities are "rapidly reshaping industry competition" (p. 27) urging companies, particularly incumbents, to incorporate data and analytics into the very foundations of their business in order to keep up with digital natives (Henke et al., 2016). Companies apply BDA to extract latest insight/information to be used for improved decision-making, and/or to create new/improve existing offerings (products and services), reduce costs/time (Davenport, 2014, p. 22), improve organisational processes, transform existing business models to harness the power of big data (Rigby, 2015, p. 17), examine new opportunities (Gressel et al., 2020, p. 34). Moreover, as Pentland has noted, big data

could help "green the environment, create transparent government, deal with pandemics, and, of course, lead to better workers and better service for customers" (Berinato, 2014, p. 102). Hagiu and Wright (2020, p. 96) have also emphasised that technological advancements enable high-speed data processing, which leads to obtaining purposeful information. For example, products connected to internet have the ability to gather customer data directly; after data analysis and interpretation are carried out by machine learning algorithms, companies' products and/or services could be automatically improved and/or adjusted to meet the needs of individual customers (Hagiu & Wright, 2020, p. 96).

For the analytics, as the "central step in BDA", numerous techniques (or models), such as machine learning, data mining, statistics, could be selected to be applied to the data (Elragal & Klischewski, 2017, p. 9). In this paper, BDA is viewed from organisational perspective, as a management tool with huge potential to positively affect businesses (e.g., their performance and competitiveness).

## 3. BDA – increasing popularity and adoption rate

The number of papers and publications in the field of big data analytics is on the rise (Mikalef, Pappas, Krogstie, & Pavlou, 2020). In addition to various BDA techniques, tools, methods and solutions that are used across industries, an increased attention has been paid to many other aspects of this complex and multidisciplinary area. For example, it was shown that there was a steady upward trend in the number of articles focused on supply chain "demand forecasting" in the presence of big data, between 2005 and 2019, which is expected to continue (Seyedan & Mafakheri, 2020), and that the number of studies in the area of big data business models (BDBM) was on the rise during the reference period (from 2008 to 2017), with "impressive and encouraging" number of studies since 2014 (Wiener, Saunders & Marabelli, 2020, pp. 71-81). Likewise, another study (Maroufkhani et al., 2019) has found that scholars are increasingly exploring the relationship between BDA and company performance, with a growing number of both papers published in this area (especially since 2017), and received citations (pp. 5-6).

Since multiple aspects and factors are associated with the effective adoption of big data analytics, academics and practitioners have also begun focusing on "big data analytics capabilities" ("BDA capabilities", BDAC) to explore issues about organisational resources needed for the successful transformation of big data into (actionable) insights (Mikalef, Pappas, Krogstie & Giannakos, 2018). Generally, the term "BDA capability" refers to "orchestrating and managing" all resources related to big data successfully; it is the ability of a company to leverage big data for strategic and operational insights, improved performance, competitive advantage (Mikalef et al., 2018).

As noted earlier, since leading and managing in the digital era can be very challenging, executives use management tools to help them make quicker and better decisions, thus enhancing the opportunities for growth and improved performance. These management tools include big data analytics (advanced analytics) (Rigby & Bilodeau, 2018). Bain & Company has been tracking the effectiveness of 25 most used management tools in companies by surveying executives around the world. Big data analytics (BDA)

was added to Bain's survey of management tools and trends in 2012, and since 2017, the name "advanced analytics" was used instead (Rigby & Bilodeau, 2018). It could be concluded from the reports that BDA (i.e., advanced analytics) is growing in popularity among companies, with an upward trend in usage: 42 per cent of companies used this tool in 2017, a rise from 29 per cent in 2014, and 26 per cent in 2012 (Rigby & Bilodeau, 2018, p. 3; 2015, p. 14; 2013, p. 11). In addition, respondents were generally quite satisfied with this tool throughout the years, as its satisfaction rate remained steady, but significantly above the average: it was just under 4 in 2012 (5=highest satisfaction), 4.01 in 2014 (when it was number one tool regarding user satisfaction), and 4.06 in 2017 (Rigby & Bilodeau, 2013, p. 10; 2015, p. 14; 2018, p. 3).

As reported in another Bain's global survey (of executives - respondents at more than 700 companies) on tools and trends in the area of customer experience, most large companies have their analytics groups devoted to finding the ways that would best leverage analytics for better description, anticipation and improvement of customer interactions (du Toit, Dullweber, Hatherall & Moreau, 2018, p. 2). Predictive analytics was among three most-used customer experience tools across industries in 2018 (including consumer markets, as well as business-to-business markets) but, despite extremely high levels of usage and adoption throughout the companies, it remained among the lowest ranked tools in terms of satisfaction (du Toit et al., 2018, pp. 2-6).

Still, according to a 2020 survey of nearly 1,200 executives, customer experience tools overall usage has increased in 2020 (especially due to Covid-19's impact on consumer behaviour), as has the number of satisfied users (du Toit et al., 2020). Many of these tools rely on (advanced) analytics. For example, "customer journey mapping and analytics" tool (visualising potential customer interactions to create a holistic view) was used by 60% of respondents (78% were satisfied with it); "propensity model" (using advanced analytics to predict customer behaviour) was adopted by 53% of respondents (82% satisfied), "predictive forecasting or scheduling" (data analysis to predict future supply/demand) was used by 67% of respondents (79% were satisfied), while 51% of respondents adopted "personalization engine" (using advanced analytics for better understanding the needs of a customer as individual), and 81% of them were satisfied with this tool (du Toit et al., 2020). According to this report, companies expect much wider adoption of all customer experience tools by 2023, including those that rely on big data and advanced analytics.

Therefore, being "at the heart of digital transformation", data has become an extremely significant asset for companies (Reinsel et al., 2018, p. 3), and big data and big data analytics have become increasingly important for contemporary organisations (Mikalef et al., 2020). Nowadays, more than half (56 per cent) of the worldwide companies are relying on data to drive business innovation (Mlitz, 2022b). According to the latest report published by Fortune Business Insight (2021), global market size of big data analytics (BDA) rose by 11.7 per cent in 2020, reaching almost USD 207 billion; this market is expected to grow to almost USD 550 billion in 2028 – a rise from USD 231 billion in 2021. Similarly, as reported in IDC's Spending Guide, BDA (in this report: "Big Data and business analytics") spending in Europe has continued its rise in 2020 regardless of

disruption(s) caused by the Covid-19 pandemic, and it is likely to show a continued upward trend during the next five years (IDC, 2021).

## 4. Big data analytics as a source of competitive advantage

According to McGrath (2013, p. 64), digital revolution is one of several forces behind profound changes in business environment - with "too unpredictable" customers and "too amorphous" industries, maintaining a company's competitive advantage(s) has become very rare. In order to be at least one step ahead of competition, companies should be constantly developing/launching new strategic initiatives, while simultaneously building a number of "transient" advantages (McGrath, 2013, pp. 64–65).

Strategies based on data will play an increasingly significant role in competitive differentiation: big data and advanced analytics could be seen as a means for improving business performance, but this would require developing strengths and enhancing capabilities within three areas (Barton & Court, 2012, p. 79). These areas include (Barton & Court, 2012, pp. 80–82): (1) *data sources*, which refers to the need to discover new and creative ways to recognise usable (existing) data, exploiting external data coming from multiple, "surprising" sources, providing appropriate IT infrastructure; (2) *building analytics models* based on identifying opportunities and potential improvements of business performance, to produce both prediction and optimisation of business outcomes; and (3) *organisational change*, so that "the data and models actually yield better decisions"; this includes adjusting/changing the culture, developing capabilities and analytics compatible with the existing processes and decision-making standards, incorporating analytics into simple tools, and so forth.

Moreover, by reviewing and summarising highly ranked papers related to BDA and firm performance, published from 2013 to 2019, Maroufkhani et al. (2019) have identified key factors that may positively affect the adoption of BDA and the impact it has on firm performance. They have found that "individual aspect" (technical knowledge and capability of people) was the most important factor, which is followed by "organizational aspect" (organisational readiness, management support, culture, infrastructure), "BDA capability" (using all resources related to big data crucial for taking the maximum advantage of it), "data-related aspect" (factors related to data quality), and others. Indeed, according to a study of Ashrafi, Zare Ravasan, Trkman & Afshari (2019), developing business analytics capabilities has been shown to have a significant positive impact on firm performance by enhancing information quality, which positively influences the agility of companies. Since agility enables improved performance, it could be seen as a means of achieving competitive advantage, particularly in turbulent business environment (Ashrafi et al. pp. 4-9).

Benefits of the deployment of "data science for business" (which encompasses big data and BDA; DSB), as reported by DSB users, do include improved organisational performance, productivity, competitiveness, as a recent study of Medeiros, Hoppen and Maçada (2020) has shown. In addition, another study indicates that competitive advantage has been one of the determining factors behind decisions on investments into big data and

artificial intelligence (along with other offensive factors, such as innovation and transformation) for nearly 65 per cent of companies (Mlitz, 2022a).

Although many studies have demonstrated that larger companies may have higher returns from their investments in BDA solutions than smaller companies (e.g., Raguseo, Vitari & Pigni, 2020), there is also empirical evidence that adopting BDA positively impacts organisational performance (e.g., Shabbir & Gardezi, 2020), i.e., both financial and marketing performance of small and medium sized companies (e.g., Maroufkhani, Tseng, Iranmanesh, Ismail & Khalid, 2020). Anyhow, BDA assets in companies are associated with improvements in productivity (Müller, Fay & vom Brocke, 2018) and performance, but generating value from BDA requires "the orchestration of complementary organizational resources" (Mikalef, Boura, Lekakos & Krogstie, 2019, p. 262). Mikalef et al. (2019, pp. 268-271) have found that various combinations of BDA-related resources, such as data, technology, people i.e., skills, organization (practices, data-driven culture), process (procedural practices) could, to a greater or lesser extent, contribute to firm performance, depending on the context the resources are used in, including the factors such as size of a company, and dynamism, heterogeneity and hostility of external environment.

## 5. Key challenges

Companies still struggle to obtain value from data; a 2019 survey by Accenture, of 190 executives (in the U.S.), has revealed that only 32 per cent of companies report that they have the ability to realise tangible, measurable value from data (Vasal et al., 2019, p. 4).

Noticeably, companies need to tackle a number of specific challenges related to the adoption of big data analytics. As reported in McKinsey's 2015 survey of more than 500 executives, numerous challenges accompany this area, and barriers to the use of (i.e., obtaining value from) data and analytics in an organisation could be grouped into three categories. Challenges/barriers within the first category are associated with (1) *strategy* (i.e., strategic vision that should be developed to support/incorporate data and analytics), *leadership* (e.g., involvement of senior management, internal leadership for projects in this area), *talent* (refers to finding and/or retaining the right analytics/technical talent/"business translators"). These are followed by challenges related to (2) *organisational structure* (which should not only support the activities related to data and analytics, but also monitor their impact), *organisational processes* (as they need to be flexible to make the most of insights), and (3) *IT infrastructure* (e.g., designing, investing at scale, providing support to business functions, data-sharing) (as cited in Henke et al., 2016, pp. 36–38).

According to Medeiros et al. (2020), deployment of data science for business (which encompasses big data and BDA concepts) poses challenges for companies through the following four dimensions: (1) "leadership and culture", (2) "strategy, structure, and processes", (3) "talent management", and (4) "information technology". More specifically, their study has revealed that companies find challenges related to data-driven culture (indicator within the first dimension), training, i.e., developing relevant skills and knowledge (indicator within the third dimension), allocation of investments in

information/analytics technologies (indicator within the fourth dimension), and data governance and strategy (indicators within the second dimension) to be most significant (pp. 159-161). To address these issues, companies need to develop data strategies and data governance mechanisms, foster data-driven culture, encourage the development of specific skills, and allocate investments in technologies (Medeiros et al., 2020, p. 161).

As could be seen, challenges that accompany the adoption of BDA is among the topics of interest to scholars. Recent critical review of literature (Wiener et al. 2020) has identified challenges associated with the deployment of big data business models, and categorised them into internal and external. Internal challenges are related to *big data management and governance* (e.g., data quality, data access, internal politics; data context, privacy and security); *infrastructures* (technical, e.g., IT architectures, software, algorithms, and human, e.g., lack of internal BDA skills and knowledge); (expected) *costs and value* (e.g., discovering value of big data; payoff of BD investments; operational costs, costs related to infrastructure, skill development), *organisational context* (e.g., transformation - structures, processes, culture, etc.; integration into existing models), while external include *environment and market* (e.g., weak regulation, lack of standards), and *consumers/public* (e.g., ethical and concerns about privacy) (Wiener et al., 2020, pp. 88-89). Moreover, authors have indicated that the existing literature is mostly focused on internal and operational (big data management and governance), infrastructural, and challenges regarding cost vs. value, while less attention has been paid to external challenges, including (increasingly significant) ethical issues and associated privacy concerns (pp. 73-75).

Indeed, increased digital surveillance and the deployment and adoption of various big data solutions to mitigate the COVID-19 pandemic have raised even more concerns about privacy and data protection (Newlands et al., 2020). Companies thus need to respond to considerable challenges related to data protection, trust, ethics, transparency, cybersecurity, regulatory compliance. For example, they need to check if General Data Protection Regulation (GDPR), relevant EU legislation/documents, national laws/legislation and the like apply to specific country/company/project/research. To illustrate, in terms of data protection in research settings, a project/research need to be in compliance with EU's GDPR, relevant EU directives/measures, national laws/legislation on data protection, etc., as explained by European Commission (2021). A special emphasis should be placed on processing operations that may pose "higher risks to the rights and freedoms of data subjects" (p.4); these operations include, among others, big data analytics, automated decision-making, and data-mining techniques (European Commission, 2021, p. 4). Therefore, as Pentland has argued, when describing his concerns about data collection, data privacy, data ownership, and controlling the flow of data (first introduced in 2007 within the "New Deal on Data"), a solution should be found in creating "a win for customers and citizens, a win for companies, and a win for government" (Berinato, 2014, pp. 101–102).

Anyhow, another study (Vasal et al., 2019) has revealed that cultural and operational challenges, including the lack of trust in data; inability to manage data at scale i.e., operationalise it and use data strategically (e.g., due to silo-ed, slow data); and the lack of

enterprise strategy, data-driven culture, skills and talent, C-level sponsorship, are among the biggest obstacles to obtaining the expected value from investments in big data (pp. 2-7).

To overcome these challenges, companies not only need to take completely new approach to strategy, but also employ (new) data-driven strategy which, like all strategies, "comes down to where resources are allocated and how resources are used" (Vasal et al., 2019, p. 3, 20). However, aside from being mindful of all areas that could make a difference in obtaining value from data, companies also need to consider expected costs and gains, the time (and complexity) required for developing some big data-related resources (e.g., data-driven culture), and possible resistance to change (which would require developing detailed and effective mechanisms and practices for overcoming organisational inertia) (Mikalef et al. 2019, pp. 270-271).

## Conclusion

Changes in business environment and market dynamics are rapid and ever-present. What is more, the volume of (big) data is constantly growing (von See, 2021), exceeding the capacity and capability of traditional database systems. The availability and use of advanced technologies and the data they generate have a notable impact on companies across industries, profoundly changing their business strategies, business models, processes. Still, the "real revolution is not in the machines that calculate data but in data itself and how we use it" (Mayer-Schönberger & Cukier, 2013, p. 7). According to Reinsel et al. (2018), it will be essential for companies to perceive the role data plays in their company, so as to be and stay relevant during the next several years. Indeed, companies that embraced data-driven decision-making have shown better results than those of competitors (that did not rely on data when making decisions) by being more productive, and more profitable (McAfee & Brynjolfsson, 2012, pp. 63–64).

Companies use management tools to help them "boost revenues, innovate, improve quality, increase efficiencies or plan for the future", especially when they need to cope with the challenges of turbulent business environment (Rigby, 2015, p. 10). In this regard, big data analytics (BDA) is viewed as a management tool in this paper. Based on a review of selected literature, the paper has emphasised the growing interest in BDA among practitioners and academics, and the importance of BDA for today's businesses, i.e., their productivity, performance, competitiveness, thus adding to a body of literature focused on correlations between the BDA adoption in companies and improved outcomes. It could be concluded that big data analytics creates business value for companies (e.g., Müller et al., 2018), and that BDA and BDA capabilities are associated with improvements in organisational performance (e.g., Mikalef et al., 2019; Ashrafi et al., 2019, pp. 4, 9; Raguseo et al., 2020; Medeiros et al., 2020). Still, BDA is not only about data and technologies. From a managerial point of view, some of the important implications arising from the reviewed literature have been selected and pointed out in this paper, including multiple challenges related to the adoption of BDA. Certainly, there is a need for companies to not only address these challenges, but also have the ability to overcome them. When considering the investments in adoption of BDA within a company, different

(combinations of) BDA resources/factors (including data, technology, organisational structure, top management support, people, i.e., technical and managerial skills) need to be emphasised for best results (that could lead to better performance), depending on contextual factors (such as company size, uncertainty of external environment) (Mikalef et al., 2019).

Furthermore, companies will need to radically change the way BDA initiatives are "approached, designed and refined", while revising (and examining the alignment to business strategy) resource planning, resource orchestration, and expected performance results, which would all enable them to identify proper key development indicators (KPIs) (Mikalef et al., 2020). Data-driven culture (e.g., using data in decision-making), people with adequate skills and knowledge, data strategies, as well as governance mechanisms, are some of the factors of great importance for obtaining value from (big) data. (Medeiros et al., 2020). Besides, it was also argued that developing and adopting analytics tools that "focus on business outcomes and that are relevant and easy to use for everyone from the C-suite to the front lines" is the matter of critical importance. (Barton & Court, 2012, p. 81). Nevertheless, various disruptions have shown how important it is for companies to be adaptive, agile, innovative, and ready to embrace new technologies as a means of improved business outcomes; these technologies, evidently, include big data analytics.

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UDC: 665.6/.7:061.5]:005.21
DOI: 10.5937/AnEkSub2248119J
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 119-137
Received: 17/02/2022
Accepted: 18/04/2022

# Liquidity analysis of oil companies in the Republic of Serbia

## Анализа ликвидности нафтних компанија у Републици Србији

**Tanja Janaćković***
Academy of Vocational Studies Southern Serbia, Leskovac, Republic of Serbia, spasictanja7@gmail.com
**Maša Georgiev**
Academy of Vocational Studies Southern Serbia, Leskovac, Republic of Serbia, kulic.masa@vpsle.edu.rs
**Marko Janaćković**
Academy of Vocational Studies Southern Serbia, Leskovac, Republic of Serbia, janackovic.marko@vpsle.edu.rs

**Abstract:** The focus of the paper is liquidity analysis, which is an essential tool of the corporate financial management process. Converting assets, especially working capital, into cash is the primary way for a company to obtain the resources it needs to pay its current liabilities. The aim of the research is to look at the movement of current, quick and cash liquidity indicators, their comparative analysis, as well as differences in the level of liquidity for the period 2011-2020 on the example of certain oil companies in the Republic of Serbia. Ratio analysis based on their official financial statements was used to measure the liquidity of selected companies (NIS, OMV and LUKOIL), while the one-way ANOVA test was used to test hypotheses. The research results show that there is a statistically significant difference in the level of current liquidity between NIS and LUKOIL and OMV and LUKOIL, while there is no significant difference between NIS and OMV. There is a statistically significant difference in terms of quick ratios between NIS and LUKOIL, while there is no significant difference between NIS and OMV and OMV and LUKOIL. Observing the cash liquidity indicator, there is no significant difference between these indicators in the companies that are the subject of the research.
**Keywords:** oil companies, analysis, liquidity
**JEL classification**: G39

**Сажетак:** Фокус рада је анализа ликвидности, која је есенцијални алат процеса корпоративног финансијског менаџмента. Конвертовање средстава, а нарочито обртних средстава у готовину је примарни начин на који компанија долази до ресурса који су јој неопходни за плаћање текућих обавеза. Циљ истраживања је да се на примеру одређених нафтних компанија у Републици Србији сагледа кретање показатеља текуће, убрзане и тренутне ликвидности, њихова компаративна анализа, као и разлике у нивоу ликвидности у временском периоду од 2011-2020. године. За мерење ликвидности одабраних компанија коришћена је рацио анализа на основу њихових званичних финансијских извештаја, док је за тестирање хипотеза примењен тест one-way АНОВА. Резултати истраживања показују да постоји статистички значајна разлика у нивоу текуће ликвидности између компанија НИС и ЛУКОИЛ и ОМВ и ЛУКОИЛ, док нема значајније разлике између компанија НИС и ОМВ. Статистички значајна разлика у погледу показатеља убрзане ликвидности постоји између компанија НИС и ЛУКОИЛ, док између компанија НИС и ОМВ и компанија ОМВ и ЛУКОИЛ нема значајније разлике. Посматрајући тренутни показатељ ликвидности нема значајне разлике између ових показатеља код компанија које су предмет истраживања.
**Кључне речи:** нафтне компаније, анализа, ликвидност
**ЈЕЛ класификација:** G39

* Corresponding author

## Introduction

Analysis of financial statements (financial analysis) involves examining and evaluating the financial position and performance of the company. Generally speaking, performance is defined as the achievement of the goals set by the company within an agreed timeframe and at minimal costs while using the available resources (Delova-Jolevska et al., 2018). A well-organized group of individuals with specialized knowledge from different areas, which are united and well organized, make up the basis of corporate performance (Marić et al., 2019). The success of the company's operations, as well as the successful audit of financial statements requires knowledge of the basic principles of financial analysis. In economic theory, there are financial analyses, which speak not only about various aspects of financial condition (position and financial structure of the company), its activity in the financial field (asset and liability management) and its functioning in the financial field, but also analyze expressions and relationships, look at the overall activity of the company, its position and development. The analysis of financial statements is based on past, present and future results presented in the financial statements. The data contained in the financial statements form the starting point for economic and financial analysis of business entities over time, as well as for reviewing their business performance and financial capacity, or relative position in relation to the environment and overall economic trends. Therefore, the basic financial statements on the state and success of the company, the balance sheet and income statement, as well as the cash flow balance and statistical annex, form the information basis for financial analysis. In order to fully assess the financial status and earning capacity of the company, it is necessary to analyze previous reports, bearing in mind that the individual analysis of each of these reports provides an assessment of certain aspects of financial activities of the company. The analysis of financial statements quantifies and investigates the relation that exists between the positions of financial statements, which allows a correct assessment of financial position, liquidity and business performance. In practice, there are different tools for analysis (techniques). The most common techniques (instruments) of analysis include: 1) horizontal analysis, 2) vertical analysis, 3) ratio analysis or analysis of basic financial indicators, 4) cash flow analysis, 5) analysis using net working capital, 6) leverage analysis (Knežević et al., 2013).

One of the most commonly used techniques of financial analysis is ratio analysis, which has been applied in business practice for many years. The preliminary financial analysis allows to assess the financial standing of the examined entity, but a more complete assessment can be obtained after performing a ratio analysis (Kowalik, 2018). Credit institutions in the United States of America (USA) contributed greatly to the affirmation of ratio analysis in the second half of the 20th century, since they used it as a basic instrument in assessing the creditworthiness of borrowers. The goal of ratio analysis is to examine and evaluate the financial position and business performance, based on a set of ratio numbers. A ratio number is a quotient that quantifies the relationship between related balance sheet items and quantities, which belong to assets, liabilities, expenses or income. They are therefore obtained by placing in a relative relationship the individual positions of the

balance sheet and income statement and are expressed in a mathematical formula. Ratio analysis implies the application of certain norms and standards, which relate to the fact that: 1) analysis is performed in relation to data from previous periods, 2) analysis is performed in relation to planned ratio numbers, 3) analysis is performed in relation to selected data groups of enterprises, 4) comparison can be performed with data of enterprises in a certain economic branch or group, 5) analysis can be performed based on experience, 6) analysis can be performed in the context of funding rules. Ratio numbers can be classified as follows: 1) liquidity ratio or short-term financial balance, 2) long-term financial balance ratio, 3) asset structure ratio, 4) capital structure ratio, 5) management efficiency ratio, 6) expenditure structure ratio, 7) ratio of income structure, 8) ratio of profitability, 9) economic ratio, 10) ratio of productivity and 10) ratio of market value of shares (NARR, pp. 4-9).

One of the basic requirements for management is liquidity, which is generated by the requirements of creditors. Liquidity is a traditional, primary measure of financial position and of a company's survival or disappearance (Čavlin et al., 2021; Ejike & Agha, 2018) and it is very important for a company to have a good liquidity ratio (Karim et al., 2021). Financial liquidity is the basis for building a strong company (Zimon, 2020) and it indicates the capacity of the company to cover its current liabilities to suppliers and creditors on the basis of its working capital (Batranchea, 2021; Ali & Bilal, 2018). Depending on which values contained in the balance sheet items are compared, liquidity indicators differ, namely: 1) current liquidity, 2) quick liquidity, 3) cash liquidity, 4) future or prospective liquidity and 5) financial stability. Maintaining liquidity is an extremely important goal of every legal entity's business, and by liquidity we mean the company's ability to settle all due obligations in a timely manner. Liquidity analysis is used to analyze the financial position of a company.

The subject of the research is the liquidity of selected oil companies in the Republic of Serbia in the period from 2011 to 2020. First, a review of the literature in relation to the subject of research is considered, and then the methodology and results of the research are indicated. Within the methodology, a presentation of the method of calculation and meaning of current, quick and cash ratios are given, on the basis of which the analysis and measurement of liquidity of selected oil companies were performed. After the methodology, liquidity analysis is performed, i.e. the movement of liquidity indicators of the observed companies in the period from 2011-2020 is considered, as well as a comparison as well as a comparison of the liquidity level of these companies. After that, in order to measure the differences of the liquidity level of the observed companies and test hypotheses, a statistical test of variance analysis (one-way ANOVA) is conducted. The petroleum industry is specific for many reasons (high equipment costs, fierce market competition, volatile prices, regulations etc.), so the companies need to pay attention to important facts during the decision-making process, because wrong decisions can be too expensive, especially for smaller companies (Veselinović & Veselinović, 2019).

## 1. Literature review

Effective business management requires managers to use financial indicators. In order to smoothly perform business activities and achieve positive results, it is necessary to obtain, use and return funds, where the management of funds is an extremely complex task that requires the use of certain principles (Hodžić & Gregović, 2014). The principle of liquidity is particularly important and it is one of the earliest indicators used in the analysis of financial statements. Liquidity plays an important role in unifying all operations of a firm (Yameen et al., 2019) and forms an imperative part in the development, improvement and successful functioning of company (Li et al., 2020; Musah & Kong, 2019; Zimon et al., 2022). It is an important issue in financial decision making (Bibi & Amjad, 2017) and it affects financial costs or growth, changes in business and the level of risk of the company and consequently, the profitability of the company (Ali et al., 2019). Liquidity can be viewed from the aspect of assets and enterprises, where the liquidity of an asset in non-monetary form implies its ability to transform into monetary form. The degree of liquidity is determined based on the time required for this transformation. If liquidity is viewed from the aspect of the company, it is defined as the ability of the company to settle due liabilities in a short time. Liquidity is a ratio that shows the company's ability to settle liabilities or pay short-term debt (Prihatiningsih et al., 2022) and working capital management largely involves short-term investments and financing (Bijendra & Singhvi, 2017; Zambrano-Farías et al., 2021). Three important elements that include liquidity are time, means of payment and financial obligation. The basic condition for achieving and maintaining the liquidity of the company is the quantitative and temporal harmonization of these elements. In addition, liquidity can be defined as the financial balance of the company, bearing in mind that the financial balance implies that the cash expenditures that the company has at a certain time, are covered by its cash income.

The analysis of company liquidity is the subject of numerous researches. Kontuš & Mihanović (2019) point out that liquidity is an important factor in determining short-term financial management policies. Vásquez Villanueva et al. (2021) analyze the volume of accounts receivable and liquidity through financial ratios, in companies in the dairy sector and it was concluded that good collection standards provide companies with considerable liquidity.

The study Kala, Maan & Kumar Kala (2020) included a comparative analysis of the liquidity of selected real estate companies, pointing out the significant factors that affect the liquidity of companies. Different liquidity ratios of selected companies were analyzed, with the aim of analyzing the liquidity position and solvency of companies in the short term. The important role of liquidity in the survival of business was emphasized and the trends of liquidity fluctuations during the observed period were pointed out. In addition, it is pointed out that liquidity analysis is the most important tool for understanding the financial strength and solvency capacity in the short term of comparative companies.

Mitrović, Knežević & Milašinović (2019) in their research conduct an analysis of cash flow ratios and traditional liquidity ratios on the example of hotel companies in Serbia. The research points to the analysis of financial statements as a significant technique that is

often used to assess the historical performance of a company. In addition, ratio analysis is pointed out as the most important technique for analyzing financial statements, as it provides a wealth of useful information for potential buyers, including a large number of indicators, which are used in different time periods and provide information on different users. The aim of the research is to analyze liquidity indicators with a focus on hotel companies in the period from 2016 to 2018. Based on the results of the research, the movement of the observed indicators is indicated, taking into account the three-year period, as well as the trend analysis and the historical analysis of the movement of liquidity indicators.

In a study by Vuković, Pjanić & Kalaš (2018), the liquidity analysis of agricultural companies in AP Vojvodina was performed. The paper investigates the trend of liquidity performance of agricultural enterprises, in order to examine the stability and sustainability of liquidity. In addition, it is pointed out that regardless of the fact that liquidity is a short-term category, the establishment of an optimal level of liquidity is the starting point for the success of medium and large agricultural enterprises in achieving the economic activity of AP Vojvodina.

Hiadlovský, Rybovičová & Vinczeová (2016) investigated the importance of liquidity analysis in the process of financial management of companies operating in the tourism sector in Slovakia. The research defines financial analysis with an emphasis on liquidity analysis as a key tool of the corporate financial management process. The aim of the research is based on statistical verification and includes the analysis of liquidity of the observed companies, with the identification of key factors influencing the degree and development of liquidity. It is emphasized that if they are adequately managed, they can affect the improvement of liquidity management, and thus improve the quality of the financial management process in companies. Given that liquidity is one of the areas that affects one side of a company's performance, its systematic and good management can help the company achieve its goals in the best possible way.

Singh & Singh (2018) in their study analyze the liquidity of pharmaceutical companies in India for the period 2010-2015, bearing in mind that this pharmaceutical market is one of the most developed industries in the world. They measured the liquidity of selected companies using ratio analysis, which confirmed that companies based on the NSE Pharma index maintain an ideal level of liquidity. Saini & Bansal (2020) also explore and analyze the liquidity position of selected pharmaceutical companies by analyzing various liquidity ratio such as current ratio and quick ratio for the period 2004-2013.

## 2. Data and methodology

The research is based on the analysis and evaluation of the scientific literature on liquidity indicators, as well as their role in companies, with a focus on oil companies in the Republic of Serbia. The aim of the research is to consider the liquidity position, as well as to compare and analyze the liquidity positions of selected companies. Liquidity analysis examines the

company's ability to meet liabilities on maturity, i.e. whether it has sufficient liquid assets to cover short-term liabilities. The paper first examines previous research on liquidity indicators, and then discusses and systematizes the liquidity indicators of oil companies. For the purpose of liquidity analysis, the research included three oil companies in the Republic of Serbia, namely: Petroleum Industry of Serbia (NIS AD), LUKOIL Serbia AD and OMV Serbia DOO, where the liquidity indicators of these companies in the period from 2011 to 2020 are considered. For the purpose of analysis, official data from the financial statements of companies for the observed period were used. Ratio numbers, i.e. liquidity indicators were used for analyzing the liquidity of oil companies. For the needs of analysis and measurement of liquidity of the observed companies, the following ratios (variables) were used: a) current ratio, b) quick ratio and c) cash ratio.

The current ratio is obtained by applying the following formula:

$$\text{Current ratio} = \text{Current Assets}/\text{Current Liabilities}$$

This ratio shows how many dinars of current assets are covered for each dinar of short-term liabilities. In order to determine whether liquidity is satisfactory, standards for ratio analysis are applied, including financing rules. The fact is that there are no rules that can be applied equally to all companies and the situations in which they find themselves. According to the 2:1 financing rule, liquidity is satisfactory if the current ratio is greater than or equal to 2, or if the ratio of short-term assets to short-term liabilities is 2:1. If the value of the ratio is between 1 and 2, the liquidity is relatively satisfactory, while if its value is less than 1, the company is illiquid. This financing rule originates from American banking practice and it is a requirement that the value of current assets should be twice the value of short-term liabilities. The application of this rule aims to provide liquidity, while it is important to keep in mind the amount of inventories and the time required for their conversion into cash. High stocks with a low turnover ratio make it impossible to achieve liquidity, although the rule has been met. The quick ratio is calculated using the following formula:

$$\text{Quick ratio} = \text{Quick Assets}/\text{Current Liabilities}$$

Given that in many companies inventories are transformed into liquid assets in a relatively long period, this ratio is considered a more reliable measure of liquidity. The quick ratio shows how many dinars of relatively liquid assets each dinar of short-term liabilities is covered with, i.e. it represents the company's ability to settle short-term liabilities with liquid assets (cash, cash equivalents and short-term receivables) in a period of 1 year. Based on the 1:1 (acid-test) financing rules, the ratio of relatively liquid assets and cash to short-term liabilities should be at least 1:1 to maintain liquidity. If RRL > 1 the liquidity is satisfactory. There is also the possibility of compliance with the rules by the company with the simultaneous illiquidity, if the amount of receivables is high and they are collected slowly, while on the other hand most of the short-term liabilities mature in a very short time.

Cash ratio is calculated using the following formula:

$$\text{Cash ratio} = \text{Cash and equivalent}/\text{Current Liabilities}$$

Cash ratio measures the ability of a company to settle current liabilities with the most liquid assets. The reference value of this indicator is 1 or more than 1, and it is determined as the most inaccurate liquidity ratio, which is based on the fact that the ability to settle current liabilities is measured at the moment, on the day of liquidity. In accordance with the financing rules, if RGL > 1 the company is liquid on the day of liquidity measurement, if RGL=1 it is the lower limit below which the value of the indicator should not fall, and if RGL < 1 available cash and cash equivalents are not enough to settle current liabilities. Based on this indicator, it cannot be claimed whether the company will be able to meet its obligations in the coming period.

The research hypotheses are as follows:

$H_{0.1}$: $\mu_{\text{current ratio NIS}} = \mu_{\text{current ratio OMV}} = \mu_{\text{current ratio LUKOIL}}$

$H_{1.1}$: $\mu_{\text{current ratio NIS}} \neq \mu_{\text{current ratio OMV}} \neq \mu_{\text{current ratio LUKOIL}}$

$H_{0.2}$: $\mu_{\text{quick ratio NIS}} = \mu_{\text{quick ratio OMV}} = \mu_{\text{quick ratio LUKOIL}}$

$H_{1.2}$: $\mu_{\text{quick ratio NIS}} \neq \mu_{\text{quick ratio OMV}} \neq \mu_{\text{quick ratio LUKOIL}}$

$H_{0.3}$: $\mu_{\text{cash ratio NIS}} = \mu_{\text{cash ratio OMV}} = \mu_{\text{cash ratio LUKOIL}}$

$H_{1.3}$: $\mu_{\text{cash ratio NIS}} \neq \mu_{\text{cash ratio OMV}} \neq \mu_{\text{cash ratio LUKOIL}}$

In order to analyze the data and test the hypotheses, a statistical test of variance analysis (one-way ANOVA) is employed with SPSS, and the obtained results are presented in tables and textually interpreted. First, the movement of the value of liquidity indicators of oil companies in the observed period is considered, and then the differences in the level of liquidity are measured on the example of selected companies.

## 3. Liquidity analysis of oil companies in Serbia

Table 1 provides an overview of the movement of the liquidity ratio of companies for the observed period.

*Table 1: Trends of the liquidity indicators of oil companies in the period 2011-2020*

| | Current ratio | | | Quick ratio | | | Cash ratio | | |
|---|---|---|---|---|---|---|---|---|---|
| | **NIS** | **OMV** | **LUKOIL** | **NIS** | **OMV** | **LUKOIL** | **NIS** | **OMV** | **LUKOIL** |
| **Year** | | | | | | | | | |
| **2011** | **1.79** | 0.50 | 0.55 | **1.07** | 0.31 | 0.32 | **0.51** | 0.03 | 0.02 |
| **2012** | **1.69** | 1.53 | 1.37 | 0.98 | 0.81 | **0.99** | **0.13** | 0.12 | 0.03 |
| **2013** | **1.18** | **1.18** | 0.55 | 0.77 | **0.92** | 0.41 | 0.05 | **0.21** | 0.06 |
| **2014** | **1.54** | 1.47 | 1.14 | **1.05** | 0.83 | 0.71 | 0.07 | **0.17** | 0.05 |
| **2015** | **1.29** | 1.16 | 0.66 | **0.97** | 0.81 | 0.48 | **0.26** | 0.06 | 0.08 |
| **2016** | **1.36** | 1.20 | 0.88 | **1.01** | 0.63 | 0.63 | **0.29** | 0.09 | 0.15 |
| **2017** | **1.69** | 1.50 | 0.41 | **1.14** | 0.95 | 0.24 | **0.38** | 0.33 | 0.03 |
| **2018** | **1.77** | 1.30 | 0.86 | 0.95 | **0.98** | 0.57 | 0.22 | **0.31** | 0.18 |
| **2019** | **1.51** | 1.18 | 0.93 | 0.82 | **0.85** | 0.64 | 0.21 | 0.21 | **0.26** |
| **2020** | 1.15 | **1.33** | **1.33** | 0.74 | 0.82 | **0.99** | 0.14 | 0.17 | **0.68** |

*Source: the authors' research*

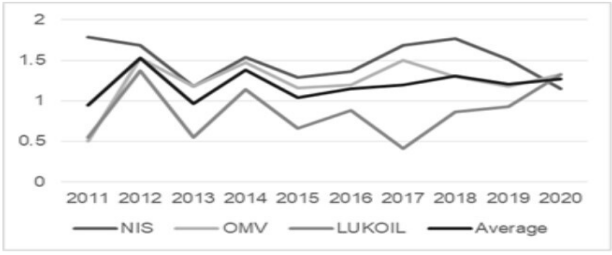
Based on the data from Table 1, it can be noticed that all companies have generally lower values of all liquidity indicators in the observed time period. Observing the value of current liquidity indicators from 2011 to 2020 (Table 2), the value below 2 can be seen for all companies. Based on the data from Table 2, the average values of current liquidity indicators by year can be seen. Thus, for NIS, the value of current liquidity ratios ranged between 1 and 2, as much as for OMV, except in 2011, when the value of current ratio for OMV was 0.50. Looking at the data for LUKOIL, it can be seen that the value of indicators is generally below 1, which indicates low liquidity, with exceptions in 2012, 2014 and 2020 when their value was above 1. Comparative analysis of current liquidity indicators for all three companies shows the highest values of this indicator in NIS in the period from 2011 to 2019, while in 2013 OMV had the same value of the indicator and it was 1.18, while in 2020 there was a noticeable increase in the value of this indicator for OMV and LUKOIL amounting to 1.33, while for NIS the value was 1.15. Fluctuations of the value of current liquidity indicators caused by fluctuations of the value of due liabilities and current assets from which liabilities are covered can also be observed (Chart 1). Thus, observing the average value of the coefficient, in the dynamics of business there is its growth for the period 2011-2012, 2013-2014, 2015-2018, 2019-2020, while for the period 2012-2013, 2014-2015 and 2018-2019 there is a decrease in the value of this coefficient.

*Table 2: Current liquidity of oil companies*

| Year | Coefficient values | | | |
|---|---|---|---|---|
| | NIS | OMV | LUKOIL | Average |
| **2011** | 1.79 | 0.50 | 0.55 | 0.95 |
| **2012** | 1.69 | 1.53 | 1.37 | 1.53 |
| **2013** | 1.18 | 1.18 | 0.55 | 0.97 |
| **2014** | 1.54 | 1.47 | 1.14 | 1.38 |
| **2015** | 1.29 | 1.16 | 0.66 | 1.04 |
| **2016** | 1.36 | 1.20 | 0.88 | 1.15 |
| **2017** | 1.69 | 1.50 | 0.41 | 1.20 |
| **2018** | 1.77 | 1.30 | 0.86 | 1.31 |
| **2019** | 1.51 | 1.18 | 0.93 | 1.21 |
| **2020** | 1.15 | 1.33 | 1.33 | 1.27 |

*Source: the authors' research*

*Figure 1: Trend of current ratio*




*Source: the authors' research*

If the current ratio has a high value over a long period of time, there are problems related to the utilization of cash, holding too high inventories, inability to lend to suppliers or inadequate receivables management policies. As a consequence, an inadequate corporate governance policy may occur (Vuković, Pjanić & Kalaš, 2018, p. 210). Good planning and control of current assets and liabilities is a prerequisite for the balance between liquidity and profitability of each company (Vuković, Andrić & Jaksić, 2017). In order to determine the appropriate working capital management policy, it is necessary to shorten the time period for settling liabilities to suppliers, i.e. collection of receivables from customers. In addition, it is required to shorten the time period in which stocks are tied up, in order to achieve faster production and sales. The goal of an efficient working capital management policy is to strive to establish the optimal size and structure of these assets, which will affect the growth of liquidity and financial stability of the company. Table 3 provides an

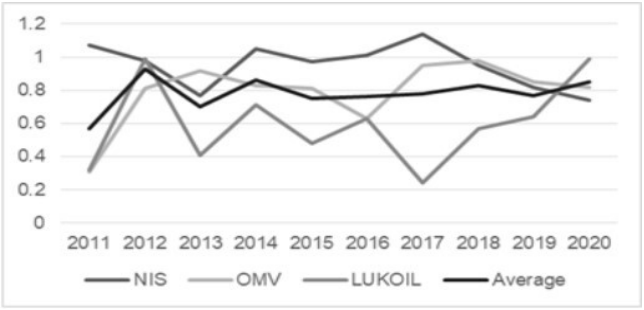
overview of the movement of quick ratios and their average values, while the following chart shows the trend of these indicators in the observed period.

*Table 3: Quick ratios of oil companies*

| Year | Coefficient values | | | |
|---|---|---|---|---|
| | NIS | OMV | LUKOIL | Average |
| **2011** | 1.07 | 0.31 | 0.32 | 0.57 |
| **2012** | 0.98 | 0.81 | 0.99 | 0.93 |
| **2013** | 0.77 | 0.92 | 0.41 | 0.70 |
| **2014** | 1.05 | 0.83 | 0.71 | 0.86 |
| **2015** | 0.97 | 0.81 | 0.48 | 0.75 |
| **2016** | 1.01 | 0.63 | 0.63 | 0.76 |
| **2017** | 1.14 | 0.95 | 0.24 | 0.78 |
| **2018** | 0.95 | 0.98 | 0.57 | 0.83 |
| **2019** | 0.82 | 0.85 | 0.64 | 0.77 |
| **2020** | 0.74 | 0.82 | 0.99 | 0.85 |

*Source: the authors' research*

*Figure 2: Trend of quick ratio*




*Source: the authors' research*

Observing the quick ratios, it can be seen that they had values higher than 1 for NIS in 2011 (1.07), 2014 (1.05), 2016 (1.01) and 2017 (1.14), which indicates that the company is liquid. In addition, the values of this indicator of the company NIS in 2012 (0.98), 2015 (0.97), and in 2018 (0.95), which were close to the reference value, can be highlighted. Based on these values, it can be concluded that in the period 2011 to 2018 NIS was liquid and able to settle current liabilities using liquid assets, i.e. cash, cash equivalents and short-

term receivables over a period of 1 year. In the period 2011-2020, the quick ratios of OMV and LUKOIL were below 1, with their value being close to 1 for LUKOIL in 2012 and 2020 (0.99), while for OMV in 2013 and 2018, the values of this coefficient are close to 1 (0.92 and 0.98). It is important to point out 2019, when the quick ratio was the highest for OMV and amounted to 0.85. It can be concluded that, in general, with exceptions, oil companies operated illiquidly in other years, i.e. they failed to settle due liabilities within one year with liquid assets. Liquidity was not greatly impaired, given that the ratios are below 1, which indicates that the liquid assets used to cover current liabilities were lower than the amount of due liabilities. Observing the fluctuations of the average values of quick ratio in the dynamics of business, it can be seen that its value increased for the period 2011-2012, 2013-2014, 2015-2018, 2019-2020, while it marked a decline for the periods 2012-2013, 2014-2015 and 2018-2019 (Chart 2). The average value of the quick ratio for the period 2011-2020 was 0.78. It can be noticed that the tendencies in the movement of the value of the quick ratio correspond to the movement of the value of the current ratio during the entire observed period, i.e. both ratios record an increase or decrease in the same time period.

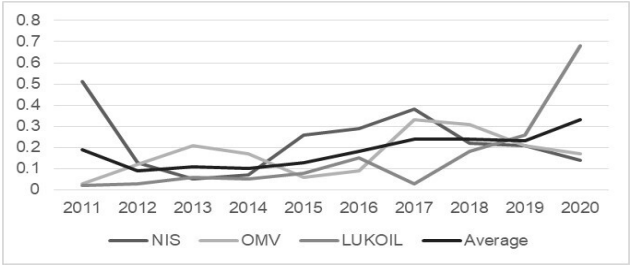
The trend of low values of current and quick indicators was reflected in the cash indicator, which is the most rigorous liquidity indicator in this group, bearing in mind that its value was lower than 1 in all companies in the observed period (Table 4). According to the results of the value of this indicator, it can be concluded that the observed oil companies in the Republic of Serbia do not operate liquidly during the entire observed period, i.e. they do not have enough cash and cash equivalents to meet current liabilities. Considering that this is the current liquidity, that is, the ability of the company to settle due liabilities, it is necessary to consider other indicators in order to assess the liquidity of the business. Observing the value of the cash ratios by companies, it can be seen that the value of ratio for NIS ranged from 0.05 in 2013 to 0.51 in 2011. OMV had values of this coefficient from 0.03 in 2011 to 0.31 in 2018. At LUKOIL, the coefficient values ranged from 0.02 in 2011 to 0.68 in 2020. By comparative analysis of these ratios, it can be concluded that the highest value of the cash ratio was achieved in LUKOIL in 2020 (0.68) in relation to NIS (0.14) and OMV (0.17), while on average NIS had the highest value of the ratio. The trend of cash indicators is shown in Chart 3. Observing the fluctuations of the value of the achieved cash ratio, a decrease in its value is observed for the periods 2011-2012, 2013-2014, 2018-2019, while in the periods 2012-2013, 2014-2018 and 2019-2020 there is growth. The trend of the value of the cash ratio corresponds to the movement in the value of current and quick ratios in certain periods (growth in the period 2015-2018 and 2019-2020, and fall in the period 2018-2019).

*Table 4: Cash ratios of oil companies*

| Year | Coefficient values | | | |
|---|---|---|---|---|
| | NIS | OMV | LUKOIL | Average |
| | | | | |
| **2011** | 0.51 | 0.03 | 0.02 | 0.19 |
| **2012** | 0.13 | 0.12 | 0.03 | 0.09 |
| **2013** | 0.05 | 0.21 | 0.06 | 0.11 |
| **2014** | 0.07 | 0.17 | 0.05 | 0.10 |
| **2015** | 0.26 | 0.06 | 0.08 | 0.13 |
| **2016** | 0.29 | 0.09 | 0.15 | 0.18 |
| **2017** | 0.38 | 0.33 | 0.03 | 0.24 |
| **2018** | 0.22 | 0.31 | 0.18 | 0.24 |
| **2019** | 0.21 | 0.21 | 0.26 | 0.23 |
| **2020** | 0.14 | 0.17 | 0.68 | 0.33 |

*Source: the authors' research*

*Figure 3: Trend of cash ratio*




*Source: the authors' research*

## 4. Measuring differences of the liquidity level of oil companies in Serbia

The ANOVA test was used to test hypotheses i.e. to examine whether differences of liquidity level are significant between the observed companies, from the aspect of liquidity indicators. Table 5 shows the test results in which current liquidity ratio was observed. The value of the sample statistics is F = 11,734. The table shows that the value of p is 0.000, which is less than the significance level of 0.05(α), which rejects the null hypothesis $H_{0.1}$: $\mu_{\text{current ratio NIS}} = \mu_{\text{current ratio OMV}} = \mu_{\text{current ratio LUKOIL}}$ and accepts alternative hypothesis $H_{1.1}$: $\mu_{\text{current ratio NIS}} \neq \mu_{\text{current ratio OMV}} \neq \mu_{\text{current ratio LUKOIL}}$, which indicates that one of the indicators of

current liquidity of selected oil companies is not equal to others. Multiple comparisons were made in order to examine the differences of the liquidity position in more detail. The data are presented in Table 6, based on which we can see that there is a statistically significant difference in terms of current liquidity ratios between NIS and LUKOIL (p = 0.000) and OMV and LUKOIL (p = 0.024) while there is no significant difference between NIS and OMV (p = 0.129).

*Table 5: ANOVA*

| Current ratio | | | | | |
|---|---|---|---|---|---|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 1.997 | 2 | .998 | 11.734 | .000 |
| Within Groups | 2.297 | 27 | .085 | | |
| Total | 4.294 | 29 | | | |

*Source: the authors' research*

*Table 6: Multiple comparisons*

| | (I) Companies | (J) Companies | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Tukey HSD | NIS | OMV | .26200 | .13044 | .129 | -.0614 | .5854 |
| | | LUKOIL | .62900* | .13044 | .000 | .3056 | .9524 |
| | OMV | NIS | -.26200 | .13044 | .129 | -.5854 | .0614 |
| | | LUKOIL | .36700* | .13044 | .024 | .0436 | .6904 |
| | LUKOIL | NIS | -.62900* | .13044 | .000 | -.9524 | -.3056 |
| | | OMV | -.36700* | .13044 | .024 | -.6904 | -.0436 |
| Dunnett t (2-sided) | NIS | LUKOIL | .62900* | .13044 | .000 | .3246 | .9334 |
| | OMV | LUKOIL | .36700* | .13044 | .017 | .0626 | .6714 |

*. The mean difference is significant at the 0.05 level.

*Source: the authors' research*

Table 7 shows the results of the ANOVA test for the quick liquidity ratio. The value of the sample statistics is F = 7,779. The table shows that p is 0.002 which is less than the significance level 0.05(α), which rejects the null hypothesis $H_{0.2}$: $\mu_{\text{quick ratio NIS}} = \mu_{\text{quick ratio OMV}} = \mu_{\text{quick ratio LUKOIL}}$ and accepts alternative hypothesis $H_{1.2}$: $\mu_{\text{quick ratio NIS}} \neq \mu_{\text{quick ratio OMV}} \neq \mu_{\text{quick ratio LUKOIL}}$, which indicates that one of the indicators of quick liquidity of selected oil companies is not equal to others. In order to examine the differences of the liquidity

position in more detail, multiple comparisons were made. The data are presented in Table 8, based on which we can see that there is a statistically significant difference in terms of quick liquidity ratios between NIS and LUKOIL (p = 0.001) while there is no significant difference between NIS and OMV (p = 0.196) and OMV and LUKOIL (p = 0.097).

*Table 7: ANOVA*

| Quick ratio | | | | | |
|---|---|---|---|---|---|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | .621 | 2 | .311 | 7.779 | .002 |
| Within Groups | 1.078 | 27 | .040 | | |
| Total | 1.700 | 29 | | | |

*Source: the authors' research*

*Table 8: Multiple comparisons*

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | (I) Companies | (J) Companies | Mean Difference (I-J) | Std. Error | Sig. | Lower Bound | Upper Bound |
| Tukey HSD | NIS | OMV | .15900 | .08938 | .196 | -.0626 | .3806 |
| | | LUKOIL | .35200* | .08938 | .001 | .1304 | .5736 |
| | OMV | NIS | -.15900 | .08938 | .196 | -.3806 | .0626 |
| | | LUKOIL | .19300 | .08938 | .097 | -.0286 | .4146 |
| | LUKOIL | NIS | -.35200* | .08938 | .001 | -.5736 | -.1304 |
| | | OMV | -.19300 | .08938 | .097 | -.4146 | .0286 |
| Dunnett t (2-sided) | NIS | LUKOIL | .35200* | .08938 | .001 | .1434 | .5606 |
| | OMV | LUKOIL | .19300 | .08938 | .072 | -.0156 | .4016 |

*. The mean difference is significant at the 0.05 level.

*Source: the authors' research*

The results of the ANOVA test for the cash ratio are given in Table 9. The value of the statistical sample is F = 0.609, while the p value is 0.551, which is higher than the significance level of 0.05 (α). This provides enough statistical evidence to accept the null hypothesis $H_{0.3}$: $\mu_{\text{cash ratio NIS}} = \mu_{\text{cash ratio OMV}} = \mu_{\text{cash ratio LUKOIL}}$ and reject the alternative $H_{1.3}$: $\mu_{\text{cash ratio NIS}} \neq \mu_{\text{cash ratio OMV}} \neq \mu_{\text{cash ratio LUKOIL}}$. Acceptance of the null hypothesis indicates that the cash ratio is the same for all observed companies.

*Table 9: ANOVA*

| Cash ratio | | | | | |
|---|---|---|---|---|---|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | .029 | 2 | .014 | .609 | .551 |
| Within Groups | .633 | 27 | .023 | | |
| Total | .662 | 29 | | | |

*Source: the authors' research*

*Table 10: Multiple comparisons*

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | (I) Groups | (J) Groups | Mean Difference (I-J) | Std. Error | Sig. | Lower Bound | Upper Bound |
| Tukey HSD | NIS | OMV | .05600 | .06849 | .696 | -.1138 | .2258 |
| | | LUKOIL | .07200 | .06849 | .552 | -.0978 | .2418 |
| | OMV | NIS | -.05600 | .06849 | .696 | -.2258 | .1138 |
| | | LUKOIL | .01600 | .06849 | .970 | -.1538 | .1858 |
| | LUKOIL | NIS | -.07200 | .06849 | .552 | -.2418 | .0978 |
| | | OMV | -.01600 | .06849 | .970 | -.1858 | .1538 |
| Dunnett t (2-sided) | NIS | LUKOIL | .07200 | .06849 | .479 | -.0878 | .2318 |
| | OMV | LUKOIL | .01600 | .06849 | .961 | -.1438 | .1758 |

*Source: the authors' research*

## Conclusion

Based on the analysis of liquidity of selected oil companies in the Republic of Serbia, it can be seen that all companies generally have lower values of liquidity ratios in the observed time period. The value of the current liquidity indicator for the observed period is below 2, with the value of the indicator at NIS ranging between 1 and 2, as well as at OMV (the exception is 2011 when it was 0.50), while LUKOIL records the values of current liquidity indicators generally below 1. The comparative analysis of current liquidity shows the highest values of indicators at NIS. In addition, there are fluctuations in the value of this indicator, which is a consequence of fluctuations in the value of due liabilities and working capital from which liabilities are covered. Based on the analysis of quick liquidity indicators, it can be concluded that NIS was liquid having in mind that its values were higher than 1, or were close to the reference value. For OMV and LUKOIL, the values of this indicator are mostly below 1, with the exceptions when the values were close to 1 (for LUKOIL in 2012 and 2020, and for OMV in 2013 and 2018). In general, it can be concluded, with exceptions that the business of oil companies from the aspect of this indicator is illiquid in the observed period, but liquidity is not significantly compromised given that the value of the indicator is below 1. In addition, there are fluctuations of average values of the quick liquidity ratios in business dynamics, which correspond to the

movement of the value of the current liquidity ratio in the observed time period. Low values of current and quick liquidity indicators also had an impact on the cash ratio. Based on the review of cash indicator, it can be noticed that the selected oil companies do not operate liquidly in the observed period. Bearing in mind that this is the instant liquidity, it is necessary to consider other indicators in order to adequately assess the liquidity of the business. For NIS, the value of this indicator ranged from 0.05 to 0.51, for OMV from 0.03 to 0.31, while LUKOIL had values from 0.02 to 0.68. Comparing this indicator between companies, it can be concluded that on average, NIS had the highest value.

By measuring the differences in the level of liquidity between companies, observed from the aspect of current, quick and cash ratios, the following can be concluded. From the aspect of current and quick liquidity indicator, the null hypothesis is rejected, given the existence of a significant difference between these indicators in the observed companies. There is a statistically significant difference in terms of current liquidity indicators between NIS and LUKOIL ($p = 0.000$) and OMV and LUKOIL ($p = 0.024$), while there is no significant difference between NIS and OMV ($p = 0.129$). There is a statistically significant difference in terms of cash ratios between NIS and LUKOIL ($p = 0.001$), while there is no significant difference between NIS and OMV ($p = 0.196$) and OMV and LUKOIL ($p = 0.097$). Observing the cash ratio, the null hypothesis is accepted, because there is no significant difference between these indicators in the companies that are the subject of the research.

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UDC: 336.226.14(497.11 Beograd)
DOI: 10.5937/AnEkSub2248139D
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 139-154
Received: 24/02/2022
Accepted: 15/04/2022

# Average effectiveness of corporate income tax on the example of companies listed on the Belgrade Stock Exchange

## Просечна ефективност пореза на добит на примеру компанија на листингу Београдске берзе

**Miloš Đaković***
University of Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia,
milos.djakovic@ef.uns.ac.rs

**Milica Inđić**
University of Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia,
milica.indjicic@ef.uns.ac.rs

**Danica Cicmil**
University of Novi Sad, Faculty of Economics in Subotica, Subotica, Republic of Serbia,
danica.cicmil@primevestcp.com

**Abstract:** The fiscal policy of a country is a crucial source of successful and normal functioning of that country's economy. The implications of fiscal policy can be reflected in both the private and the functioning of the public sector of a country's economy. Public finance is an area of economics dealing with the analysis of tax policy and government spending policy. One of the important areas of public finance research is corporate income tax. Corporate income tax is a direct tax imposed at the national level for the purpose of taxing the profits of certain companies, whether state-owned or privately owned. The aim of this paper is to look at the actual amount of profit tax paid, i.e. by observing the profit before taxation of companies listed on the Belgrade Stock Exchange. The paper considers the effective tax rate of companies and points out the deviation of the same from the legally prescribed corporate income tax rate in the Republic of Serbia and the implications of corporate income tax on the company's business results. The paper presents graphical and tabular representations of the effective tax rates of each company as well as the average effective tax rate of companies listed on the Belgrade Stock Exchange in relation to the law in the period from 2013 to 2020 in the Republic of Serbia. Finally, a statistical analysis of the presented results is given in order to understand more precisely the deviation of the effectiveness of corporate income tax of companies listed on the Belgrade Stock Exchange as well as the analysis of the correlation between the growth of the average pre-tax profit and the growth of the average effective corporate income tax rate.

**Keywords:** taxation, corporate income tax, effectiveness of corporate income tax, Belgrade stock exchange
**JEL classification**: G10, H20, H25

**Сажетак:** Фискална политика једне земље представља круцијалан извор успешног и нормалног функционисања економије те земље. Импликације фискалне политике се могу огледати како на

* Corresponding author

приватном тако и на функционисању јавног сектора привреде једне земље. Јавне финансије представљају област економије која се бави анализом пореске политике и политике државне потрошње. Један од важних подручија истраживања јавних финансије јесте управо порез на добит. Порез на добит предузећа представља директни порез који се намеће на националном нивоу ради опорезивања добити одређених предузећа, била она у државном власништву или у приватном власништву. Циљ рада је да посматрањем добити пре опорезивања компанија које се налазе на листингу Београдске берзе сагледа стварни износ пореза на добит који је плаћен тј. сагледа ефективна пореска стопа компанија и укаже на одступање исте од законски прописане стопе пореза на добит у Републици Србији и да се сагледају импликације пореза на добит на резултате пословања компаније. У раду су графичким и табеларним приказима представљене кретања ефективних пореских стопа сваког предузећа као и кретање просечне ефективне пореске стопе компанија које су листиране на Београдској берзи у односу на законски прописану и то у периоду од 2013 до 2020 године у Репулици Србији. На крају је и дата статистичка анализа изнетих резулатата ради прецизнијег разумевања одступања ефективног пореза на добит компанија на листингу Београдске берзе као и анализа корелације између раста просечне добити пре пореза и раста просечне ефективне стопе пореза на добит предузећа.
**Кључне речи:** Порез, порез на добит, ефективна пореска стопа, Београдска
**ЈЕЛ класификација:** G10, H20, H25

## Introduction

The subject of the study of Public Finance is sometimes unclear. Harvey S. Rosen, Ted Gayer (2011) stated that economists dealing with public finances analyse not only the effects of actual state activities in the field of taxation and consumption, but also analyse what those activities should be. Opinions on how the state should function in the field of economy are influenced by ideological attitudes regarding the relationship between the individual and the state. Engen and Skinner (1992) argue that there is a significant debate about the effects of government fiscal policy on economic growth, especially in developing countries. One view suggests that the reduction in government spending is justified by low productivity and inefficiency of government spending and high tax costs. An alternative view is that government plays a central role in economic development by providing public goods, encouraging productive investment, and providing a socially optimal direction for economic growth. This is followed by the contention of Gruber (2016), who stated that in the simplest terms, public finance is the study of the role of the government in the economy. This represents a very broad definition. Gruber (2006) also argues that there are four main questions of public finance: When should the government intervene in the economy, how might the government intervene, what is the effect of those interventions on economic outcomes and why do governments choose to intervene in the way that they do? Kalaš (2017) states that tax policy is one of the most important segments of economic policy, and its relevance is manifested through the process of taxation and collection of public funds. Easterly and Rebelo (1993) said that if you ask an economist to explain the growth performance of a particular country he is likely to mention fiscal policy as being an important growth determinant. This deep-seeded belief that taxation, public investment, and other aspects of fiscal policy can contribute to growth miracles as well as to enduring stagnation has been articulated in the context of growth models during the past three decades.

Kornhauser (1990) stated that various views can be applied to the notion of tax itself. Governments continue to rely on corporate income taxes as important revenue sources, the product of uneasy compromises between some forces that would reduce, and others that would increase, the tax burden on corporations (Auerbach, Hines & Slemrod, 2007). While Harvey S. Rosen, Ted Gayer (2011) believe that companies are independent legal entities, and are therefore often referred to as artificial legal entities. A company can enter into contracts, own property, borrow, sue and be sued. Like any other person, a company must pay tax on its income, that is, the realized profit, and that the corporate income tax protects the integrity of the personal income tax. Also, since the companies listed on the Belgrade Stock Exchange are the subject of this paper, we should also mention the importance of financial markets. Šoškić (2010) said that the concept of the financial market starts from the organized market as a way of trading financial instruments and that the financial market from this point of view is an organized confrontation of supply and demand of financial instruments in a certain place. We can conclude from the previous statements that taxes are legally prescribed obligatory benefits that the state takes from people and without direct and immediate counter-service of companies in order to use the collected money to finance public spending. In other words, all people, as part of society, must pay a part of our income to the state in order for it to provide us with public services, such as education, health care, public safety, care for old and poor members of the company, etc. From this, we can conclude that two determinants are important: taxes are mandatory and there is no direct compensation for taxes paid. This notion is followed by a statement by James C. Van Horne, John M. Wachowicz, JR. (2007) that taxes directly or indirectly influence many business decisions. Through their tax policies, federal, state, and local governments strongly influence the behavior of businesses and their owners. What can be a very important business decision in a situation where no tax is paid, in a situation where tax is paid can be insignificant (and some vice versa). The introduction presents the scientific problem of the article, its novelty, exploration of the problem, aim, objective, research methods).

The paper includes the following: It first consists of a review of companies on the financial market, meaning the Capital Market of the Republic of Serbia (Belgrade Stock Exchange). After that, the authors review the financial performance of listed companies, observing their profit before tax in the period from 2013 to 2020. In the following section, authors also reviewed the taxes actually paid by the same companies in the same period for further analysis. The second part consists of calculating the effective (actual) tax rate based on the previously presented data and also comparing the calculated data with the legally prescribed corporate income tax rate in the Republic of Serbia. The analysis and comparisons were performed not only for the total average effective tax rate of all listed companies, but also the analysis and review of the average effective tax rate for each individual company analysed in the period from 2013 to 2020, and at the end of the second part of the calculation, data is presented graphically. In the third and last part, the authors looked at statistical calculations such as mean, standard deviation, minimum, maximum and variation of the effective tax rate of listed companies on the Belgrade Stock Exchange in the period 2013 to 2020 and also calculated the correlation between growth of average income before tax and growth of average effective tax rates. The aim of this paper is to

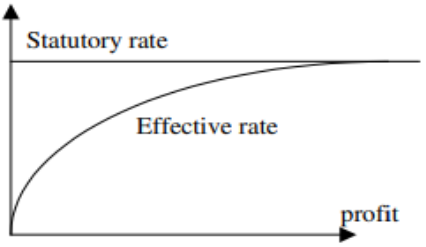
understand the difference between effective and legal tax rates and their impact on the financial results of listed companies.

## 1. Theoretical background of corporate income tax

The economic essence of a state is reflected in taxes and they manifest economic expression of the state's existence. In this way, they are determined as the price that must be paid for public services. The modern approach to public finance emphasizes that taxes give a contribution to economic efficiency and fair income distribution (Andrašić, Kalaš, Milenković, Mirović & Pjanić, 2018). There are many research papers regarding corporate income tax. Research conducted by Vržina and Dimitrijević (2019) showed that effective corporate income tax rates (ETRs) in agricultural companies are significantly lower than the statutory corporate income tax rate. Furthermore, nearly 69% of observations have both a current ETR and cash ETR of 0%, which indicates that agriculture is an industry with an exceptionally low corporate income tax burden. Panel regression showed that agricultural companies with lower ETRs are more profitable than companies with higher ETRs. Results of the analysis are not sensitive to changes in corporate income tax burden and profitability proxies.

Salaudeen and Eze (2018) stated that the statutory tax rate has been severely criticized for its inability to reflect the actual tax burden borne by firms. Their study showed that effective tax rates in Nigeria were lower than the statutory tax rate during the period of their study and that there are differences in effective tax rates from one sector of the economy to another. The study further reveals that larger and more profitable firms are faced with high tax burden while firms with high leverage and capital intensity are faced with lower effective tax rates. Government expenditures are supposed to be financed by increasing taxes, changing the consumption of expenditures or raising public debt (Iyidoğan, Balikçioğlu & Yilmaz, 2017). Petrin and Martin (2018) argue that contemporary corporate taxation is justified as a means to curb corporate power – in the political, economic, and social sense – by limiting the resources, in the form of accumulated corporate profits at the disposal of managers, and incentivizing or disincentivizing particular corporate activates.

Figure 1: Statutory and effective rate




Source: based on https://mpra.ub.uni-muenchen.de/id/eprint/3808

Nicodeme and Gaetan (2001) argue that first, comparing statutory and effective tax rates gives an idea of tax incentives given by authorities. These incentives can be either a lower tax base or a lack of enforcement. Second, the comparison of effective tax rates across countries gives indications whether there are substantially different tax treatments of companies with the same characteristics but located in different countries. These figures can indicate whether or not a large dispersion in statutory tax rates may hide little differences in effective taxation. Indeed, countries with high statutory rates can lower the base and/or decrease tax enforcement. According to research by Luković, Vržina, Grbić & Pjanić (2021), tax treatment of investment projects in Serbia is nondiscriminatory. Marginal effective tax rates for different types of investment projects do not vary widely; that is, there are no investment projects that have a markedly favourable (unfavourable) tax treatment compared to the other types of investment projects. According to Andrašić et al. (2018), corporate income tax consists of the net profit and capital gains of enterprises. Taxes as instruments of fiscal policy in modern economies are often used in acting to change the economic structure. Taxes are a forced method of payment, given by the taxpayer. In modern countries with a regulated legal and legislative framework, coercive character is reflected in the impossibility of non-fulfilment of tax obligations, because otherwise the prescribed sanctions are applied.

Mirović (2019) states that personal income tax and corporate income tax have the greatest impact on unemployment, investment and government expenditures. It is now widely accepted in public economics that empirical work on the role of corporate taxation for the production and investment decisions of multinational firms should rely on a broader set of tax components rather than only on statutory corporate tax rates. (Egger, Loretz, Pfaffermayr and Winne, 2009). When determining the distribution of tax burden on companies as legal entities, it is necessary to emphasize the model of taxation profit through individual income tax and corporate income tax. Namely, corporate income tax includes the profits of businesses that are organized in a corporate form, a form of company based on a joint stock capital, as well as forms of public enterprises. When taxing corporate profits, the problem of double taxation may arise. The company can keep realized profit or pay dividends to shareholders, whereby paid dividends cannot be deducted from realized profits. That means paid off dividends are subject to taxation and there is a double economic phenomenon taxation. It implies that the realized profit is taxed at the level of companies, as well as at the level of shareholders at the time of distribution of profits to shareholders. Corporate income tax represents income tax on the income of companies (OECD). Corporate income tax represents the main form of taxation of corporate profits, thus affecting incentives to invest and innovate, with effects for growth and employment (Arnold, Brys, Heady, Johansson, Schwellnus & Vartia, 2011; Djankov, Ganser, McLiesh, Ramalho & Shleifer, 2010).

Heshmati, Johansson and Bjuggren (2010) stated that corporate tax affects the expected return after tax on investments and therefore shapes the incentives of entrepreneurs to establish and run enterprises. Tax systems include deductions and loopholes which make the statutory corporate tax rates differ from the effective corporate tax rates. In all their complexity, tax systems may introduce distortions concerning firm

size, for instance, because small firms are short of organizational and financial resources to take full advantage of incentives and loopholes in the law. Their research analysed the effects of effective corporate tax rates on the size distribution of firms in Sweden and the results suggested that effective corporate tax rates differed by firm size, industry and over time. They concluded that effective corporate tax rates affect the size distribution of firms as well as the composition of industries. Tax forms should take an important place in the economic policy of each country. The level and share of taxes in the economy must be adequately defined so that taxes would be in function of growth and enable optimum functioning of the economy. Any increase in taxes can potentially have a negative influence on the main macroeconomic indicators. However, tax cuts can result in lower revenues, which mean lower public funds, or resources needed to meet public expenditures. There are numerous tax forms that are related to income, profits, ownership and value of assets, turnover, consumption, as well as to imports and exports in the course of performing economic activities. (Mirović, Andrašić & Kalaš, 2019). Panda & Nanda (2021) stated that effective tax rate (ETR) is significantly explained by company size, profitability, growth rate and innocent tax shield in most sectors, and the debt ratio, tangible assets and age of companies have different effects on ETR in different sectors. In the case of the entire manufacturing sector, the size of the company, profitability, growth and a tax shield that is not in charge of debt have a positive effect on ETR, and the tangibility of assets has a negative effect on ETR and also the response is very marginal following shocks to debt ratio, interest cover ratio and age of the firm.

This research is also backed by Andrejovska (2019) who monitored enterprises in the EU member states, and pointed that microeconomic indicators are all important determinants for effective corporate tax rate. The leverage effect, the capital intensity and the profitability of the company had a negative impact, and the nominal rate and R & D spending had a positive effect on the effective rate. In accordance with that, Andrejovska also concluded that macroeconomic determinants such as the nominal rate and the gross domestic product are statistically significant. Her research showed that an increase of 1% in gross domestic product resulted in an increase in the effective rate of 0.4869% and an increase of 1% in unemployment resulted in an increase in the effective rate by 6.421%. On the other hand, the tax revenues of corporations had a negative impact. An increase of 1% caused a decline in the effective rate of 13.75%. Also Rodriguez, Fernandez & Arias (2021) researched the determinants of Effective Tax Rate (ETR) in emerging economies from a joint perspective, focusing on the BRICS (Brazil, Russia, India, China and South Africa) and MINT (Mexico, Indonesia, Nigeria and Turkey) countries. They considered both traditional business characteristics (size, leverage, asset composition and profitability) and other newer ones (firm growth, earnings management and deferred tax), as well as the specific institutional factors of each country (Statutory Tax Rate, level of development, index of economic freedom, GDP growth and institutional quality). They concluded that both business variables and institutional factors have a significant effect on the tax burden for firms in emerging countries.

## 2. Methodology overview

For the purposes of this study, the authors used data on profit before tax and actual tax paid in the period from 2013 to 2020 obtained from the website of the Belgrade Stock Exchange in combination with data from the Business Registers Agency to calculate the effective tax rate and compare it with the statutory tax rate. According to Law on Corporate Income Tax the corporate income tax base is taxable profit. Taxable profit is determined in the tax balance by adjusting the taxpayer's profit shown in the income statement, which is made in accordance with international accounting standards (hereinafter: IAS), or international financial reporting standards (hereinafter: IFRS), or international financial reporting standard for small and medium-sized legal entities (hereinafter: IFRS for SMEs) and regulations governing accounting, in the manner prescribed by Law on Corporate Income Tax. Taxable profit of taxpayers, which is, according to the regulations governing accounting, determined in the tax balance by adjusting the taxpayer's profit, expressed in accordance with the method of recognition, measurement and assessment of income and expenses prescribed by the Minister of Finance in the manner determined by this law. For the determination of taxable profit, expenses are recognized in the amounts determined by the income statement, in accordance with IAS, IFRS and IFRS for SMEs, as well as regulations governing accounting, except for expenses for which this law prescribes another method of determination.

The definition above is the basis for calculating and obtaining the results that are the subject of this paper. The official legally prescribed corporate income tax rate in Serbia is 15%. The companies that are the subject of this paper are the companies that are in the basket of the Belex15 stock exchange index. The following companies are Aerodrom Nikola Tesla a.d., Nis a.d., Komercijalna banka a.d., Metalac a.d., Jedinstvo a.d., Dunav osiguranje a.d., Energoprojekt holding a.d., Impol Seval a.d. and Alpha Flame Inc. For the purposes of this study, the authors used the symbols of companies used on the Belgrade Stock Exchange in tabular representations.

Model estimation is presented:

$$Ef = (Tx / Ix) * 100$$

Where explanatory variables are determined as:

*Ef – effective tax rate*

*Tx – real tax paid*

*Ix – income before tax*

An overview of the data used to calculate the effective tax rate is given in the following tables:

*Table 1: Income before tax of listed companies from 2013-2020*

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| AERO | 21375 | 3762705 | 3953390 | 3784805 | 3880644 | 62611189 | -499872 | -789471 |
| NIIS | 58309325 | 36456884 | 20455884 | 18601544 | 34956787 | 31642961 | 22014007 | -7623436 |
| KMBN | 4588375 | 4757589 | -6175885 | -8377636 | 7187250 | 8121073 | 8268685 | 4192846 |
| MTLC | 397203 | 236006 | 254935 | 258332 | 291267 | 270729 | 284243 | 254854 |
| TGAS | 683194 | 856971 | 1743388 | 1133525 | 2271939 | 2064461 | 2127396 | 2276817 |
| JESV | 267154 | 281994 | 159585 | 188886 | 212078 | 251291 | 362086 | 380284 |
| DNOS | 99560 | -1381997 | 327733 | 1060828 | 1223081 | 1723608 | 3412618 | 3593985 |
| ENHL | 420244 | 73579 | 252025 | 245681 | 438763 | 810194 | -26346 | 269880 |
| IMPL | 273930 | 53775 | 925656 | 1257934 | 777933 | 897724 | 504793 | 13655 |
| ALFA | 394067 | 762154 | 770662 | 791216 | 800047 | 429930 | 120550 | 91825 |

*Source: the authors' calculation based on https://www.belex.rs/trgovanje/indeksi/belex15/korpa*

This segment above allows us to see the amounts of profit before tax on the example of companies that are in the basket of the Belex15 index of the Belgrade Stock Exchange and provides us with a basis for further analysis. In accordance with the data above regarding the listed companies, in the next table we can see the overview of tax paid in the period of 2015 to 2020 for all of the listed companies. Deferred tax assets and deferred tax liabilities are a very important item in the calculation of the actual tax liability. Recording of deferred tax liabilities and funds can be done on several grounds and is conditioned by the Law on Corporate Income Tax of the Republic of Serbia. Deferred tax assets / liabilities based on fixed (fixed assets) are in fact deferred taxes, which arise on the basis of the difference between the calculated accounting and tax depreciation. In accordance with tax regulations for the purposes of calculating taxable profit (income tax bases), accounting depreciation is not recognized (and added to gross profit), while tax depreciation is recognized and deducted from gross profit. In theory, when the tax depreciation is higher, the taxable profit is lower (the amount of income tax is lower) and vice versa. Accounting depreciation is depreciation that we calculated in accordance with accounting regulations by applying the appropriate amortization rates obtained by the formula based on the service life: 100 / service life. The calculation of tax assets and liabilities (temporary tax differences) that arise as the difference between accounting and tax depreciation, determined by applying) the prescribed corporate income tax rate of 15% on the amount of temporary difference. When the tax depreciation is higher than the accounting depreciation, the temporary tax difference between them represents deferred tax assets, while the reverse

relationship represents deferred tax liabilities. We conclude that deferred tax arises as a result of temporary differences that exist at the balance sheet date between accounting and tax depreciation. It is with the help of these explanations that we can see why the actually paid income tax (effective rate) deviates from the legally prescribed corporate income tax rate.

*Table 2: Tax paid by listed companies from 2013 to 2020*

| | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|---|---|---|
| AERO | 5170 | 340571 | 662904 | 594066 | 614970 | 9455739 | -46015 | 9651 |
| NIIS | 5984959 | 5897647 | 4351217 | 2519675 | 7166327 | 5575472 | 4313942 | -1714938 |
| KMBN | -87950 | -27988 | -114527 | -314453 | -930118 | -24109 | -687074 | 1264085 |
| MTLC | -5239 | -4980 | 508 | -125 | -846 | -865 | 7534 | -213 |
| TGAS | 205465 | 197774 | -33081 | 120211 | 217751 | 241766 | 337690 | 383920 |
| JESV | 18083 | 37900 | 11828 | 27166 | 5516 | 23363 | 21430 | 55153 |
| DNOS | 83584 | -8054 | -42585 | 163062 | 72593 | 150090 | 410802 | 395532 |
| ENHL | 21156 | 29712 | 15052 | 13567 | -170 | 46721 | 1916 | 6602 |
| IMPL | 6815 | 44705 | 23338 | 55397 | 10842 | 1953 | -83 | 1714 |
| ALFA | 1850 | -3157 | 9423 | -5478 | -5036 | -6921 | -10366 | -16803 |

*Source: the authors' calculation based on https://www.belex.rs/trgovanje/indeksi/belex15/korpa*

## 3. Effectiveness of corporate income tax

In the next section of the paper we can see data on the amounts of the effective tax rate of all companies that are the subject of this paper, calculated based on the methodology mentioned in the previous section of the paper. We can see that all companies in the basket of the Belgrade Stock Exchange have differences in the effective tax rate, as previously stated in the method of calculation and payment of taxes according to the law on corporate income tax.

*Table 3: Effective tax rate of listed company for the period2013-2020*

| **Effective tax rate** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|---|---|---|
| AERO | 24.19% | 9.05% | 16.77% | 15.70% | 15.85% | 15.10% | 9.21% | -1.22% |
| NIIS | 10.26% | 16.18% | 21.27% | 13.55% | 20.50% | 17.62% | 19.60% | 22.50% |
| KMBN | -1.92% | -0.59% | 1.85% | 3.75% | -12.94% | -0.30% | -8.31% | 30,15% |
| MTLC | -1.32% | -2,11% | 0.20% | -0.05% | -0.29% | -0.32% | 2.65% | -0.08% |
| TGAS | 30.07% | 23.08% | -1.90% | 10.61% | 9.58% | 11.71% | 15.87% | 16.86% |
| JESV | 6.77% | 13.44% | 7.41% | 14.38% | 2.60% | 9.30% | 5.92% | 14.50% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DNOS | 83.95% | 0.58% | -12.99% | 15.37% | 5.94% | 8.71% | 12.04% | 11.01% |
| ENHL | 5.03% | 40.38% | 5.97% | 5.52% | -0.04% | 5.77% | -7, .27% | 2.45% |
| IMPL | 2.49% | 83.13% | 2.52% | 4.40% | 1.39% | 0.22% | -0.02% | 12.55% |
| ALFA | 0.47% | -0.41% | 1.22% | -0.69% | -0.63% | -1.61% | -8.60% | -18.30% |

*Source: the authors' calculation based on https://www.belex.rs/trgovanje/indeksi/belex15/korpa*

This chapter focuses on an overview of the effective tax rates of listed companies in the period from 2013 to 2020. Also below are the results of the research where we will be able to see the average effective tax rate of all listed companies individually and for each year in the period from 2013 and 2020. We will also be able to view the obtained results graphically where a certain trend rates in relation to the legally prescribed corporate income tax rate.

## 3.1 Empirical results

The aim of this paper is to review the amount of the effective tax rate of listed companies in relation to the legally prescribed corporate income tax rate and also analyse the trend of the effective tax curve of these companies and statistical analysis to see the deviation of the same.

*Table 4: Descriptive statistics – effective tax rates*

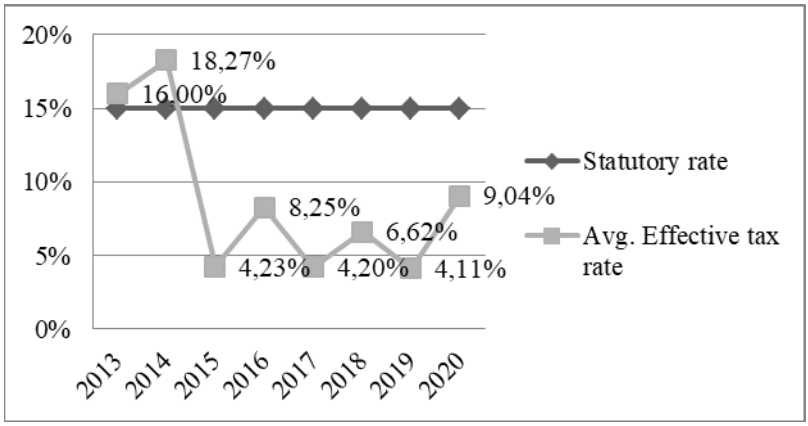
| | **Mean** | **Std. dev.** | **Median** | **Min.** | **Max.** |
|---|---|---|---|---|---|
| 2013 | 16 | 26.17 | 15 | -1.92 | 83.95 |
| 2014 | 18.27 | 26.38 | 15 | -2.11 | 83.13 |
| 2015 | 4.23 | 9.6 | 15 | -12.99 | 21.27 |
| 2016 | 8.25 | 6.4 | 15 | -0.69 | 15.7 |
| 2017 | 4.2 | 9.42 | 15 | -12.94 | 20.5 |
| 2018 | 6.62 | 6.96 | 15 | -1.61 | 17.62 |
| 2019 | 4.11 | 10.19 | 15 | -8.6 | 19.6 |
| 2020 | 9.04 | 13.8 | 15 | -18.3 | 30.15 |

*Source: the authors' calculation*

Table 4 shows the mean effective tax rate of all listed companies for all years of study. We can also see the amount of the standard deviation together with the calculated rate as the median with the maximum and minimum amounts of the average effective tax rates. As we can see, the highest average effective tax rate was present in 2014 in the

amount of 18.27%, which is a much higher amount compared to other years, except in 2013, where the rate is slightly lower and amounts to 16%. Similarly, the maximum amount of standard deviation is 26.38 in 2014 which can be attributed to a wide range minimum and maximum effective tax rates in 2014, where it ranged from -2.11% to even 83.13%. Approximately in 2013, we get similar results where we see that the standard deviation is 26.17, where the average rate ranged from -1.92% to 83.95%. Looking at other years, the average effective corporate income tax rate is lowest in 2015, 2017 and 2019, where the average rate ranges from 4% to 5%, while in 2016, 2018 and 2020 it ranges from 6% to 10%. In the following section the authors used the previous results and presented it in the next figure.

*Figure2: The ratio of the effective tax rate to the legal rate*




*Source: the authors' calculation*

Figure 2 below shows the curve of effective tax rate of listed companies in contrast to the statutory tax rate in Republic of Serbia calculated using the previous table. We can see that in 2013 and 2014 the curve of the average effective tax rate of listed companies exceeds the legally prescribed corporate income tax rate (Blue Curve) while in other years the curve moves below the legal rate. We can conclude from this that in the previous 6 years, the companies listed on the Belgrade Stock Exchange paid taxes at a lower rate than the legally prescribed rate, thanks to the deferred tax funds they accumulated. The biggest disparity is observed in 2019, where the average effective rate is as much as 4.11%, which is significantly lower than the average. We also notice that in 2020 there is a growth trend of the rate and that it is at the highest level since 2014, so it is expected that at the end of 2021 the average effective rate will be slightly increased.

Table 5 below presents the calculated average effective tax rates for each company listed on the Belex15 index in order to better understand the deviation of the total average effective tax rates from the legal one in the period from 2013 to 2020. As we can see, the highest average rate, in the amount of 17.69%, is attributed to the company NIS a.d. which

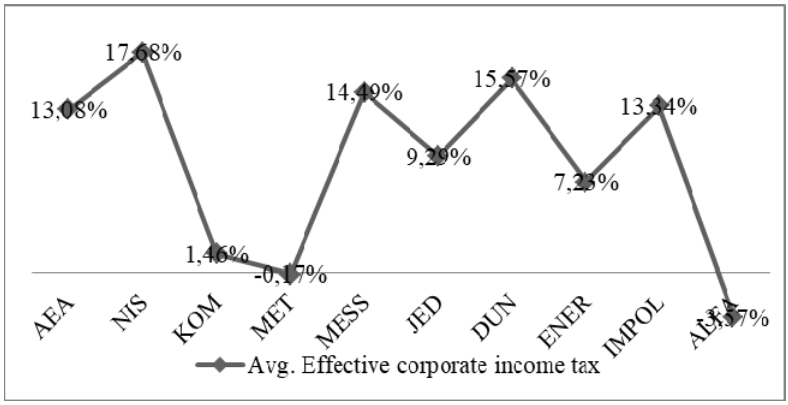
was followed by companies such as Aerodrom Nikola Tesla a.d., Messer Tehnogas a.d., Dunav Osiguranje a.d. and Impol Seval a.d. where average effective rates range from 13% to 16%. We also note that the largest amount of standard deviation is present in the company Dunav Osiguranje a.d. and Impol Seval a.d. where they are 29.01 and 28.48 respectively, which is attributed to the large range between the maximum and minimum average effective rates for both companies. The company Alfa plam a.d. has the lowest amount of the average effective rate of -3.57% and is followed by the companies Metalac a.d. and Komercijalna banka a.d. where the average effective corporate income tax rate ranges from -0.5% to 2%. Based on the previous explanations of the concepts of calculating the effective income tax rate, such a low amount of the average effective rate can be attributed to the large amount of deferred tax assets in relation to deferred tax liabilities due to higher tax depreciation compared to accounting depreciation in these companies.

*Table 5: Descriptive statistics*

| | **Mean** | **Std. dev.** | **Median** | **Min.** | **Max.** |
|---|---|---|---|---|---|
| AERO | 13.08 | 7.48 | 15.00 | -1.22 | 24.19 |
| NIIS | 17.69 | 4.18 | 15.00 | 10.26 | 22.50 |
| KMBN | 1.46 | 12.82 | 15.00 | -12.94 | 30.15 |
| MTLC | -0.16 | 1,38 | 15.00 | -2.11 | 2.65 |
| TGAS | 14.48 | 9.56 | 15.00 | -1.90 | 30.07 |
| JESV | 9.29 | 4.41 | 15.00 | 2.60 | 14.50 |
| DNOS | 15.58 | 29.01 | 15.00 | -12.99 | 83.95 |
| ENHL | 7,23 | 14.12 | 15.00 | -7.27 | 40.38 |
| IMPL | 13.33 | 28.48 | 15.00 | -0.02 | 83.13 |
| ALFA | -3.7 | 6.68 | 15.00 | -18.30 | 1.22 |

*Source: the authors' calculation in SPSS*

*Figure 3: Average effective tax rate*




*Source: the authors' calculation*

Figure 3 manifests graphically the previously calculated average effective tax rates of listed companies and gives us a more precise insight into the movement of average effective rates in relation to the legally prescribed rate. What we notice is that only for two companies that are in the basket of the Belex15 index, the effective rates for the period from 2013 to 2020 exceed the amount of 15%, while for the rest of the company this is not the case. As we have previously mentioned in theory, the reason why the effective income tax is lower than the prescribed rate is precisely because of the disparity between deferred tax assets and deferred tax liabilities.

*Table 6: Correlation*

| | | Avg. Income | Avg. Eff tax |
|---|---|---|---|
| Avg. Income | Pearson correlation | 1.000 | .103 |
| | Sig. (2-tailed) | | .809 |
| | n | 8 | 8 |
| Avg. Eff tax | Person Correlation | .103 | 1.000 |
| | Sig. (2-tailed) | .809 | |
| | n | 8 | 8 |

*Source: the authors' calculations in SPSS*

Finally, we can see that Table 6 represents the calculated correlation between the growth of average pre-tax profit and the growth of the average effective income tax rate of listed companies using Pearson's correlation test. We can see that there is a weak positive but not significant correlation between profit before tax and the effective income tax rate because the Pearson test shows a score of .103 which indicates a weak positive relationship but Sig two- tailed score show us a result of .809 that is higher than .05 which is required

for a significant correlation to exist. So, we conclude that if a company makes high profits it does not necessarily mean that it will have a large amount of effective income tax.

## Conclusion

Income tax is one of the basic types of direct tax applied in the business world. In addition to value added tax, it is the most commonly used form of business tax. We can also notice how companies use legislation to provide a higher amount of financial results, but we can also detect the use of income tax as a tool of fiscal policy of the Republic of Serbia. As the subject of the study, we used the capital market of the Republic of Serbia, which still belongs among less developed markets in Europe and in the world. The financial results of listed companies have a direct effect on their movement on the stock exchange, so we can conclude the importance of the impact of corporate income tax on their financial results and movement of their value in the capital market of the Republic of Serbia.

As the paper concludes, we note that the amount of the effective rate of listed companies (joint stock companies) in only two of the eight years that are the subject of the study exceeded the legal rate. As we could see, the effective corporate income tax rate in 2013 and 2014 was 16% and 18.27%, respectively, while in other years that are the subject of the study, the effective rate was 4.23%, 8.25%, 4.20%, 6.62%, 4.11% and 9.04% which is below the legal rate, which leads us to the conclusion that there is a significant discrepancy between the actual income tax rate and the legal rate of 15% through the use of tax depreciation prescribed Law on Corporate Income Tax in the Republic of Serbia, and accordingly we can also conclude that there is no significant correlation between the growth of income before corporate taxation and increase the effective corporate income tax.

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UDC: 004.9:657.4
DOI: 10.5937/AnEkSub2248155K
**Original scientific article**

Анали Економског факултета у Суботици – The Annals of the Faculty of Economics in Subotica
Vol. 58, No. 48, pp. 155-173
Received: 05/04/2022
Accepted: 20/05/2022

# A scale development study on the expectations of university students from the accounting course in the digitalization process

**Ayşe Kurtlu ***
Karabuk University, Safranbolu Tourism Faculty, Karabuk, Turkey, aysekurtlu@karabuk.edu.tr
**Mehmet Uçar**
Karabuk University, Safranbolu Tourism Faculty, Karabuk, Turkey, mehmetucar@karabuk.edu.tr

**Abstract:** Digitization has become an inevitable part of life, affecting all systems. Today, when technological developments are increasing rapidly, and almost everything can be done with mobile devices, all sectors and individuals have started to take more place in digital environment. Since the 20th century, the accounting profession has undergone significant changes, especially with the spread of the internet and technological developments, and many accounting practices have been transferred to digital environments. The traditional methods of accounting education cause the candidate students to grow away from the digital sector. For this reason, the digital transformation process in the accounting profession should also be started in accounting education. To train professionals who will meet the needs in the digital age, accounting education should be supported by changing technology, and students should be equipped in this regard by using digital education technologies such as augmented reality (AR) and simulation in courses. In the study, a scale was developed to determine the expectations of the students from the accounting course during the digitalization process. As a result of the study, it was determined that the scale was divided into two sub-dimensions: expectations from digital education technologies and expectations from traditional expression in the accounting course.

**Keywords:** digital transformation, digital education technologies, accounting education.
**JEL classification**: M40, I20

**Сажетак:** Дигитализација је постала неизоставан део живота, који утиче на све системе. Данас, када развој технолошких достигнућа све више убрзава, и скоро све се може урадити путем мобилних уређаја, сви сектори и појединци почели су да заузимају више места у дигиталном окружењу. Од 20. века, рачуноводствена професија је прошла кроз значајне промене, нарочито са ширењем интернета и технолошких достигнућа, а многи облици рачуноводствене праксе пренети су у дигитално окружење. Традиционални методи образовања удаљавају апсолвенте од дигиталног сектора. Због тога, процес дигиталне трансформације треба започети и у образовању будућих рачуновођа. Да би се образовали професионалци који ће задовољити потребе дигиталне ере, образовање рачуновођа треба подржати променом технологије, а студенте треба оспособити у том погледу укључивањем дигиталних образовних технологија као што су проширена стварност (ПР) и симулација у предмете студијских програма. У овом

* Corresponding author

истраживању је развијена скала за утврђивање очекивања студената на катедри за рачуноводство током процеса дигитализације. Као резултат истраживања, утврђено је да је скала подељена у две под-димензије: очекивања од дигиталних образовних тернологија и очекивања од традиционалног изражавања у студијском програму Рачуноводство.

**Кључне речи**: дигитална трансформација, дигиталне образовне технологије, образовање рачуновођа
**ЈЕЛ класификација:** M40, I20

## Introduction

In its simplest form, digitization is the transfer of information to a digital environment that can be read by computers, tablets, mobile phones, etc. Digitization and digital transformation, which express the last point reached by technological change and developments, affect every aspect of life. Industry 4.0 technologies, which are a new dimension of digitalization, irreversibly affect every field and force digital transformation.

With digitalization, the qualifications of professions differ depending on the developments in every field around the world (Alkayış, 2021: 230). The spread of digital technologies and their effects on the business world are changing accounting practices and the competencies required by professional accountants (ACCA, 2016). Especially after the 1980s, the development of technology and digitalization began to transform the structure of the accounting profession (Allahverdi, Alagöz, & Alagöz, 2021). Examples of technological developments that affect the accounting profession and shape its future are digital technologies such as accounting software, artificial intelligence, robotic processes, cloud technology, blockchain database, industry 4.0, big data, internet of things etc. (Kaya & Utku, 2021). In the accounting profession, digital documents prepared and presented in a virtual environment such as e-ledger facilitate accounting processes. In addition, accounting functions such as documentation, recording, analysis, reporting and interpretation are rapidly becoming digital, and the digital transformation process is starting in the accounting profession.

Digitization of the accounting profession will ensure that documents, records, reports, archives, audits, etc. processes are fast, easy, error-free, and accessible to all information users at the least cost. These developments will also improve professional accountants' job descriptions, qualifications, and tools (Dursun, Ektik, & Tutcu, 2019). In short, the job descriptions of professional accountants will also change. (Frey & Osborne, 2017). Therefore, professional accountants should be familiar with digital technologies (Sarıçiçek, 2020). The digital transformation in the accounting profession also forces the accounting professionals to digital transformation and requires the professional members to master digital technologies. At this point, accounting education plays a key role.

Accounting education is also affected by the changes in the accounting profession in the digital age. It is necessary to equip students with age-appropriate knowledge and skills to increase their intellectual capacity and enable them to think more systematically. This makes the search for change indispensable in accounting education. Future accountants

must be flexible in design, integration, and creativity. Educators need to go beyond the standards and use new education-teaching and assessment methods (Qin, Liu, & Grosvenor, 2016). However, it is tough for accounting professionals to respond to innovations by teaching these developments only theoretically. In this respect, it is necessary to make learning more permanent by giving applied and technology-supported accounting education (Büyükarıkan, 2021). Especially since students who take accounting courses can easily access basic subjects via the internet, some changes should be made in their learning methods, and techniques. It is necessary to give importance to applications by using information communication techniques during the course. In short, accounting education also needs to be digitized (Rasgen & Gönen, 2019; Shukla & Sharif, 2017). Because students' taking accounting education with technology support in parallel with the changing technology will make it easier for them to adapt to technology while performing their profession.

Digital education technologies, including various learning methods, have been used in higher education institutions (Rutz et al., 2003). Examples of these technologies are simulation, which provides permanent learning without the time and resource constraints, and artificial intelligence and autonomous robots, used as assistant instructors in science, mathematics, and foreign language (Extreme, 2018). In addition, computers, interactive boards, cameras, videos, animations, games, tablets, e-books, AR books, online library resources, Google Glass, and 3D printers/documents are digital education technologies that can be used in today's educational environments. To initiate the digital transformation process in accounting education, these technologies should be used in addition to theoretical education. The study aimed to develop a scale to measure the expectations of students from accounting courses in the digital age. For this purpose, a pilot study was conducted on the students who took accounting courses after receiving expert opinions. At the end of the pilot study, the scale was revised. Data were collected twice at different times from the students of the departments where accounting courses were taught at Karabuk University. According to the findings, the developed scale can be used in accounting education to determine the expectations of students from the accounting course in the digital transformation process.

## 1. Literature review

Some studies on the use of technology in accounting education are summarized below:

Coşkun (2008) stated that besides teaching accounting courses with traditional methods, educational tools such as power points and accounting programs should be used, and they should be transferred to the digital environment. In addition, it was emphasized that the preparation of web pages for accounting courses and formal education would contribute to learning.

Hacırüstemoğlu (2008) stated in his study that electronic applications in accounting education should be included in the curriculum. In addition, it was emphasized that a classroom environment where technological tools are used to ensure active participation of the students by supporting the course with tools such as power points should be preferred.

Pan and Seow (2016) aimed to determine how accounting graduates should be prepared for the digital age and how students should improve their skills and nativeness in the digitalization process. Academic studies published between 2004 and 2014 were analyzed for this purpose. As a result of the study, it was determined that the technologies used in accounting should be included in the curriculum, and four courses should be opened, namely, business process analysis, information technologies, forensic accounting, corporate accounting systems, and business analytics.

Yürekli and Şahiner (2017) investigated the relationship between industry 4.0 and accounting education. It was concluded that there is a relationship between them, and with the widespread use of industry 4.0 in accounting, accounting education will also change in parallel with these developments.

Evans and Paisey (2018) aimed to determine the differences in accounting education from past to present and the changes it has undergone due to technological developments. At the end of the study, predictions were made about the future of accounting education in the light of digitalization and globalization.

Güney and Kara (2018) conducted a study to determine the views of academicians who teach accounting courses in the light of technological developments about whether accounting courses are compatible with these developments. It has been concluded that learning methods that will improve the mental, logical, and financial analysis skills of the students taking accounting courses and cover the requirements of the changing accounting profession should be used.

Şahin and Uyar (2019) examined the usability of hologram technology in accounting education the study. At the end of the study, the convenience, innovation, and benefits of hologram technology to accounting education were evaluated.

Yaşar and Alkan (2019) examined how digital games can be used in accounting education. The authors aimed to raise awareness for alternative ideas to traditional accounting education in the digital transformation process.

Kurnaz et al. (2020) aimed to determine the effect of digital transformation on accounting education and whether the existing accounting courses in educational institutions are sufficient. As a result of the study, it has been determined that digital technologies are essential for accounting education. Still, these technologies are not sufficiently included in accounting education, and therefore professionals who can meet the needs of businesses cannot be trained.

Apalı et al. (2021) aimed to determine the differences between the students' success, focus, and interest levels in the accounting courses taught with traditional and

contemporary methods in the accounting and finance management department. The study determined that there was a significant difference between the two methods in terms of success, focus, and interest.

Erdoğan and Erdoğan (2021) examined the contribution of the Menti application, an interactive presentation tool, to the effectiveness of the course, together with the traditional methods of General Accounting 1 and Introduction to Business Finance. As a result of the study, it was determined that the student's opinions about the course in which the traditional way of teaching and the Menti application were used together were more positive, and the level of understanding and success of the course was higher than the course taught only in the traditional way.

Kaya and Utku (2021) suggested a course that complements theoretical accounting education and includes technological developments that affect the field of accounting in the digital age. The 14-week content of this course, called Accounting Information Technologies and E-Applications, has prepared information such as descriptive information, ECTS, credits, and learning outcomes.

Kurtlu (2021) examined the possible effects of AR and simulation technologies on accounting education. In the study, it has been concluded that the use of these technologies in accounting education will increase participation and interest in the course and provide permanent learning.

Yükçü et al. (2021) applied a questionnaire to the relevant academicians in which cost accounting subjects were explained through a simulation. In the study, it was concluded that the academicians who participated in the survey had an innovative attitude but did not give up their traditional teaching habits. It was emphasized that this situation was caused by the fact that the academicians were familiar with the courses taught in a conventional way throughout their education life. In addition, it was stated that academics, although innovative, could not display a definite attitude towards change.

## 2. Methodology

In this part of the study, the data collection process, the characteristics of the study group, and the scale development process were discussed.

## 2.1. Population and sample

The population of the study consists of students studying in Business Administration, Tourism Management, Finance and Banking, International Trade and Finance, Actuarial Sciences, Political Science and Public Administration, Entrepreneurship, Tourism Guidance, and Economics programs at Karabuk University. The reason for including these programs in the research is that they have accounting courses. However, sampling was

needed in cases where it was not possible to reach all the elements that make up the population. As it is known, different generally accepted techniques have been developed for sample selection (Padem, Göksu, & Konaklı, 2012). Therefore, depending on the purpose of the study, a simple random sampling method was preferred in this study. In simple random sampling, every possible combination of elements in the population has an equal probability of being included in the sample. Generally, the researcher assigns a number to each item within the framework of the sample, which is formed as a list. Then, the researcher generates random numbers as much as the number of items he wants in the sample or uses a computer program or random number lists to randomly select items from the list he has created (Baltacı, 2018: 240). In this research process, a list of students studying in the programs mentioned above was created, and individuals were randomly selected within the framework of this list.

Although Explanatory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) have similarities in scale development studies, they are different mathematically and conceptually. For this reason, it is stated that the data collection process should be carried out on other sample groups (Fokkema & Greiff, 2017). Based on this assumption, data were collected from the sample group twice, at separate times, apart from the pilot study. Tabachnick and Fidell (2007) stated that it is sufficient for the sample group to be above 150, provided that some factor loads are more significant than 0.80 during the scale development process. However, it is more reliable if the sample size is at least 300. Indeed, Comrey and Lee (1992) stated that 50 is too weak; 100 of them are poor; 200 are fair; 300 are good; 500 is very good; rated 1000 and above are excellent for the adequacy of the sample size. After the pilot study, a total of 342 students participated in the first phase of the research, which was conducted in February 2022. Of the students participating in the study, 198 (57.9%) were female, and 144 (42.1%) were male. Of the participants, 43 (12.6%) were in Business Administration, 42 (12.3%) in Tourism Management, 42 (12.3%) in Finance and Banking, 32 (9.4%) International Trade and Finance program students. On the other hand, 33 (9.6%) of the participants were in Actuarial Sciences, 45 (13.2%) in Political Science and Public Administration, 36 (10.5%) in Entrepreneurship, 38 (11.1%) in Tour Guiding, and 31 (9.1%) of them are students of Economics program. The second phase of the research was carried out in March 2022. As in the first phase, 342 students voluntarily participated in the second phase. Of the students participating in the study, 154 (45%) were female, and 188 (55%) were male. Of the participants, 50 (14.6%) were in Business Administration, 55 (16.1%) in Tourism Management, 33 (9.6%) in Finance and Banking, 30 (8.8%) International Trade and Finance program students. On the other hand, 32 (9.4%) of the participants were in Actuarial Sciences, 37 (10.8%) in Political Science and Public Administration, 31 (9.1%) in Entrepreneurship, 42 (12.3%) in Tour Guiding, and 32 (9.4%) are active students in economics program.

## 2.2. Data collection tool

In the study, first, a literature review was conducted for scale development. Based on research on technological educational tools in education, an item pool of 22 items was developed. To determine whether 22 items are valid in terms of consistency, the opinions of 4 academicians and 1 literary scholar were taken. After receiving expert opinions, the pilot study was applied to a group of 150 students who took accounting courses. According to the data obtained from the pilot study, final adjustments were made on the scale. As a result of this arrangement, an 11-item scale form was prepared. The items in the scale form were designed in a 5- point Likert type (1=Strongly Disagree; 5=Strongly Agree). After redesigning the scale, it was applied to 342 students who took accounting courses in 2 stages. The scale of expectations from the accounting course in the digital transformation process is shown in Appendix 1.

## 2.3. Data analysis

The data obtained from the students as a result of the pilot and main study were analyzed through SPSS 20 and AMOS 20 statistical package programs. Explanatory Factor Analysis was performed to test the structural validity and reliability of the data collected during the pilot study. The Cronbach -Alpha coefficient was examined for scale reliability. Attention was paid to whether the reliability coefficient met the 0.70 rule. Barlett and Kaiser-Meyer-Olkin values were examined to decide whether the data were suitable for factor analysis. Bartlett's value should be $p<0.05$ or $p<0.01$ (Hair et al., 2010: 99). The Kaiser-Meyer-Olkin (KMO) value, on the other hand, is considered suitable for factor analysis if it gives a result above 0.60 (Tabachnick & Fidell, 2007). While sizing the scale, care was taken to ensure that the Eigen Value was above 1. Factor loadings of 40 and above were taken into account (Büyüköztürk, 2006). After the pilot study, the questionnaire was applied twice to the students who took the accounting course. Both explanatory and confirmatory factor analyses were applied to the data collected from 342 people. In confirmatory factor analysis, the Chi-Square Test of Fit ($\chi 2$), which is widely considered, is the Square Root of Standardized Errors (SRMR), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), and Mean of Approximate Errors. Square root (RMSEA) compliance criteria are considered (Schumacker & Lomax, 2004; Byrne, 2010; Meydan & Şeşen, 2011; Kline, 2011). A Chi-Square/Degree of Freedom ($\chi 2/sd$) below 3 indicates that the model has a good fit (Kline, 2011). While the SRMR is below 0.08 is acceptable, a value below 0.05 means that the fit criteria are good (Şimşek, 2007). However, the CFI value (Schumacker & Lomax, 2004), the NFI value (Raykov & Marcoulides, 2006), and the GFI value should be greater than 0.90 (Byrne, 2010). In addition, the RMSEA value being below 0.08 means that the model has acceptable fit values (Kline, 2011).

# 3. Findings

## 3.1. Findings of the First Field Study

Varimax Rotation Explanatory Factor Analysis was applied to the data obtained in the first field study. Kaiser-Meyer-Olkin (KMO) and Bartlett Sphericity Test results were examined to determine suitable data for factor analysis (Tabachnick & Fidell, 2007). As a result of the analysis, it was determined that the KMO value was 0.87, and the Bartlett test value was also significant ($\chi 2=1292.957$; $p<0.001$). A significant Bartlett value and a KMO above 0.60 showed that the data were suitable for factor analysis. Findings related to Explanatory Factor Analysis are shown in Table 1.

*Table 1: Findings Related to Factor Analysis*

| Items | 1. Expectations from digital education technologies | 2. Expectations from traditional expression |
|---|---|---|
| q3 - I think that 3D – real-size technological training tools should be used for invoices, receipts, etc. documents in the accounting course | 0.785 | |
| q7 - I think that an online accounting program/module should be used in the accounting course. | 0.753 | |
| q8 - I think that the theoretical information given in the accounting course should be explained with technological applications. | 0.737 | |
| q2 - I think that the lecture notes about the accounting course should be accessed from digital platforms such as online library resources | 0.735 | |
| q1- I think that subjects such as stock control, production process, etc. should be explained through a simulation in the accounting course | 0.735 | |
| q6- I think that subjects such as establishing an enterprise and end-of-term transactions should be enriched with games and animations in the accounting course. | 0.735 | |
| q5- I think that the topics that I want to repeat in the accounting course should be accessed from the sources of books with enriched content (AR books) | 0.723 | |
| q4- I think that in the accounting course, the teacher should be reached through digital platforms such as Google Glass outside the classroom | 0.647 | |
| q10- Educational materials (board, pencil, projector, power point presentation, etc.) are sufficient for the accounting course. | | 0.820 |
| q11- Theoretical course hours are sufficient for the accounting course. | | 0.806 |

| | | |
|---|---|---|
| q9- I think it is sufficient to explain the accounting course with traditional methods. | | 0.766 |
| Eigen Value | 4,324 | 1,936 |
| Variance Disclosure Ratio | 39,307 | 17,596 |
| Total Variance Disclosure Ratio | | 56,903 |
| Kaiser-Meyer-Olkin (KMO) | | 0.878 |
| Bartlett Test: $\chi^2$ | | 1292,957; p<0.001 |

*Source: the authors' calculation*

As seen in Table 1, the scale explains 56.903% of the total variance and consists of 2 factors with an eigenvalue above 1. In addition, the factor loads of the expressions measuring the expectation about the accounting course are at an acceptable level. It has been stated in the literature that a load value of 0.35 or more for scale expressions measuring a particular phenomenon is sufficient for the usability of the scale (Büyüköztürk, 2006).

The item-total correlation results of the expectation scale for the accounting course are shown in Table 2 and Table 3 as dimensions.

*Table 2: Item-total correlation results of the expectation from digital education technologies sub-dimension*

| Items | scale mean if item deleted | scale variance if item deleted | corrected item - total correlation | Cronbach's alpha if item deleted |
|---|---|---|---|---|
| q1- I think that subjects such as stock control, production process, etc. should be explained through a simulation in the accounting course | 26.0117 | 38.399 | 0.635 | 0.861 |
| q2 - I think that the lecture notes about the accounting course should be accessed from digital platforms such as online library resources | 25.7836 | 39.449 | 0.639 | 0.860 |
| q3 - I think that 3D – real-size technological training tools should be used for invoices, receipts, etc. documents in the accounting course | 25.9211 | 38.407 | 0.697 | 0.854 |
| q4 - I think that in the accounting course, the teacher should be reached through digital platforms such as Google Glass outside the classroom | 26.0585 | 40.560 | 0.548 | 0.869 |

| | | | | |
|---|---|---|---|---|
| q5 - I think that the topics that I want to repeat in the accounting course should be accessed from the sources of books with enriched content (AR books) | 25.8012 | 40.406 | 0.626 | 0.861 |
| q6 - I think that subjects such as establishing an enterprise and end-of-term transactions should be enriched with games and animations in the accounting course. | 25.9678 | 39.063 | 0.641 | 0.860 |
| q7 - I think that an online accounting program/module should be used in the accounting course. | 25.9357 | 39.521 | 0.659 | 0.858 |
| q8 - I think that the theoretical information given in the accounting course should be explained with technological applications. | 25.8392 | 39.778 | ,642 | ,860 |

*Source: the authors' calculation*

*Table 3: Item-total correlation results of the expectation from traditional expression sub-dimension*

| Items | scale mean if item deleted | scale variance if item deleted | corrected item - total correlation | Cronbach's alpha if item deleted |
|---|---|---|---|---|
| q9 - I think it is sufficient to explain the accounting course with traditional methods. | 6.3801 | 5,456 | 0.501 | 0.673 |
| q10 - Educational materials (board, pencil, projector, power point presentation, etc.) are sufficient for the accounting course. | 6.3713 | 5.014 | 0.573 | 0.585 |
| q11 - Theoretical course hours are sufficient for the accounting course. | 5.9211 | 5.164 | 0.540 | 0.626 |

*Source: the authors' calculation*

Item-total correlation is used to improve the Cronbach Alpha value. Nunnally (1978) states that items with an item-total correlation value of less than 0.40 should be removed from the scale. The analysis determined that the item-total correlation score of no item was below 0.40, and the values ranged between 0.501 and 0.697. In addition, the Cronbach Alpha coefficient was found to be 0.876 for the "Expectations from digital education technologies" sub-dimension, 0.718 for the "Expectations from traditional expression " sub-dimension, and the Cronbach Alpha coefficient for the overall scale was 0.783. The fact that these results are in the range of a=0.70 indicates that the scale used is highly reliable (Kayış, 2009).

## 3.2. Findings of the second field study

Factor analysis was applied again to the data obtained from the students who took accounting courses. As a result of the analysis, it was determined that the KMO value was 0.87, and the Bartlett test value was also significant ($\chi 2=1282.848$; $p<0.001$). It was determined that the Bartlett value was substantial and the KMO was above 0.60, which was suitable for factor analysis. The findings of the Explanatory Factor Analysis applied to the data related to the main study are shown in Table 4.

*Table 5: Findings related to factor analysis*

| Items | 1. Expectations from digital education technologies | 2. Expectations from traditional expression |
|---|---|---|
| q3- I think that 3D – real-size technological training tools should be used for invoices, receipts, etc. documents in the accounting course | 0.777 | |
| q7- I think that an online accounting program/module should be used in the accounting course. | 0.749 | |
| q1- I think that subjects such as stock control, production process, etc. should be explained through a simulation in the accounting course | 0.739 | |
| q8- I think that the theoretical information given in the accounting course should be explained with technological applications. | 0.733 | |
| q6- I think that subjects such as establishing an enterprise and end-of-term transactions should be enriched with games and animations in the accounting course. | 0.731 | |
| q2- I think that the lecture notes about the accounting course should be accessed from digital platforms such as online library resources | 0.726 | |
| q5- I think that the topics that I want to repeat in the accounting course should be accessed from the sources of books with enriched content (AR books) | 0.720 | |
| q4- I think that in the accounting course, the teacher should be reached through digital platforms such as Google Glass outside the classroom | 0.640 | |

| | | |
|---|---|---|
| q10- Educational materials (board, pencil, projector, power point presentation, etc.) are sufficient for the accounting course. | | 0.826 |
| q11- Theoretical course hours are sufficient for the accounting course. | | 0.813 |
| q9- I think it is sufficient to explain the accounting course with traditional methods. | | 0.763 |
| Eigen Value | 4,271 | 1,961 |
| Variance Disclosure Ratio | 38,830 | 17,828 |
| Total Variance Disclosure Ratio | | 56,658 |
| Kaiser-Meyer-Olkin (KMO) | | 0.872 |
| Bartlett Test: $\chi^2$ | | 1282,848; p<0.001 |

*Source: the authors' calculation*

As seen in Table 4, the scale, which measures the expectation about the accounting course, explains 56,658% of the total variance. It is seen that it consists of 2 factors with an eigenvalue above 1. The factor loads of the expressions measuring the expectation about the accounting course are at an acceptable level. It has been stated in the literature that a load value of 0.35 or more for scale expressions measuring a particular phenomenon is sufficient for the usability of the scale (Büyüköztürk, 2006).

Since the confirmatory factor analysis was performed with another sample, it was deemed appropriate to calculate the reliability value of the sub-dimensions and the scale. In Table 5, general and dimensional reliability results of the expectation scale regarding the accounting course are given.

*Table 5: Reliability results of the expectation scale for the accounting course*

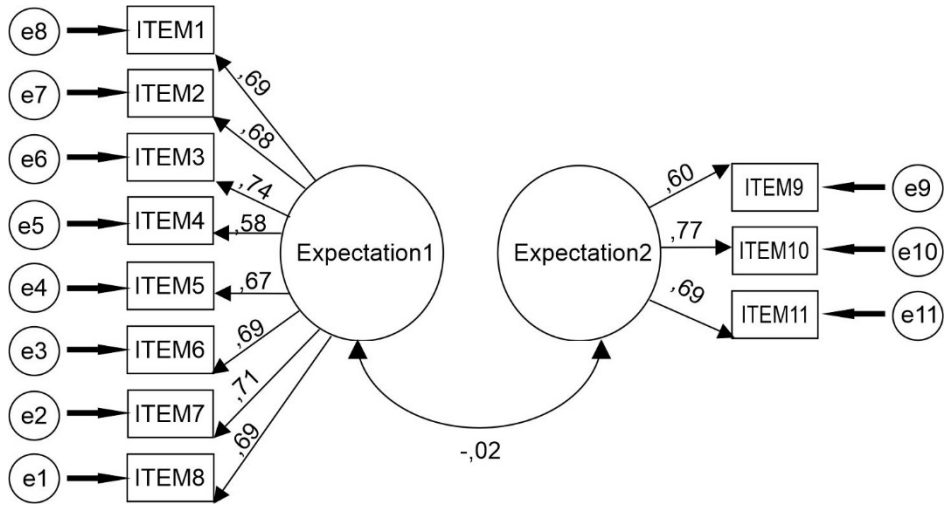
| Dimensions | Number of Expressions | Cronbach's Alpha |
|---|---|---|
| Expectations from digital education technologies | 8 Pieces | 0.872 |
| Expectations from traditional expression | 3 Pieces | 0.725 |
| Total | 11 Pieces | 0.780 |

*Source: the authors' calculation*

In Table 5, the Cronbach scale of the whole scale was found to be 0.78. It is seen that the reliability coefficient of the expectations sub-dimension from digital education technologies is 0.87, and the coefficient of the expectations from the traditional narrative sub-dimension is 0.72. According to these values, it is possible to say that the internal reliability coefficients of the scale and its sub-dimensions are at a reasonable level (Tabachnick & Fidell, 2007).

After the explanatory factor analysis and reliability results were found to be at an acceptable level, confirmatory factor analysis with AMOS was applied to the 11-item scale. The obtained findings are shown in Figure 1.

*Figure 1: Confirmatory Factor Analysis Findings Regarding the Expectation Scale*




*Source: the authors' calculation*

As a result of the confirmatory factor analysis, it can be said that the fit criteria ($\chi 2$ = 85,214 (sd = 43, p < .001), ($\chi 2$/sd) = 1,982, RMSEA = 0,054, GFI = 0,957, CFI = 0,966, NNFI= 0,934) of the model shown in Figure 1 meet the desired conditions and the fit criteria of the model are good.

*Table 6: Relationship between first and second fieldwork*

| | | Second Field Study |
|---|---|---|
| First field study | Pearson correlation | 0.707** |
| | Sig. (2-tailed) | 0,000 |
| | N | 0.342 |

*Source: the authors' calculation*

The correlation between the first and second field study arithmetic averages of the data obtained was examined. Obtained findings; showed a high correlation.

## Conclusion

Digitization, which expresses the last dimension of technological developments, affects and changes every field irreversibly. One of these areas is the accounting profession. The accounting profession is rapidly digitizing with applications such as e-ledger and e-declaration. Therefore, the job descriptions of professional accountants are also changing rapidly. Professional accountants need to adapt to digital transformation in order to respond to the needs in the digitalization process. Accounting education plays a crucial role in raising suitable professionals for the age. However, today, explaining accounting education with traditional methods causes career candidates to grow away from the sector and the process. Accounting education should also be digitalized to train accountants compatible with the digitalized accounting profession. Digitalization in accounting education, on the other hand, will be possible with the use of digital education technologies such as augmented reality and simulation in accounting courses. As a result of this situation, which constitutes the main problem of the research, a scale development study was conducted to determine the expectations of the students from the accounting course during the digitalization process. The findings are summarized below.

The scale development study was carried out on 342 students who took accounting courses at Karabuk University. Before starting the field study, the relevant literature was scanned, and a 22-item question pool was created, expressing the expectation about the accounting course in the digitalization process. After receiving expert opinions and conducting a pilot study on 150 people, the questionnaire was given its final form. A two-stage field study was carried out at different times, with the final form consisting of a total of 11 items. The data obtained from the main study were evaluated, and it was seen that the scale items explained 56,658% of the total variance. The factor loads of the items ranged from 0.64 to 0.82. It has been determined that the scale is divided into two sub-dimensions, the expectation from digital education technologies and the Expectation from traditional expression. The reliability level of the scale was found to be reasonably reliable. Based on

the analysis results obtained, the scale can be used in accounting education to determine the expectations of students from the accounting course in the digital transformation process.

When the related literature was examined, it was seen that the studies generally focused on determining the student/teacher opinions about the use of technology in accounting education. However, in the digitalized accounting profession, the digitalization of professionals is related to the expectations of the candidates' students as well as their opinions. In order to prepare the candidate students for the digitalized accounting profession, it is necessary to develop their intellectual knowledge and enable them to think analytically and systematically. For this, the first thing to do is to determine student expectations about the digitalization of accounting education. Thus, according to this expectation, a curriculum, that is compatible with technological developments and includes courses using digital technologies, can be created. It can be ensured that students receive more comprehensive education on the changes in the accounting profession and practices. In addition, the digitalization of accounting education will enable students to have the necessary knowledge and skills for the needs of the digital age and to have more opportunities to find a job after graduation.

In brief, the digitalization of accounting education largely depends on students' expectations regarding the use of digital education technologies in accounting courses. Accounting education will be digitalized to the extent that students' expectations about the use of digital education technologies in accounting courses are positive. Thus, it will be possible to train professional accountants who are compatible with the digital transformation process and can meet the needs of the sector. The starting point of this study is to determine the expectations of university students from the accounting course in the digital age. However, in the relevant literature, there is hardly a scale study that can be used to measure students' expectations from digital education technologies in accounting courses. In this respect, a scale development study was conducted to measure the expectations of students from the accounting course in the digital age. It is recommended that the developed scale be used in future studies to determine the expectations of students from digital technologies in other courses besides the accounting course.

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APPENDIX 1. Expectation scale from accounting course in the digital transformation process

| **1: Strongly disagree**<br>**2: Disagree**<br>**3: Neither Agree nor Disagree**<br>**4: Agree**<br>**5: Strongly Agree** | **Strongly disagree** | **Disagree** | **Neither agree nor disagree** | **Agree** | **Strongly agree** |
|---|---|---|---|---|---|
| q1- I think that subjects such as stock control, production process, etc. should be explained through a simulation in the accounting course | ① | ② | ③ | ④ | ⑤ |
| q2 - I think that the lecture notes about the accounting course should be accessed from digital platforms such as online library resources | ① | ② | ③ | ④ | ⑤ |
| q3 - I think that 3D – real-size technological training tools should be used for invoices, receipts, etc. documents in the accounting course | ① | ② | ③ | ④ | ⑤ |
| q4 - I think that in the accounting course, the teacher should be reached through digital platforms such as Google Glass outside the classroom | ① | ② | ③ | ④ | ⑤ |
| q5 - I think that the topics that I want to repeat in the accounting course should be accessed from the sources of books with enriched content (AR books) | ① | ② | ③ | ④ | ⑤ |
| q6 - I think that subjects such as establishing an enterprise and end-of-term transactions should be enriched with games and animations in the accounting course. | ① | ② | ③ | ④ | ⑤ |
| q7 - I think that an online accounting program/module should be used in the accounting course. | ① | ② | ③ | ④ | ⑤ |
| q8 - I think that the theoretical information given in the accounting course should be explained with technological applications. | ① | ② | ③ | ④ | ⑤ |
| q9 - I think it is sufficient to explain the accounting course with traditional methods. | ① | ② | ③ | ④ | ⑤ |
| q10 - Educational materials (board, pencil, projector, power point presentation, etc.) are sufficient for the accounting course. | ① | ② | ③ | ④ | ⑤ |
| q11 - Theoretical course hours are sufficient for the accounting course. | ① | ② | ③ | ④ | ⑤ |

*Source: the authors*

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➲ **Magazine article**

Strakić, F. (2005, October 15). Remembering users with cookies. *IT Review*, *130*, 20-21.

➲ **Newsletter article with author**

Dimitrijević, M. (2009, September). MySql server, writing library files. *Computing News, 57,* 10-12.

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*Web user interface* (10th ed.). (2003). Subotica: Faculty of Economics.

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Statistical office of the Republic of Serbia. (1978). *Statistical abstract of the Republic of Serbia.* Belgrade: Ministry of community and social services.

➲ **Edited book**

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Boškov, T., & Strakić. F. (2008). Bridging the gap: Complex adaptive knowledge management. In T. Boškov & V. Tanasijević (Eds.), *The enterprise knowledge portal and its architecture* (pp. 55-89). Subotica: Faculty of Economics.

➲ **Encyclopedia entry**

Mirković, D. (2006). History and the world of mathematicians. In *The new mathematics encyclopedia* (Vol. 56, pp. 23-45). Subotica: Faculty of Economics.

## C. Unpublished Works

➲ **Paper presented at a meeting or a conference**

Ljubojević, K., Tanasijević, V., Dimitrijević, M. (2003). *Designing a web form without tables*. Paper presented at the annual meeting of the Serbian computer alliance, Beograd.

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Boškov, T., Strakić, F., Ljubojević, K., Dimitrijević, M., & Perić, O. (2007. May). *First steps in visual basic for applications*. Unpublished paper, Faculty of Economics Subotica, Subotica.

➲ **Doctoral dissertation**

Strakić, F. (2000). *Managing network services: Managing DNS servers*. Unpublished doctoral dissertation, Faculty of Economics Subotica, Subotica.

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Dimitrijević, M. (2003). *Structural modeling: Class and object diagrams.* Unpublished master's thesis, Faculty of Economics Subotica, Subotica.

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Faculty of Economics. (2008, March 5). *A new approach to CRM*. Retrieved July 25, 2008, from http://www.ef.uns.ac.rs/papers/acrm.html

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Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, *2*(2), 45-54. Retrieved from http://www.ef.uns.ac.rs/mis/TestDriven.html.

## 2. Reference Quotations in the Text

➲ **Quotations**

If a work is directly quoted from, then the author, year of publication and the page reference (preceded by "p.") must be included. The quotation is introduced with an introductory phrase including the author's last name followed by publication date in parentheses.

> According to Mirković (2001), "The use of data warehouses may be limited, especially if they contain confidential data" (p. 201).
>
> Mirković (2001), found that "the use of data warehouses may be limited" (p. 201). What unexpected impact does this have on the range of availability?

If the author is not named in the introductory phrase, the author's last name, publication year, and the page number in parentheses must be placed at the end of the quotation, e.g.

> He stated, "The use of data warehouses may be limited," but he did not fully explain the possible impact (Mirković, 2001, p. 201).

➲ **Summary or paraphrase**

> According to Mirković (1991), limitations on the use of databases can be external and software-based, or temporary and even discretion-based (p.201).
>
> Limitations on the use of databases can be external and software-based, or temporary and even discretion-based (Mirković, 1991, p. 201).

➲ **One author**

> Boškov (2005) compared the access range…
>
> In an early study of access range (Boškov, 2005), it was found...

➲ When there are **two authors**, both names are always cited:

> Another study (Mirković & Boškov, 2006) concluded that…

➲ If there are **three to five authors**, all authors must be cited the first time. For subsequent references, the first author's name will cited, followed by "et al.".

> (Jovanov, Boškov, Perić, Boškov, & Strakić, 2004).

In subsequent citations, only the first author's name is used, followed by "et al." in the introductory phrase or in parentheses:

> According to Jovanov et al. (2004), further occurences of the phenomenon tend to receive a much wider media coverage.
>
> Further occurences of the phenomenon tend to receive a much wider media coverage (Jovanov et al., 2004).

In "et al.", "et" is not followed by a full stop.

➲ Six or more authors

The first author's last name followed by "et al." is used in the introductory phrase or in parentheses:

> Yossarian et al. (2004) argued that…
>
> … not relevant (Yossarian et al., 2001).

➲ Unknown author

If the work does not have an author, the source is cited by its title in the introductory phrase, or the first 1-2 words are placed in the parentheses. Book and report titles must be italicized or underlined, while titles of articles and chapters are placed in quotation marks:

> A similar survey was conducted on a number of organizations employing database managers ("Limiting database access", 2005).

If work (such as a newspaper editorial) has no author, the first few words of the title are cited, followed by the year:

> ("The Objectives of Access Delegation," 2007)

**Note:** In the rare cases when the word "Anonymous" is used for the author, it is treated as the author's name (Anonymous, 2008). The name Anonymous must then be used as the author in the reference list.

➲ Organization as an Author

If the author is an organization or a government agency, the organization must be mentioned in the introductory phrase or in the parenthetical citation the first time the source is cited:

> According to the Statistical Office of the Republic of Serbia (1978), …

Also, the full name of corporate authors must be listed in the first reference, with an abbreviation in brackets. The abbreviated name will then be used for subsequent references:

> The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS], 1978).
>
> The list does not include schools that were listed as closed down in the previous statistical overview (SORS, 1978).

➲ When citing **more than one reference from the same author**:

> (Bezjak, 1999, 2002)

➲ When several **used works by the same author were published in the same year**, they must be cited adding a, b, c, and so on, to the publication date:

> (Griffith, 2002a, 2002b, 2004)

➲ **Two or more works in the same parentheses**

When two or more works are cited parenthetically, they must be cited in the same order as they appear in the reference list, separated by a semicolon.

> (Bezjak, 1999; Griffith, 2004)

➲ **Two or more works by the same author in the same year**

If two or more sources used in the submission were published by the same author in the same year, the entries in the reference list must be ordered using lower-case letters (a, b, c…) with the year. Lower-case letters will also be used with the year in the in-text citation as well:

> Survey results published in Theissen (2004a) show that…

➲ To **credit an author for discovering a work**, when you have not read the original:

> Bergson's research (as cited in Mirković & Boškov, 2006)…

Here, Mirković & Boškov (2006) will appear in the reference list, while Bergson will not.

➲ When **citing more than one author**, the authors must be listed alphabetically:

> (Britten, 2001; Sturlasson, 2002; Wasserwandt, 1997)

➲ When there is **no publication date**:

> (Hessenberg, n.d.)

➲ **Page numbers must always be given for quotations**:

> (Mirković & Boškov, 2006, p.12)
>
> Mirković & Boškov (2006, p. 12) propose the approach by which "the initial viewpoint…

➲ **Referring to a specific part of a work**:

> (Theissen, 2004a, chap. 3)
>
> (Keaton, 1997, pp. 85-94)

➲ **Personal communications, including interviews, letters, memos, e-mails, and telephone conversations**, are cited as below. (These are *not* included in the reference list.)

> (K. Ljubojević, personal communication, May 5, 2008).

# 3. Footnotes and Endnotes

A few footnotes may be necessary when elaborating on an issue raised in the text, adding something that is in indirect connection, or providing supplementary technical information. Footnotes and endnotes are numbered with superscript Arabic numerals at the end of the sentence, like this.[1] Endnotes begin on a separate page, after the end of the text. However, journal **does not recommend the use of footnotes or endnotes.**

ISSN 0350-2120