

Fourth International Scientific Conference
on Economics and Management

EMAN 2020



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**4TH INTERNATIONAL SCIENTIFIC CONFERENCE
EMAN 2020**

***EMAN 2020 – Economics & Management:
How to Cope with Disrupted Times***

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PREFACE

Association of Economists and Managers of the Balkans headquartered in Belgrade – Serbia; Faculty of Management Koper – Koper, Slovenia; DOBA Business School - Maribor, Slovenia; Integrated Business Faculty - Skopje, North Macedonia and Faculty of Management - Zaječar, Serbia organized Fourth International Scientific Conference on Economics and Management: How to Cope with Disrupted Times - EMAN 2020. Due to the COVID-19 pandemic the conference was held online/virtually.

Fourth International Scientific Conference on Economics and Management - EMAN 2020 – aimed to establish and expand international contacts and co-operation across regions and countries. The main purpose of the conference was to provide scientists an encouraging and stimulating environment in which they may present results of their research to the scientific community and public.

The conference theme was discussed in following sections:

1. Economics,
2. Management,
3. Law,
4. Tourism,
5. Environment,
6. Technology.

The aim of this year's conference has been achieved - bring together the academic community of the Balkans region and other countries and publication of their papers with the purpose of popularization of science and their personal and collective affirmation. The unique program combined presentation of the latest scientific developments in these areas, interactive discussions and other forms of interpersonal exchange of experiences.

Within publications from EMAN 2020 conference:

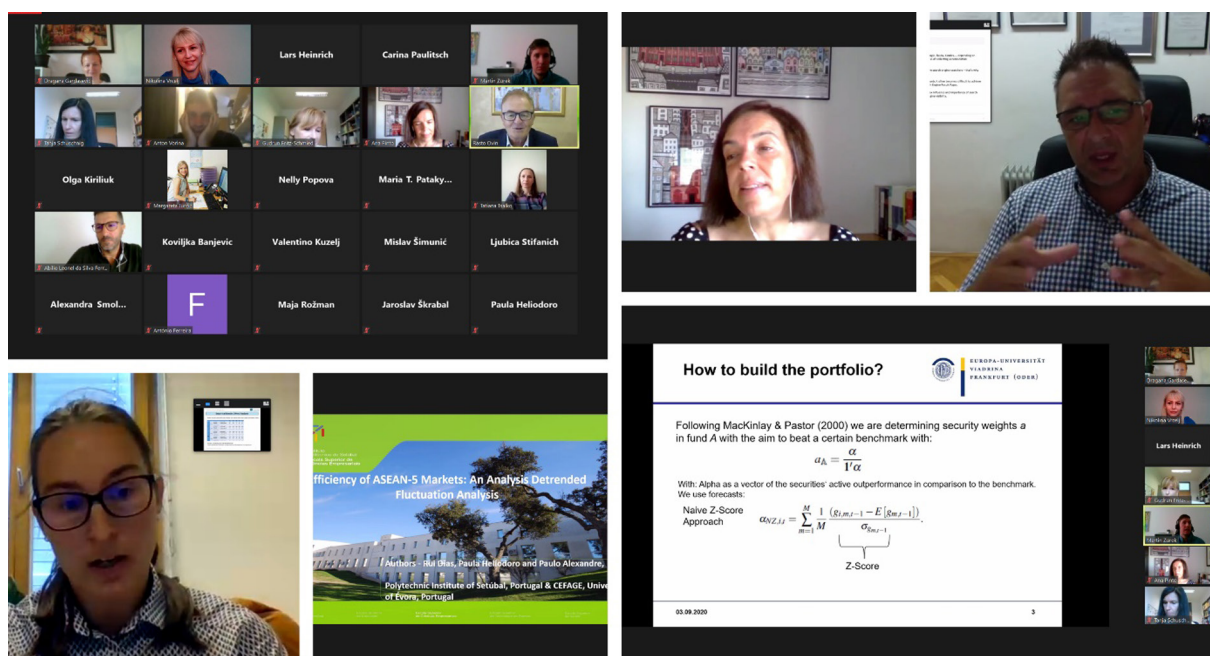
- **17 double peer reviewed papers** have been published in the *EMAN 2020 – Economics & Management: How to Cope with Disrupted Times - Selected Papers*,
- **60 double peer reviewed papers** have been published in the *EMAN 2020 – Economics & Management: How to Cope with Disrupted Times - Conference Proceedings* and
- **28 abstracts** have been published in the *EMAN 2020 Book of Abstracts*.

EMAN 2020 publications have more than **750 pages**. Besides that, **15 papers** have been accepted for publication in the conference partner journals also, namely:

1. **Public Sector Economics** is a scientific journal published by the Institute of Public Finance – Zagreb (Croatia), which seeks theoretical, empirical and policy-oriented contributions analyzing the role and functioning of the public sector at macroeconomic, sectoral and microeconomic levels, in both advanced and emerging market economies. Articles published in Public Sector Economics are indexed in: SCOPUS (Elsevier), DOAJ (Directory of Open Access Journals, Lund University, Sweden), EconLit (American Economic Association's electronic database), HRČAK (Portal of Scientific Journals of Croatia), IBSS (International Bibliography of the Social Sciences, ProQuest, Cambridge, UK), RePEC (Research Papers in Economics);
2. **International Journal of Environmental Sustainability and Green Technologies (IJESGT)** is a scientific journal published by the IGI Global whose journals are found in a number of

prestigious indices, including Web of Science and Scopus. New editor of the IJESGT was recently appointed and it is expected that the journal will accomplish good indexation soon. Now it is indexed in Google Scholar;

3. **Balkans Journal of Emerging Trends in Social Sciences (Balkans JETSS)** is an international scientific journal, published by the Association of Economists and Managers of the Balkans. Aims and scope are economics, management, law and tourism. Balkans JETSS have indexation in Google Scholar, CEEOL (Central and Eastern European Online Library), ProQuest's Serial Solutions, Summon, Primo Central, Alma, EBSCO's EDS Discovery Service and Knowledge Base, TDNet and OCLC.
4. **Journal of Innovative Business and Management** is published by the DOBA Faculty, Maribor (Slovenia) and referred in international scientific journal bases DOAJ, Google Scholar, Econ-Papers, ResearchGate and RePec. It has been published since 2009 and since then it has been attracting more and more interest among the readers, who predominantly come from academia and business practice.



Participation in the conference took 187 researchers with the paper representing 24 different countries (Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, India, Italy, Japan, Montenegro, North Macedonia, Oman, Poland, Portugal, Russia, Serbia, Slovakia, Slovenia, Spain, Switzerland and United States), different universities, eminent faculties, scientific institutes, colleges, etc.

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FINANCIAL CONTAGION BETWEEN THE US AND EMERGING MARKETS: COVID-19 PANDEMIC CASE

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Abstract: *To realise how crises are disseminated is relevant for policy makers and regulators in order to take appropriate measures to prevent or contain the propagation of crises. This study aims to analyse the financial contagion in the six main markets of Latin America (Argentina, Brazil, Chile, Colombia, Mexico and Peru) and the USA, in the period 2015-2020. Different approaches have been undertaken to carry out this analysis in order to consider the following research question, namely whether: (i) the global pandemic COVID-19 has accentuated the contagion between Latin American financial markets and the US? The results of the autocorrelation tests are totally coincident with those obtained by the BDS test. The rejection of the null hypothesis, i.i.d., can be explained, among other factors, by the existence of autocorrelation or by the existence of heteroscedasticity in the stock market index series, in which case the rejection of the null hypothesis is explained by non-linear dependence on data, with the exception of the Argentine market. However, significant levels of contagion were expected to occur between these regional markets and the US as a result of the global pandemic (Covid-19), which did not happen. These results may indicate the implementation of efficient diversification strategies. The authors consider that the results achieved are relevance for investors who seek opportunities in these stock markets, as well as for policy makers to carry out institutional reforms in order to increase the efficiency of stock markets and promote the sustainable growth of financial markets.*

Keywords: COVID-19; Contagion effects; Region LAC; Portfolio diversification.

1. INTRODUCTION

Until the 1980s, crises in emerging markets, particularly in Latin American countries, with their long history of enormous external debts, successive devaluations, banking crises and deep economic recessions, were attributed to inconsistent domestic policies. Financial crises were considered as events that occurred in individual markets, without a systemic character, and therefore deserved little attention to the possibility of transmitting shocks between countries. (Bejarano-Bejarano, Gómez-González, Melo-Velandia, and Torres-Gorron, 2015; Wagan and Ali, 2014).

The scenario changed throughout the 1990s as a series of serious financial crises unfolded: the European Exchange Rate Mechanism crisis in 1992, the crisis in Mexico in 1994-1995, the crisis in South East Asia in 1997-1998, the crisis in Russia in 1998, the crisis in Brazil in 1999, the Dot-com crisis in 2000, the crisis in Argentina in 2001-2002, the subprime crisis in 2008, the sovereign debt crisis in 2010, and the stock market crash in China in 2015. The negative

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consequences associated with the episodes of instability and uncertainty were not limited to the countries of origin but were transmitted quickly to various markets with very diverse structures and dimensions throughout the world, constituting what has come to be described in the literature as contagion effects (Gunay, 2020; Kanno, 2020; Yuan, Wang, and Zhuang, 2020).

This paper aims to study financial contagion in the six main Latin American markets (Argentina, Brazil, Chile, Colombia, Mexico and Peru) and the US, in the period 2015-2020. Different approaches have been undertaken to carry out this analysis in order to investigate the following research question, namely whether: (i) has the global pandemic accentuated the contagion between Latin American financial markets and the US? The results show persistence in these regional markets. The rejection of the null hypothesis, i.i.d., may be explained, among other factors, by the existence of autocorrelation or by the existence of heteroscedasticity in the stock market index series, in which case the rejection of the null hypothesis is explained by non-linear dependence on data. However, it was expected to verify significant levels of contagion between these regional markets and the US, resulting from the global pandemic (Covid-19), which did not occur.

This research adds contributions to the literature, especially in the study on financial contagion in Latin American and US financial markets. According to our information, this is the first study that examines these financial markets during the pandemic (Covid-19). However, there are recent studies that have analysed risk diversification in other financial markets during the global pandemic, namely the authors Liu, Manzoor, Wang, Zhang and Manzoor (2020) and Zeren and Hizarci (2020). However, the approach was quite different from that followed in this study.

In terms of structure this paper is organised in 5 sections. Section 1 is represented by the current introduction. Section 2 presents a literature review on articles concerning contagion in financial markets. Section 3 describes the data and methodology. Section 4 contains the results. Finally, Section 5 presents the main conclusions.

2. LITERATURE REVIEW

The literature describes many ways in which financial crises spread among countries. The transmission of shocks in periods of crisis has been one of the main topics of study. While there are many definitions of financial contagion that are adapted to the specific nature of each study, we will follow the definition of Forbes e Rigobon (2002) for contagion „... This is a significant increase in links between markets after a shock in one country (or group of countries) ...”. In practical terms, there is financial contagion when the correlation between the yields of two markets increases statistically significantly after an unexpected event. This line of research is the one that is considered the most appropriate and is adopted in this study.

Luchtenberg and Vu (2015), Cho, Hyde and Nguyen (2015), Antonakakis, Breitenlechner and Scharler (2015), Bejarano-Bejarano, Gómez-González, Melo-Velandia, and Torres-Gorron (2015) examined the risk in financial markets, in the context of contagion. Luchtenberg and Vu (2015) concluded that the North American market contaminated all the markets examined, except for China, Japan and Germany. The evidence indicates a significant change in the behaviour of institutional investors in relation to risk at the beginning of the 2008 financial crisis. These outcomes are in accordance with the study of Kenourgios (2014), on the issue that there is greater risk aversion on the part of institutional investors. Cho, Hyde e Nguyen (2015) ana-

lysed 30,838 shares corresponding to thirty-one markets between 1973 and 2011, demonstrating that the subprime financial crisis has contaminated the markets globally, while the impact of the Mexican and Asian crises was smoother and limited to the region of the country of origin. Antonakakis, Breitenlechner e Scharler (2015) suggest that the subprime crisis has led to unprecedented shocks, particularly in the real estate and stock market. Additionally, the contagion gave rise to uncertainty in economic and monetary policy, with considerable impact on the real economy. Bejarano-Bejarano, Gómez-González, Melo-Velandia, and Torres-Gorron (2015) reveal two episodes of contagion among Latin American financial markets to shocks originating in the United States and Europe. The first corresponds to the time of the subprime crisis, while the second corresponds to the period of the sovereign debt crisis in Europe.

Karanasos, Yfanti e Karoglou (2016), Shahzad, Ferrer, Ballester e Umar (2017) have studied the impact of the 2008 financial crisis on several financial markets. Karanasos, Yfanti e Karoglou (2016) argue that the markets have been abruptly affected by the 2008 financial crisis compared to the Asian financial crisis. Shahzad, Ferrer, Ballester e Umar (2017) suggest that Islamic financial markets have been affected, such as the developed markets under review. The authors argue that Islamic markets, by not being immune to global contagion, make it difficult for institutional investors to operate when they want to diversify their investment portfolios, particularly in periods of financial crisis.

BenSaïda (2017) suggest financial contagion from more developed markets to peripheral markets in the Eurozone, demonstrating that the level of turbulence has remained high since the 2008 financial crisis. Fortunato, Martins, and de Lamare Bastian-Pinto (2020) have studied the financial markets in Latin America, and they demonstrate global commodity market shocks in these regional markets.

In summary, this paper aims to contribute to providing information to investors and regulators in Latin American stock markets, where individual and institutional investors seek diversification benefits, as well as to help promote the implementation of policies that contribute to the efficiency of these markets. Therefore, the context of this work is to examine financial accounting in the context of the global pandemic (Covid-19).

3. DATA AND METHODOLOGY

The closing price data for the financial markets of Argentina, Brazil, Chile, Colombia, Peru, Mexico and the US were obtained from the Thomson Reuters platform. The stock prices are daily and comprise the period from 1 July 2015 to 29 June 2020 and were split into two sub-periods pre and during Covid-19. Stock prices are in local currency to mitigate exchange rate distortions.

Table 1. The name of countries and their indices used in this paper

Country / Region name	Index
Argentina / América Latina	MERVAL
Brasil / América Latina	BOVESPA
Chile / América Latina	IPSA
Colombia / América Latina	COLCAP
Peru / América Latina	BVLAC
Mexico / América Latina	BOLSAA.MX
US / America	DJI

Source: Own elaboration

The development of research has taken place in several stages. The characterization of the sample used was carried out through descriptive statistics, the adherence test of Jarque and Bera (1980). The persistence of the yields will be tested through the following tests: Ljung-Box (with the squares of the yields); ARCH-LM (Engle, 1982) and BDS (Brock e De Lima, 1996). The importance of studying the level of autocorrelation in contagion research is due to the existence of volatility clusters. According to Mandelbrot (1963) and Engle (1982) if the volatility is high (low), in a certain period, it tends to continue to be so in the following period, because the new information that arrives in the market is correlated in time. In order to understand if the generalized increase in the correlations had statistical significance, the t-t test of heteroscedasticity of two samples Forbes and Rigobon (2002), will be applied. This type of correlations requires transformation through Fisher's method. This test will show the results on the existence or not of contagion between the financial markets of the LAC Region and the USA.

4. RESULTS

Figure 1 illustrates the evolution of the markets, in first differences, under analysis. The sample comprises the time span from July 1, 2015 to June 29, 2020, which is a very complex period due to the understanding of the outbreak of the global pandemic (VIDOC-19). The yields clearly reveal the instability experienced in these markets in February, March and April.

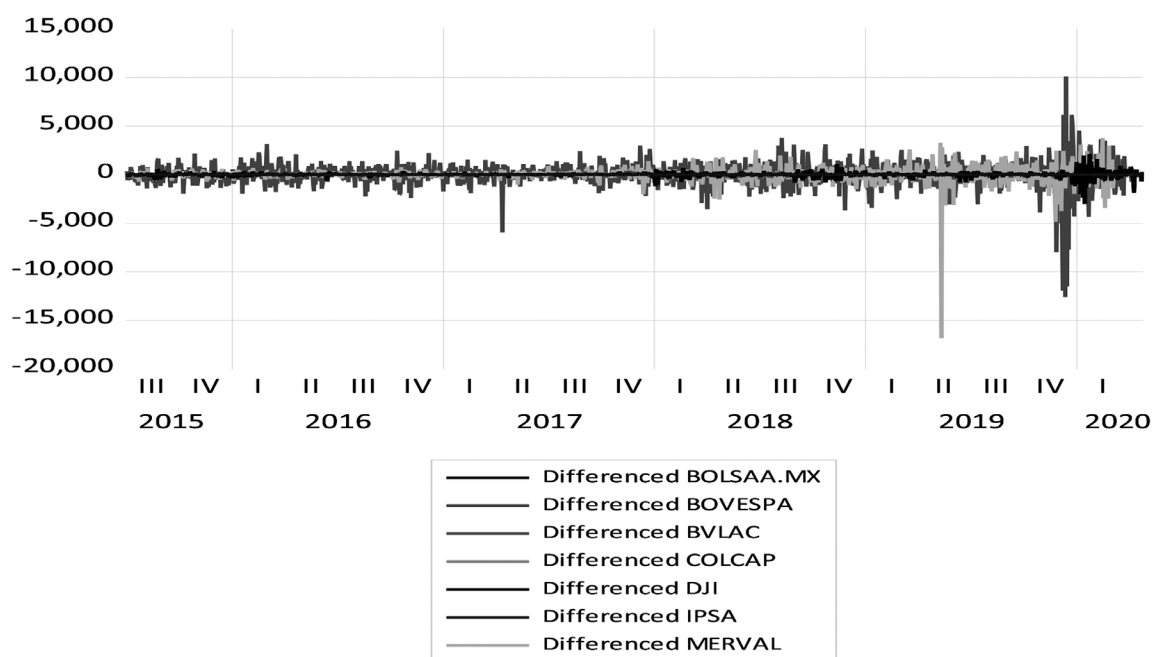


Figure 1. Evolution, in first differences, of the 7 financial markets analysed

Source: Own elaboration

Table 2 presents the main descriptive statistics of the seven indices, referring to the complete sample period. The average is positive for most stock market indices, except for Chile and Colombia. The Argentine market presents the highest standard deviation. The results achieved show that the yield series propose deviations from the normality hypothesis. This result emerges through the test of Jarque and Bera (1980) which made it possible to reject the null hypothesis of normality (H_0) in favour of the alternative (H_1 – non-normality), for a significance level of 1%. Additionally, the asymmetry and kurtosis coefficients are statistically different from those of a normal distribution. The analysed series are leptokurtic and asymmetric.

Table 2. Descriptive statistics, in yields, of the 7 financial markets

	BOLSAA MX	BOVESPA	BVLAC	COLCAP	DJI	IPSA	MERVAL
Mean	0.000341	0.000485	0.000184	-0.000354	0.000296	-9.84E-05	0.000986
Std. Dev.	0.019598	0.017721	0.010191	0.012433	0.012794	0.010873	0.027853
Skewness	0.737319	-1.270587	-0.986542	-2.100000	-1.143581	-2.808352	-4.300342
Kurtosis	14.68516	19.39696	20.85103	51.84137	27.88837	50.61238	73.62126
Jarque-Bera	7259.546	14408.30	16880.25	125763.2	32690.66	120287.4	264876.5
Observations	1256	1256	1256	1256	1256	1256	1256

Source: Own elaboration

With the purpose of testing the persistence of the yields we will estimate the following methodologies: Ljung-Box (with the squares of the yields); ARCH-LM (Engle, 1982) and BDS (Brock e De Lima, 1996). The results obtained, through the Ljung-Box test, applied to the index yields, as well as to the square yields, are presented in table 3. We have verified that all the indexes suggest autocorrelation, in the considered lags (12), with the exception made to the Argentine market.

Table 3. Results of the Ljung-Box tests applied to the daily index returns series, in the period considered in the study

	MERVAL	BOVESPA	IPSA	BVLAC	COLCAP	BOLSAA MX	DJI
LB (12)	13.662	83.363***	67.563***	40.500***	97.956***	62.124***	311.73***
LB ² (12)	10.618	1566.3***	571.08***	269.89***	796.64***	668.15***	1.644.4***

Note: ***, ** represent the significance at 1% and 5% respectively

Source: Own elaboration

To analyse the presence of the phenomenon of conditioned heteroscedasticity in financial series, it is usual to use the Lagrange Multiplier test (ARCH-LM test)(Engle, 1982). The ARCH-LM tests were applied to the residues of first order autoregressive processes and, for lag 10. In table 4 it can be observed that the residues of autoregressive processes in the financial markets under analysis exhibit conditioned heteroscedasticity, corroborating this characteristic often present in financial assets. The Ljung-Box tests, applied to the square of the yields (table 3), for lag 12, corroborate the evidence of the ARCH-LM test, reinforcing the evidence of presence of ARCH effects in time series.

Table 4. ARCH-LM test to the residues of the autoregressive process applied to the yields, in the full period

MERVAL	BOVESPA	IPSA	BVLAC	COLCAP	BOLSAA MX	DJI
5.327**	528.17***	47.25***	47.25***	26.34***	254.61***	304.03***

Note: The LM test was applied to the residues of a first order autoregressive process of each series. ***, ** represent the significance at 1% and 5% respectively.

Source: Own elaboration

The BDS test rejects the hypothesis that returns are i.i.d. with the results showing statistical significance, from dimension 2 onwards, reinforcing the idea that stock market index returns have a non-linear nature or have a significant non-linear component, with the exception of the Argentine market, which was expected due to the results of the Ljung-Box (with the squares of the returns) and ARCH-LM tests. According to Taylor (1986), the significant presence of a higher autocorrelation between the squares of yields than between the original values of yields is also an indication of the presence of nonlinearity. Table 3 presents the results of the autocorrelation tests of the squares of the yields for lag 12 and all indexes reject the null hypothesis, identifying autocorrelation in series. The results of the autocorrelation tests are totally coincident with those obtained by the BDS test. The rejection of the null hypothesis, i.i.d., can be explained, among

other factors, by the existence of autocorrelation or by the existence of heteroscedasticity in the stock market index series, in which case the rejection of the null hypothesis is explained by non-linear dependence on the data. These results are in line with the studies of the authors Ferreira and Dionísio (2016), Aggarwal (2018), Pernagallo and Torrisi (2019), which evidence the existence of persistence and memories in the stock market indices.

Table 5. BDS Test Statistics, full period

	ARG	BRA	CHI	PER	COL	MEX	US
Dimension (2)	-0.028	7.217***	8.490***	7.188***	7.908***	8.867***	14.934***
Dimension (3)	-0.038	8.962***	9.937***	8.608**	10.951**	9.089***	18.057***
Dimension (4)	-0.045	9.894***	10.631***	10.085***	13.300***	9.1435***	20.592***
Dimension (5)	-0.052	10.586***	11.718***	10.990***	14.973***	9.174***	22.826***
Dimension (6)	-0.058	11.323***	12.240***	11.586***	16.503***	9.205***	25.3112***

Notes: The first column concerns the *embedding dimension*. The method considered in the BDS test was the fraction of pairs, for a value of 0.7. The values presented in the table refer to the z-Statistic. ***, ** represent the significance at 1% and 5% respectively.

Source: Own elaboration

In order to estimate the occurrence of financial contagion between the financial markets of the LAC Region and the U.S., the unconditional correlations were estimated, and the statistical significance examined. One method of testing the statistical significance of the correlation coefficient is to apply the t -test, that follows the distribution t_{n-2} , with $n-2$ degrees of freedom, where r is the correlation coefficient between two series and n is the number of observations.

To test if the correlation coefficient matrix is globally different from the identity matrix, the verisimilitude ratio test is used, proposed by Pindyck and Rotemberg (1990). The null hypothesis of this test assumes that there is no correlation between the various markets of the sample. The statistics of the test are given by $-N \cdot \log [R]$, which is proved to follow a Chi-square distribution, with $0,5p(p-1)$ degrees of freedom, in which $[R]$ is the determinant of the correlations matrix, N is the number of observations of the common sample and p is the number of series analysed in the test.

Table 6 presents the unconditional correlation coefficient of the t -statistic for the pre-Covid subperiod. As we can see all the coefficients are significant at 1%, that is, the Latin American markets and the USA present robust correlation coefficients.

Table 6. Non-conditional correlation coefficients, in the Pre-Covid period

Correlation	BOLSAA MX	BOVESPA	BVLAC	COLCAP	DJI	IPSA	MERVAL
BOLSAA_	*****						
MX							
BOVESPA	0.826452	*****					
BVLAC	0.845146	0.903175	*****				
COLCAP	0.802287	0.840090	0.899658	*****			
DJI	0.832249	0.932512	0.937698	0.845853	*****		
IPSA	0.779933	0.813341	0.936881	0.840480	0.908348	*****	
MERVAL	0.810014	0.939341	0.913974	0.833162	0.934985	0.883293	*****

Source: Own elaboration

Table 7 presents the unconditional correlation coefficients for the Covid period. As we can see all the correlation coefficients, they have decreased in a very significant way.

Table 7. Non-conditional correlation coefficients, in the period Covid

Correlation	BOLSAA MX	BOVESPA	BVLAC	COLCAP	DJI	IPSA	MERVAL
BOLSAA_	*****						
MX							
BOVESPA	-0.001424	*****					
BVLAC	0.239068***	0.758758***	*****				
COLCAP	-0.222915***	0.642907***	0.609330***	*****			
DJI	0.405436***	0.558996***	0.903947***	0.471105***	*****		
IPSA	-0.352050***	0.479263***	0.496683***	0.832843***	0.378162***	*****	
MERVAL	0.044687	0.219725***	-0.215788***	0.032303	-0.299853***	-0.175876***	*****

Note: ***, ** represent the significance at 1% and 5% respectively

Source: Own elaboration

Table 8a and 8b presents the t-test results, to the contagion effect between the pre-Covid and Covid subperiods. The results indicate the existence of interdependencies and not contagion, this was due in part to the significant decrease in correlations between these regional markets and the US, in the Covid period. These results suggest possible portfolio diversification.

Table 8a. Results of the contagion effect between the pre-Covid / Covid subperiods

Markets	t-Statistic	Results	Markets	t-Statistic	Results
BOLSAA MX / BOVESPA	-4.61	No Contagion	COLCAP / BOLSAA MX	-1.89	No Contagion
BOLSAA MX / BVLAC	-4.69	No Contagion	COLCAP / BOVESPA	-2.09	No Contagion
BOLSAA MX / COLCAP	-4.56	No Contagion	COLCAP / BVLAC	-2.21	No Contagion
BOLSAA MX / DJI	-4.66	No Contagion	COLCAP / DJI	-2.17	No Contagion
BOLSAA MX / IPSA	-4.57	No Contagion	COLCAP / IPSA	-2.04	No Contagion
BOLSAA MX / MERVAL	-4.62	No Contagion	COLCAP / MERVAL	-2.13	No Contagion
BOVESPA / BOLSAA MX	-1.93	No Contagion	DJI / BOLSAA MX	-1.88	No Contagion
BOVESPA / BVLAC	-2.27	No Contagion	DJI / BOVESPA	-2.08	No Contagion
BOVESPA / COLCAP	-2.04	No Contagion	DJI / BVLAC	-2.19	No Contagion
BOVESPA / DJI	-2.24	No Contagion	DJI / COLCAP	-1.97	No Contagion
BOVESPA / IPSA	-2.09	No Contagion	DJI / IPSA	-2.03	No Contagion
BOVESPA / MERVAL	-2.19	No Contagion	DJI / MERVAL	-2.12	No Contagion
BVLAC / BOLSAA MX	-1.55	No Contagion	IPSA / BOLSAA MX	-2.33	No Contagion
BVLAC / BOVESPA	-1.76	No Contagion	IPSA / BOVESPA	-2.52	No Contagion
BVLAC / COLCAP	-1.65	No Contagion	IPSA / BVLAC	-2.62	No Contagion
BVLAC / DJI	-1.84	No Contagion	IPSA / COLCAP	-2.42	No Contagion
BVLAC / IPSA	-1.71	No Contagion	IPSA / DJI	-2.59	No Contagion
BVLAC / MERVAL	-1.79	No Contagion	IPSA / MERVAL	2.54	No Contagion

Notes: Critical values correspond to a one-tailed significance on the right, 2.7638 (1%), 1.8125 (5%) and 1.3722 (10%).

Source: Own elaboration

Table 8b. Results of the contagion effect between the pre-Covid / Covid subperiods

Markets	t-statistic	Results
MERVAL / BOLSAA MX	-5.58	No Contagion
MERVAL / BOVESPA	-5.61	No Contagion
MERVAL / BVLAC	-5.67	No Contagion
MERVAL / COLCAP	-5.60	No Contagion
MERVAL / DJI	-5.64	No Contagion
MERVAL / IPSA	5.58	No Contagion

Notes: Critical values correspond to a one-tailed significance on the right, 2.7638 (1%), 1.8125 (5%) and 1.3722 (10%)

Source: Own elaboration

5. CONCLUSION

The general conclusion to be retained and, supported by the results obtained, through tests performed with econometric models, demonstrates that the global pandemic has a significant impact on the memory properties of financial market indices in Latin America. The markets exhibit strong evidence of persistence in yields. However, significant contagion levels were expected to occur between these regional markets and the US, a fact that was not verified. In conclusion, we believe that these evidences are relevant for policy makers and investors in relation to regional development policies and portfolio diversification strategies in the LAC region's financial markets.

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EMERGING FOREIGN EXCHANGE MARKETS AND MONETARY POLICY IN EURO AREA: EVIDENCE FROM THE CRISIS

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Abstract: *We examine how emerging market (EM) foreign exchange (FX) markets respond to innovations in the monetary policy in advanced economies over the crisis period. We focus on the case of the European Central Bank (ECB) which pursued a combination of different policies during the Eurozone sovereign crisis. In a new econometric framework, we identify responses of foreign exchange markets in three EM economies (Hungary, Poland and Turkey) to different types of ECB policies. We find weak effect of the ECB's Euro liquidity provisions on the EM foreign exchange markets. In contrast, while the ECB's foreign exchange liquidity provisions as well as government bond interventions and policy rate changes did not impact the FX levels, they led to higher uncertainty in the FX markets. The results are indicative of the additional, uncertainty channels through which monetary policy shocks in advanced economies may affect the business cycle fluctuations in the EM economies.*

Keywords: *Exchange rates, Monetary policy, Uncertainty, Conditional quantiles, MCMC.*

1. INTRODUCTION

The global financial crisis (GFC), which began in the summer of 2007, required central banks to respond on a scale they had not confronted since the Great Depression of the 1930s. Evaporating liquidity, particularly for Dollars, represented the primary short-term concern. The risk of economy falling into a recession with impaired financial markets and elevated uncertainty was the other, deeper worry. In Europe the crisis evolved into the sovereign debt crisis in which the government bond yields of five peripheral countries (Greece, Ireland, Italy, Portugal and Spain, GIIPS) reached unprecedented levels over the 2009–2012 period. The sovereign-bank nexus increased the uncertainty in the European financial sector and elevated the bank solvency and funding liquidity risks.

Central banks can respond to a worsening macro-financial environment with two principal types of policies.³ The central bank can provide liquidity to stabilize financial markets and support bank lending. In addition, it can provide monetary stimulus through lower nominal interest rates. When the nominal interest rates reach the zero-lower bound, monetary stimulus includes some combination of forward guidance (a credible promise to keep interest rates low for an extended period) and the purchase of financial assets to lower the long-term interest rates.

In the post-2007 years, central banks implemented both types of policies. The major central banks opened up liquidity lines in the early phases of the subprime crises. The Fed also reduced its policy interest rate sharply, bringing it down to nearly zero by December 2008, at which point

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³ See e.g. Svensson (2010) for the discussion of different types of policies.

it began forward guidance and large-scale asset purchases. The Bank of England followed similar policy stance. The European Central Bank (ECB), in turn, used a combination of policies throughout the most intense phase of the crises. The ECB provided *Euro liquidity* through variety of measures which included: changes in the design of the open market operations; reduction in the required reserves ratio; changes in the collateral requirements for Euro borrowing; provision of long-term loans to banks and interventions in the covered bond market. The ECB also supplied *foreign currency liquidity* (mostly Dollar) through swap operations with the Fed and the Bank of England. Finally, the ECB provided direct *monetary stimulus* through policy rate changes and interventions in the sovereign bond market. The latter included direct purchase of the sovereign bonds of the stressed countries under the Securities Markets Programme (SMP), as well as the conditional commitment to purchase government bonds (Outright Monetary Transactions, OMT). The measures, in total, were expected to contribute to the reduction of elevated risks and easing of Euro area financial conditions with a positive effect on the real economy.

Over the past two decades the degree of trade and financial integration overall, and of emerging market economies (EM) in particular, has significantly increased. Higher integration of the global economy increased the potential that the impact of domestic shocks may spill over to other economies, especially if the shock originates in one of or several key advanced economies (AE). What is more, the deepening integration gives rise to views that financial conditions and growth worldwide may be driven by a global financial cycle, which in turn is largely driven by monetary policy conditions in the US and Europe (Rey, 2013). While the debate about the extent of monetary policy spillovers has a long history in international economics (being part of the Mundell-Fleming framework), (unconventional) monetary policies in AE over the post-2007 period and volatile capital flows in and out of integrating emerging markets over the same period have brought the spillovers back to the forefront of the policy and academic debate in recent years.

Spillovers to EMs may arise through several channels discussed in the literature (trade, portfolio rebalancing, signaling, liquidity and risk-taking), that are, to some extent, non-exclusive and overlapping. The transmission mechanism of the most of the channels is based on the changes in global investors' behavior and capital flow dynamics which, in the sum, can impact the exchange rate.

This paper studies empirically the importance of the exchange rate channel of monetary policy spillovers from advanced economies to the EM. We focus on the case of the Euro zone crisis and quantify the effect of the ECB monetary policy shocks on the neighboring EM exchange rates during the most intense phase of the Euro zone crisis, 2009-12. In particular, we want to identify any significant differences in foreign exchange (FX) market's reactions to different types of policy actions. The experience of the ECB over the Euro zone financial crisis provides a crucial empirical setup for achieving this goal. The fact that the ECB (unlike other AE central banks) pursued a combination of different policies over this period minimizes the learning bias in the data⁴ and facilitates empirical comparison between the effects of different measures. In addition, the focus on the crisis period allows studying the spillovers in time of elevated uncertainty which is informative for the design of optimal policy response in the EM.

We use daily data between October 2009 and September 2012 and examine the changes in the foreign exchange rates vis-à-vis Euro for Hungary, Poland and Turkey. The choice of EM coun-

⁴ The learning bias can arise if market participants adapt their actions to the prevailing mode of intervention.

tries reflects the prevailing exchange rate regime (floating) and the availability of sufficiently long data on the comparable measures of local sovereign risk.

We study the exchange rate responses using a recently developed econometric framework that allows for the estimation of causal asset price reactions to multiple shocks in the presence of regional market spillovers and confounding (common) factors (Mody and Nedeljkovic, 2019). In particular, to evaluate the impact of the policy shocks on FX market expectations and uncertainty, we estimated the augmented vector autoregression for quantiles (QVARX, White et al., 2015; Mody and Nedeljkovic, 2019) of the conditional distribution of FX returns. The QVARX framework provides several advantages over the standard regression (vector autoregressive) or event study methodology. It delivers measures of both the market's central predictions (conditional median) and uncertainty (the difference between the upper and the lower conditional tail quantile), which are robust to outliers, departures from normality and misspecification of the volatility process. In addition, the framework features common and individual confounding factors and allows for a more general type of dynamic spillovers between the exchange rates without specifying whether they occur at the conditional mean, volatility or at higher moments of the conditional distribution. We follow Mody and Nedeljkovic (2019) and use an external (to the information embedded in QVARX) measure of policy interventions – the orthogonalized change in suitable policy indicators on the policy announcement days. The estimates of the changes in the FX market's predictions and uncertainty due to the ECB monetary policy innovations are obtained through simulated (generalized) impulse-response functions.

We find weak spillovers of the ECB's Euro liquidity provisions on the European EM foreign exchange markets. The conditional median responses are small and not statistically significant for all three exchange rates. The policy interventions did lead to higher uncertainty in the FX markets; however, the effects are statistically significant only in the case of Turkish Lira. The results are in line with Acharya and Steffen (2015) and Drechsler et al. (2016) who show that European banks that borrowed via the ECB liquidity programs tend to use the funding to invest in risky assets, primarily government bonds. In this way, the newly generated liquidity did not induce significant cross border capital flows to outside of the Euro area (rather, only within Euro area), thereby having a small effect on the neighbouring EM countries exchange rates.

The spillovers from the provisions of foreign currency (Dollar and Pound) liquidity were slightly stronger. The ECB FX policy measures led to appreciation of the EM currencies, though not by a statistically significant degree. In contrast, the measures led to higher FX market uncertainty as the estimated uncertainty responses are persistent and statistically significant for all three currencies. Similarly, monetary stimulus measures only had a marginal effect on the EM currency levels, yet they had stronger and statistically significant effect on the higher uncertainty in the FX markets.

The empirical results imply that in times of the crisis and of heightened financial stress in advanced economy, accommodative monetary policy innovation in that economy may not significantly impact the level of exchange rates in emerging markets which share close financial and trade ties with the AE. This is especially the case if the monetary policy innovations in AE provide uncertain signals about the underlying state of the economy to the market participants, increasing the risks in the AE financial markets (Husted et al, 2019; Mody and Nedeljkovic, 2019) which, in turn, impact the capital flows to EM. Our evidence of elevated uncertainty in the EM FX markets following the AE monetary policy innovations is consistent with the uncertainty spillovers arising from higher monetary policy uncertainty.

To the extent that higher FX uncertainty may dampen the trade flows and investment activity in a given economy (Goldberg, 1993; Darby et al, 1999; Binding and Dibiasi, 2017), our empirical results are indicative about less explored channel through which accommodative monetary policy innovations in AE may affect business cycle fluctuations in the EM economies.

This paper is related to a rapidly growing empirical literature that studies the effects of unconventional policy measures on financial asset prices. The literature's primary focus is on the effects on the US economy (see, inter alia, Krishnamurthy and Vissing-Jorgensen, 2011; Wright, 2012; and Hanson and Stein, 2015). A small subset of literature focuses on evaluating domestic effects of the ECB policy measures (Gambacorta et al, 2014; Falagiarda and Reitz, 2015; Eser and Schwaab, 2016; Krishnamurthy et al, 2017; Mody and Nedeljkovic, 2019). The question of international spillovers to EM economies has gained attention more recently. Chen et al. (2014), Albagli et al. (2018) showed that the US unconventional policy measures reduced longer-term yields and appreciated the EM currencies vis-à-vis US Dollar. Similarly, Falagiarda et al. (2015), Feldkirscher et al. (2017) found that the ECB unconventional measures outside the peak of the crisis led to an appreciation of local currencies against the Euro, rise in equity prices and, to a lesser extent, decrease in the long-term yields in Central and Eastern European countries. In addition, despite the importance of financial market uncertainty (Ludvigson, et al, 2019) for the business cycle fluctuations, the impact of the policy measures on changes in the market perceived uncertainty is largely unexplored in the literature.

We contribute to this literature in several ways. We study causal reactions of EM exchange rates to multiple policy shocks in advanced economy in a more general econometric framework which allows for cross EM market spillovers and confounding global and local factors. We highlight the absence of significant spillovers to the EM economies at the exchange rate level in crisis time. More importantly, estimated significant uncertainty reactions provide new evidence on the differences in which the markets interpreted the policy innovations and new channels through which the shocks can affect the EM economies.

The remainder of the paper is organized as follows: Section 2 presents the dataset. Section 3 discusses econometric approach. Section 4 presents empirical results. Section 5 concludes.

2. DATA

This section presents financial and other data used in empirical analysis (2.1) as well as the measure of the ECB policy changes (2.2).

2.1. Financial Data

We use daily data in all estimations. The sample runs between October 1, 2009 and September 28, 2012. The start date is chosen to match the beginning of the European sovereign crisis which can be traced to mid-October of 2009 when the Greek government officially announced the budget deficit in excess of 12% of GDP, the number more than double the previous forecast of the deficit. We take a more conservative approach and start the sample two weeks earlier allowing for the possibility that some of the movements were already anticipated by the markets. The end date of the sample matches the decrease in financial risks in the Euro zone, exemplified by the strong and continuous fall in the sovereign bond yields of the periphery countries (Greece, Ireland, Italy, Spain and Portugal).

Our primary variables of interest are exchange rates of the neighbouring European EM economies with flexible exchange rate regime – Czech Republic, Hungary, Poland, Turkey and Romania. The data comes from Bloomberg. Figure 1 shows plots of the exchange rate levels and of the corresponding daily changes. We see a general tendency of exchange rate appreciation in EM economies in the late 2009 and early 2010, which lasted relatively longer in the case of the Czech Republic. We also observe several depreciation periods, which largely coincide with periods of heightened stress in the Euro zone financial markets. At the daily changes level, the Hungarian Forint, the Polish Zloty and the Turkish Lira display larger volatility relatively to the Czech Koruna and Romanian Lei, the latter of which changes in a limited manner.

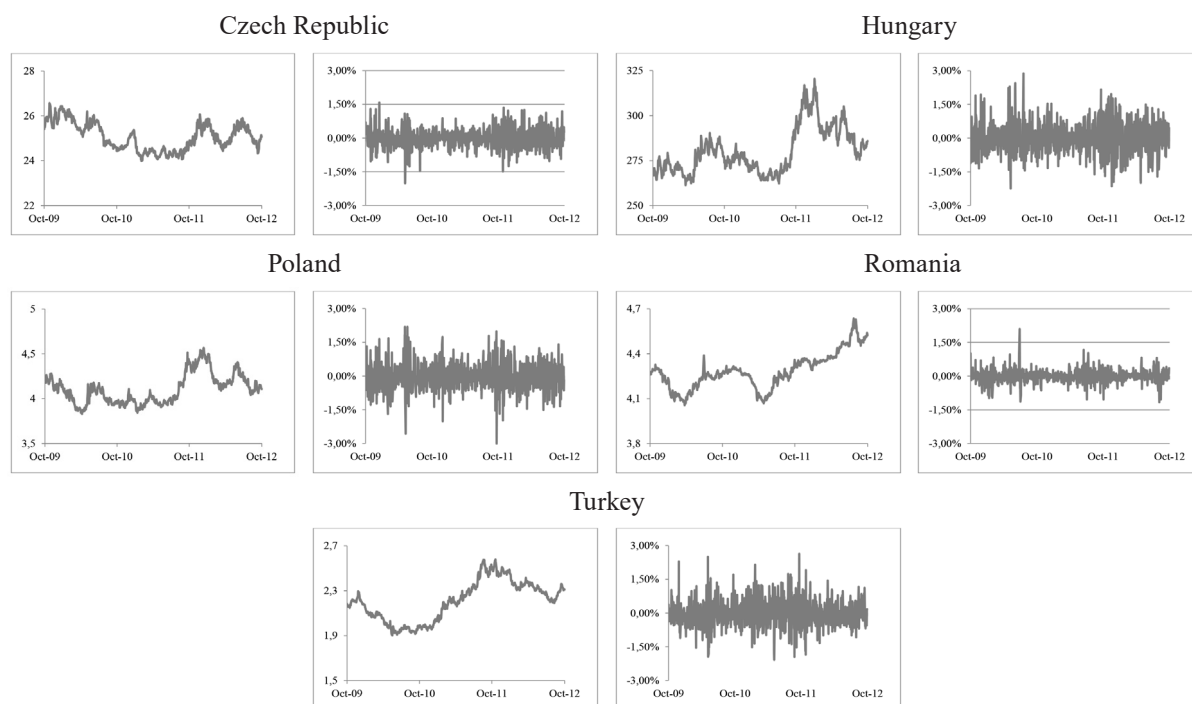


Figure 1. Exchange rate: levels and daily changes

Source: Bloomberg

To control for confounding effects, we include several proxies at the global/Euro zone level, as well as the individual country level. At the global level we include: (i) the VIX index of the implied volatility of S&P 500 stock market index options as a proxy for the general risk aversion of global investors; (ii) JP Morgan's EM VXY index of implied volatility in emerging market currencies (based on at-the-money currency options) as a proxy for the risk aversion of EM currency investors. Both variables are obtained from Bloomberg. The top panel in Figure 2 shows plots of the variables and their daily changes.

At the Euro zone level, we use data on country rating changes, major Euro zone/EU-wide (non-monetary) policy announcements, and economic and political news in the Euro zone periphery countries. The information on rating changes is used from Bloomberg and data are coded following the literature (Gande and Parsley, 2005): the variable takes value zero on days with no rating change for the Euro zone sovereigns and takes the value equal to the number of notches in the downgrade (minus sign for upgrade) on the rating changes days. The changes in the credit outlook and credit watch received value 0.5 (assigned to credit watch / negative outlook) and -0.5 (taken out from credit watch / positive outlook). The data on major Euro zone/EU-wide (non-monetary) policy announcements, and local economic and political news in the

periphery countries is taken from Mody and Nedeljkovic (2019). The authors compiled the narrative dataset over the 2009-2012 period using information from the Bloomberg newswire and performing multiple validation cross-checks to ensure its consistency and coverage.

We complement the global/EU level data with a proxy for the local financial conditions. In order to use a comparable measure across the countries we use country-level EMBI spreads. The data is available from Bloomberg. The EMBI spreads provide a proxy for the sovereign risk premium that is not directly influenced by the exchange rate movements.

The variable, however, is not available for the Czech Republic and Romania for the period of study and we focus our analysis only on the remaining three currencies. Figure 2 (lower panel) reports plots of the available EMBI series, which display slightly higher volatility over the first part of the sample.

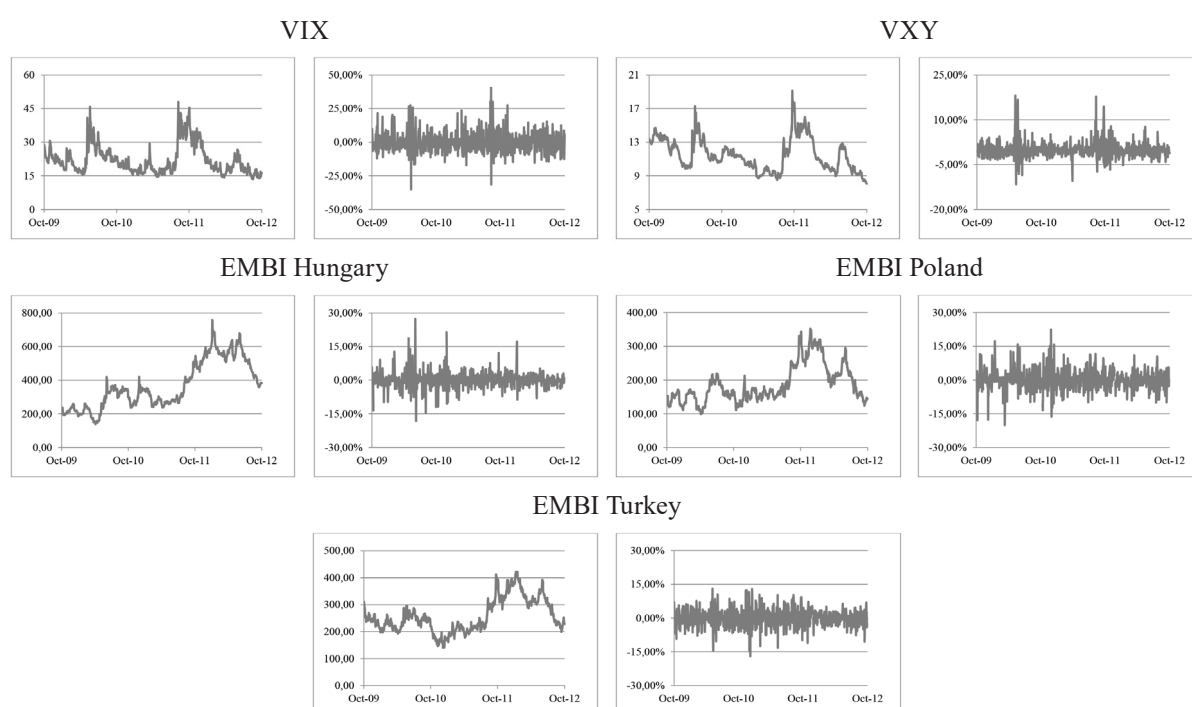


Figure 2. Control variables: levels and daily changes

Source: Bloomberg

2.2. Measure of Monetary Policy Changes

As a last building block of the data framework we use data on the ECB monetary policy innovations from Mody and Nedeljkovic (2019). Their approach builds upon the so-called high frequency approach to identification of monetary policy shocks (Kuttner, 2001) in using changes in financial variables on the policy announcement days as an exogenous measure of policy innovations. The authors distinguish between three types of policy changes – Euro liquidity provision, Dollar liquidity provision and monetary stimulus by using suitable financial variables (“policy indicators”) that tend to co-move only with the type of the policy measure of interest. They identify the ECB policy shocks from the daily variation in the policy indicators by cleaning the daily changes from the impact of other (observed) news and public information about the state of the economy through additional orthogonalization step. The obtained series are then a meas-

ure of the component of the specific type of the policy change that is unexpected by the financial markets given their pre-announcement information set. In this way, the constructed measure of the policy change can be included to the empirical specification as an exogenous variable.

3. ECONOMETRIC FRAMEWORK

We are interested in understanding the broader effect of monetary policy innovations in advanced economies on the EM foreign exchange markets that goes beyond their effects on the conditional mean of the univariate distribution of FX changes. Rather, we are interested in studying the effects on the key features of the multivariate conditional distribution. The econometric methodology is based on vector autoregressive model for conditional quantiles, introduced in White et al (2015) and later extended in Mody and Nedeljkovic (2019).

Empirical specification is given in (1):

$$Q_t^\theta = \alpha + A Q_{t-1}^\theta + B \Delta y_{t-1} + C M P_t + D x_{t-1} + G N_t \quad (1)$$

where Δy_{t-1} is the K -dimensional vector of the exchange rate changes (in our case $K=3$), α is the K -dimensional vector of intercepts, $M P_t$ is the vector of the ECB policy changes, x_{t-1} is p -dimensional vector of global and local covariates ($p=2$) and N_t is the 3-dimensional vector of the news variables (EU-level policy actions, Euro zone country-level rating changes and local news). Q_t^θ is the θ^{th} quantile of the conditional distribution $P(\Delta y_t < y \mid \Delta y_{t-1}, M P_t, x_{t-1}, N_t)$. To mitigate the endogeneity concerns the variables x_{t-1} are included with a lag. The specification can arise from a simple VARX model with spillovers in conditional volatility:

$$\Delta y_t = \Psi + \Phi \Delta y_{t-1} + \Pi M P_t + \Lambda x_{t-1} + \Xi N_t + \Sigma_t^{1/2} (\Delta y_{t-1}, M P_t, x_{t-1}, N_t) u_t$$

where the errors u_t come from asymmetric Laplace distribution and the monetary policy innovations, global and local factors and other news can also impact the conditional volatility matrix $\Sigma_t^{1/2}$. The specification (1) can also arise in various ways from spillovers at higher moments of the conditional distribution or from a VAR with time-varying parameters (White et al, 2015); we therefore do not assume a specific underlying data generating process and focus on directly estimating (1).

The empirical framework offers several advantages. First, it yields a parsimonious framework for studying different types of asymmetries in the FX reactions with weaker distributional assumptions on the underlying data generating process. Second, the VAR allows for dependence of the conditional quantiles of the exchange rate on lagged quantiles and past values of other exchange rates, thereby capturing dynamic spillovers between the regional exchange rates at the distributional level. Third, despite the fact that individual quantile estimates may be of separate interest, we use them to construct the robust measure of the market's central prediction of the exchange rate changes (conditional median) and the robust measure of uncertainty (the difference between the corresponding upper and lower quantile).

We are interested in tracing the contemporaneous and dynamic impact of policy innovations on the proposed measures. The contemporaneous responses can be recovered from estimates of corresponding elements of matrix C . Dynamic responses can be obtained following the dynamic simulation procedure outlined in Mody and Nedeljkovic (2019).

The simulation procedure builds upon the representation of the quantile impulse-responses in the form of the quantile treatment effects. Denote by Z_t^{SH} the state of the variable Z_t following the realization of a specific monetary policy shocks, while Z_t^{NO} denotes the state of the variable when the shock does not hit the system. Given the representation in equation (1), the quantile impulse-responses (QIR) at time $t+1$ can be represented as⁵:

$$Q_{t+1}^{SH} - Q_{t+1}^{NO} = A(Q_t^{SH} - Q_t^{NO}) + B(\Delta y_t^{SH} - \Delta y_t^{NO}) + D(x_t^{SH} - x_t^{NO}) \quad (2)$$

where we see that QIR depend on the history (the time t at which we evaluate the response) and on the paths of endogenous and other weakly exogenous variables after the shock $\{\Delta y_t^{SH} - y_t^{NO}\}$ and $\{x_t^{SH} - x_t^{NO}\}$. The latter property implies that unless one is willing to assume that paths of these variables are independent of the policy innovation, the QIR cannot be recovered directly from VAR or using local projection methods (Jorda, 2005). The idea that we follow is to simulate the paths $\{\Delta y_t^{SH}, x_t^{SH}\}$ and $\{\Delta y_t^{NO}, x_t^{NO}\}$ from the empirical distribution of the variables within and outside of the time band around the actual time of policy announcements which, in combination with the estimated parameters allows recovering QIR at various horizons h .

The procedure generates dynamic impulse responses at the specific quantile level. The uncertainty responses at horizon h are then constructed as the difference between the two (upper and lower) quantile responses:

$$UNC_{t+h} = (Q_{t+h}^{UP,SH} - Q_{t+h}^{UP,NO}) - (Q_{t+h}^{LOW,SH} - Q_{t+h}^{LOW,NO}), h = 0, 1, \dots, H$$

4. RESULTS

4.1. The Baseline Specification

The baseline specification is estimated for the conditional median and two tail quantiles (10 and 90). The vector of weakly exogenous variables includes the VIX index of implied volatility and the local EMBI spreads. Matrix A is assumed to be diagonal in estimations for parsimony reasons. In this way, the dynamics of conditional quantile of a particular exchange rate capture the persistence in quantiles (matrix A), spillovers from past changes in all exchange rates (matrix B), the impact of monetary policy innovations in the Euro area (matrix C), the impact of weakly exogenous variables (global and regional factors, matrix D) and the effect of financial and economic news (matrix G).

We estimate the parameters of the model following Mody and Nedeljkovic (2019) which use a Laplace type estimator (LTE) introduced in Chernozhukov and Hong (2003). The LTE is based on the integral transformation of the so-called quantile check (criterion) function, which provides a quasi-posterior distribution of parameters. The estimates are computed as the mean of the quasi-posterior distribution. The quasi-posterior distribution is approximated using Markov Chain Monte Carlo method (MCMC). The MCMC sampling is based on the block adaptive Random Walk Metropolis Hastings algorithm introduced in Roberts and Rosenthal (2009).⁶ The starting values of the parameters are based on the estimates from quantile autoregressions for each exchange rate. We run 600,000 iterations of the algorithm with the burn-in of 100,000. We then select every 200th observation to minimize the sampler's autocorrelation. We confirm the good

⁵ See Mody and Nedeljkovic (2019) for simple recursion that lead to equation (2).

⁶ For details of the algorithm please see Appendix D in Mody and Nedeljkovic (2019).

convergence properties of the sampler following the procedures in Cowles and Carlin (1996). The confidence intervals for QIR are computed using the generated MCMC chain of parameter values. In particular, 2500 parameter values are drawn from the quasi-posterior distribution and, for each draw, the impulse response paths were constructed. The 68-percent confidence intervals are then obtained as the corresponding quantiles of the response paths distribution.

Figure 3-5 present the results from the baseline specification. While all three types of policy innovations are included jointly in the QVARX specification, we present the results in separate figures for each type of the policy change. Each figure presents: 1) shift in the FX market's prediction of the changes in the exchange rate level (conditional median responses, top panel); (2) shifts in the FX market's uncertainty (uncertainty responses, lower panel), both in response to a given change in the ECB monetary policy.

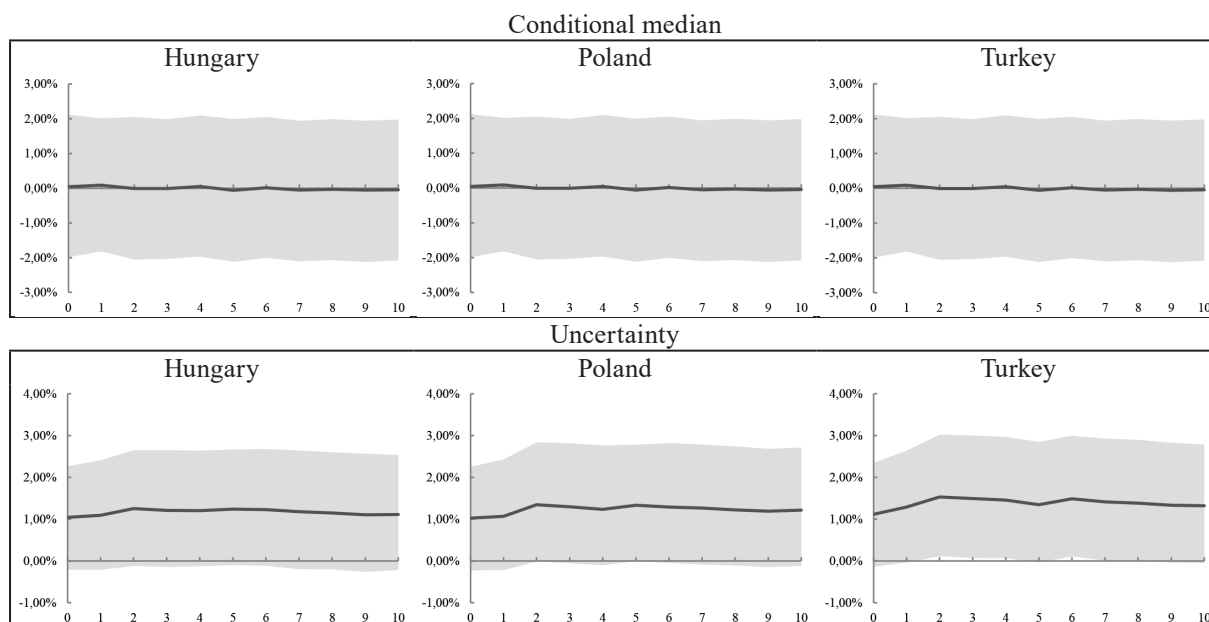
Following Mody and Nedeljkovic (2019) we normalize the size of the ECB policy innovations in order to obtain a broadly comparable measure of responses between different types of policy measures. The size of innovation is normalized at 10th quantile of the empirical distribution of the policy indicators which captures a moderate level of expansionary monetary policy effect. Following the literature we use the excess bank liquidity in the Euro-system as a policy indicator for Euro liquidity innovations (Garcia de Andoain et al., 2016), the Euro-Dollar swap basis as an indicator for Dollar liquidity innovations (Acharya et al. 2018) and the yield on two year Belgium sovereign bond as an indicator of monetary stimulus policy innovations. The use of the latter follows the literature (Hanson and Stein, 2015; Gertler and Karadi, 2015) that advocates the use of changes in sovereign yields at longer maturities (2 year) to capture the information about the expected path of interest rates revealed in the policy change; the use of Belgium sovereign bond is motivated by the fact that this bond remained outside direct purchases by the ECB, yet it displayed some variability over the empirical sample that allows extracting the information about the policy change.

For each type of policy innovation and each exchange rate, we report the contemporaneous and ten-day cumulative reactions (solid line). The shaded areas display the confidence intervals.

The ECB's Euro liquidity provisions had a marginal spillover effect on the EM foreign exchange markets (Figure 3). The conditional median responses are not statistically significant, and in the case of Poland and Turkey suggest small depreciation. The uncertainty in all FX market increases following the Euro liquidity measures. However, the effect is statistically significant only in the case of Turkish Lira, where it tends to decelerate over time and becomes insignificant after nine days.

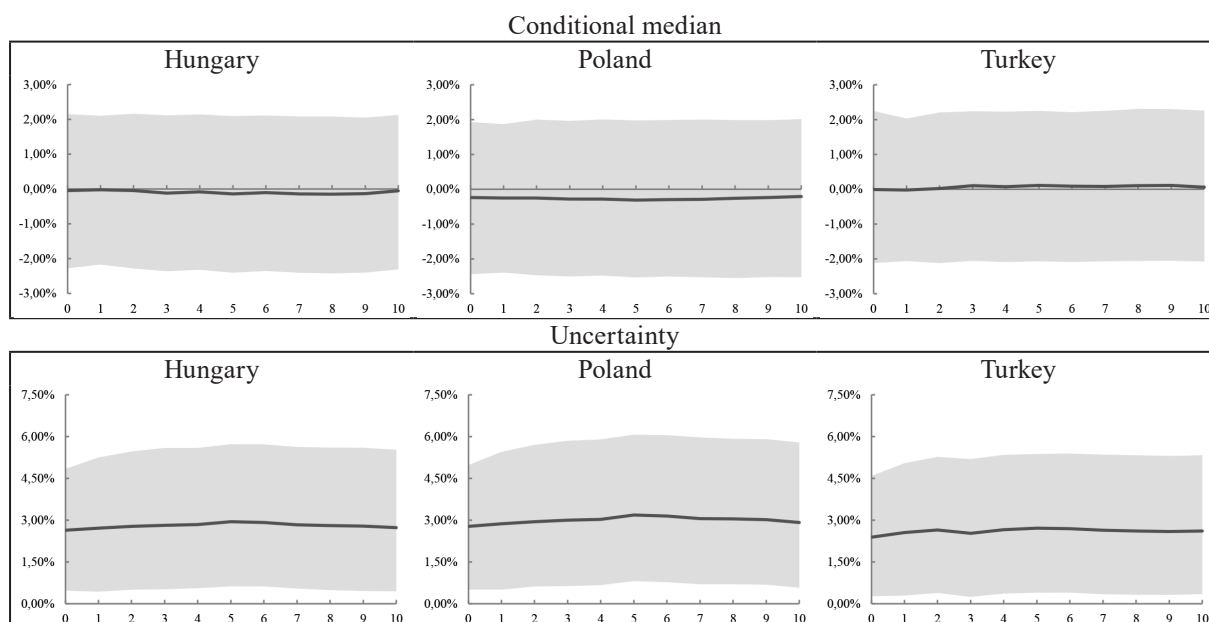
The ECB's FX (Dollar and Pound) liquidity provisions tend to lead to appreciation pressures in the range between 0.1% and 0.5% daily change for the three currencies, yet the estimated effect is not statistically significant (Figure 4). In turn, the FX provision measures exacerbate uncertainty in the FX market. Estimated uncertainty in the EM currencies spikes on the day of policy innovation, and remains elevated throughout the following two weeks. The magnitude and the shape of the response are quite similar in the case of the Hungarian Forint and the Polish Zloty; it is further pronounced in the case of Turkish Lira. The estimated effects are also economically meaningful. While the unconditional daily sample standard deviation ranges between 0.62% (Turkey) and 0.71% (Hungary), estimated uncertainty reactions to (relatively large) ECB policy changes reach between 2.33% (Poland) and 2.92% (Turkey).

Similarly, the *ECB's monetary stimulus measures* did not have a statistically significant effect on the conditional median of the exchange rate changes (Figure 5). However, they also led to a significant increase in the uncertainty. The estimated effect in the case of Forint and Zloty is comparable in magnitude to the effects of the ECB's FX liquidity provisions. In the case of Lira, the estimated uncertainty response to monetary stimulus measures, on the other hand, is lower relative to FX provisions.



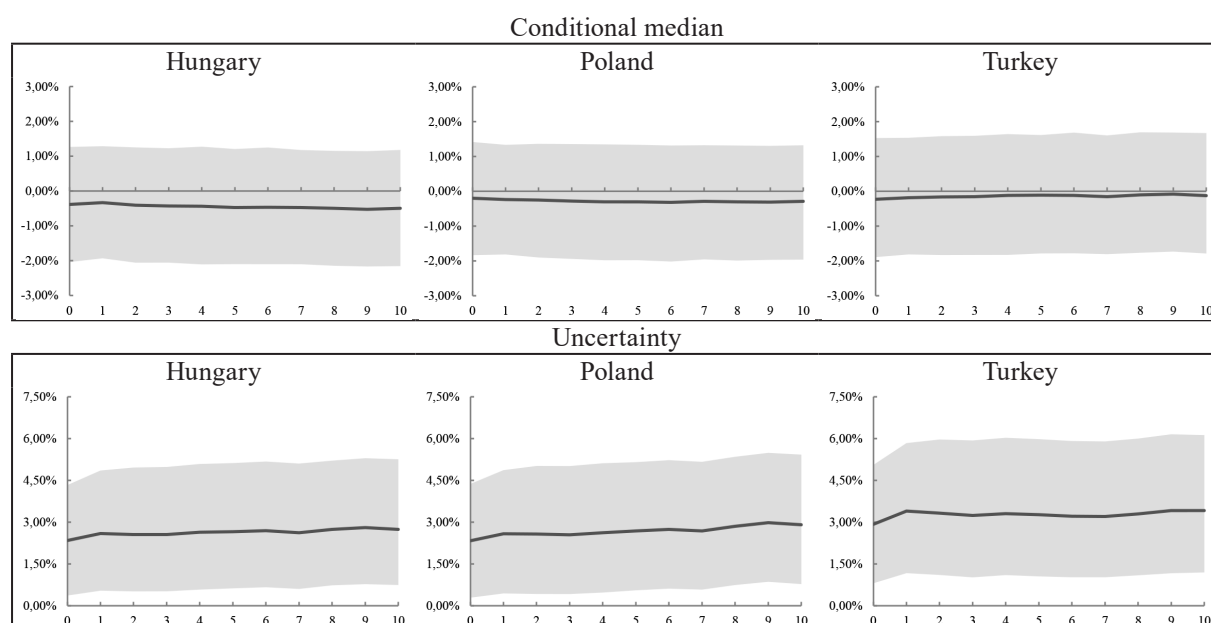
Notes: The figure reports estimated daily cumulative conditional median (top row) and uncertainty (bottom row) response of the change in exchange rates vis-à-vis Euro to the ECB euro liquidity intervention that decreases the Eurosystem excess liquidity by 11.5 bn EUR. The uncertainty is the difference between the 90th and the 10th conditional quantile. The shaded areas are 68% confidence intervals.

Figure 3. Euro liquidity interventions: exchange rate responses (in percentage)



Notes: The figure reports estimated daily cumulative conditional median (top row) and uncertainty (bottom row) response of the change in exchange rates vis-à-vis Euro to the ECB monetary stimulus intervention that decreases the Belgium 2Y sovereign bond yield by 7 basis points. The uncertainty is the difference between the 90th and the 10th conditional quantile. The shaded areas are 68% confidence intervals.

Figure 4. Monetary stimulus interventions: exchange rate responses (in percentage)



Notes: The figure reports estimated daily cumulative conditional median (top row) and uncertainty (bottom row) response of the change in exchange rates vis-à-vis Euro to the ECB foreign exchange liquidity intervention that increases the three months euro-dollar swap basis by 1.2 basis points. The uncertainty is the difference between the 90th and the 10th conditional quantile. The shaded areas are 68% confidence intervals.

Figure 5. Foreign exchange liquidity interventions: exchange rate responses (in percentage)

The obtained results suggest that different types of policy innovations pursued by the ECB during the crisis period had a relatively similar effect on the emerging European foreign exchange markets. The policies did not affect the exchange rate levels in a significant way in these economies. Yet they have led to higher uncertainty in the FX markets. Among the policies, the effects of Euro liquidity provisions are the weakest in line with the notion that European banks that borrowed via the ECB liquidity programs tend to use the funding to invest in risky assets, primarily Euro zone sovereign bonds (Acharya and Steffen, 2015; and Drechsler et al., 2016). In this way, the newly generated liquidity did not affect capital flows to outside of the Euro area (rather, only within Euro area), thereby having a small effect on the exchange rates of the neighbouring EM countries.

The absence of a significant reaction of the exchange rates contradicts the conventional wisdom that expansionary monetary policy shocks lead to depreciation of the currency of the country that conducts such policy (see Clarida and Gali, 1994 and the subsequent literature). The conventional view typically considers advanced economies and the periods of “normal” business cycle. Our empirical results suggest that in times of the crisis and of heightened financial stress in advanced economy, accommodative monetary policy innovation in that economy may not significantly impact the level of exchange rates in emerging markets which share close financial and trade ties with the AE. This is especially the case if the monetary policy innovations in AE provide uncertain signals about the underlying state of the economy to the market participants, increasing risks in the AE financial markets (Husted et al, 2019; Mody and Nedeljkovic, 2019) which, in turn, impact the capital flows to EM. Our evidence of elevated uncertainty in the EM FX markets following the AE monetary policy innovations is consistent with the uncertainty spillovers arising from higher monetary policy uncertainty. To the extent that higher FX uncertainty may dampen the trade flows and investment activity in a given economy (Goldberg, 1993; Darby et al, 1999; Binding and Dibiasi, 2017), our empirical results are indicative about less explored channel through which accommodative monetary policy innovations in AE may affect business cycle fluctuations in the EM economies.

4.2. Specification Checks

We evaluate the baseline specification from various perspectives. First, we perform formal specification checks of the empirical specification. Second, we study the importance of control variables for the obtained results: we look at the responses to the ECB policy innovations when the set of global confounding factors is alternated. Third, we examine the importance of the choice of the tail quantiles in uncertainty calculations.

We start with the model fit. Table 1 shows the general fit of the model. For each currency/quantile pair, Table 1 reports empirical frequency of the events when the sample exchange rate change is smaller than the estimated conditional quantile (in-sample fit, left part of the cell), as well as the p-values from the general dynamic conditional quantile specification test (Escanciano and Velasco, 2010, right part of the cell). Empirical frequencies are close to their population values and the null hypothesis of no misspecification is not rejected for all country/quantile pairs, implying a satisfactory performance of the baseline specification.

Next, we evaluate the choice of the control variables. Taken into account relatively high sample correlation between the VIX, and VXY (above 0.5), we include only one in estimations. The main results are not sensitive to the choice of control variables. Finally, we examine the sensitivity of the estimates of the uncertainty reactions to the selection of baseline quantile levels. We test for this by re-estimating the baseline specification at other quantile levels (15, 20, 80, 85) and constructing an alternative set of uncertainty estimates. The results with VXY (instead of VIX) in the specification and with different quantile levels do not differ qualitatively and often quantitatively from the baseline estimates and for space considerations are not reported (they are available on request from the authors).

In sum, additional specification checks do not detect any significant deficiencies in the baseline specification.

Table 1. QVARX model fit

Quantile	10		50		90	
	Hits	DCQ test	Hits	DCQ test	Hits	DCQ test
Hungary	8.59%	0.12	50.48%	0.37	91.48%	0.19
Poland	8.73%	0.17	50.75%	0.21	92.09%	0.14
Turkey	9.14%	0.28	49.39%	0.35	91.41%	0.22

Notes: For each currency in row and each quantile level in column, Table 1 reports: the percentage of times the actual exchange rate change was below the estimated quantile level (first column); the p-value of the dynamic conditional quantile (DCQ) specification test (second column) of Escanciano and Velasco (2010). The conditioning set under the alternative for each currency in the row includes regressors from equation (1) and up to four lags of the corresponding change in the exchange rate. Critical values of the test statistic are obtained using the approximation procedure outlined in Escanciano and Jacho-Chavez (2010). In calculations we use 2000 draws from 10 independent ($m=10$ in notation of their paper) standard normal random variables.

5. CONCLUDING REMARKS

This paper examined the response of EM foreign exchange markets to innovations in the monetary policy in advanced economies over the most intensive phase of the crisis. We focused on the case of the European Central Bank which pursued a combination of different policies during

the Eurozone sovereign crisis, which facilitates empirical comparison between the effects of different measures. We applied a recently developed econometric framework that allows identification of causal responses of foreign exchange markets to different types of the shocks across the entire conditional distribution of foreign exchange rates.

We found weak effect of the ECB's Euro liquidity provisions on foreign exchange markets in three neighbouring EM economies (Hungary, Poland and Turkey). In contrast, while the ECB's Dollar and Pound liquidity provisions as well as government bond interventions and policy rate changes did not impact the FX levels, they led to higher uncertainty in the FX markets.

The empirical results suggest that in times of the crisis and of heightened financial stress in advanced economy, accommodative monetary policy innovation in that economy may not significantly impact the level of exchange rates in emerging markets which share close financial and trade ties with the AE. However, if the monetary policy innovation increase uncertainty in the AE financial markets, the potential for uncertainty spillovers to emerging FX markets increases, as documented in our results. The observed rise in FX uncertainty is indicative of the additional, uncertainty channels through which monetary policy shocks in advanced economies may affect the business cycle fluctuations in the EM economies. Further work can explore in more detail the connection between the foreign exchange uncertainty and the real outcomes in the crisis context.

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COMPARISON OF DEVELOPMENT OF SELECTED MACROECONOMIC INDICATORS IN SLOVAKIA AND SLOVENIA

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Abstract: *Every country and its economy has undergone some historical development and is going through it even nowadays, constantly evolving. Today, however, individual changes occur more frequently, are dynamic and have a larger dimension. Technology has accelerated processes and information exchange. The economies of states can no longer function in isolation, because we are at a time where the division of labour is not only of European but also of global character. This work focuses on the development of selected macroeconomic indicators, mainly employment and unemployment of two Slavic states of Slovakia and Slovenia. The size of the area and the number of inhabitant's ranks among the small states of Europe, they have similar geographical and demographic conditions. However, the development of the economy seems different, which is the subject of this paper. To compare the development of macroeconomic variables of the above-mentioned states, the data were drawn from the published data of the Statistical Office of the Slovak Republic, the Statistical Office of the Republic of Slovenia and Eurostat. To evaluate the year-on-year changes in selected indicators, the relative indices were used.*

Keywords: *Employment, Unemployment, Gross domestic product per capita, Average nominal wage.*

1. INTRODUCTION

Looking at the history of any country in the world, we find that the historical events associated with it and its economic development continues to affect the people of that country today. Past decisions and action in the present affect our daily lives. The same is true of the economy and the national economy. In today's world of sudden changes and the interconnectedness of states' economies, it is necessary to closely monitor changes in macroeconomic indicators. We have to monitor the changes in the gross domestic product, which shows us the development of the economy, but we must not forget other indicators, such as employment and unemployment, since all indicators are related and we must not forget either indicator when managing the economy to grow the country's economy. The aim of economic governance is to keep GDP growth and employment rates or unemployment rates at an acceptable level. The development of macroeconomic indicators in the Slovak Republic is largely influenced by its historical development too. In the 1990s Slovakia underwent a major economic transformation from a centrally managed economy to a market-oriented economy. Like most countries in the former Eastern bloc, the country had to go through a development that the countries of the western world had long since passed.

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Slovenia and Slovakia were part of Austria-Hungary until 1918. It then formed a union with neighbouring Slavic states called the Kingdom of Serbs, Croats and Slovenes, which was subsequently renamed in Yugoslavia in 1929. In 1953, Yugoslavia broke up with the Soviet Union, which meant it was built outside the eastern and western blocs. In the 1970s, there were internal conflicts, the Slovenes point to economic and political inequalities. They make the most contribution to the common construction and development coffers, but they make the least decisions on important matters. In 1991 Slovenia declared independence following a referendum. Subsequently, Slovenia became a member of the UN, NATO and the European Union. Since 2007, Slovenia has been a member of the European Monetary Union – the Eurozone. Throughout its existence, Slovenia has shown the greatest economic development over other members of the former Yugoslavia.

2. ANALYSIS OF SELECTED MACROECONOMIC INDICATORS IN SLOVAKIA AND SLOVENIA

Slovenia, like Slovakia, has undergone a transformation process after 1989, from a centrally managed economy to a market economy. This was not possible without the rise in unemployment, which was a natural development of transformation, since unemployment in the former regime was virtually non-existent because every citizen had to work. Work efficiency was low, part of the employees was paid for their participation in the workplace. After the change of regime, work efficiency began to grow, but there were more people out of work. In later years, the unemployment situation gradually began to improve, new jobs were created and productivity increased.

The development of employment is not only a consequence of the causes and factors affecting employment in a given year. Employment is the result of factors mainly from the period preceding the reference year, as these factors influence the economic development of the country in the future and hence the employment indicator. Other factors that will affect employment are the current labour market conditions and the expected assumption of economic development. The economic development of a state that has a market-oriented, open economy is not linear and unidirectional. Every year there may be some slight or widespread variation in its development, which is predictable or, in the worst case, unexpected and all the more devastating (e.g. economic crisis). The unemployment rate is mainly influenced by the economic development of the country. If the value of gross domestic product decreases, production is declining, as many workers are not needed as at full production and unemployment.

Table 1. Development of employment rate between 2008 and 2018
in the Slovak and Slovenian Republics

Slovakia											
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MZ (%)	68,8	66,4	64,6	65,0	65,1	65,0	65,9	67,7	69,8	71,1	72,4
Δ (%)	---	-2,4	-1,8	0,4	0,1	-0,1	0,9	1,8	2,1	1,3	1,3
Slovenia											
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MZ (%)	73,0	71,9	70,3	68,4	68,3	67,2	67,7	69,1	70,1	73,4	75,4
Δ (%)	---	-1,1	-1,6	-1,9	-0,1	-1,1	0,5	1,4	1,0	3,3	2,0

Legend: MZ (%) – employment rate in %; Δ (%) – year-on-year change in %

Source: Eurostat, own processing

In the Slovak Republic, since 2009 and 2010, we have observed a decline in the employment rate (Table 1). The labour market was delayed in responding to the financial crisis that our economy had already anticipated in 2008. In 2009, the employment rate fell by 2.4% year-on-year and by a further 1.8% in 2010. These years can be described as the years when the first wave of the financial crisis, which affected our economy, came to our territory. As a result of unfavourable development on foreign markets and uncertainty for the future, exports decreased, which resulted in a decrease in production volume and a decrease in the number of employees. The largest decline in exports was recorded in the products of the vehicle manufacturing and electronic and electrical industries (Okáli et al., 2011). In 2011 and 2012, the Slovak economy began to recover from the financial crisis, the employment rate rose, but at a slow pace. The low increase in employment was due to the expectation of the second wave of the financial crisis, and the future of production and demand for individual goods was unclear (Morvay et al., 2013). The second wave of the financial crisis at the level of the employment rate was signed in 2013. The employment rate of 67.7% represented a year-on-year decline of 1.1%. The labour market again reacted with a lag, and to a lesser extent to economic developments. The number of employees did not decrease rapidly, as it was assumed that the financial crisis was already overcome and that the economy of the Slovak Republic would grow in the following periods (Morvay et al., 2014).

In the following years, the economy and employment in the Slovak Republic had a favourable development and increase. In 2014, employment increased year-on-year by 0.9%, in 2015 by a further 1.8%. The highest year-on-year increase occurred only in 2016, when the employment rate increased by 2.1% compared to 2015. The employment rate was 69.8%. 2016 was the first year of the reference period in which the employment rate equalled the employment rate in the pre-crisis period of 2008 and even increased by 1% from it. The main factors behind the increase in employment were the favourable situation on foreign markets, the increased demand for products of our economy, especially the production of industry and the increase in jobs in the services sector. The population was also motivated by rising wage levels, and even a large proportion of the long-term unemployed found employment (Morvay et al., 2017). 2017 and 2018 were also characterized by an increase in the employment rate, but growth slowed. Employment increased by 1.3% year-on-year and stood at 72.4%. The economy and production growth were doing well, and job creation also had a positive development. However, there was a problem with insufficient workforce, either unqualified but mainly qualified. The influx of labour from abroad, notably from Ukraine and Serbia, which occupied some of the vacancies (Morvay et al., 2018) was clearly visible.

At the beginning of the period under review, in 2008 the employment rate in Slovenia was 73.0% (Table 1). In 2009, the employment rate fell to 71.9%. Although it was a slight decline, it was a harbinger of the beginning of the financial crisis. Demand for export commodities decreased slightly. The number of people in employment has decreased, the number of small private entrepreneurs and self-employed persons has slightly increased. In 2010, employment fell by 1.6% year on year. Companies continued to be cautious in recruiting new employees; The necessary production volume was not obtained through the recruitment of new employees, but through timeless hours. The worst situation with employment occurred in the production sphere. The largest decline in employment occurred in the second half of 2010. Unemployment decreased in all sectors, with the exception of social work, where there is a slight increase. This was mainly about long-term care for the elderly, funded by private funds. Real estate trade was another exception in employment growth (Lindič, Kraigher, 2011). The year 2011 was marked by a further decline in employment, particularly in construction, real estate and agriculture. In

some kinds of services there has been an increase – professional, scientific and technical activities. However, when looking at total employment in services, it was lower than in the previous year (Kraigher, Perko, 2012).

In 2014 there was a slight increase in employment. Although the performance of the economy has progressed in a positive direction, employers remained cautious in recruiting, hence preferring to hire workforce from recruitment agencies and also preferred to work not on a full-time basis but on contracting to use work as needed (Perko, 2015). Employment continued to grow in 2017. Its year-on-year increase was 3.3%. Also, this year, the increase in total employment was driven by demand from abroad, which caused production for export needed additional workforce. Employment also grew in domestic services, as well as in science and research. The improved situation of the national economy has allowed a slight increase in the number of employees in public administration. We also saw an increase in employment in the construction sector after the implementation of foreign investment. Employers began to favour direct employment over contracted employment or employment. Foreign workers, mainly Serbia, predominantly in the construction industry (Perko, 2018) accounted for a significant share of employment growth.

During the period under review, employment in Slovenia was influenced by the State, in particular in mitigating the effects of the financial crisis. Employment support measures were taken to curb unemployment growth. The state supported certain groups of jobs. It also supported the growth of the number of self-employed and private entrepreneurs in the implementation of employment policy through legislation, various financial concessions and subsidies. On the basis of the above, it can be stated that the development of employment in both countries had similar character, causes and consequences. Slightly better results can be observed in the Republic of Slovenia.

Table 2. Development of the unemployment rate in the years 2008 to 2019
in the Slovak and Slovenian Republics

Slovakia												
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MN (%)	9,5	12,0	14,4	13,6	14,0	14,2	13,2	11,5	9,7	8,1	6,5	5,8
Δ (%)	---	2,5	2,4	-0,8	0,4	0,2	-1,0	-1,7	-1,8	-1,6	-1,6	-0,7
Slovenia												
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MN (%)	4,4	5,9	7,3	8,2	8,9	10,1	9,7	9,0	8,0	6,6	5,1	4,6
Δ (%)	---	1,5	1,4	0,9	0,7	1,2	-0,4	-0,7	-1,0	-1,4	-1,5	-0,5

Legend: MZ (%) – employment rate in %; Δ (%) – year-on-year change in %

Source: Eurostat, own processing

From Table 2 it can be concluded that at the beginning of the period under review the level of unemployment was more favourable for Slovenia. The unemployment rate compared to Slovakia was halved by 4.4%, while Slovakia had an unemployment rate of 9.5%. This difference was due to the development of the economy from previous years. It can be said that Slovenia has better managed its role of building a market economy with an open economy. Slovakia was influenced by the transformation of the command economy into a market economy and subsequent turbulences in the 1990s, which were years of imperfect legislation and privatization. Slovenia has developed its economy, especially its openness to trade with neighbouring countries and the world gradually. In both countries, the unemployment rate fell in 2008 thanks to foreign investment, but GDP growth started to slow due to the coming financial crisis.

In 2009, the openness of the economy and dependence on foreign demand in both countries manifested itself. If we break down the economies of both countries by industry, the leading role in both cases is in manufacturing and manufacturing. The financial crisis brought a decrease in foreign demand mainly for the commodities of this sector, which caused a decrease in production already in 2008, but due to labour market imperfections, the number of employees adjusted almost 9 months later, only in 2009, where the unemployment rate in Slovakia increased. year-on-year by 2.5% and in Slovenia by 1.5%. In the following years we see an annual increase in the unemployment rate in both countries, until in 2013 they reached their highest level in the monitored period, in the case of Slovakia 14.2%, in the case of Slovenia 10.1%. The unemployment rate in Slovakia increased by 4.7% compared to 2008 and in Slovenia by 5.7%. Despite lower unemployment growth in five years, unemployment in Slovakia was still higher than in Slovenia by 4.1%. Both countries tried to mitigate the increase in the unemployment rate by state intervention, various business support, trade concessions, subsidies. According to the table, when looking at the development of the growth of the unemployment rate from 2008 to 2013 the role of solving the problem of unemployment, namely slowing its growth, was better addressed by the Slovak Republic, but the historical development of the economy played in favour of Slovenia. Since 2014, after the situation on foreign markets has been satisfied, we have seen an improvement in economic development in the countries under review as well as in the area of unemployment. The unemployment rate fell until the end of the period under review. In 2019, the unemployment rate was 5.8% in the Slovak Republic and 4.6% in the Republic of Slovenia. The Republic of Slovenia had 0.2% higher unemployment rate in 2019 than in 2008, the Slovak Republic improved by 3.7%, compared to Slovenia it had a higher unemployment rate of 1.2%, which is a positive improvement compared to the beginning of the period under review. The gradual decline in the unemployment rate was due to various factors, namely an increase in foreign demand for the aftermath of the financial crisis and investment by foreign investors who sought to reduce production costs. The development of the unemployment rate in the period under review was of a similar nature in both countries under review, mainly due to the impact of the financial crisis and state intervention in support of employment. Slovenia had a lower unemployment rate in the period under review, due to the economic development already mentioned, but also because of its location by the sea and mountains. Slovenia has a well-built infrastructure of destination holiday destinations, which contributes to high employment in accommodation, catering, recreation, spa and the like.

Table 3. Development of GDP per capita in the years 2008-2018 (in €)
in the Slovak and Slovenian Republics

Slovakia											
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP/inhabitant	12 200	11 800	12 400	13 100	13 400	13 700	14 000	14 600	15 000	15 600	16 500
Δ (%)	---	-3,4	4,8	5,3	2,2	2,2	2,1	4,1	2,7	3,8	5,5
Slovenia											
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP/inhabitant	18 800	17 700	17 700	18 000	17 500	17 600	18 200	18 800	19 500	20 800	22 000
Δ (%)	---	-6,2	0,0	1,7	-2,9	0,6	3,3	3,2	3,6	6,3	5,5

Legend: Δ (%) – year-on-year change in %

Source: Eurostat, own processing

As can be seen in Table 3, GDP per capita in Slovakia gradually increased over the whole period under review, but at a much slower pace. In the case of Slovenia, some fluctuations occurred in times of financial crisis, but nevertheless it had substantially higher GDP per capita than Slovakia in the whole period under review.

Table 4. Development of average monthly wage in the years 2008-2018 (in €)
in the Slovak and Slovenian Republics

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Slovakia	723	745	769	786	805	824	858	883	912	954	1013
Slovenia	1391	1439	1495	1525	1525	1523	1540	1556	1585	1627	1682

Source: ŠÚ SR, SiStat, own processing

The average monthly wage in Slovakia gradually increased throughout the period under review. (Table 4.) At the beginning of the period under review, it was at EUR 723, reaching EUR 1 013 over 11 years. On the one hand, the increase in the average wage was caused by the inflow of foreign investment and by an increase in labour demand. The second reason was the annual increase in the statutory minimum wage, which allowed the average wage to rise even in times of financial crisis. The employers tried to slow the growth of the average wage by employing a cheaper workforce mainly from Ukraine and Serbia, especially in the second half of the period under review.

The average wage in Slovenia was better in absolute terms than in Slovakia. At the beginning of the period under review, the average wage was EUR 1 391 per month, gradually increasing annually, until 2011 and the following two years stagnated, respectively. decreased. The decline was due to reduced demand for labour due to the uncertainty in foreign markets caused by the financial crisis. Since 2014, after the economy started, wages in Slovenia have risen. In 2018, the average monthly wage reached EUR 1,682. During the period under review, Slovenia had a level of average monthly wage relative to Slovakia, owing to its economic results, labour demand and also the statutory minimum wage. However, if we compare the increase in the average monthly wage at the beginning and at the end of the period under review in both countries, we get a surprising result. The increase in Slovakia was by € 290, and in Slovenia by € 291, in absolute terms, almost the same. We can state that despite the difference of one euro, the average wage in Slovakia was more positive than in Slovenia in terms of the growth rate of this indicator.

3. CONCLUSION

Both Slovenia and Slovakia are mainly dependent on foreign demand for production and manufacturing, and therefore its employment development is closely related to the situation on foreign markets. In the case of Slovenia, the financial crisis would have a very high impact on employment and unemployment rates. However, Slovenia used employment support instruments similar to those of Slovakia, thereby significantly mitigating the impact of the financial crisis on employment. Throughout the whole employment and unemployment survey, Slovenia performed better than Slovakia. In 2008, the unemployment rate in Slovenia was 5.1% lower than in Slovakia and at the end of the period under review the difference between the unemployment rates of these countries was 1.2%. Both countries were marked by the already mentioned financial crisis. Although the unemployment rate has improved in recent years, Slovakia has been better at tackling the unemployment rate, and Slovenia's employment gap has eased at the end of the reporting period. Slovenia has achieved a better labour market situation, in particular in terms of employment rates, on the basis of various factors. First of all, it was a larger volume of GDP per capita compared to Slovakia. In 2008, Slovenia had a GDP per capita by more than 50% higher than Slovakia, by 25% at the end of the reporting period. The volume of production per capita and the efficiency of work were in favour of Slovenia, therefore it also had better employment results, as the volume of GDP significantly affects labour demand. The higher efficiency of work in Slovenia was due to the higher technological level. The willingness to work at a given wage also influences

the employment and unemployment rates to a large extent. In comparison with Slovakia, Slovenia has a stronger social policy, more protecting its people on the labour market. In 2008, the minimum wage in Slovakia was set at EUR 241 per month, in Slovenia EUR 539. The minimum wage gradually increased annually in both countries, reaching only EUR 435 in Slovakia and EUR 805 in Slovenia in 2017. During the whole monitored period the minimum wage was almost twice as high in Slovenia as in the Czech Republic. The average monthly wage in the country also derives from the statutory minimum wage. In 2008 the average wage in Slovakia was EUR 723 per month, in Slovenia EUR 1 391. Until the end of the period under review, it grew, until 2018 the monthly average wage was EUR 1,013 in Slovakia and EUR 1,682 in Slovenia. During the whole monitored period the average monthly wage was in Slovenia as in Slovakia. The amount of wages, as the main factor of motivation to perform dependent gainful activity, i.e. employment considerably influenced the rate of employment and unemployment in these countries. When comparing the development of employment and unemployment in Slovakia and Slovenia, we conclude that GDP and labour efficiency affect employment rates and wage levels. Looking at the fluctuations in the employment and unemployment rates of these countries as a result of changes in foreign demand gives us a picture of the dependence of economies on the world economy. A suitable recommendation for both countries would be to extend their production portfolio to other spheres. Not only concentrate on the processing and manufacturing industry of certain commodities (cars), but also build production focused on other types of goods. They should also focus on the development of services and tourism, as these spheres have the potential to build new jobs. Distributing employment across the economy would mitigate the negative impact on employment in the future in times of unfavourable development in individual foreign markets.

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INTEGRATION IN BRIC STOCK MARKETS: AN EMPIRICAL ANALYSIS

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Abstract: *This paper aims to analyse financial integration in the markets of Brazil, China, India and Russia (BRIC's), from July 2015 to June 2020, being the sample split in pre and during the global pandemic (Covid-19). In order to carry out this analysis, different approaches were undertaken to analyse two issues, namely, whether: (i) the global pandemic has accentuated the interdependencies in the BRIC financial markets? If so, how it has influenced the efficiency of portfolio diversification. The results suggest very significant levels of integration, in the Covid period these evidences diminish the chances of portfolio diversification in the long term. In turn, the analysis of the relationship between markets, in the short term, through the impulse response functions, in a period of global pandemic, shows positive/negative movements, with statistical significance, with persistence exceeding one week. In addition, there was no immediate adjustment in prices between markets, due to the high levels of shocks identified. Regarding the implementation of efficient portfolio diversification strategies, we consider that a good option for investors would be to avoid investments in stock markets. In this sense, one suggestion could be to invest in derivatives, gold and sovereign debt markets, with the purpose of diversifying portfolios and mitigating the risk arising from the global pandemic. The authors consider that the results achieved are of interest to investors seeking opportunities in these exchanges, as well as to policy makers to undertake institutional reforms in order to increase the efficiency of stock markets and promote the sustainable growth of financial markets.*

Keywords: *COVID-19; Financial integration; Arbitration; Risk diversification.*

1. INTRODUCTION

The COVID-19 outbreak has caused global concern. On 30 January, the WHO declared it a global health emergency. The easy spread of this virus has caused uncertainty in the global population. This epidemic has also changed people's lifestyles, millions of people have been put in isolation to reduce virus transmission, companies have closed to control the spread of the virus, causing income losses and leading to significant levels of unemployment. Worldwide, flights were cancelled, and transport systems were shut down. In general, economic activities were disrupted and stock markets fell sharply (Saadat, Rawtani, and Hussain, 2020).

The interdependence and integration of financial markets are quite distinct concepts, and the interdependence between markets is associated with the phenomenon of price movements between different markets, even though there is no economic basis for or enough knowledge of the

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facts that led to this joint movement. On the other hand, we are dealing with integrated markets when assets with similar risk but belonging to different markets are associated with similar returns (Tilfani, Ferreira, Dionisio, and Youssef El Boukfaoui, 2020).

In the same context, Grubel (1968), Levy and Sarnat (1970) argue that investing in international stock markets is substantiated by the fact that the correlation between assets is less than that examined in domestic assets. Therefore, the low correlation between international stock markets is a key factor in portfolio diversification. This essay aims to analyse financial integration in Brazil, China, India and Russia (BRIC's) in the context of the global pandemic (COVID-19). Different approaches have been undertaken to carry out this analysis in order to analyse two issues, namely whether: (i) has the global pandemic accentuated interdependencies in the BRIC financial markets? If so, how has it influenced the efficiency of portfolio diversification? The results suggest very significant levels of integration, in the Covid period these evidences diminish the chances of portfolio diversification in the long term. In turn, the analysis of the relationship between markets, in the short term, through the impulse response functions shows positive/negative movements, with statistical significance, with persistence exceeding one week. In addition, there was no immediate adjustment in prices between markets, due to the high levels of shocks identified.

This research adds two main contributions to the literature. The first contribution refers to the study of risk diversification in BRIC's financial markets. As far as we know, this is the first study that analyses these financial markets in isolation, in the context of the Covid pandemic. However, there are studies that have analysed the integration and diversification of risk in BRIC markets, namely, the authors Tripathy (2015), Siddiqui (2015), Ranjan Dasgupta (2016). However, the approach was quite different from that followed in this paper. The second contribution is econometric in nature, as results are compared between econometric methods and mathematical models that have the possibility of evaluating correlations in the context of non-stationarity. In particular, the Gregory and Hansen (1996) which demonstrates the presence of integration between financial markets with broken structures and, in a complementary way, the VAR-IRF model with the purpose of checking the links of these markets in the short term and assessing whether these markets provide international investors with a good diversification of their portfolios. In terms of structure this test is organised into 5 sections. Section 1 is represented by the current introduction. Section 2 presents a Literature Review regarding articles on integration in financial markets. Section 3 describes the data and methodology. Section 4 contains the results. Finally, Section 5 presents the general conclusions of the work.

2. LITERATURE REVIEW

The assessment of the current state of financial integration and shocks between markets is also relevant from a cost versus benefit perspective. The literature commonly agrees that financial integration brings benefits in good times. However, in times of crisis, high financial integration increases the probability of contagion, due to the close interrelationship between financial markets through proximity to markets. Overall, in the long run, the benefits of financial integration are expected to outweigh the costs (Babecký, Komarek e Komárková, 2017).

Tripathy (2015), Siddiqui (2015), Ranjan Dasgupta (2016) analysed financial integration in BRIC's markets. Tripathy (2015) shows the existence of a bi-directional causal relationship between the Indian and Russian markets, the Brazilian and Russian markets. Furthermore, the

Chinese market does not show any level of integration with the other BRIC markets. On the contrary, Siddiqui (2015) show that the stock markets of Brazil, Russia, India and China (BRIC) are not integrated in the long term and in the short term there are no causal relationships between these markets. Already Ranjan Dasgupta (2016) shows that the BRIC markets are integrated showing that these markets do not offer any opportunity for diversification with the USA.

Özer, Kamışlı and Kamışlı (2016) show hybrid results by not being able to show movement between the market of Germany, Austria, Czech Republic, Croatia, Lithuania and Greece. These findings have important implications for international investors, portfolio managers and policy makers. While the authors Moagar-Poladian, Clichici and Stanciu (2019) show that the markets of Central and Eastern Europe show a significant level of integration during the European financial crisis. Jawadi, Chlibi and Cheffou (2019) studied the movements between the US market and the G6, BRICS and MENA markets. The authors show that the MENA and BRICS markets are segmented with the US market, while the G6 markets show integration. Already Salisu, Ndako, Adediran and Swaray (2020) have analysed integration in Islamic markets and show that markets are integrated and that this behaviour can be influenced by global economic conditions.

Liu, Manzoor, Wang, Zhang and Manzoor (2020) studied the impact of the coronavirus outbreak on 21 stock indexes. The authors show significant structural breaks due to the COVID-19 outbreak. Already Zeren and Hizarci (2020) analysed the effects of the Covid-19 epidemic on stock markets in the period 23 January 2020 and 13 March 2020. The authors show levels of causality between the number of deaths from the global outbreak and the financial markets. It was understood that the global cases of the outbreak have cointegration relationships with the ESO, KOSPI and IBEX35 markets, but not with the FTSE MIB, CAC40, DAX30 markets.

In summary, this work aims to contribute to the provision of information to investors and regulators in the BRIC markets, where individual and institutional investors seek diversification benefits, as well as to help promote the implementation of policies that contribute to the efficiency of these markets.

3. METHODOLOGY

3.1. Data

The prices index data for the financial markets of Brazil, China, India and Russia (BRIC's) were obtained from the Thomson Reuters platform. The prices are daily and comprise the period from July 1st 2015 to June 29th 2020, being the same divided into two pre-Covid (July 1st/2015 to December 31st/2018) and Covid (January 2nd/2019 to June 29th/2020) sub-periods, being the same in local currency to mitigate exchange rate distortions.

Table 1. The name of countries and their indices used in this paper

Country name	Index
Brasil	BOVESPA
China	SSEC
India	SENSEX
Rússia	IOMEX

Source: Own elaboration

3.2. Methodology

The development of research has taken place in several stages. The characterization of the sample used was done through descriptive statistics, the adherence test. In order to analyse the integration between the BRIC markets we will use the model of Gregory and Hansen (1996). To measure and evaluate the shocks (movements) between markets, in the short term, we will use the methodology impulse response functions (IRF), with Monte Carlo simulations, because they provide a dynamic analysis (variable with time), generated from the estimates of the VAR model, thus allowing us to study the causality relations calculated, even when we do not detect previously the causality relations Granger between the variables (Lütkepohl and Saikkonen 1997).

4. RESULTS

Figure 1 shows the evolution of the BRIC markets in % of the differences. The sample comprises the time span from July 1, 2019 to June 29, 2020, which is a very complex period due to the understanding of the outbreak of the global pandemic (COVID-19). The yields clearly reveal the instability experienced in these markets in February, March and April 2020.

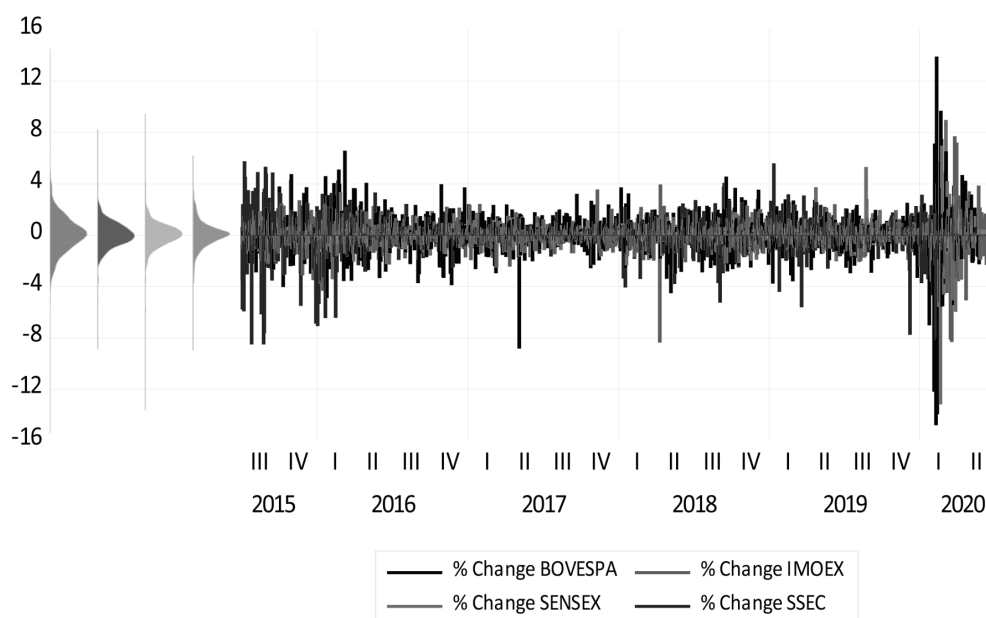


Figure 1. Evolution, as % of differences, of the 4 financial markets, in the period from 01/07/2015 to 29/06/2020

Source: Own elaboration

Table 2 shows the main descriptive statistics of the financial markets under analysis, as well as the Jarque-Bera adherence test. The analysis of the descriptive statistics allows us to assess that most of the returns have positive daily averages, except for the China market (SSEC). The market that presents the most significant standard deviation (risk) is that of Brazil (BOVESPA), being the smallest verified in Russia (IMOEX). On the other hand, all the series of returns showed signs of deviation from the hypothesis of normality, given the coefficients of asymmetry and kurtosis. The series analysed are leptocurricular and have asymmetric tails. Additionally, all the yield series showed signs of deviation from the normality hypothesis, since the Jarque-Bera test allows rejecting the null hypothesis of normality (H_0) in favour of the alternative (H_1), not normality, for the significance level of 1%.

Table 2. Descriptive statistics, in yields, of the 4 financial markets in the full period

	BOVESPA	IMOEX	SENSEX	SSEC
Mean	0.000485	0.000416	0.000271	-0.000216
Std. Dev.	0.017721	0.011096	0.011586	0.013702
Skewness	-1.270587	-0.964421	-1.817829	-1.313148
Kurtosis	19.39696	15.13801	30.58782	11.56917
Jarque-Bera	14408.30	7905.035	40522.01	4203.835
Sum	0.608915	0.521909	0.339800	-0.271698
Sum Sq. Dev.	0.394107	0.154517	0.168464	0.235612
Observations	1256	1256	1256	1256

Note: ***, ** represent significance at 1% and 5%, respectively.

Source: Own elaboration

Table 3 shows the results of the Gregory-Hansen test, and easily detects 6 pairs of integrated markets. The markets of China and Russia show 3 integrations (in 3 possible). While the markets of Brazil and India do not show integration with their peers, that is, they are segmented. These results do not call into question the implementation of efficient diversification strategies, especially in markets that do not show integration. These results are partially corroborated by the author Siddiqui (2015).

Table 3. Gregory-Hansen tests, Pre-Covid period (01/07/2015 to 31/12/2018)

Markets	t-statistic	Method	Lags	Break Date	Results
IMOEX / BOVESPA	-5.75***	Trend	1	10/03/2017	Cointegration
IMOEX / SENSEX	-5.55***	Trend	1	16/03/2017	Cointegration
IMOEX / SSEC	-5.70***	Trend	1	10/03/2017	Cointegration
SSEC / BOVESPA	-4.88*	Regime	5	02/05/2018	Cointegration
SSEC / SENSEX	-5.02*	Regime	5	10/05/2018	Cointegration
SSEC / IMOEX	-4.80*	Regime	0	01/09/2017	Cointegration

Source: Own elaboration

Notes: Data worked on by the authors (software: Stata). The AIC information criterion was chosen. The critical values are found in Gregory and Hansen (1996). The critical values for the ADF and Zt parameters are: -5,45 (1%); -4,99 (5%); -4,72 (10%). For the Za parameter, the critical values are: -57,28 (1%); -47,96 (5%); -43,22 (10%). The asterisks ***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.

Table 4 shows the integration results in the Covid period, and we easily see that integration in BRIC markets has increased significantly, which calls into question the hypothesis of diversification. The markets of Brazil, Russia and China show 3 integrations (out of 3 possible), while India presents 2 integrations. In addition, we note that the breakdown in structure is mostly in 2020. These results are in line with the authors' studies Moagar-Poladian, Clichici and Stanciu (2019), Caporale, Gil-Alana and Poza (2020), Milos, Hatiegan, Milos, Barna and Botoc (2020), which show high levels of integration in stock markets, questioning whether portfolio diversification will be efficient.

Notes: Data worked on by the authors (software: Stata). The AIC information criterion was chosen. The critical values are found in Gregory and Hansen (1996). The critical values for the ADF and Zt parameters are: -5,45 (1%); -4,99 (5%); -4,72 (10%). For the Za parameter, the critical values are: -57,28 (1%); -47,96 (5%); -43,22 (10%). The asterisks ***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.

Table 4. Gregory-Hansen tests, Covid period (02/01/2019 to 29/06/2020)

Markets	t-statistic	Method	Lags	Break Date	Results
BOVESPA / SENSEX	-5.39**	Regime	1	04/06/2019	Cointegration
BOVESPA / IMOEX	-5.00**	Trend	0	28/04/2020	Cointegration
BOVESPA / SSEC	-5.28***	Trend	0	06/02/2020	Cointegration
IMOEX / BOVESPA	-5.93***	Trend	5	10/03/2020	Cointegration
IMOEX / SENSEX	-5.97***	Trend	5	10/03/2020	Cointegration
IMOEX / SSEC	-5.99***	Trend	5	10/03/2020	Cointegration
SENSEX / BOVESPA	-45.00*	Trend	1	13/06/2019	Cointegration
SENSEX / SSEC	-4.80*	Regime	5	27/02/2020	Cointegration
SSEC / BOVESPA	-5.10**	Trend	3	06/02/2020	Cointegration
SSEC / SENSEX	-5.19**	Trend	3	25/03/2019	Cointegration
SSEC / IOMEX	-4.76*	Trend	3	25/03/2019	Cointegration

Source: Own elaboration

To analyse the significance of the causal relationships between the profitability of the four markets under analysis, the VAR Granger Causality/Block Exogeneity Wald Tests procedure was applied. To determine the number of lags to include in the causality tests, we used the HQIC (Hannan-Quinn information criterion), which suggests 6 lags. Fewer lags increase the degrees of freedom, more lags decrease the autocorrelation problems. As we previously performed a VAR with 6 lags, and then performed the VAR Residual Serial Correlation LM Tests with 7 lags, the null hypothesis was not rejected, which corroborates that the model presents a robust estimation.

The IRF methodology, with Monte Carlo simulations (see figure 2), tested the degree of response of the variables in the markets of Brazil, China, India and Russia, to changes (impulses) of one standard deviation of each of the mentioned variables. These results show the prompt response to market shocks, reflected on the following day, but also the speed of information processing in the markets. In all cases, innovations of their own and other pairs generate positive/negative responses on the following day, but shocks between markets have little significance. These results are in line with the authors' evidence Özer, Kamışlı e Kamışlı (2016).

Figure 3 shows the results of the IRF-VAR model, in the Covid period, with reflection on the following day, but also the speed of the markets in information processing. In all cases, the innovations of their own and other pairs generate statistically significant positive/negative responses the following day, at the 5% significance level. Given the one-day maturity, the response of each market to shocks in its own market exceeds the size of the response to shocks in other markets, in virtually all markets. Few situations have failed to do so. We can therefore infer that the assumption of market efficiency is questionable, since the forecast of market movement can be improved by considering the lagged movements of the other markets, allowing for arbitrage operations.

5. CONCLUSION

The general conclusion to be retained and, supported by the results obtained, through tests performed with econometric models, demonstrates that the global pandemic has a significant impact on the memory properties of BRIC's financial market indices. We found that the level of financial integration and the shocks between markets increased significantly in the Covid period. These markets also prove to be inefficient in their weak form due to the high levels of arbitrage identified. In conclusion, we consider that these evidences are relevant for policy makers and investors in relation to regional development policies and portfolio diversification strategies in BRIC's financial markets.

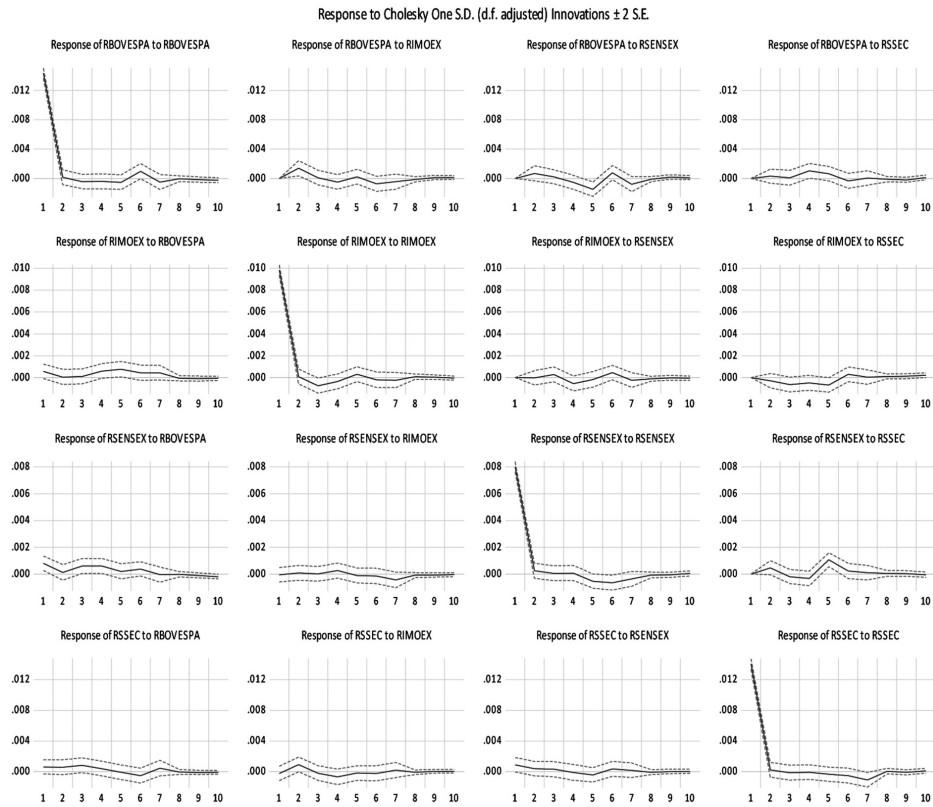


Figure 2. IRF Graphs, with Monte Carlo Simulations, in the Pre-Covid period.

Standard Errors: Monte Carlo (1000 repetitions)

Source: Own elaboration

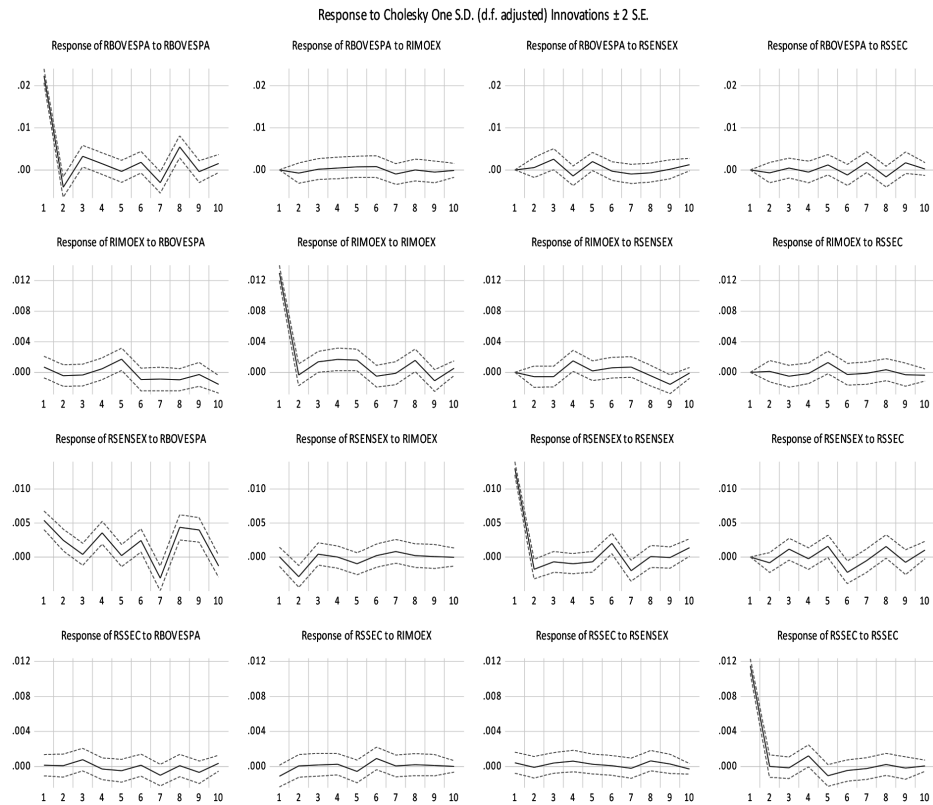


Figure 3. IRF charts, with Monte Carlo Simulations, in the Covid period.

Standard Errors: Monte Carlo (1000 repetitions)

Own elaboration

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THE FACTORS EFFECTING ON BANK PROFITABILITY: THE CASE OF BOSNIA AND HERZEGOVINA

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Abstract: *This research includes all banks in Bosnia and Herzegovina and testing internal and external variables on bank profitability indicators. In addition, the profitability of banks in B&H is also influenced by the financial result of operations, which is determined by price and interest rate risk. The primary goal of this paper is to determine, through correlation and regression analysis, the strength and significance of external and internal variables on bank profitability in Bosnia and Herzegovina. The research period covered from 2008: q1 to 2019: q4 on a quarterly database. Also, in this paper, the STATA 13.0 software package will be used. The following dependents variable were used: return on asset (ROA) and return on equity (ROE). The following independent variables were used: the growth rate of net gross/loss (GRNGL), the growth rate of non-performing loans (GRNPL), GDP growth rate (GRGDP), concentration ratio of loans of the largest banks in the system (CR Loans), concentration ratio of deposits of the largest banks in the system (CR Deposits), capital adequacy ratio (CAR) and loan-to-deposit ratio. The total number of observations was 48. The results showed that the significant influence on the dependent variables were the return on equity (ROE) and return on asset (ROA), which has been achieved by the following independent variables, such as the growth rate of net gross/loss, the growth rate of non-performing loans and concentration ratio of loans and deposit of the largest banks.*

Keywords: *Profitability indicators, Non-performing loans, Concentration ratio, Loan-to-deposit ratio.*

1. INTRODUCTION

Generally, the approach to measuring the performance of banks is no different from the approach adopted in measuring the performance of companies. Mostly it is a model of return on equity where decomposition is done in order to identify the sources that influenced the profitability of the company. The behavior of company stock prices is the best indicator of the success of their business. However, with banks, the return on equity is often not a reliable indicator, because usually small and medium-sized banks are not listed on any of the stock exchanges. In this regard, the use of different profitability indicators is a logical choice. Therefore, for banks whose stock is listed on stock exchanges, which is often the case in countries with underdeveloped capital markets, using profitability ratios is the only way to measure their business performance (Đukić, Đ. 2011., p.185). Profitability indicators provide a systematic summary of the significance of information based on the vast amount of data contained in the financial statements. Financial managers use ratios to evaluate their company's performance against competitors and set goals for future business. Financial advisers use indicators to evaluate whether the shares are undervalued or overvalued, and to make possible recommendations to investors (Burns *et al.* 2008).

Both ROE and ROA are very significant indicators of profitability, but more researchers are focusing on ROE, as it shows the profitability of the bank from the point of view of capital in-

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vestment, and is therefore more important in the context of bank shareholders (Mishkin, 2007). In this paper, both ROE and ROA will be used as dependent variables. In the financial system of Bosnia and Herzegovina, banks have the most dominant share in the structure of the total system whose participation in 2018 amounted to 88.5%. The profitability of banking sector remained at a high level, where ROE and ROA had slightly lower values than the previous year. Banks in Bosnia and Herzegovina derive most of their income from loans, where about 60% of total loans relate to loans (The Central Bank of Bosnia and Herzegovina, 2018).

The first analyzed indicator is, return on equity (ROE), followed an identical pattern in moving to higher values. The negative ROE of banks in Bosnia and Herzegovina in 2010 was a direct result of increased costs and increased deductions from current revenues to cover loan losses. After 2010, profits were positive and reach a level of 10%. The highest levels of earnings were recorded in the third quarter of 2018 (19.90%) and the fourth quarter of 2018 (20.40%) respectively. Retention of expansionary monetary policy and low-interest rates by ECB had positive implications for boosting economic growth not only in EU countries but also in Southeast Europe (Banking Agency of the Federation Bosnia and Herzegovina, 2018, p. 38). The zero hypothesis supports the random-effects model. The second analyzed indicator of banks in Bosnia and Herzegovina return on asset (ROA) which had a volatile trend with a decline in value in 2010, as a result of increased costs of loan loss provisions and poor quality of the loan portfolio. In the later period, due to the recovery of economic activity and falling interest rates and write-offs of toxic loans, the ROA was increased slightly to 1% in the last quarter of 2016. In the fourth quarter of 2018, the ROA was recorded a value of 1.2%, and the average value of the observed period it was about 0.48%.

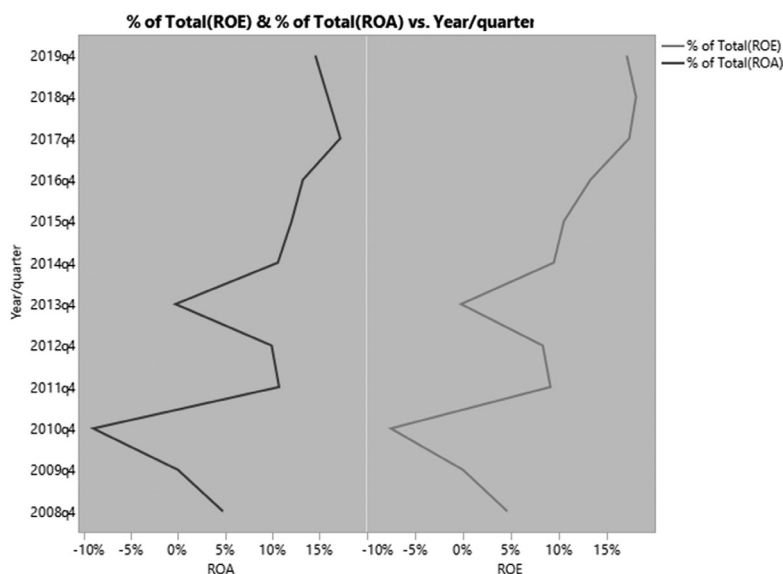


Figure 1. Trend of return on equity (ROE) and return on asset (ROA) of banks in Bosnia and Herzegovina in the period: 2008q4-2019q4 (in%)

Source: Author's study based on data from the Banking Agency of the Federation of Bosnia and Herzegovina and Banking Agency of Republika Srpska

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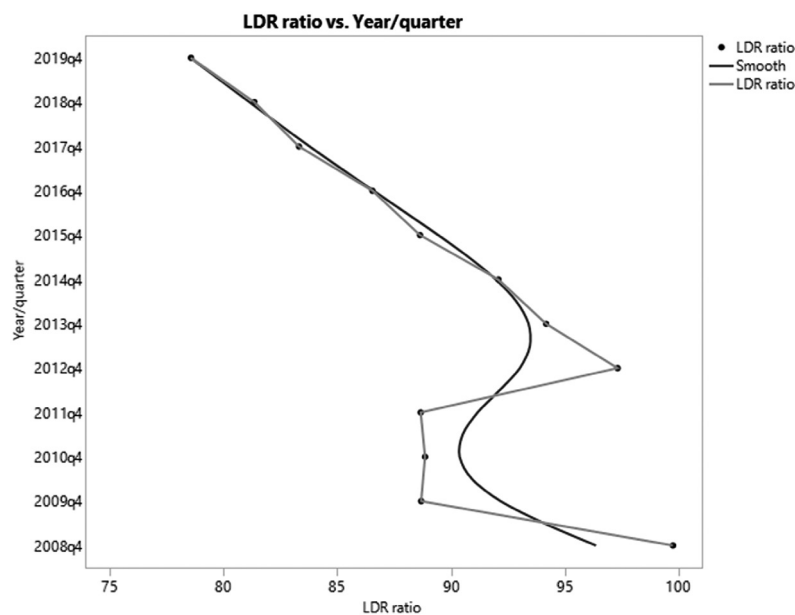


Figure 2. Trend of the loan-to-deposit ratio of banks in Bosnia and Herzegovina in the period 2008q1-2019q4 (in%)

Source: Author's study based on data from the Banking Agency of the Federation of Bosnia and Herzegovina and Banking Agency of Republika Srpska

As we can see from the previous figure, the liquidity indicator of bank loans in Bosnia and Herzegovina (i.e. loan-to-deposit ratio) had a very variable trend. At the end of the fourth quarter of 2008, the amount of credit placements was almost equal to the amount of total bank deposits in banks of Bosnia and Herzegovina, which means that only one year after the crisis, banks reduced risk aversion and increased lending activity. However, immediately after 2008, there was a turn-around in their credit policies, where the loan-to-deposit ratio in 2009 was amounted 88.69%, or by 11.31%, total deposits were higher. This is primarily the result of the banks prudence resulting from the impact of the global economic crisis, weakened economic activity, increased credit risk and other factors. Banks prudence and reduced volume of lending activity of banks in Bosnia and Herzegovina lasted until 2012, when there was a slight recovery period of economic activity, where banks slightly increased the amount of credit placements, which is reflected in the credit liquidity indicator, in 2012. The year was amounted to 97.31%. Almost equalized levels between total loans and deposits were recorded only in 2008 and 2012. The amount of deposits in relation to loans from 2016 to 2019 tends to increase, as a result of the absence of alternative forms of savings on the one hand, and on the other, the establishment of a deposit insurance system. Even after the crisis, banks continued to pursue a policy of rationalization of loans, due to the continued high credit risk, which is the basis of financial stability and the inability to find good debtors.

The paper consists of four parts. The first part describes the importance of profitability indicators in measuring the efficiency of B&H bank's operations, as well as internal and external variables that affect profitability indicators such as ROA and ROE. The second part of the paper provides an overview of empirical evidence in terms of the results of the influence of internal and external factors on the profitability of bank operations. The third part describes the chosen research methodology. The fourth part deals with the data necessary for the analysis and the results of the research with recommendations.

2. EMPIRICAL EVIDENCE

Goddard et al. (2004) used panel analysis as well as cross-sectional regression to estimate growth and profitability models in a sample of nearly 600 banks from five European Union countries for the period 1992 to 1998. According to Boubakri et al. (2005), bank privatization to strategic investors plays a significant role in business performance. The authors that newly privatized banks controlled by local industry groups became more exposed to credit and interest rate risk after privatization. On the other hand, privatized banks controlled by foreign investors have become more cost-effective. In many transition countries, control of a large number of privatized banks has shifted from state ownership to foreign ownership. The entry of foreign banks after privatization had a positive impact on the way that domestic banks became much more efficient in terms of overhead costs and interest spread, although it did not always have a positive effect on profitability.

Naceur and Omran (2011) investigated the impact of concentration, bank regulation, institutional and financial development on the margins and profitability of Middle Eastern and North African banks. They came to the conclusion that credit risk and capitalization have a significant impact on the profitability and economy of banks. They also concluded that there was no significant impact of macroeconomic and financial development indicators on the level of net interest margins, except for inflation. Likewise, they found that institutional and regulatory variables have a significant impact on the bank's operations. Ćuraka, Poposkib and Pepura (2012) investigated the bank-level, industry-level and macroeconomic factors that may affect the profitability of the Macedonian banking sector, using a dynamic panel consisting of 16 banks between 2005 and 2010. They concluded that the operating cost is a major determinant of bank profitability. They also concluded that solvency and liquidity risks have an impact on profitability. The findings also indicated that concentration, banking system reform and economic growth have a significant impact on bank profitability.

According to a study by Borio et al (2015), high short-term interest rates can have the effect of reducing bank's profitability. The results of their research show that the effects of short-term interest rates on bank profitability depend on the elasticity of supply and demand for loans. In conditions where the demand for loans is resilient, and when interest rates on deposits are higher, this may have the effect of reducing bank's profitability. According to the results of Căpraru and Ihnatov (2015), bank profitability is negatively affected by the cost / income ratio, bank size, credit risk and market concentration. Ibrahimov (2016) analyzed the impact of banking and macroeconomic variables on the profitability of 41 banks for the period: 2012-2015. Based on the results of the statistical panel, he came to the conclusion that bank size and bank capital have a positive impact on the return on assets, while liquidity risk is negative associated with the return on assets. In the context of macroeconomic variables, such as: the devaluation of the exchange rate and the price of oil, he came to the conclusion that they have both a positive and a negative impact on profitability.

Satria et al. (2018) conducted a survey on a sample of the 10 largest commercial banks in ASEAN over the period from 2012 to 2016. They concluded that equity to asset had a positive impact on profitability, while the following factors had a negative impact on profitability: loan to deposit, investment to asset and GDP.

3. HYPOTHESES AND RESEARCH GOALS

The following hypotheses will be tested:

- a) The null hypothesis is the reason why the independent variables do not significantly affect the dependent.
- b) The alternative hypothesis is the reason why the independent variables do significantly affect the dependent.

The main objectives of this research are the following:

- *This research attempts to identify the internal and external factors that determine banks' profitability in Bosnia and Herzegovina, by investigating the effect of each one of them on profitability, mainly (the growth rate of net gross/loss, the growth rate of non-performing loans, the growth rate of gross domestic product, the concentration ratio of loans, the concentration ratio of deposits, capital adequacy ratio and loan-to-deposit ratio). Therefore, this research focuses on the determinants of banking sector profitability that can be divided into two groups, namely: internal and external factors (Gul et al. 2011).*

4. EMPIRICAL METHODOLOGY AND DATA

We want to answer the following question: *Which of the independent variables in the model has the most substantial impact on the bank profitability of Bosnia and Herzegovina on the one hand, and the other hand, which of the variables has the lowest impact?* Based on the above-mentioned research, we will investigate the aggregate effect of the bank profitability in Bosnia and Herzegovina using the following regression model:

$$ROE_{i,t} = \alpha + \alpha_1 GRNGL_{i,t} + \alpha_2 GRNPL_{i,t} + \alpha_3 GRGDP_{i,t} + \alpha_4 CR\ Loans_{i,t} + \alpha_5 CR\ Deposits_{i,t} + \alpha_6 CAR_{i,t} + \alpha_7 LDR_{i,t} + \epsilon_{i,t} \quad (1)$$

And

$$ROA_{i,t} = \alpha + \alpha_1 GRNGL_{i,t} + \alpha_2 GRNPL_{i,t} + \alpha_3 GRGDP_{i,t} + \alpha_4 CR\ Loans_{i,t} + \alpha_5 CR\ Deposits_{i,t} + \alpha_6 CAR_{i,t} + \alpha_7 LDR_{i,t} + \epsilon_{i,t} \quad (2)$$

Where:

- GRNGL* – the growth rate of profit/loss,
- GRNPL* – the growth rate of non-performing loans,
- GRGDP* – GDP growth rate,
- CR Loans* – concentration ratio of loans of the largest bank in the system,
- CR Deposits* – concentration ratio of deposits of the largest banks in the system,
- CAR* – capital adequacy ratio,
- LDR* – the loan-to-deposit ratio.

The significance of the model will be carried out by the calculation of the coefficient of correlation (r), the coefficient of determination and adjusted coefficient of determination

4.1. Data Collection

The data have been collected from the official websites of the Banking Agency of the Federation of Bosnia and Herzegovina and the Banking Agency of the Republika Srpska. This empirical study uses quarterly data for the entire banking system of Bosnia and Herzegovina. The survey period covers the period from the first quarter of 2008 to the fourth quarter of 2019. The dependent variables the return on asset (ROA) and the return on equity (ROE) were used. Seven independent variables as the growth rate of net gross/loss (GRNGL), the growth rate of non-performing loans (GRNPL), the growth rate of the gross domestic product (GRGDP), the concentration ratio for the three to five banks in terms of loan placement (CR Loans), the concentration ratio for the three to five banks in terms of deposits (CR Deposits), capital adequacy ratio (CAR) and loan-to-deposit ratio (LDR) were used. In table 1 the explanatory variables and anticipated effects of dependent and independent variables are given:

Table 1. A brief description of the dependent and independent variables in the model

VARIABLE	MEASURED BY	ANTICIPATED SIGNS
ROE	This ratio is obtained by dividing the bank's net income with equity	-
ROA	The ratio of profit to total assets	-
GRNGL	The growth rate of net gross/loss	Positive (+)
GRNPL	The growth rate of non-performing loans (payment of interest and principal past due date by 90 days or more) to total gross loans	Negative (-)
GRGDP	The growth rate of the gross domestic product	Positive (+)
CR Loans	The ratio of branch offices for the three to five banks to total bank offices for all commercial banks. Therefore, the paper will test the concentration ratio of three to five banks for loan placement	Positive (+)
CR Deposits	The ratio of branch offices for the three to five banks to total bank offices for all commercial banks. Therefore, the paper will test the concentration ratio of three to five banks for deposits	Negative (-)
CAR	Capital adequacy ratio	Negative (-)
LDR ratio	The loan-to-deposit ratio is a measure of a bank's liquidity assessment and is obtained as the ratio between total loans and total deposits.	Negative (-)

Source: Author's own study

Return on equity – (ROE) – expresses how much a bank earns on the book value of its investments. This ratio is obtained by dividing the bank's net income with equity, which reflects the revenue generation, operational efficiency, financial leverage, and tax planning. For some banks, ROE may be high because banks do not have an adequate capital ratio. The capital adequacy ratio in Bosnia and Herzegovina is 12%, which is the legal minimum so that almost all banks maintain a capital adequacy ratio. ROE can also be obtained as a product of ROA and leverage multiplier, where a bank can use this ratio between two ratios to improve ROE ratios. For example, banks with low ROA, can increase their ROE by using additional leverage, that is, by increasing their asset-equity ratio (Koch & MacDonald, 2009).

Return on assets (ROA) – is considered to be the most appropriate measure to evaluate the performance of a bank's business. The ROA is obtained by dividing the bank's income before the interest payable on its assets. Thus, ROA measures the effectiveness of management in using the resources of a bank to make a profit. It also evaluates the efficiency of the bank in using its financial and real investments to earn interest and other fees. This measure of bank profitability is particularly significant when comparing operational efficiency between banks (Sinkey, 1988).

The growth rate of non-performing loans (NPLs) – represents the sum of borrowed money by banks to debtors, where debtors have not made the payment of interest and principal at least 90 days for commercial bank loans and 180 for consumer loans (Đukić, 2011).

The growth rate of the gross domestic product (GRGDP) – is a measure of economic growth as it relates to gross domestic product from one period to another, adjusted for inflation, and presented in real terms as opposed to nominal. Vong and Hoi (2009) argue that there is a general perception where the default values of bank loans are usually lower at a time of favorable economic growth, while they are higher during adverse economic growth, and these situations do affect the profit of banks. According to Ongore and Kusa (2013), the trend of gross domestic product influences bank's assets in the context that as trends move towards a declining GDP, demand for loans decreases, which negatively affects bank's profitability. Conversely, when economic trends move toward increasing magnitude or have positive GDP growth, then such a cycle leads to a high demand for credit.

Concentration ratio (CR) and the Herfindahl-Hirschman index are the main market concentration measures that have been proposed in many books and studies. The concentration ratio shows the share of the total market, especially in the bank market (for example, measured by employment, sales, assets, deposits, and loans). The banking sector of the Republika Srpska uses a concentration rate for the three largest banks in the system (Banking Agency of Republika Srpska, 2019), while the banking sector of the Federation of Bosnia and Herzegovina uses a concentration rate for the five largest banks in the system. In this study, we took the average concentration ratio (Banking Agency of the Federation of Bosnia and Herzegovina, 2018).

The capital adequacy ratio (CAR) is the ratio determined by the regulatory body for supervising banking operations and serves to test the health of the banking system, that is, it represents a safety pill for the absorption of a certain amount of losses (Bokhari & Ali, 2009).

The loan-to deposit ratio (LDR) is a measure of banks' ability to refinance eventual withdrawal of deposits that can be realized by savers relying on credit as a source of financing. If the ratio is high, the bank may face the problem of meeting unforeseen needs for funds. Conversely, if the ratio is too low, the bank will not earn as much as it could be.

4.2. Results

Our main results are shown in this section. Before the hypothesis is tested, primary statistic indicators, correlations are given in Table 2 and 5. The total number of observations taken into consideration is 48 which represents a relatively representative sample both in terms of the company and the view of the timeframe.

Table 2 shows that the growth rate of gross domestic product was recorded the high volatility (980.674%), then the growth rate of non-performing loans (822.698%). GDP growth in the reporting period was recorded in 2007 (6%), so that in 2009 the real GDP growth recorded a negative value of 2.7%. In the period after 2009, there was a tendency of further decline in GDP until 2013, as a result of weak economic activity and weak domestic and foreign demand. From 2014 to 2017, there has been a slight improvement in economic activities measured by GDP as a reflection of economic recovery and increased exports. Also, the growth rates of non-performing loans were highly volatile. The highest value for the analyzed period was recorded in the third

quarter of 2014 (about EUR 1.32 million), while the second lowest was recorded in the third quarter of 2019 (about EUR 801 thousand). The decrease was due to the monitoring of loans from banks, partial write-offs, and an increased volume of credit placements. It is important to mention that the movement of the first volatility measure, i.e. standard deviation and mean, had the same pattern of movement in the context of higher / less volatility of the selected variables.

Table 2. Descriptive statistics of dependent and independent variable variables of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Variables	Obs	Mean	Std. Dev.	Min	Max
ROE	48	7,666	6,941	-8,53	20,40
ROA	48	0,514	0,459	-0,68	1,30
GRNGL	48	106,122	92,448	-124,29	255,35
GRNPL	48	1.590.458,0	822.698,40	382,22	2.599.508
GRGDP	48	7.112.134,0	980.674,10	539.820,40	914.403,20
CR Loans	48	73,291	4,219	68,60	82,10
CR Deposits	48	73,945	3,773	70,30	84,10
CAR	48	16,345	0,835	14,90	18,0
LDR ratio	48	90,645	5,891	78,59	99,74

Source: Calculated by the author (STATA 13.0)

Table 3. Correlation matrix between dependent and independent variables of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Variables	ROE	ROA	GRNGL	GRNPL	GRGDP	CR Loans	CR Deposits	CAR	LDR ratio
ROE	1.000								
ROA	0.979	1.000							
GRNGL	0.957	0.947	1.000						
GRNPL	-0.393	-0.424	-0.389	1.000					
GRGDP	0.782	0.706	0.739	0.471	1.000				
CRLoans	-0.664	-0.641	-0.636	-0.814	-0.752	1.000			
CRDeposits	-0.583	-0.569	-0.549	-0.863	-0.658	0.944	1.000		
CAR	0.179	0.157	0.203	0.193	0.184	-0.193	-0.194	1.000	
LDR ratio	-0.455	-0.334	-0.385	-0.071	-0.661	0.428	0.387	0.082	1.000

Source: Calculated by the author (STATA 13.0)

The strongest positive causality with return on equity was achieved by the following independent variables: the return on asset (0.979) than the growth rate of net gross/loss (0.957) and the growth rate of gross domestic product (0.782). A number of larger banks, even with low return on asset (ROA), can achieve fairly high return on equity (ROE) with high borrowing or leverage and minimal capital utilization. Also, with an increase in the rate of growth of net profit, the return on equity increases as net profit represents the basis for calculating the return. Also, with an increase in business activity measured by the GDP growth rate, it creates a favorable economic climate for foreign bank migration, which increases banking assets and lending placement, and thus influences the successful conversion of assets into bank earnings. The strongest negative correlation of the dependent variable return on equity (ROE) was recorded with the following independent variables: the concentration ratio of loans (-0.664), then the concentration ratio of deposits (-0.583), the loan-to-deposit ratio (-0.455) and growth rate of non-performing loan (-0.393). Therefore, from three to five banks in the entire banking system of Bosnia and Herzegovina hold an oligopoly position, which affects the increase of its profitability, but not the equal increase in the profitability of other banks in the system, and consequently has a slight decrease

in the total return on assets. The relationship between loan-to-deposit ratio and return on equity is inverse because the relationship between liquidity and profitability is inversely proportional. For illustrative purposes, the share of liquid assets in the total assets in the banking sector of Bosnia and Herzegovina in 2007 was amounted to a high 41.1%, while in the third quarter of 2019 it dropped to about 26.2% (Banking Agency of the Federation of Bosnia and Herzegovina and Herzegovina and Banking Agency of Republika Srpska, 2019). Such high amounts of liquid assets, especially in 2007, are primarily the result of the still present risk of credit placements, and the difficulty in finding good debtors and quality programs.

The preceding VIF cutoffs were considered to be multi collinear, which were set at industry level. Each variable that has a higher VIF than 3 was considered as multi collinear and was dropped from the model. In case of multi-collinearity, coefficients of the variables became unstable and standard errors were inflated.

Table 4. Multicollinear analysis via variance inflation factor (VIF)

Variable	VIF	1/VIF
GRNGL	2.50	0.400430
GRNPL	2.78	0.35971
GRGDP	2.85	0.350877
CRLoans	2.57	0.389105
CRDeposits	2.69	0.371747
CAR	1.14	0.877691
LDRratio	2.87	0.348432
Mean VIF	2.48	

Source: Calculated by the author (STATA 13.0)

As you can see in the previous table, each individual independent variable has a value of VIF coefficient less than 3, then it is clear that there is no multicollinearity between the variables and that the set model is valid. The total number of observations taken into consideration is 48 which represents the significance of the model. The coefficient of determination between the return on equity and the independent variables is 93.22%, while the adjusted determination coefficient is 92.03%, which means that there is a 92% change in the independent variables to the dependent relation. These 92% refers to the deviation or the smaller impact of independent variables in relation to the dependent variable.

In terms of testing the zero and alternative hypotheses through the empirical and the theoretical value of the F test, we came to the next conclusion: The empirical value of the F test for 8 degrees of freedom in the numeration and 40 in the denomination was 78,57; The obtained empirical value of the F test is 78,57, which is more than the theoretical value (2,18), which rejects the zero hypotheses and confirms the alternative hypothesis, and also confirms the individual influence of independent variables on the dependent variable.

There is a negative link between the concentration ratio of deposits (CRDeposits) and the return on equity (ROE) (-0.244). Increase the concentration ratio of deposits by one unit, ceteris paribus, leads to a decrease of return on equity (ROE) by 0.24 units. At the end of the first half of 2019, 54.7% of savings were concentrated in two banks in the Federation of B&H, while the other five banks had individual participation of less than 2.0%. Also, of the total amount of savings, 46.9% refers to savings deposits in domestic and 53.1% in foreign currency. The given concentration consequently leads to three to four banks having significant financial result in the

structure of the total financial result. For illustration, at the end of the first quarter of 2019, the following banks had the largest share in the financial result structure: UniCredit bank Mostar (34.86%), Raiffeisen bank, Sarajevo (29.81%), Intesa Sanpaolo bank (11.05%) and NLB bank (6.55%) (Banking Agency of the Federation of Bosnia and Herzegovina, 2019, p. 23).

Table 5. The basic analysis between the dependent variable (ROE) of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Source	SS	df	MS	Number of observations	48	
Model	2.111,28	8	301,61	F (8,40)	78,57	
Residual	153,55	40	3,838	Prob >F	0.000	
Total	2.264,83	48	305,448	R-squared	0.932	
				Adj R-squared	0.9203	
				Root MSE	1.959	

ROE (dependent)	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
GRNGL	0.06256	0.0048	12.81	0.000	0.05269	0.07243
GRNPL	-7.84e-07	8.62e-07	-0.91	0.368	-2.53e-06	9.58e-07
GRGDP	9.38e-07	6.58e-07	1.43	0.162	-3.91e-07	2.27e-06
CRLoans	0.02387	0.24970	0.10	0.924	-0.48081	0.52855
CRDeposits	-0.2443	0.28528	-0.86	0.397	-0.82098	0.33219
CAR	-0.1560	0.36505	-0.43	0.671	-0.89381	0.58180
LDR ratio	-0.0072	0.08214	-0.09	0.930	-0.17332	0.15872
_cons	15.1374	17.877	0.85	0.402	-20.993	51.268

Source: author's own calculations (STATA 13.0).

The same results were obtained for the second dependent variable (ROA) in the context of the comparison of the empirical and theoretical F test. The empirical value of the F test for 8 degrees of freedom in the numerator and 40 in the denominator was 55.13. The obtained empirical value of the F test is 55.13, which is more than the theoretical value (2,18), which rejects the zero hypotheses and confirms the alternative hypothesis, and also confirms the individual influence of independent variables on the dependent variable.

Table 6. The basic analysis between the dependent variable (ROA) of banks in Bosnia and Herzegovina in the period: 2008q1 – 2019q4

Source	SS	df	MS	Number of observations	48	
Model	8,979	8	1,2827	F (8,40)	55,13	
Residual	0,9307	40	0,023	Prob >F	0,000	
Total	9,9097	48	1,3057	R-squared	9,9061	
				Adj R-squared	0,8896	
				Root MSE	0,15254	

ROE (dependent)	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
GRNGL	0.00454	0.00038	11.94	0.000	0.00377	0.00531
GRNPL	-1.55e-08	6.71e-08	-0.23	0.818	-1.51e-07	1.20e-07
GRGDP	2.48e-08	5.12e-08	0.48	0.631	-7.87e-08	1.28e-07
CRLoans	0.004036	0.01944	0.21	0.837	-0.03525	0.0433
CRDeposits	-0.0169	0.0221	-0.76	0.451	-0.0618	0.0279
CAR	-0.0332	0.0284	-1.17	0.248	-0.0907	0.0241
LDR ratio	0.0073	0.0063	1.15	0.257	-0.0055	0.0202
_cons	0.7140	1.3918	0.51	0.611	-2.0988	3.5270

Source: author's own calculations (STATA 13.0).

Almost similar movements were recorded in the second dependent variable, i.e. return on assets in the context of the impact of individual independent variables. Table 6 shows the results of the ANOVA test between the dependent variables, i.e. return on asset (ROA) and the independent variables in the model. The most significant positive effects on the dependent variable (ROA) were recorded by the following independent variables: the growth rate of gross domestic product, the growth rate of net gross/loss (0.004), the concentration ratio of loans (0.004), and loan-to deposit ratio (0.007). The gross domestic product is one of the most common measures of economic activity in the country. GDP growth has a significant positive impact on the profitability of the financial sector, such that if economic activity grows at a faster pace than defined, it requires a higher amount of loans and capital and higher credit placements, which in turn affects improved banking activity. On the other hand, the strongest negative causality with the second dependent variable in the model (ROA) was recorded by the following independent variables: CRdeposits (-0.017), then the growth rate of non-performing loans and capital adequacy ratio (-0.03). Also, a high inverse relationship was observed between toxic credits and return on equity, which is quite logical. Non-performing loans increased the cost of provisioning, have the effect of reducing the bank's capital, making the bank unable to grow and expand its operations, and the result may be bank insolvency or liquidation (Babouček and Jančar, 2005). Also, banks with a high amount of non-performing loans in their investment portfolio are sure to achieve a reduction in their earnings (Bessis, 2006). In the banking sector of B&H at the end of 2018, the share of non-performing loans in total loans was amounted to only 6.5%, as a result of permanent write-offs by individual banks. Also, reprogramming and better monitoring, as well as interest rate reductions, had a greater impact on reducing toxic loans (The Central Bank of Bosnia and Herzegovina, 2018, p. 35).

According to Flannery and Rangan (2008), banks with low capital and higher levels of risk can increase profits by increasing the equity multiplier. According to our results, there is an inverse relationship between the dependent variable (ROA) and CAR. Increase the capital adequacy rate of one unit, *ceteris paribus*, leads to a decrease of return on asset (ROA) by 0.03 units. Banks in Bosnia and Herzegovina had regulatory capital above 12% of the time horizon required by law. For the observed period, CAR recorded its highest value in the third and fourth quarters of 2019, 18% respectively. The lowest value was recorded in the third and fourth quarters of 2015, 14.90% respectively.

5. CONCLUSION

Bank profitability is a very important determinant of both the bank and the entire financial system. Further lending to the economy depends on bank profitability. In this regard, bank profitability depends primarily on the amount of lending and credit risk associated with the lending, as well as other risks arising from the macroeconomic environment. In this paper, we investigated the internal and external factors that determine the profitability of banks in Bosnia and Herzegovina. For this purpose, in this study investigated took place for the banking sector of Bosnia and Herzegovina on period of 2008: q1-2019: q4 in the research part of the paper through the underlying correlation analysis, comparison of empirical and theoretical F-test in terms of testing null and alternative hypothesis. The results showed that a zero hypothesis were rejected and an alternative hypothesis accepted in terms of some independent variables that have a significant influence on the ROE and ROA. The results showed that the most significant (positive) influence on the dependent variables were the return on equity (ROE) and return on asset (ROA), which has been achieved by the following independent variables, such as the growth rate of net gross/

loss, the growth rate of gross domestic product and concentration ratio of loans. On the other hand, the most significant negative link on the dependent variables were the return on equity (ROE) and return on asset (ROA), which has been achieved by the following independent variables: the growth rate of non-performing loans, concentration ratio of deposits and loan-to-deposit ratio for the dependent variable ROE.

Improving the performance of banks in Bosnia and Herzegovina over the next few years will be a major challenge due to the influence of external factors such as slower economic growth, competitiveness, saturation of economy and population with credit, slow growth of employment and income, etc. In this regard, a successful response to a turbulent environment is certainly to forecast the bank's performance. Therefore, a larger data set of B&H banks could help to incorporate more determinants into the model and better understand the long-term and short-term relationships to the bank's profitability. This issue should be further explored.

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LABOUR MARKET TENDENCIES IN THE ERA OF THE FOURTH INDUSTRIAL REVOLUTION

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Abstract: *In the era of the Fourth Industrial Revolution, technological change is also transforming the labour market. Technological and structural unemployment is simultaneously present in the economy, as well as the labour shortage causes many problems for the firms. The labour market has to respond to both demographic and technological change, while workers' expectations and workers' preferences are transformed in the digital era. The biggest fear in the new technological era is related to robots, which generate the loss of jobs because they can substitute human resources in an efficient way. Technological changes typically threaten lower-skilled workers doing routine tasks, while the need for a high-skilled workforce combined with creativity is increasing. This asymmetry of training already appeared in the earlier industrial revolution, but nowadays digital literacy, as well as the technological knowledge necessary for the operation of machines and equipment, are becoming a basic skill, so new competence requirements are formulated for the employees. In the era of the Fourth Industrial Revolution, not only robots cause problems in the global labour market, but also international trends that cause major transformation in both the supply and demand side of the labour market. Effective labour market adaptation to technological change can be the key to competitiveness in the new technological era. This research aims to provide a short analysis of the differences in the European labour market in the era of the Fourth Industrial Revolution. The labour demand and supply will be analysed in order to highlight the main tendencies related to the qualitative features of labour market in the new technological era.*

Keywords: *The Fourth Industrial Revolution; Skill-biased technological change; European labour market; Qualitative features of labour market, Skills.*

1. INTRODUCTION: HOW THE FOURTH INDUSTRIAL REVOLUTION IMPACT ON THE LABOUR MARKET?

The Fourth Industrial Revolution induces fundamental changes in economic processes, mainly in the labour market, to which we have to adapt. Many workplaces are in danger due to the new technologies, but at the same time, new jobs are required where people create innovations and using new inventions. The new technologies can substitute the human resources in production process, because they are more efficient and make less mistakes than people. Through machine learning, routine tasks can be automated but machines cannot do the full range of tasks that humans can do. Because of this, the substitution of humans by machines and the complementarity of machines and humans exist in the same time in the labour market that should be managed by skills development. This will be the most important challenge in the labour market in the future.

According to the estimation of Frey and Osborne (2013) about 47% of total US employment is at risk by automation. The authors examined 702 jobs and they estimated that for example the work of telemarketers and library technicians with 99%, while accounting and credit analysts with 98% can be robotized within two decades. According to Chui et al. (2015), fewer than 5

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percent of occupations can be entirely automated using current technology, however, about 60 percent of occupations could have 30 percent or more of their constituent activities automated. The World Economic Forum (2016) forecasted that 7.1 million jobs will be disappeared globally, while 2 million new ones will be created by the technological progress. This report estimated that more than a third of the knowledge and skills needed for current jobs to load changes within five years (will not be part of the knowledge currently in use longer needed, however, increases the demand for new skills specified). According to a joint survey by the ILO and the EU, technological progress is eliminating only 10% of jobs, elsewhere changing tasks and creating new job opportunities (Artner, 2019:20). Szalavetz (2018:56) also emphasized that the diffusion of new technologies creates new workplaces too. A significant employment growth is expected, for example, in manufacturers, service providers and installers of industrial robots, infrastructure providers of cyber-physical systems, including suppliers of security solutions for these systems. The number of people employed in business intelligence activities and cyber-physical production systems will increase. In sum, a significant rearrangement is expected in the labour market, which favours mainly the skilled workers with up-to-date knowledge. According to Andor (2018:47) it seems to be more difficult to reconcile the flexibility required by economic competition with the stability of employment and the quality of jobs and the exploitation of the possibilities of the technology with the need to maintain quality jobs and social cohesion. The society needs to be prepared to receive, process and evaluate the rapidly expanding amount of information and knowledge (Simai, 2018:94). Kovács (2017) also emphasized that this industrial revolution transforms our working and living conditions.

Technological progress generates changes not only the structure of labour market but also the content of jobs. The survey of Chui et al. (2016:8) finds that in practice, automation will depend on more than just technical feasibility, other factors are important such as costs to automate, the relative scarcity, skills, and cost of workers who might otherwise do the activity; benefits of automation beyond labor-cost substitution; and regulatory and social-acceptance considerations. Based on these results skills are very important to realize technological progress. A survey so-called 'The Revolution of Skills' was commissioned by ManpowerGroup finds that creativity, emotional intelligence, and cognitive flexibility are the skills which that differentiate human resources and allow them to rise above machines without being replaced (Manpower-Group, 2016). This survey is pointed out the relevance of staff training which allows employees to develop their skills in the workplace. The relevant literature (i.e. Autor et al, 2013; Frey and Osborne, 2013; Nedelkoska and Quintini, 2018) pointed out that the automation is not possible in the case of tasks requiring perception and/or skilful handling as well as creative or social intelligence (MKIK 2019). Fazekas (2019:23) emphasizes that the share of jobs requiring both mathematical and non-cognitive skills has increased rapidly in recent years. At the same time, a high decline is observed in jobs requiring neither mathematical nor social skills. The author pays the attention to young people have to have the skills needed to adapt to technological changes and to be motivated and able to learn new skills which are required by new technologies. The early school leaving is dangerous because, as school time increases, these skills can be acquired more confidently.

The Fourth Industrial Revolution generates skill-biased technological changes, where developed countries have a competitive advantage. It's because, in higher-income countries, there are more skilled workers, and therefore, these countries choose technology that requires high-skilled labour, whose labour productivity is higher. In contrast, lower-income countries choose technology that is better suited to the unskilled labour force which is better available to them.

The acquisition of new skills is essential both in higher and lower-income countries, but the productivity will be different so the gap becomes bigger between them. It is interesting that in the long run, in developed countries they fear a decline in job opportunities while the labour market of less developed countries labour demand is expected to increase (Boda 2017; Fülöp 2018).

This research aims to highlight the main trends in the European labour market from the aspect of the Fourth Industrial Revolution. It is assumed that there is a strong correlation between innovation capability and labour market adaptability, so if the labour market adapts faster to the new challenges, the benefits of innovation can be exploited more effectively. Summarizing the labour market trends in the European Union since the millennium, Artner (2018) finds that although employment is growing, working conditions become worse. At the same time, unemployment is growing and mainly the youth unemployment causes problems, the ratio of neither in employment nor in education and training increases. It is favourable for technological development that the atypical forms of employment are spreading rapidly in the European labour market which facilitates the situation of workers through flexibility. *This analysis focus on skills and other qualitative features of labour market. The research question is what differences can be observed between European countries grouped by innovation performance in terms of new labour market trends.*

2. DATABASE AND METHODOLOGY

This research focuses on the qualitative features of the European Union labour market. The current 27 member states of the European Union were involved in the analysis and they were classified into innovation performance groups based on the Summary Innovation Index (SII) which is calculated from the European Innovation Scorecard. Based on SII, countries are classified into four innovation performance groups: innovation leaders, strong innovators, moderate innovators and modest innovators. According to EIS (2020) EU 27 countries can be grouped as follows (the order fits for innovation performance):

- *Innovation leaders*: Sweden, Finland, Denmark, Netherlands, Luxembourg,
- *Strong Innovators*: Belgium, Germany, Austria, Ireland, France, Estonia, Portugal,
- *Moderate Innovators*: Cyprus, Spain, Slovenia, Czech Republic, Malta, Italy, Lithuania, Greece, Slovakia, Hungary, Latvia, Poland, Croatia
- *Modest Innovators*: Bulgaria, Romania

The Europe 2020 strategy was aimed at the improvement of flexibility and efficiency of the European labour market in order to realize smart, inclusive, and sustainable growth but this strategy is pointed out the heterogeneity of Europe in terms of competitiveness (WEF 2012). It's because the labour market is analysed by innovation performance groups to give a comprehensive picture of main differences.

Firstly, it is worth comparing the labour productivity of innovation performance groups because despite the intensive technological progress there is no rapid productivity growth in developed countries. Figure 1 illustrates the changes in real labour productivity in the EU member states grouped by innovation performance groups related to 2010.

Based on Figure 1, the highest growth in real labour productivity is observed in modest innovator countries (Bulgaria and Romania), it is around 18% on average per year while innovation leaders' productivity growth is only 2% on average per year. The dynamism of growth in labour

productivity is very similar in strong innovators and moderate innovators, it is around 6%. This tendency is associated with income convergence but it is interesting because new technologies appeared mainly in developed, innovation leader countries. Nevertheless, productivity grew faster in less developed, less innovative countries although it is assumed that new inventions generate intensive growth in innovation leader countries.

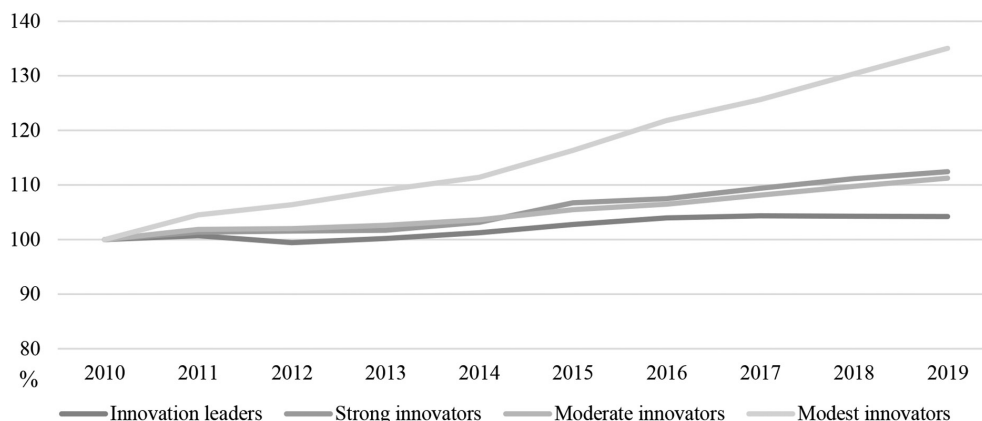


Figure 1. Changes in real labour productivity per person by innovation performance groups (2010=100%)

Source: own calculations based on Eurostat (2020)

To analyse the differences of European labour market, the Global Competitiveness Index 4.0 was used which contains a wide range of variables related to the labour market, skills and innovation capability². The GCI 4.0 is organized into 12 main drivers of productivity and it contains variables related to the new phenomenon of the Fourth Industrial Revolution. The pillar of Skills includes variables related to the current and future workforce. Mean years of schooling, extent of staff training, quality of vocational training, skillset of graduates, digital skills among active population and ease of finding skilled employees, school life expectancy, critical thinking in teaching and pupil-teacher ratio in primary education are measured in this pillar. The pillar of Labour market divided into two parts as flexibility and meritocracy and incentivization. It can be measured the redundancy costs, hiring and firing practices, cooperation in labour-employer relations, flexibility of wage determination, active labour market policies, worker's rights, ease of hiring foreign labour, internal labour mobility, reliance on professional management, pay and productivity, ratio of wage and salaries female workers to male workers, and labour tax rate. It is assumed that the more competitive economics typically have greater innovation capability. The Summary Innovation Index 2019 and Innovation capability of EU member states are strongly correlated (the correlation coefficient is 0.8679) so the innovation performance groups are suitable for analysis the labour market trends with the variables of GCI 4.0. Figure 2 shows the standardized values of two variables related to the EU member states grouped by innovation performance which reflects the relationships between them.

Using parametric and non-parametric tests, the qualitative features of labour market are compared to highlight the significant differences between EU member states grouped by innovation performance. Firstly, the normal distribution of variables is tested using Kolmogorov-Smirnov test. If a variable has a normal distribution, ANOVA and Independent-Samples t test is used to compare the means of country groups. There is another prerequisite of t test, it is the homoscedasticity which is tested by the Levene's test. If equal variances are not assumed, Welch's t test is used to compare means.

² The units and the source of the variables included in the analysis can be found in the appendix (Table A1).

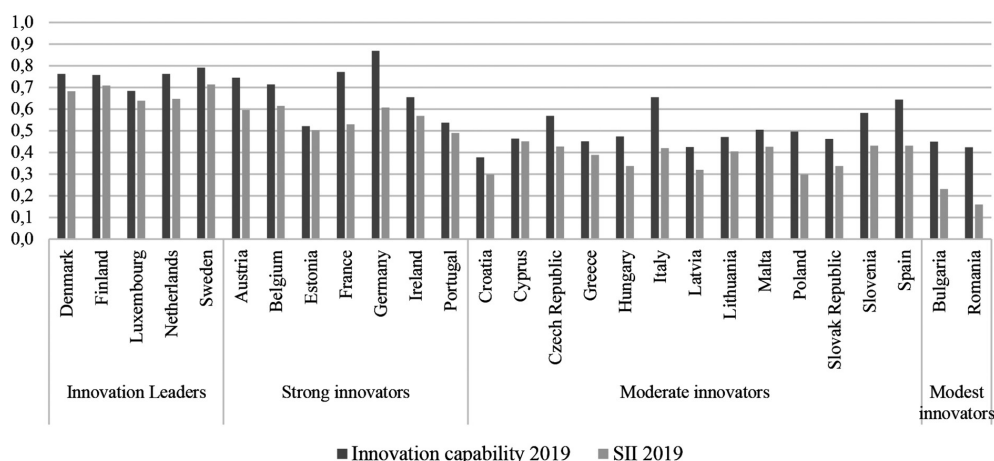


Figure 2. The comparison of standardized values of Innovation capability and Summary Innovation Index in EU 27 by innovation performance groups
Source: own construction based on Global Competitiveness Index 4.0 (2019) and EIS 2020

3. EMPIRICAL RESULTS

Before the detailed analysis of labour market, the relationship between innovation capability and skills and labour market (Figure 3) is analysed because it is assumed that if the labour market is more adaptable to the technological changes, the innovation capability is better. The innovation capability pillar contains variables related to diversity of workforce, state of cluster development, international co-inventions, multi-stakeholder collaboration, scientific publications, patent applications, R&D expenditures, research institutions prominence, buyer sophistication and trademark applications. Because of this, the qualitative features of labour market and innovation can be compared in EU member states.

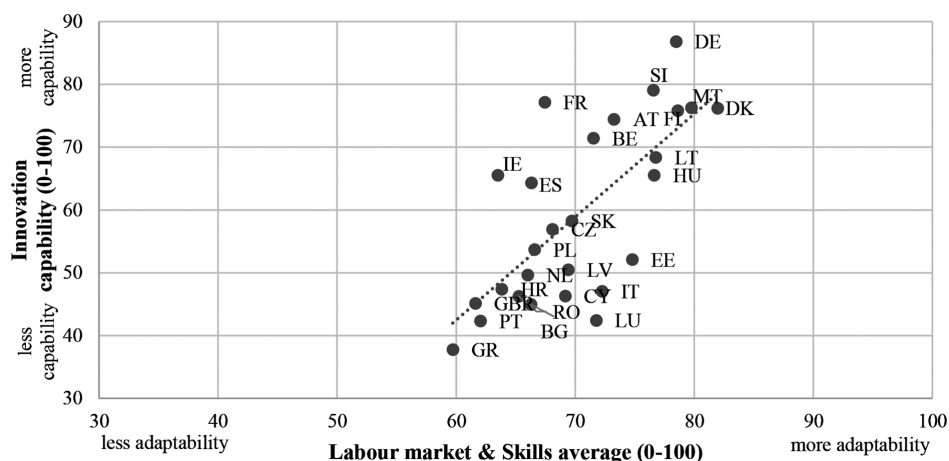


Figure 3. The relationship between the average of labour market and skills and innovation capability in EU member states

Source: own construction based on Global Competitiveness Index 4.0 (2019)

There is strong correlation between the average of labour market and skills and innovation capability in EU member states, the correlation coefficient is 0,7077. Based on Figure 3, we can conclude that if the qualitative features of labour market and skills are better, the innovation capability is higher in a country. Nevertheless, the causal relationship is not clear for innovation performance groups. The moderate and modest innovator countries' labour market and

skills are better than their innovation capacity while innovation leaders and strong innovators have more capability to innovate than their labour markets' adaptability. This trend reflects that countries with less innovation performance can improve their situation if their labour market adapts well to the challenges of the Fourth Industrial Revolution.

In the next step of the analysis, normal distribution of variables related to skills and labour market is tested. Using Kolmogorov-Smirnov test there is normal distribution in the case of all variables of Skills pillar (results are seen in Appendix, Table A2), so ANOVA is used to compare means of innovation performance groups. The results of ANOVA related to the elements of Skills' pillar are in Table 1.

Table 1. The results of ANOVA comparing means of Skills' pillar variables

Variable	F	Sig.
Mean years of schooling	0.636	0.599
Extent of staff training	20.688	0.000
Quality of vocational training	17.999	0.000
Skillset of graduates	22.292	0.000
Skillset of secondary-education graduates	20.905	0.000
Skillset of university graduates	19.579	0.000
Digital skills among active population	12.591	0.000
Ease of finding skilled employees	7.305	0.001
School life expectancy	3.300	0.038
Critical thinking in teaching	28.263	0.000
Pupil-to-teacher ratio in primary education	4.138	0.017

Source: own calculations based on Global Competitiveness Index 4.0 (2019)

Table 1 shows that there is a significant difference between innovation performance groups for almost all indicators except mean years of schooling. In Innovation leader countries 12.6355 years, in strong innovators 11.9994 years, in moderate innovators 11.8562 years while in modest innovators 11.3966 years are the mean of schooling. These average values are close to each other, but the difference between countries are higher. Comparing the mean years of schooling in EU member states, the lowest value is in Portugal (9.1909), while the highest value is in Germany (14.1322). These countries are also strong innovators, so the variable of years of schooling cannot affect significantly on innovation performance of EU member states.

Table 2. The results of t test/Welch test comparing means of Skills' pillar variables by innovation performance groups

Variable	Innovation leaders and strong innovators		Strong and moderate innovators		Moderate and modest innovators	
	t/Welch test	Sig.	t/Welch test	Sig.	t/Welch test	Sig.
Mean years of schooling	0.953	0.370	0.201	0.845	0.849	0.464
Extent of staff training	4.030	0.004	4.204	0.001	2.070	0.067
Quality of vocational training	1.886	0.089	4.258	0.001	1.228	0.241
Skillset of graduates	3.552	0.005	5.342	0.000	2.610	0.097
Skillset of secondary-education graduates	3.300	0.010	4.902	0.000	1.945	0.225
Skillset of university graduates	2.908	0.016	5.223	0.000	3.433	0.007
Digital skills among active population	4.067	0.002	2.524	0.024	-0.398	0.697
Ease of finding skilled employees	1.536	0.156	2.784	0.014	1.682	0.195
School life expectancy	0.715	0.498	1.361	0.204	3.924	0.012
Critical thinking in teaching	4.533	0.002	4.934	0.000	0.381	0.760
Pupil-to-teacher ratio in primary education	-1.297	0.224	0.263	0.798	-5.214	0.020

Source: own calculations based on Global Competitiveness Index 4.0 (2019)

ANOVA is a statistical method which is able to compare means of more than two groups so we got a comprehensive picture of significant differences between innovation performance groups. It is worth comparing means of groups by pairs too because several differences can emerge between them. Independent-Samples t test can be run to compare the means of innovation performance groups. Equal variances are not assumed in the case of 30 variables from 33 based on this test. In these cases, Welch's t test is used instead of t test to compare means. The results are in Table 2 highlighted t test and significant differences (the difference is significant if P value is higher than 0.05).

As a result of this analysis, there are significant differences between groups in several cases. The skillset of university graduates is the only variable which is not different significantly in innovation performance groups. The extent of staff training, the skillset of graduates, the skillset of secondary-education graduates, digital skills among active population, and critical thinking in teaching are the variables that can differentiate moderate and modest innovators, but there is no significant difference in other innovation performance groups. There is a significant difference in the quality of vocational training, the ease of finding skilled employees between innovation leaders and strong innovators while the school life expectancy and pupil-to-teacher ratio in primary education as metric variables can differentiate the more innovative groups. Summarizing the results, we can conclude that the differences in metric variables are more clearly seen between groups and the informal trainings are more important for innovation leaders. The biggest difference is measured between moderate and modest innovators, while strong innovators and moderate innovators are less different.

To continue the analysis, using Kolmogorov-Smirnov test there is normal distribution in the case of all variables of Labour market pillar (results are seen in Appendix, Table A2), so ANOVA is used to compare means of innovation performance groups. The results of ANOVA related to the elements of Labour market pillar are in Table 3.

Table 3. The results of ANOVA comparing means of Labour market' pillar variables

Variable	F	Sig.
<i>Redundancy costs</i>	0.983	0.418
<i>Hiring and firing practices</i>	2.906	0.056
Cooperation in labour-employer relations	12.720	0.000
<i>Flexibility of wage determination</i>	2.078	0.131
Active labour market policies	7.666	0.001
<i>Ease of hiring foreign labour</i>	1.398	0.269
<i>Internal labour mobility</i>	1.112	0.365
Reliance on professional management	17.878	0.000
Pay and productivity	6.037	0.003
Ratio of wage and salaried female workers to male workers	5.485	0.005
<i>Labour tax rate</i>	1.464	0.250

Source: own calculations based on Global Competitiveness Index 4.0 (2019)

Table 3 shows a quite different picture in labour market than skills between innovation performance groups. There is significant difference in redundancy costs, hiring and firing practices, flexibility of wage determination, ease of hiring foreign labour and internal labour mobility. It reflects that the qualitative features are different depending on a country's innovation performance. The adequate human resources are essential to exploit the advantages of innovation potential. It is worth comparing means of groups by pairs too; Independent-Samples t test can be run to compare the means of innovation performance groups. Equal variances are not as-

sumed in the case of 30 variables from 33 based on this test. In these cases, Welch's t test is used instead of t test to compare means. The results are in Table 4 highlighted t test and significant differences (the difference is significant if P value is higher than 0.05).

Table 4. The results of t test/Welch test comparing means of Labour market' pillar variables by innovation performance groups

Variable	Innovation leaders and strong innovators		Strong and moderate innovators		Moderate and modest innovators	
	<i>t/Welch test</i>	<i>Sig.</i>	<i>t/Welch test</i>	<i>Sig.</i>	<i>t/Welch test</i>	<i>Sig.</i>
<i>Redundancy costs</i>	-0.454	0.663	0.361	0.726	2.613	0.128
<i>Hiring and firing practices</i>	1.094	0.307	1.445	0.176	-3.080	0.058
Cooperation in labour-employer relations	3.321	0.008	2.357	0.036	1.395	0.270
<i>Flexibility of wage determination</i>	-1.226	0.249	-0.733	0.483	-1.025	0.324
Active labour market policies	1.553	0.152	3.085	0.007	1.362	0.200
<i>Ease of hiring foreign labour</i>	-0.019	0.985	1.605	0.136	-1.513	0.320
<i>Internal labour mobility</i>	0.021	0.984	1.682	0.110	-0.813	0.531
Reliance on professional management	2.855	0.019	3.965	0.002	2.543	0.025
Pay and productivity	1.063	0.321	2.562	0.025	0.618	0.577
Ratio of wage and salaried female workers to male workers	1.032	0.343	2.723	0.014	0.448	0.722
<i>Labour tax rate</i>	-1.791	0.105	0.948	0.367	1.094	0.355

Source: own calculations based on Global Competitiveness Index 4.0 (2019)

It can be seen only the reliance on professional management which is not different significantly in innovation performance groups. The strong and moderate innovators do not differ significantly in other features. There is a significant difference in active labour market policies, pay and productivity, and ratio of wage and salaried female workers to male workers between innovation leaders and strong innovators as well as between moderate and modest ones. Summarizing these results, we can conclude that the European labour market is heterogeneous related to innovation performance. The less flexible and less adaptable labour market creates worse opportunities for innovation.

4. CONCLUSION

The Fourth Industrial Revolution induces changes in the labour market to which we have to adapt. Many workplaces are in danger due to the new technologies, but at the same time, new jobs are required where people create innovations and using new inventions. The substitution of humans by machines and the complementarity of machines and humans exist in the same time in the labour market that should be managed by skills development. This research aimed to illustrate the differences related to skills and labour market in EU member states grouped by innovation performance groups based on Summary Innovation Index. There is a strong correlation between the quality of labour market and innovation capacity – if the labour market is more adaptable, the innovation capability is higher. Using parametric and non-parametric test, we can conclude that the qualitative features of labour market are more different than skills between innovation performance groups. The biggest difference is measured between moderate and modest innovators, while strong innovators and moderate innovators are less different. Innovation leader countries create the most favourable environment for innovation, the labour market can adapt more efficient to technological changes. There are no significant differences in reliance

on professional management and the skillset of university graduates between country groups. Summarizing the results, the European labour market is heterogeneous in terms of skills and qualitative features related to innovation performance. The less innovative countries have to adapt to technological changes in a more efficient way to provide adequate human resources for innovation which can generate productivity and economic growth.

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APPENDIX

A1. Variables of Skills and Labour market pillars of the Global Competitiveness Index 4.0

Pillar	Variable	Units	Source
SKILLS	Mean years of schooling	years	UNESCO: Wittgenstein Centre for Demography and Global Human Capital
	Extent of staff training	1–7 (best)	WEF Executive Opinion Survey
	Quality of vocational training	1–7 (best)	WEF Executive Opinion Survey
	Skillset of graduates	1–7 (best)	WEF Executive Opinion Survey
	Skillset of secondary-education graduates	1–7 (best)	WEF Executive Opinion Survey
	Skillset of university graduates	1–7 (best)	WEF Executive Opinion Survey
	Digital skills among active population	1–7 (best)	WEF Executive Opinion Survey
	Ease of finding skilled employees	1–7 (best)	WEF Executive Opinion Survey
	School life expectancy	years	UNESCO: Wittgenstein Centre for Demography and Global Human Capital
	Critical thinking in teaching	1–7 (best)	WEF Executive Opinion Survey
	Pupil-to-teacher ratio in primary education	ratio	World Development Indicators
LABOUR MARKET	Redundancy costs	weeks of salary	World Bank: Doing Business
	Hiring and firing practices	1–7 (best)	WEF Executive Opinion Survey
	Cooperation in labour-employer relations	1–7 (best)	WEF Executive Opinion Survey
	Flexibility of wage determination	1–7 (best)	WEF Executive Opinion Survey
	Active labour market policies	1–7 (best)	WEF Executive Opinion Survey
	Workers' rights	0–100 (best)	WEF calculations based on International Trade Union Confederation. 2019 Global Rights Index
	Ease of hiring foreign labour	1–7 (best)	WEF Executive Opinion Survey
	Internal labour mobility	1–7 (best)	WEF Executive Opinion Survey
	Reliance on professional management	1–7 (best)	WEF Executive Opinion Survey
	Pay and productivity	1–7 (best)	WEF Executive Opinion Survey
	Ratio of wage and salaried female workers to male workers	%	WEF calculations based on ILO
	Labour tax rate	%	World Bank: Doing Business

Source: WEF (2019)

A2. The results of Kolmogorov-Smirnov test of variables

Pillar	Variable	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
SKILLS	Mean years of schooling	0.498	0.965
	Extent of staff training	0.690	0.728
	Quality of vocational training	0.579	0.890
	Skillset of graduates	0.587	0.881
	Skillset of secondary-education graduates	0.504	0.961
	Skillset of university graduates	0.657	0.781
	Digital skills among active population	0.739	0.646
	Ease of finding skilled employees	0.783	0.572
	School life expectancy	0.634	0.816
	Critical thinking in teaching	0.809	0.529
	Pupil-to-teacher ratio in primary education	0.890	0.407
LABOUR MARKET	Redundancy costs	0.858	0.453
	Hiring and firing practices	0.540	0.932
	Cooperation in labour-employer relations	0.463	0.983
	Flexibility of wage determination	0.754	0.620
	Active labour market policies	0.524	0.947
	Workers' rights	0.672	0.757
	Ease of hiring foreign labour	0.699	0.713
	Internal labour mobility	0.522	0.948
	Reliance on professional management	0.524	0.946
	Pay and productivity	0.631	0.821
	Ratio of wage and salaried female workers to male workers	0.516	0.953
	Labour tax rate	0.858	0.453

Source: own calculations based on GCI 4.0

TECHNICAL-ECONOMIC EVALUATION OF CORN SILAGE AND MANURE FOR ELECTRICITY AND HEAT PRODUCTION IN SLOVAK REPUBLIC

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Abstract: *This article is focused on technical-economic evaluation of the efficiency of corn silage in comparison with manure in case of combined production of electricity and heat. Mentioned energetical sources are used for production of biogas by fermentation in biogas plants, which include equipment for cogeneration. We analysed resources' efficiency of installations with installed capacity of 1 MW. We found that the use of manure with deterministically defined value, NPV 2 508 303 EUR and IRR 26.35% is more effective. NPV for corn silage was 1 690 562 EUR and IRR 21.37%. Price of electricity, use of electricity and initial investment in both projects have the greatest impact on the change of criterion. Taking into account the risk from Monte Carlo simulation, we found, that with any risk aversion, the NPV of the monitored projects will never be negative. Functions of density and distribution confirmed the ranking of energy resources' efficiency obtained using NPV and IRR criteria. It can be stated that both investment plans are very perspective.*

Keywords: *Efficiency, Biomass, Cogeneration.*

1. INTRODUCTION

No mature civilization can imagine everyday life without electricity or without heat during winter period. As the population is still growing and technology evolves, the question of sufficient energy reserves is very important. Fossil fuels are often very criticized for their environmental impact and the urgency of replacing them by renewable sources is increasing. The question arises: to what extent are we able to replace conventional resources by alternative ones, and if it is economically efficient. The usage of alternative sources often requires new approaches in technology, which may be more efficient than conventional sources, but less affordable. That is why we decided to focus our attention on the research oriented on efficiency of using two alternative energy sources: corn silage and pig manure. These energy sources are used for biogas production by fermentation in biogas plants, which include cogeneration plants. They are used for combined production of electric and heat energy. From a practical point of view and assuring sufficient quantities, these sources are suitable for installations with installed capacity approximately up to 1 MW.

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2. THEORETICAL BACKGROUND

There is no precise guidance on assessing investment projects. When investing, it is extremely important to choose an evaluation methodology already in the project preparation phase, and if we want to compare them, it is important to keep the same methodology for all of them. Although the existing methods considerably vary in their implementation, they all share a common principle – they are based on the budget calculation of the project's economic return, which is defined as a series of discounted cash flows (Chiesa and Frattini, 2009). The value of innovation is measured in terms of its contribution to creating economic value from the required investments. This technique offers many variations (Koller, Goedhart, Wessels, 2010). Kroi and Oclon (2018) addressed the question of the profitability of energy production for combined heat and power installations. They developed a mathematical model for this analysis. According to the authors, mathematical modeling has proved to be a reliable tool for evaluating the efficiency and profitability of a cogeneration unit.

The criterion of Net Present Value (NPV) is considered by Dallimer et al. (2018) as the generally acceptable criterion used in the assessment of the technical and economic feasibility of installing geothermal drilling systems to exploit geothermal energy production in Ukraine. They designed the expected performance and profitability for different depths and thermal water flows using analytical heat transfer methods combined with the current net value. The technical-economic analysis of biofuel production was presented by Ingle, Chandel and da Silva (2020). They used discounted cash flows to estimate NPV. They allowed organizations to decide which projects to continue and how to optimize them to maximize profits. Hazen (2003) defined Internal Rate of Return (IRR) as a method which can be used for any project selection decision. This method requires the definition of the cash flow investment balance and a discount rate analysis. The method is in accordance with the present value.

There are many sources of risk that a decision-maker must take into account before making a decision to invest. Therefore, it is important that sources of risk are available. Only then, it is possible to carry out the necessary identification, analysis and response. The source of risk is any factor that may affect the investment project or performance of a business. The risk occurs when this effect is both uncertain and significant in its impact on the project or on the performance of the company (Merna and Al-Thani, 2007). In order to identify risk factors, the sensitive analysis can be used. The sensitivity analysis can be defined as follows: It is an examination of how uncertainty in model output (numerical or otherwise) can be divided into different sources of uncertainty in model inputs (Saltelli et al., 2004). The impact of identified risk factors should be subsequently analyzed by using a simulation method which analyzes several possible scenarios.

The Monte Carlo method is widely applicable. It is used to determine the approximate solution of probabilistic and deterministic problems by means of repeated random experiments. The use of method is based on establishing a probabilistic problem that has the same solution as the original problem. Stochastic-technical-economic analysis was performed by Frank et al. (2018) in the production of willow biomass. The model was based on input price parameters for production and willow yield. With Oracle Crystal Ball program, they earned 24-year net present value under price and revenue uncertainty. They found the interval at which it moves and NPV at 95% confidence level. The main contribution of their paper is determining the probability of acquiring NPV values. With ASPEN Plus® V8.2, Haigh et. al. (2018) proposed six conceptual scenarios of the producing biofuel process from biomass by fermentation, using the process

performance data. The most efficient scenario was also the best performing scenario, with the best values of NPV and IRR. The technical-economic efficiency of gasification of biomass from *Spartina argentinensis* in Argentina for combined energy purposes was evaluated by Emiliano (2017). The investment plan was subjected to a sensitive analysis, based on which the lower and upper limits of NPV were expressed. He pointed out on the importance of the impact of natural gas prices on economic results. According to research, energy efficiency and selling price of electricity have been identified as the most important factors affecting NPV.

3. METHODS

The basis of the evaluation of the technical-economic effectiveness of investment projects is the correct construction of a multi-period balance model, which consists of technological and economic input data. Subsequently, we evaluated efficiency using two criteria: the net present value (NPV) and the internal rate of return (IRR). NPV is defined as the sum of the current annual net income values obtained during the project implementation period. A project with a positive NPV is acceptable. The project with negative NPV is rejected (Roštárová, 2016). IRR is the rate at which the net present value of the project is 0. The evaluation of project acceptance is based on the relationship between IRR and discount rate (Hartman and Schaftrick, 2010). The project which has higher IRR than discount rate is accepted.

For quantification of IRR, we used hypothesis analysis available in Microsoft Excel software. For identification of the risk factors, we used sensitivity analysis, which examines the effect of changing one input factor on changing the target criterion (Hanafizadeh, 2004). We examined the effect of a 10% factor change. If it causes a change of more than 10%, it is a risk factor. Deterministic assessment (NPV and IRR) was strengthened by stochastic analysis, taking into account the risk in decision making. We simulated 1000 scenarios for each variant using the Monte Carlo method in the promo version of @Risk for Microsoft Excel. It provided the probabilities with which NPVs would acquire certain values as well as the possibility of a comprehensive comparison of investment projects using density and distribution functions. Data for the analysis were obtained from private companies that had a study carried out for each investment project.

4. DATA ANALYSIS

We evaluated two projects: a biogas plant with the main input of corn silage and the second plant with the main input of manure with an installed capacity of 1 MW with a lifetime of 15 years. In the following part, we describe the components of the multi-periodic balance model. The investment for a corn silage project is 4 046 428 EUR and for manure 4 396 000 EUR. The layout of the technological and architectural part is 70% and 30%. Our analysis is based on one bank loan at a discount rate of 4.7%. The repayment period is 6 years with a 2-year period of grace. Acquired assets were allocated into depreciation groups. The technological part was included in the 4th group with 12 years of repayment and the construction into the 5th group with 20 years of repayment. 1 MW of electricity per hour and 0.86 MW of heat energy is produced in case of manure. In case of corn silage the ratio is 1 : 1. Both heat and electricity are generated 8040 hours per year, with 70% of its own electricity consumption and 1,582 MW for corn silage and 1,360 MW for manure. The price of heat is set at 59.60 EUR per MW and the price of electricity is set at 134.08 EUR in order to favor the production of electricity from waste biomass by fermentation and biogas production.

In addition to energy, digestate is produced as well, which is a high-quality organic fertilizer. The use of corn silage produces 19 077 t per year and 50 000 t for manure, which can be sold at price agreed with the customer. We considered a unit price of 1 EUR. We had foreseen an external maintenance cost of 78 500 EUR for energy production facilities and the same amount for external maintenance of other facilities. For corn silage we considered one employee (part-time) at cost of 7 700 EUR and for manure we considered two employees at cost of 24 500 EUR. Equipment insurance costs were set at 16 800 EUR per year. Other unspecified material needed for corn silage requires annual cost of 12 000 EUR. For cogeneration of corn silage we need 17 150 t of corn silage at a price of 24 EUR, 6 500 t of sludge at unit price of 1 EUR and 200m³ of water at unit price of 0.50 EUR. In case of second project, the material cost include manure from 30 000 t of pigs per year at price of 0,10 EUR, 10 000 t of sorghum silage at price of 12 EUR, 1 700 t of fat at price of 5 EUR and 63 100 t of oil for 0,80 EUR/t.

Both biogas plants represent perspective projects, because the cumulative cash flow calculation is positive throughout the reporting period. However, the second investment project with manure appears to be more efficient, because of higher values.

Table 1. Cash flow for cogeneration 1MW in EUR

Years	3	16	17
corn silage			
Cash flow	101 085	639 631	639 631
cumulative Cash flow	101 085	5 600 440	6 240 071
discounted Cash flow	80 244	186 702	172 872
manure			
Cash flow	225 434	786 226	786 226
cumulative Cash flow	225 434	7 362 981	8 149 207
discounted Cash flow	178 957	229 492	212 492

Source: own processing

We evaluated the efficiency of projects using the investment decision criteria. The net present value of Project 1 was 1 690 562 EUR, but for Project 2, it was higher - 2 508 303 EUR, resulting in better efficiency of the manure biogas plant. The second criterion - IRR is higher than the chosen discount rate of 8% for both projects (corn silage 21.37% and manure 26.35%), proving that both projects will yield a return higher than the return on the capital market at the given rate.

The evaluation criterion is influenced by the input parameters. Their effect was monitored using a sensitivity analysis, from which we expressed the risk factors.

We analyzed the impact of the 10% change of the risk factors on the NPV. In this case, the price of electricity, the use of electricity and the discount rate had the greatest impact on both variants. If we increased the price of electricity, NPV would fall by 35% for corn silage and by 23% for manure. NPV decreases by the same values when the electricity use is reduced. The change in the initial investment would change NPV by 17% for corn silage and by 13% for manure. The price of the main input is only a risk factor for maize silage (14%), the same applies in case of the price of heat (13%). The discount rate for corn silage will bring 12% change and for manure over 10%. Factors are referred to as risk factors. In order to take into account the risk, we performed a simulation of 1000 scenarios for each project. We used the Monte Carlo method to determine the impact of all risk factors at once on the target criterion NPV.

The manure biogas plant is the most suitable option due to the highest mean value of NPV (2 542 230 EUR). It may range from 1 648 481 EUR to 3 528 288 EUR. The mean value of NPV of corn silage is 1 735 756 EUR and may range between 667 875 EUR and 2 845 570 EUR. With a probability of 68%, NPV values will range from 2 196 508 EUR to 2 888 552 EUR for manure, and from 1 372 521 EUR to 2 098 991 EUR for corn silage. The coefficient of skewness is very close to 0, indicating normal distribution. The coefficient of kurtosis shows a more pointed distribution (manure 2.61 and corn silage 2.85) than the normal distribution of each project, and the probability of extreme values fluctuating around the mean value is reduced. The probabilities with which NPV for each variant will fall below the value assigned to that probability are shown in Table 2, which expresses the risk of reaching the assigned value.

Table 2. Critical values of NPV for individual variants of cogeneration 1 MW

source	corn silage	manure
5%	1 131 417	1 952 891
10%	1 251 779	2 085 947
20%	1 424 471	2 251 337
25%	1 495 516	2 304 494
30%	1 542 343	2 360 262
35%	1 601 743	2 410 743

Source: own processing

Even with probability of 5%, we can expect the NPV of the first project will not fall below 1 131 417 EUR and for the second project below 1 952 891 EUR. By analogy, if at 5% this is a given value, then with a probability of 95% the value will be higher than this one.

To compare the efficiency of biogas stations, the density functions are shown in the Figure 1.

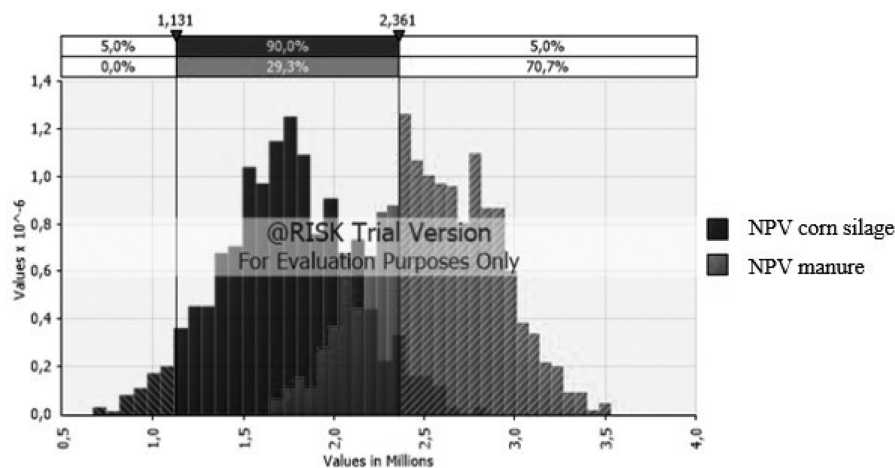


Figure 1. Function of density for both variants

Source: own processing

Based on the results of our analysis, the use of manure clearly turned out to be more efficient project, since its NPV values in the graph are much more to the right (NPV reaches a higher mean value), while both distribution functions are similarly steep, thus having a similar level of risk. In case of investment into corn silage biogas plant there is a 90% probability that NPV will be from interval 1 131 417 EUR to 2 360 513 EUR, and with the probability of 5%, the NPV will be higher than the upper limit of the interval. In case of manure, the values will be higher with 70.7% probability.

The use of manure has proved to be a more effective project. The probability of acquiring the expected NPV (corn silage 1 690 562 EUR, manure 2 508 303 EUR) by a deterministic assessment is 44.7% for corn silage and 45.6% for manure.

When analyzing 1 MW biogas stations, there is a different correlation between risk factors and NPV. There is a moderate correlation between the electricity selling price and the assessment parameter, which takes values for corn silage 0.6 and manure 0.7. The initial investment represents negative low correlation for corn silage (-0.44) and negative medium correlation for manure (-0.54). The use of electricity in conjunction with NPV has a positive low correlation of 0.45 for silage and 0.47 for manure. Among these factors, there are relatively similar correlations with the output variable for variations. With the use of manure, the price of corn silage (-0.25) or the discount rate (-0.21) have relatively low negative correlation and the heat price (0.22) have a positive correlation.

Picture 4 provides an overview of the distribution functions for the two cogeneration plants with a power output of 1 MW differing in their source of use. Distribution functions provide a comprehensive comparison of the two projects. The graph illustrates the existence of a first degree stochastic dominance. The stochastic dominance of the next stages does not occur because the distribution functions of investment project do not intersect.

The biogas plant for manure strongly dominates the corn silage plant, respectively the project two is strongly dominated by the project one. The arrangement of the distribution functions results in the ranking of effectiveness of the projects - 1st manure and 2nd corn silage.

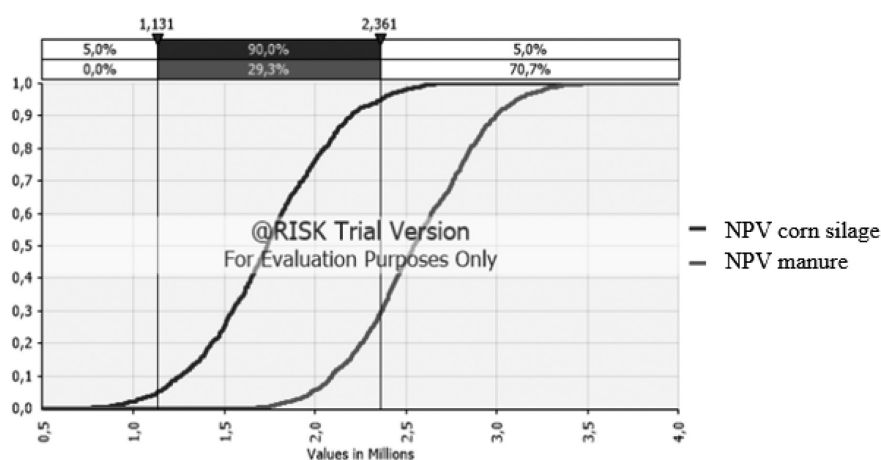


Figure 2. Distribution functions for both variants

Source: own processing

5. CONCLUSION

We were focused on evaluation of the efficiency of the use of corn silage and manure in combined production of electricity and heat in cogeneration plants with an installed capacity of 1MW. Both projects are very perspective, based on selected criteria. Price of electricity, its use and the initial investment are factors which have the greatest impact on NPV. Distribution functions confirmed that the NPV, at any level of willingness to take the risk, will not show negative values. In the moment of decision-making between certain investment plans, it is up to each subject, which project they will choose. The effectiveness of the project is influenced by vari-

ous factors and it is only up to investor to decide based on what arguments he will choose the winning option. This may also be supported by a risk analysis and his willingness to endure a certain risk plays a role as well. Unfortunately, even nowadays the willingness to bear a certain risk can not be accurately quantified.

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MATURITY LEVEL OF SUSTAINABLE PROJECT MANAGEMENT IN RUSSIAN ENTERPRISES

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Abstract: *The aim of the paper is to develop and test a new methodology for assessing the level of maturity of sustainable (green) project management at Russian enterprises, as well as establish the existing level of maturity and justify ways to improve it. The research was carried out using a methodology based on the developments of the international association for green project management Global organization "Green Project Management". Given methodology is characterized by the addition of the institutional module of sustainability and indicators of motivational readiness for the implementation of sustainability. The methodology was tested at 81 enterprises in 12 regions of Russia using the method of online questioning of experts.*

An average level of green project management maturity at enterprises was recorded by means of quantitative evaluation of the integral indicator and its constituents generalizing indicators according to four criteria - social, institutional, economic, and environmental. The motives for introducing green project management are identified.

Keywords: *Sustainability, Project management, Sustainability criteria.*

1. INTRODUCTION

When conducting research and developing proposals for implementing sustainable project management, it is important to take into account the world's achievements in the field of sustainability while developing and enriching the science and practice of sustainability. In particular, we believe that the idea of sustainable development and sustainable management has now been thoroughly scientifically substantiated. However, in practice these things are still poorly adapted to project management. There are no answers to questions about how to use sustainability criteria in project management, how to assess the manifestation of sustainability criteria in project management, how to form this green project management system in enterprises, and what is the motivation of enterprises to implement green project management. Our research provided answers to these questions.

2. CHALLENGES OF SCIENCE AND PRACTICE EVALUATING GREEN PROJECT MANAGEMENT

Our research is based on the development of Green Project Management Global an International organization that develops standards in the field of green project management. From the perspective of this organization: „green project management includes tools and management methods which allow achieving a certain balance between limited resources and social and environmental responsibility” (Carboni et al, 2013, p. 8). At the same time, the concept of sustain-

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ability in project management seeks to harmonize economic, social and environmental interests both the long and short terms (Silvius 2017).

The formation of sustainable project management is associated with certain difficulties. Let's look at the challenges posed by the concepts of sustainable development and green project management.

The first challenge is to measure and evaluate sustainable management.

A methodological challenge lies in the construction of indicators that would make it possible to reliably assess environmental and social trends, but at the same time understandable for the target audience (Hák et al, 2007; Schropfer, Tah, Kurul, 2017). There are currently no generally accepted methods for measuring stability (Gibson, 2017; Cohen et al, 2015). Today in practice and in science there are many examples when indicators are developed for a specific project / case / organization / industry (Gareis et al, 2014; Dos Santos et al, 2019). The development of universal methods for assessing sustainability would make it easier to measure sustainability for many organizations (Cohen et al, 2015; Pislaru, Herghiligi, Robu, 2019).

The second challenge is to achieve a balance between the principles of sustainable development (economic, social, environmental and institutional) in the management of an organization or project. Achieving balance is directly related to the problem of choosing between these principles when making managerial decisions (Gareis et al, 2014; Marcon, de Medeiros, Ribeiro, 2017).

The third challenge is to integrate sustainability strategies into people's minds, processes, and policies. In order to integrate the sustainability strategy into the organization's culture we need to learn more about the values and benefits that sustainability management creates, as well as the motives and factors that will actually work (Cohen et al, 2015).

These challenges have become the basis for methodology and methods of assessing sustainable project management in enterprises.

3. DESCRIPTION OF A NEW METHODOLOGY FOR ASSESSING SUSTAINABLE PROJECT MANAGEMENT PROPOSED BY THE AUTHORS

The idea of our methodology is to assess and improve the level of maturity of sustainable project management of enterprises, as well as the level of motivational readiness for this management, based on achieving at all stages of the project management life cycle a balance of four sustainability criteria (economic, social, environmental and institutional).

Within this methodology, sustainable (green) project management is understood as a management system that contributes to achieving a long-term balance of economic, social, and environmental criteria based on an institutional criterion at all stages of the project management life cycle and in all functional areas of the project management system.

The methodology is a questionnaire that experts are asked to fill out. The questionnaire is divided into three modules. The first module is the institutional issues module on sustainable project management in the organization (compiled from sources Gareis et al, 2014; Maltzman, Shirley,

2010; Silviu, 2017). The second module is a module of special questions on the three main areas of sustainability – economic, social and environmental (compiled from sources Carboni et al, 2013, Cohen et al, 2015; Gareis et al, 2014; Maltzman, Shirley, 2010). The third module was proposed for the first time-an assessment of the company's motivational readiness to implement sustainable project management.

4. RESEARCH METHODOLOGIES TO TEST THE PROPOSED NEW METHODOLOGY FOR ASSESSING THE MATURITY OF SUSTAINABLE PROJECT MANAGEMENT PROPOSED BY THE AUTHORS

The purpose of our study is to test the developed methodology for assessing the maturity of sustainable (green) project management at Russian enterprises, as well as to establish the existing level of maturity and justify ways to increase it. That is, the main result was the proof of the operability of the methodology. The accompanying result was the identification of the level of maturity of green project management and directions for increasing this level.

As noted earlier, the methodology is a questionnaire filled out by experts. The questionnaire consists of modules including questions for assessing particular indicators of economic, environmental, social and institutional sustainability of project management. The analysis of answers involves evaluating the scores first by private indicators, then by generalizing indicators and, finally, by the integral indicator of the maturity level of green project management.

Research questions include:

- Does our methodology allow us to establish the maturity level of green project management? How do experts understand the technique? How universal is it?
- What is the level of maturity of green project management at Russian enterprises? How balanced are the economic, environmental and social components of sustainability? To what extent does the institutional component affect maturity?
- What is the motivation for introducing sustainable green project management and how does it determine the direction of development of this management?

The study was conducted in the period from September 2018 to November 2019 at 81 enterprises in 12 regions of Russia using an online survey of experts. The study was conducted in the following cities: Arkhangelsk, Yekaterinburg, Kazan, Krasnoyarsk, Kyzyl, Moscow, Novosibirsk, Omsk, Saint Petersburg, Tyumen, Ulan-Ude, Chelyabinsk.

All selected experts agreed to participate in the study. The criterion for selecting companies was experience in using the principles of sustainability. The small number of enterprises is explained by the fact that sustainable project management is still not widespread in Russia. According to an expert survey, most companies proclaim a policy of sustainability, but do not implement it in the daily practice of project management. The sample includes companies that have experience in sustainable project management. For the purpose of testing the method, this number of enterprises was sufficient. The reliability of the data was ensured by careful selection of experts and their survey using a detailed methodology. The experts who answered the questionnaire were project managers, program and portfolio managers, and project management specialists with at least 3 years of experience in this field.

The studied organizations implement their projects in various sectors of the economy; among them there are industrial organizations, including chemical and petrochemical production, engineering, as well as companies working in the service sector, including IT companies, banks, etc. size of enterprises: 34 organizations are large; 13 organizations are medium-sized; 17 organizations can be classified as small; and 14 micro organizations.

5. RESEARCH RESULTS

Let's turn to a quantitative assessment of the level of maturity of project management in enterprises. To do this, our method involves first evaluating generalizing indicators by modules, and then combining these indicators into a single integral indicator.

Module 1. Institutional Matters Module

Questions related to the application of the concept of sustainability management in the organization; the sustainable development strategy; the time frame of the sustainable development strategy; the three principles of sustainable development-economic, social, and environmental - and their role in the organization's strategy.

We have obtained the following levels of institutional stability:

- 8.0 – 10 points – high level (22 organizations showed this level);
- 6.0 – 7.9 points – above average (23 organizations);
- 4.0 – 5.9 – average level (16 organizations);
- 2.0 – 3.9 – below average (5 organizations);
- 0 – 1.9 – low level (15 organizations).

The average score for the first module was 5.71 points.

Module 2. Special Issues Module

This module consists of 3 sub modules: social, environmental, and economic.

Social direction (module 2A)

The submodule included questions about opportunities for training and professional development of project performers; gender equality; inequality in the distribution of income of employees of the organization; performance indicators in the field of social sustainability (human rights, poverty reduction, prevention of corruption and bribery, customer safety).

The following levels of environmental sustainability were identified:

- 8.0 – 10 points – high level (6 out of 81 organizations);
- 6.0 – 7.9 points – above average (34 organizations);
- 4.0 – 5.9 – average level (13 organizations);
- 2.0 – 3.9 – below average (15 organizations);
- 0 – 1.9 – low level (13 organizations).

The average score for the 2A submodule was 4.92 points.

Environmental direction (module 2B)

The sub module included internal assessment of the project's environmental impact during the planning phase, transport costs, renewable energy use, waste management, and performance indicators for environmental sustainability (water consumption, carbon dioxide emissions, energy consumption, materials, and other resources).

The following levels of environmental sustainability were identified:

- 8.0 – 10 points – high level (9 out of 81 organizations);
- 6.0 – 7.9 points – above average (8 organizations);
- 4.0 – 5.9 – average level (18 organizations);
- 2.0 – 3.9 – below average (18 organizations);
- 0 – 1.9 – low level (28 organizations).

The average score for the 2B sub module was 3.40 points.

Economic direction (module 2C)

This sub module included questions related to the sustainability of an organization and its projects, such as return on investment, net present value, asset liquidity, market share, new workplaces, taxes.

The distribution of enterprises was as follows:

- 8.0 – 10 points – high level (28 out of 81 organizations);
- 6.0 – 7.9 points – above average (17 organizations);
- 4.0 – 5.9 – average level (17 organizations);
- 2.0 – 3.9 – below average (14 organizations);
- 0 – 1.9 – low level (5 organizations).

The average score for the 2C submodule was 6.02 points.

As a result, indicators for modules 1 and 2 were summarized, and for each organization an integral indicator of the maturity level of green project management was determined (table 1).

Table 1. Maturity assessment of sustainable project management

Maturity levels of sustainable project management	Number of organizations in the group
32.0 – 40 points – a high level of maturity	6 organizations
24.0-31.9 points - above average	25 organizations
16.0-23.9 - average level	25 organizations
8.0 – 15.9 - below average	18 organizations
0-7.9 - low level	7 organizations

Source: Authors

The average final score is 20.04 points, which indicates the average maturity level of sustainable project management in the organizations under consideration. Table 2 shows that a high level of institutional sustainability causes a high level of overall maturity of green project management, and it also determines social and environmental sustainability.

Table 2. Distribution of organizations by maturity level of sustainable project management and the level of individual sustainability components

Maturity levels of sustainable project management	Institutional sustainability	Social sustainability	Environmental sustainability	Economic sustainability
25.21 (high and above average) - 31 enterprises	6.84	5.59	4.25	8.54
22.75 (average) - 25 enterprises	6.09	5.51	4.41	6.74
15.25 (below average) - 17 enterprises	4.76	3.87	1.94	4.68
10.70 (below average) - 18 enterprises	3.23	3.50	1.64	2.32
7.80 (low) - 7 enterprises	3.05	3.15	0.60	1.00
Total average: 20.04	5.71	4.92	3.40	6.02

Differences between groups are statistically significant: F-criterion = 6,223; $p = 0.000$.

Source: Authors

The methodology allowed us to determine the motivation, namely, the reasons and factors that contribute to the implementation of sustainable management.

The reason for „The need to create and maintain a positive image of the company (PR) as a „green” company” was given by 42 enterprises, of which 22 enterprises have a level of maturity of sustainability of 26.3 points; 11 enterprises have a level of maturity of 20.3 points; 9 enterprises 12.3 points. That is, this reason is more often called enterprises with a high and above average level of maturity. ($M = 21.73$, $SD = 4.79$) Differences between groups are statistically significant: F-criterion = 3.825, $p = 0.050$.

The reason for the „Increase in prices for energy, materials, waste removal and disposal” was given by 35 enterprises, of which 8 enterprises have a maturity level of 27.2 points, 12 enterprises 19.8 points, 15 enterprises 14.2 points. This reason is often referred to as enterprises with an average or lower average level of maturity.

($M = 19.09$, $SD = 4.19$) Differences between groups are statistically significant: F-criterion = 3.153, $p = 0.01$.

The reason for the „Tightening of legal norms in the field of environmental and social responsibility - an increase in taxes, fines and sanctions” was given by 34 enterprises, of which 8 enterprises have a maturity level of 25.3 points; 6 companies 17.2 points; 20 enterprises 10.3 points. This reason is more typical for enterprises with a low level of maturity.

($M = 15.04$, $SD = 5.58$) Differences between groups are statistically significant: F-criterion = 2.751, $p = 0.010$.

The reason for „Our new vision of how the world should be organized, the desire for a new culture and a new social paradigm” was given by 54 enterprises, of which 30 enterprises have a maturity level of 32.2 points; 14 enterprises have 17.4 points; 10 enterprises have 9.8 points. It is clear that the reason is expressed in enterprises with a high level of maturity.

($M = 24.21$, $SD = 8.87$) Differences between groups are statistically significant: F-criterion = 3.915, $p = 0.0010$.

The reason for „The need to work with foreign partners and follow foreign practices” was given by 48 enterprises, of which 20 enterprises showed 27.2 points; 16 enterprises 19.4 points; 12 enterprises 11.2 points. For this reason, companies with a higher level of maturity are preferred.

($M = 20.6$, $SD = 6.45$) Differences between groups are statistically significant: F-criterion = 3.765, $p = 0.000$.

Thus, the study showed that the higher the level of maturity of project management sustainability, the more conscious reasons caused the transition to a sustainable policy. Businesses with a low level of sustainability turn to this policy when necessary, their actions are a forced response.

6. DISCUSSION OF THE RESULTS OF THE STUDY

In the course of the study, we obtained results containing answers to the research questions posed by us. These include the following.

- First, our proposed methodology is workable. At the same time, experts noted its intelligibility and versatility.
- Secondly, using the methodology, the average level of maturity of green project management was recorded. Conclusions are drawn about the lack of balance between the various components of sustainability. Social and environmental sustainability is low compared to economic sustainability. Moreover, the institutional component determines the level of general maturity of sustainability and individual other components. Therefore, a balance of all sustainability components is required, and the institutional component needs to be given special attention.
- Third, the methodology allowed us to determine the motives for implementing sustainable project management. It is proved that enterprises with a high level of maturity are more often motivated to consciously use sustainable management.

Our research develops Carboni's approach to assessing project management maturity. In contrast to this researcher, we have added institutional evaluation criteria to the methodology. As a result, the idea of taking into account the institutional element of sustainability was concretized in the form of a methodology (Gareis 2013; Moldan, Dahl 2007; Silviu, 2017).

Key, novel characteristics of our method are:

- a) It is proposed to assess the maturity level of green project management in enterprises by which we understand the achievement of indicators of economic, environmental, social and institutional sustainability expressed in quantitative values and indicating a certain level.
- b) To assess the level of maturity, refined systems of individual indicators of social, environmental, economic and institutional sustainability are proposed, as well as generalizing indicators for each of these four sustainability criteria. Further, we propose a quantitative integral indicator that consists of generalizing indicators for four modules.
- c) A method of evaluating motivational readiness and value for green project management companies is proposed.

The practical significance of the research is to offer an updated system of sustainable project management based on the principle of balancing all criteria. The balance of economy, society, and ecology on an institutional basis must be observed at all stages of the project management life cycle and in all functional areas of project management. To do this, we consider it important to update and supplement existing project method methods and methodologies, taking into account the requirements of sustainability in different functional areas and at different stages of project management. The institutional framework at the enterprise level is formed by translating classic project management into green project management, as well as by creating a special organizational environment that includes the development of corporate social responsibility and socially oriented project management, lean project management, environmental management and environmentally friendly projects.

7. CONCLUSION

We consider the proposed new methodology and, with its help, the established maturity level of sustainable project management in Russian organizations to be a significant scientific and practical result of the study.

The studied organizations recorded an average level of maturity. Important was the evidence that a high level of institutional maturity leads to a high level, first, of the maturity of green project management in general; secondly, of each of the individual blocks - economic, social and environmental. As a result, we substantiated recommendations for the development of the institutional foundations of sustainable project management at enterprises.

In particular, we have developed the concept of a program for the formation of green project management in enterprises. The novelty and practical significance of the program is ensured by the fact that for the first time a system of subjects, objects, interests of various stakeholder groups, measures to realize these interests are proposed; institutional foundations for the formation of motivational readiness, including a system of green project management in conjunction with systems of socially oriented project management, environmentally sound project management, and lean project management. All these results contribute to the development of the theory and practice of sustainable project management.

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COMMUNICATION DIFFERENCES AND CONFLICT RESOLUTION IN INTERNATIONAL BUSINESS ENVIRONMENT

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Abstract: *This paper aims to examine the challenges of cross-cultural communication in multicultural teams and the resolution of conflicts arising during that process of communication. For this purpose, a survey was conducted on individuals coming from various cultural backgrounds to determine how cultural differences affect the organizational communication styles, their perception of conflict situations and the choice of conflict resolution procedures. The study is underpinned by a literature review of cross-cultural communication and theories on culture, conflict resolution and multicultural team dynamics. Hofstede's Cultural Dimensions Theory will be used to define the cultural differences using four dimensions: power distance, uncertainty avoidance, individualism vs collectivism, and masculinity vs femininity. The outcome of the study assesses the intercultural communication competence of employees in North Macedonia and gives recommendations on how to improve communication and avoid conflicts that plague multicultural teams.*

Keywords: *Cross-cultural communications, Multicultural teams, Hofstede, North Macedonia.*

1. INTRODUCTION

In a globalized world, societies are becoming more diverse and cosmopolitan than ever before. Businesses with multicultural workforces have become the norm rather than the exception, making cross-cultural communication an essential issue in the everyday work environment. Multicultural teams offer many advantages to international firms, particularly when it comes to understanding the cultural sensitivity of consumers in host markets (Brett, Behfar, & Kern, 2006). However, despite the potential benefits, they also experience conflicts in the workplace that are complicated or even impossible to resolve. Such conflicts usually arise as a result of cultural differences and communication problems between team members. Thus, effective cross-cultural communication based on understanding and appreciation of other cultures is essential for resolving these disputes.

The ground-breaking work in cross-cultural communication was made by Geert Hofstede in the 1980s who created a framework for future research in this field. Hofstede's cultural dimensions' theory offers four dimensions: power distance, uncertainty avoidance, individualism versus collectivism, and masculinity versus femininity. The four dimensions tend to explain ways of structuring organizations, and the motivations and issues people face within those organizations. The combined scores from these dimensions, group countries in cultural clusters (Hofstede, 1983). Hofstede's scores have been validated multiple times through replicated studies by other scholars using the same or similar set of questions. All of them provide a valuable background for studies such as this one that observe communication among members of multicultural teams.

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2. THEORETICAL BACKGROUND

In the first research that Hofstede conducted in Yugoslavia, he excluded Macedonia, Bosnia and Herzegovina, and Montenegro. Instead, he conducted a different kind of research using the Michael Minkov new cultural dimensions, LTO and IVR. The results showed that compared to other Yugoslavian countries, Macedonia has the lowest PDI (score 66) and a very low MAS index (score 9), probably a result of the high number of women in the sample. On the other hand, large UAI showing the preference of job security is “undeniably a product of culture and history but surely exacerbated by the recent role of the state and the stress caused by the break-up of Yugoslavia (Camina, 1999). The LTO score showed that Macedonia is a society with a pragmatic orientation, while the IND score indicated that it is also seen as a restrained country. Another research conducted by Bojadjev, Kostovski & Buldioska (2015) concerning leadership styles in companies in Macedonia, showed that the majority of male managers in Macedonia (43%) prefer autocratic leaders, while female managers (41%) prefer participative leaders.

Table 1. Cross-cultural comparison of cultural dimensions

Cultural dimension	Camina (1999)				Hofstede, Hofstede et al. (2010)	
	Power distance (PDI)	Uncertainty avoidance (UAI)	Individualism (IDV)	Masculinity (MAS)	Long-Term Orientation (LTO)	Indulgence Versus Restraint (IND)
North Macedonia	66	103	33	9	62	35

The results of high-power distance and uncertainty avoidance, as well as the collectivistic mindset of the older generations, clearly show the effects that the communist regime left in the country. Nonetheless, things here have been changing lately. The younger generation tends to be more individualistic and prone to risks. This might as well be a consequence of the mixture of domestic and western cultures, resulting from the growing number of multinational companies with multicultural teams operating in the country.

Hence, the purpose of this study is to understand the way culture shapes individual and intergroup behavior in multinational teams in North Macedonia. Furthermore, it observes how cross-cultural communication contributes to conflicts and conflict resolution in multicultural teams in North Macedonia. For the purpose of this study, the following hypotheses will be tested:

Hypotheses One: Different cultural backgrounds lead to different behavior of employees.

Hypotheses Two: Cultural differences result in different perceptions of conflicts and conflict strategies.

Hypotheses Three: Most cultural disputes in a multicultural team can be resolved by effective cross-cultural communication based on understanding and appreciation of the cultures.

The questionnaire used for this study tests Hofstede’s four dimensions of national culture in multicultural teams in North Macedonia. The respondents of the questionnaire include both Macedonian and non-Macedonian employees in four MNO’s working on teams made up of members coming from different national cultures. All of the selected respondents have worked on the multicultural team for more than one year. This is to ensure that they have had enough opportunities to experience the dynamics of working on a multicultural team in North Macedonia.

3. METHODOLOGY AND DATA ANALYSIS

The questionnaire is prepared based on Hofstede's (1983) cultural relativity of organizational practices that examines the behaviors of the respondents in relation to their cultural orientation and their preferred conflict resolution styles. The Likert scale questions were analyzed with SPSS. Respondents from four different multicultural organizations in North Macedonia were sampled. They were contacted via e-mail or through social networks and the response rate was 83% (25 out of the contacted 30 individuals). Out of the 25 respondents, there were 10 males and 15 females.

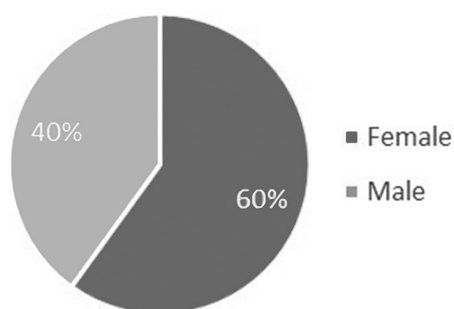


Figure 1. Gender Distribution of Respondents

13 (52%) were Macedonians and 12 (48%) non-Macedonians from Albania, Kosovo, Serbia, Slovenia, Turkey and Montenegro.

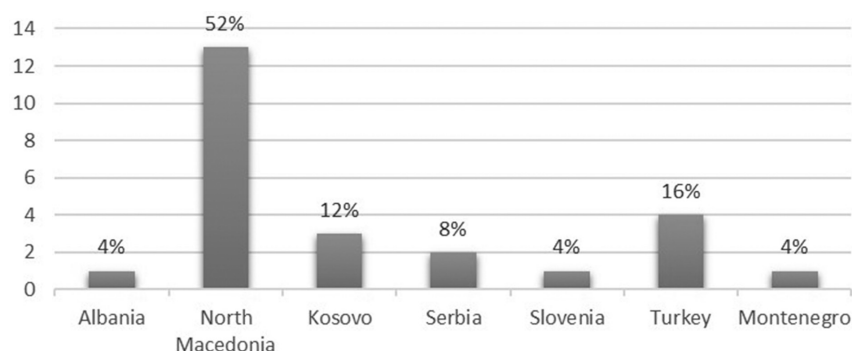


Figure 2. Nationality of Respondents

Out of the total number of respondents, 4 (16%) of them were in top-management, 8 (32%) in middle-management, 3 (12%) in lower-management and 10 (40%) in non-management positions.

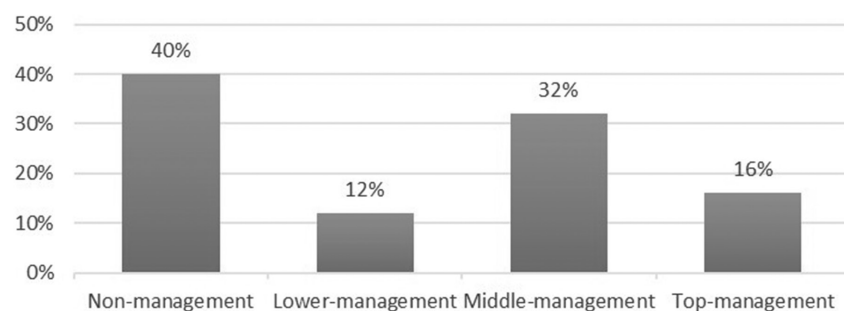


Figure 3. Job Designations of Respondents

With regards to length of employment with current organization, 16 (64%) had worked between 1 to 3 years, 4 (16%) between 3 to 5 years, and 5 (20%) had worked over 5 years.

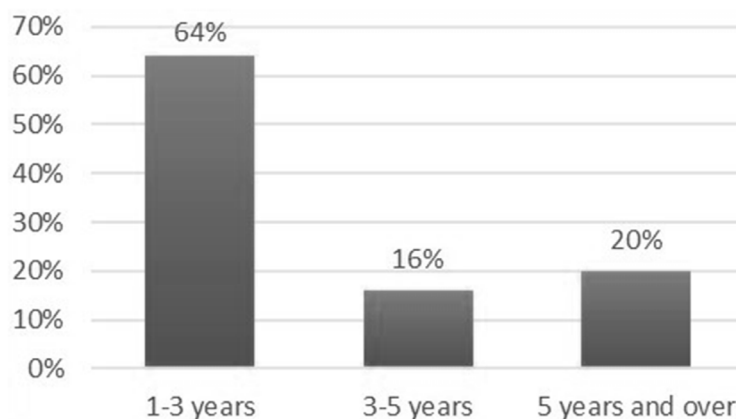


Figure 4. Number of Years Worked in Organization

Out of the 25 respondents 17 (68%) of them (including 5 Macedonians) had lived in another country other than the one they were born in, while the rest 8 (32%) (Macedonians) had lived only in North Macedonia.

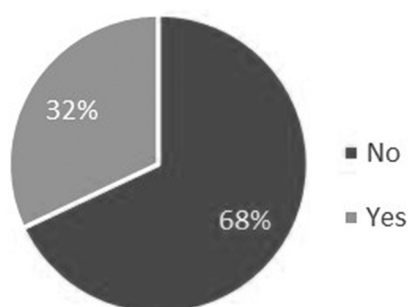


Figure 5. Cultural Experience of Respondents

In response to the key cultural orientation question, 17 of those who responded felt closer to the country in which they were born, 3 to the country they had lived longest, 3 closest to the country in which they live now (North Macedonia) and 2 of them identify themselves as other culture.

3.1. High-context and low-context cultures

The cultural orientation was measured through the respondent's context of communication. Out of 25 respondents 16 (64%) were low context and 9 (36%) medium context. There were no high context individuals. This mix was irrespective of national culture (Nationality of Respondent).

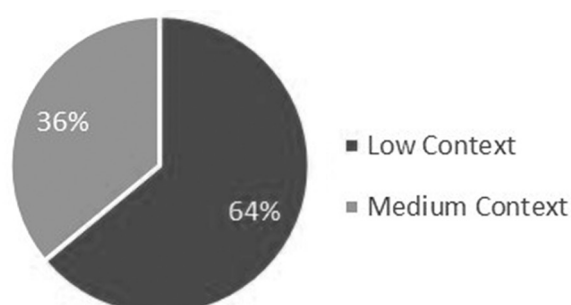


Figure 6. Distribution of Cultural Orientation by Context

Out of the 16 low context respondents, 8 were Macedonians, 2 were Serbians, 4 Turks, 1 Kosovan, 1 Slovenian. Out of the 9 medium context respondents, 5 identified themselves as Macedonians, 1 Montenegrin, 1 Albanian, and 2 Kosovans.

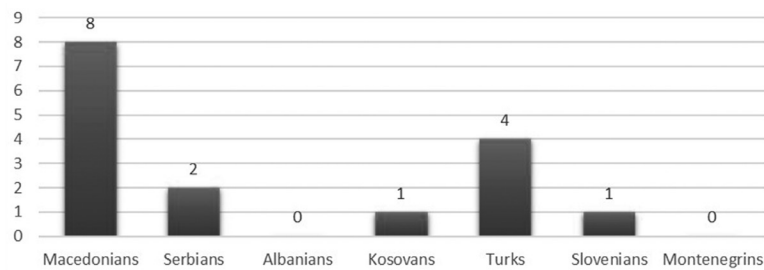


Figure 7. Distribution of Low Context Respondents by Nationality

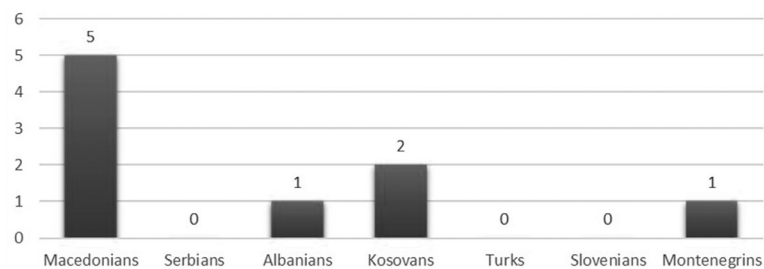


Figure 8. Distribution of Medium Context Respondents by Nationality

The context of a culture refers to the value the culture place on direct and indirect communication. The large differences between the two cultures can contribute to the creation of conflict situations. High context culture relies heavily on nonverbal cues and implicit communication. Members of this culture prefer to work in groups and place particular emphasis on interpersonal relationships. On the other hand, low-context cultures rely on explicit communication. Here members emphasize sending and receiving precise and direct messages, while nonverbal elements are not significant. According to Hofstede & Hofstede (2005) members from low-context cultures typically separate issues of communication from the person with whom they are interacting, which can have an impact on the communication in the multicultural team they are working. There are also the middle-context cultures, which according to Hofstede & Hofstede, (2005) exist as a result of cultures and societies continuously developing and evolving.

In this study, a significant number of respondents (36%) were in the middle-context category, which suggests that they have integrated aspects of both high and low context approaches. This may indicate that these respondents can use both high and low aspects according to the situation, but it can also mean that they might be uncomfortable in strictly low or high cultural contexts. This combination of middle-context respondents together with low-context respondents in this study shows the potential for cross-cultural communication-based conflicts.

3.2. Individualism and collectivism

This cultural dimension observes how people define themselves and their relationships with others. The majority of respondents, 23 (92%), were found to be collectivist and only 2 (8%) were individualists. Out of the collectivists, 9 (39%) were very collectivist, while 14 (61%) were mainly collectivist (might occasionally show individualistic characteristics).

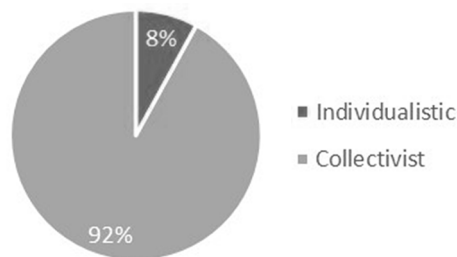


Figure 9. Representation of Power Distance

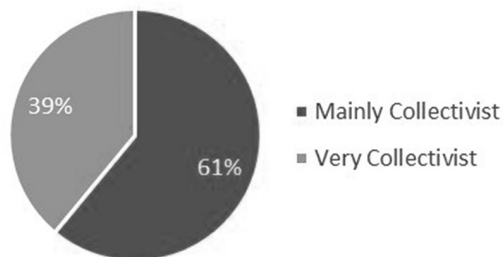


Figure 10. Levels of Collectivism

The lack of high individualists in this study is a positive sign since these individuals focus on their interests over the interests of the group (Hofstede, 1980). Unlike collectivists, they set their goals with minimal consideration to groups other than perhaps the closest family. (Hofstede 1980).

3.3. Femininity and Masculinity

This dimension reveals to what extent a society stresses achievement or nurture. Out of all respondents, 22 (88%) exhibited a feminine cultural dimension, while 3 (12%) had a masculine dimension, which corresponds to the low MAS index from Hofstede's study on North Macedonia.

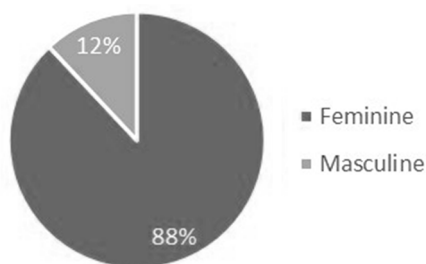


Figure 11. Representation of Masculine vs. Feminine Dimensions

Feminine cultures have overlapping social gender roles, while masculine cultures define men as “assertive, tough and focused on material success”, while women are “modest and concerned with the quality of life”. In the workplace, masculine culture dictates decisiveness, while feminine cultural values dictate the use of intuition and building of consensus (Hofstede, 1980).

3.4. Power Distance

The power distance defines how cultures deal with inequalities. Out of all respondents, 5 (20%) exhibited high power distance, while 20 (80%) a low power distance orientation. Out of the 20 that had low power distance level, 16 (64%) had relatively low levels of power distance, and 4 (16%) very low power distance. There were no respondents with a very high level of power distance.

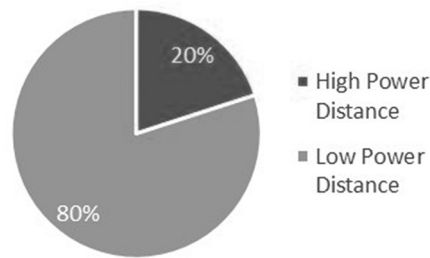


Figure 12. Representation of Power Distance

The power distance dimension describes the “extent to which less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally” (Hofstede, 1980 p. 28). High power distance cultures have high levels of inequality and are more willing to accept that without question. On the other hand, low power distance cultures are generally equal, subordinates expect to be consulted, and ideal bosses are democratic (Hofstede’s 1980). The results of the study show that within the multicultural teams studied, conflicts associated with differences in power distance will not be that common.

3.5. Uncertainty Avoidance

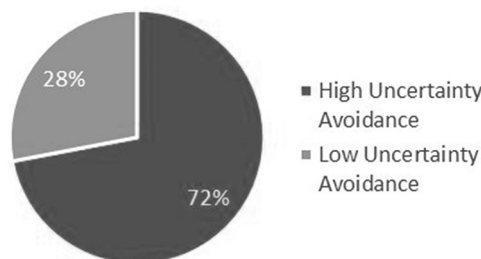


Figure 13. Representation of Uncertainty Avoidance

The uncertainty avoidance dimension reveals to what extent people feel threatened by uncertain or unknown situations. Out of all respondents, 7 (28%) exhibited low levels of uncertainty avoidance, while 18 (72%) high levels of uncertainty avoidance.

In high uncertainty avoidance culture, people tend to be risk-averse and favor a well-structured environment with rules and punctuality, while in a low uncertainty avoidance workplace, employees are more pragmatic with only a few necessary rules (Hofstede’s 1980). The variety in the UA results from this study indicate possible conflicts in the teams associated with this dimension.

3.6. Cultural Differences in Conflict Resolution Styles

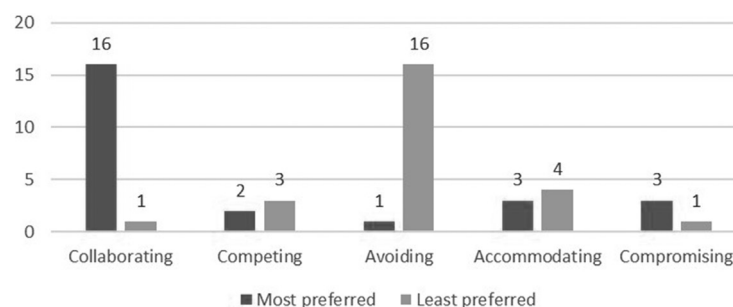


Figure 14. Representation of Preferred Conflict Styles

Conflict resolution styles are closely correlated to cultural orientation and communication styles. In this regard, individualistic cultures typically prefer avoiding, while collectivistic cultures prefer more compromising and integrating (Hofstede, 1980, 1983). The results of this study showed that the most preferred style among the respondents was collaboration, while the least preferred was avoidance.

4. CONCLUSION

The purpose of this study was to examine how cultural differences contribute to the creation of conflict situations in multicultural teams in North Macedonia. The study was based on Hofstede's framework on cross-cultural communication and the four dimensions of culture. The questionnaire used in this study aimed to reveal the cultural orientation and communication and conflict resolution styles of members of multicultural teams in North Macedonia. The results showed that the respondents had different cultural orientations even within the same organization and the same national cultural background, which might cause various conflict situations in the teams. Moreover, this study confirms the results from Hofstede's study, that North Macedonia is a collectivist, feminine society with high power distance. The only thing that differs is the uncertainty avoidance score, which in this study shows that the respondents have a low score, while Hofstede's results showed that the country has a high UAI index. With all things considered, the study was useful exposing the intercultural relations in the workplace and conflict resolution styles in MNO's. However, the small sample size is a limitation to make any authoritative claims.

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IDENTIFYING EMPLOYEE SKILLS IN SMEs IN THE REPUBLIC OF NORTH MACEDONIA

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Abstract: *The main aim of this paper is to identify current levels of knowledge, skills and abilities of the SMEs' employees in North Macedonia, vis-à-vis firms' needs for knowledge and skills. This paper analyzes the current levels of employee job-specific, soft, digital and entrepreneurial skills on a sample of firms in North Macedonia. For the purposes of this research, the employees were classified in three categories: core employees, supporting employees and managers. The results of the research show that the main challenge regarding the soft skills refers to solving complex problems, capacity for job analysis and initiative. Adapting to new technologies is found to be the weakest aspect of digital skill among employees. Entrepreneurial skills related to risk taking, capacity to generate new ideas, creativity and innovation as well as flexibility at work are also considered to be a challenge.*

Keywords: *Employee skills, SMEs, North Macedonia.*

1. INTRODUCTION

The new 21st century criteria for employee skills stem from the global trends pertaining to business environment changes, rapid ICT advancements and wide-spread use of new technologies, increased competitiveness in international markets, changes in business processes and customer expectations, as well as growing focus of firms on services. These global trends impose a need for workforce with a diverse and broad skillset. Recent research underlines the growing importance of soft and ICT skills along with job-specific skills, as a main prerequisite for achieving sustainability and competitive advantage of firms. Entrepreneurial skills do not lag behind in importance, since the entrepreneurial orientation of firms is closely related to innovation and creativity, considered to be one of the main pillars in firm's success. Thus, such complementary skill sets composed of soft, job-specific, digital and entrepreneurial skills constitute human capital prerequisite for competitiveness and sustainability of the SMEs. The level of these skills, however, depends on employee's position, firm's core business, its long-term strategy, and the level of technology applied within the firm - as internal factors, as well as the industry, competition and the overall business environment - as external factors. These four skills were the main focus of analysis in this paper. The current levels of soft, job-specific, digital and entrepreneurial skills were identified for three employee categories: core employees, supporting employees and managers. The findings reveal a rather satisfactory level of employee skills. A need for upskilling in different aspects of the skill set is identified for different employee categories.

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2. IDENTIFYING EMPLOYEE SKILLS FOR ACHIEVING FIRM'S SUSTAINABILITY AND COMPETITIVE ADVANTAGE

Today, in line with rapid technological changes, mass digitalization in production and services and the increasing competitive pressures, advanced employee skills have become central factor for achieving sustainability and competitive advantage. These global trends set new requirements for employees with high-level cognitive and non-routine skills who are able to cope with unpredictable tasks and who can understand and communicate new ideas and concepts (OECD, 2018, p.13). The main characteristic of today's knowledge employee is the ability to overcome complex challenges and to generate creative and innovative solutions in new situations. In this regard, Swart (2007, p. 452) defines knowledge workers as "employees who apply their valuable knowledge and skills to complex, novel, and abstract problems in environments that provide rich collective knowledge and relational resources". In a knowledge-based economy, the firm's success is mainly a result of the management of 'intangibles', among which the human capital. Firms should, therefore, develop their human capital so that it meets, and even exceeds, the requirements for knowledge and skills to achieve sustainability in the new market reality.

Formal education and job-specific skills are only part of the required set of skills. Recent studies underline the importance of soft skills, besides job-specific skills as essential 21st century employee skills, while others focus on the increasing importance of digital and entrepreneurial skills. Attempts have also been made to examine the relationship between employee skills and organizational performance. For instance, Balcar (2016) concludes that the productivity of hard skills stems from their combination with soft skills. In fact, an increase in hard and soft skills results in 8.84% and 8.51% wage increase (as approximation of productivity), respectively. Similarly, Haskel et al. (2005) found that hard and soft skills are positively associated to productivity, while the skills gap between top and bottom-ranked firms in the productivity distribution explains for about 3-10% of the total factor productivity gap. The requirements of employee skills are however closely related to the occupation, position, the technological development of the firm and the industry. McKinsey Global Institute (2018, p.5) classifies skills in five broad categories, associating them to different groups of occupations: physical and manual skills, basic cognitive skills, higher cognitive skills, social and emotional skills and technological skills. In addition, this study anticipates significant increase in the demand for several skills by 2030. Primarily, the increase in demand shall be for technological skills, as a result of the wide-spread digitalization and automation, immediately followed by higher cognitive skills and social and emotional skills, as a result of the changes in business processes, organizational structures and new working patterns. An increase in demand for skills in the following years is also reported by CEDEFOP (2018, p.30), especially those related to customer service, communication and team-working, problem solving, planning and advanced ICT skills.

Based on the above said, today, employees should possess a set of knowledge, skills and abilities, composed of: 1) *Soft skills*-analytical and critical thinking, problem solving, communication, teamwork, job-related decision making, ability to quickly adopt new work methods and techniques, adapt to change etc.; 2) *Job-specific skills*-hard skills related to the specifics of the job, the occupation, and those related to the technology used in the firm/industry; 3) *Digital skills*-different levels of ICT skills, skills related to use of sophisticated equipment and machinery, smart technology, and the ability to adopt new technologies; and 4) *Entrepreneurial skills*-combination of business and entrepreneurial skills as knowledge of different business aspects, proactivity, creativity, innovation and change orientation, flexibility, risk taking and alike. Ac-

According to this skills framework, firm can achieve competitive advantage in the 21st century if their employees possess a set of complementary skills. It should also be taken into account that different factors impact the demand for skills, and hence determine the level of each skill, both at individual and firm level.

3. RESEARCH METHODOLOGY

Determining the level of soft, job-specific, digital and entrepreneurial skills among employees in small and medium enterprises in the Republic of North Macedonia was the primary focus of this paper. To meet the objectives of this research, a questionnaire pertaining to firms' perception of the level of employee skills was distributed to business owners or senior managers of private firms in different sectors in North Macedonia. The questionnaire encompassed questions related to the different skills and abilities of employees classified in four major skill groups – soft, job-specific, digital and entrepreneurial. For the purposes of this research, employees were classified in three categories: *core employees* (employees who are directly included in the production process or customer service i.e. who perform activities closely related to the core business), *supporting employees* (employees who perform supporting activities to the core business i.e. activities that support the implementation of core business as administration, legal or HR issues, technical support, and alike) and *managers* (business owners and employees at managerial positions). This classification enables an in-depth analysis of skill levels among different types of employees. A sample of 133 SMEs was included in the analysis.

4. EMPLOYEE SKILL LEVELS IN SMES IN NORTH MACEDONIA

The analyzed sample included micro (37%), small (43%) and medium (20%) enterprises. Most of these firms operate in the domestic market (78.2%), either between 5 to 10 years (40%) or more than 10 years (49%). Firms that offer services cover a dominant share of 51% of the survey sample, while 26% of firms are in production and 23% in trade.

4.1. Soft skills of SMEs' employees

Employee soft skills in the observed sample are generally at a satisfactory level. However, there is a need for improvements of certain soft skills of core and supporting employees. In particular, 37.6% of the firms stated that their core employees have unsatisfactory level in terms of problem-solving initiative (Table 1). Similar percentage of firms (36.8%) considers the ability of core employees to adopt new working methods and techniques to be dissatisfactory. One third of the firms reveal a necessity for upgrading core employees' skills regarding their job-related decision making, adapting to change and solving complex problems. Development of these skills is important as they are crucial to organizational performance and improved work environment.

The results point out that the soft skill levels of supporting employees are similar to those of core employees. There is a need to upgrade and improve their skills for solving complex problems, capacity to analyze work, problem solving initiative and adopting new work methods and techniques. In addition, communication skills and team working impose greatest challenge to managers. For almost quarter of firms, these skills among managers are at an unsatisfactory level.

The main challenges concerning employee soft skills refer to analytical thinking, which is also closely related to their ability to solve complex problems, and subsequently job-related decision making.

Table 1. Share of firms according to the level of employee soft skills

	Core employees		Supporting employees		Managers	
	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
Solving complex problems	72.2%	27.8%	59.4%	40.6%	86.5%	13.5%
Capacity to analyze work	73.7%	26.3%	64.7%	35.3%	83.5%	16.5%
Applying knowledge in practice	87.2%	12.8%	77.4%	22.6%	88.0%	12.0%
Problem solving initiative	62.4%	37.6%	66.9%	33.1%	95.5%	4.5%
Job related decision making	69.9%	30.1%	74.4%	25.6%	94.0%	6.0%
Ability to work independently	84.2%	15.8%	85.0%	15.0%	94.0%	6.0%
Communication skills	81.2%	18.8%	81.2%	18.8%	75.2%	24.8%
Team working	88.0%	12.0%	83.5%	16.5%	77.4%	22.6%
Easily adapting to change	71.4%	28.6%	77.4%	22.6%	83.5%	16.5%
Adopting new work methods and techniques	63.2%	36.8%	65.4%	34.6%	86.5%	13.5%
Working under pressure	84.2%	15.8%	82.7%	17.3%	85.0%	15.0%

Source: Authors' calculations

4.2. Job-specific skills of SMEs' employees

The biggest share of firms reports that their employees possess the job-specific skills necessary for conducting job activities. More specifically, 77% of the firms have noted that their core employees and managers possess job-specific skills essential for the work, while almost 67% of the firms have the same perception about their supporting employees (Table 2). The level of job-specific skills related to the technology used in firms is similar. Again, around 75% of the firms stated that the core employees and managers have these job-specific skills and 60.9% of the firms think that supporting employees also are acquainted with the job-specific skills related to the technology used in their enterprise.

Table 2. Share of firms according to the level of employee job-specific skills

	Job-specific skills related to the job			Job-specific skills related to technology		
	Completely	Partially	None	Completely	Partially	None
Core employees	78.2%	21.8%	0.0%	75.2%	22.6%	2.3%
Supporting employees	66.9%	24.1%	9.0%	60.9%	27.1%	12.0%
Managers	76.7%	20.3%	3.0%	75.9%	21.1%	3.0%

Source: Authors' calculations

The results from the analysis show that the SMEs' employees in North Macedonia generally possess the job-specific skills needed to perform their jobs, as well as the skills related to the technology of their firms. However, the dynamic changes in technology and processes are imposing the need for continuous upgrade of the job-specific skills, since they are crucial for the firms.

4.3. Digital skills of SMEs' employees

Digital skills in the last years have growing importance in the employment process. As technology has wider use in every aspect of the business, the expectations are that employees should acquire certain level of knowledge and understanding of digital skills related to the equipment and processes of the firms. The results from the research indicate that employee digital skills

are relatively acceptable. Figure 1 shows that 60.2% of the firms consider that their supporting employees fully understand and use the technology used (equipment, machines, software etc.). This however points to the need for improvement of the digital skills related to the technology among this employees' category. The main challenge to firms refers to the capacity of employees to accept new technologies, as the results show less satisfactory levels. Namely, half of the firms consider that core and supporting employees quickly accept this kind of changes related to the new technologies. At the same time, only 3.8% of firms believe that core employees do not easily accept the introduction of new technologies.

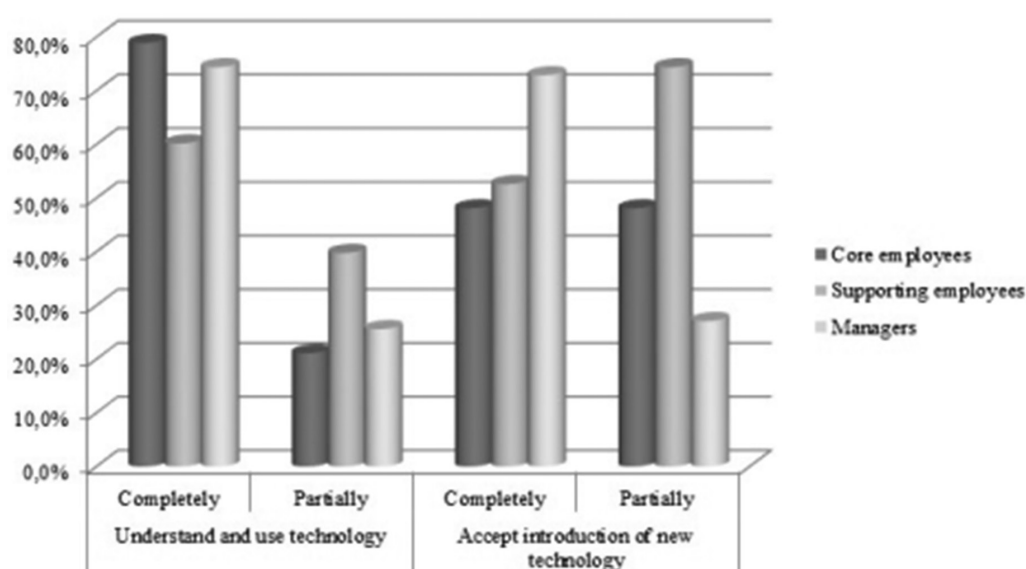


Figure 1. Share of firms according to the level of understanding, using and accepting the technology by the employees

Source: Authors' calculations

The level of digital skills of all employees, and particularly of core employees, depends on the industry, the customers, as well as the technology level of the firm. For instance, core employees in ICT firms should possess advanced level of digital skills, while in technology-intensive firms, at least high level of these skills.

The results of the research show that in almost two thirds of the firms, core and supporting employees have medium or high level of digital skills, while in 65% of the firms' managers have high level of these skills. However, the analysis points out that there is still a need to improve the digital skill levels of all employees. Namely, a significant share of firms pointed to a need for improvement of their current levels of ICT skills for all employees, mostly at high and advanced level.

3.4. Entrepreneurial skills of SMEs' employees

The 21st century business dynamics imposes a need for higher level of entrepreneurial skills. Continuous efforts of firms to improve their working processes, the quality of products and services and to increase productivity and efficiency, more or less, depends on the entrepreneurial skills of all employees. The research results show that the main challenges regarding the entrepreneurial skills of core and supporting employees refer to insufficient risk taking, lower capacity to generate new ideas, lack of creativity and innovation, lower leadership skills (Table 3).

Table 3. Share of firms according to the level of employee entrepreneurial skills

	Core employees		Supporting employees	
	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
Demonstrate work proactivity	61.7%	38.3%	63.2%	36.8%
Take initiative at work	57.9%	42.1%	61.7%	38.3%
Work flexibility	63.9%	36.1%	70.7%	29.3%
Risk taking	39.8%	60.2%	45.9%	54.1%
Demonstrate creativity	57.9%	42.1%	58.6%	41.4%
Innovation and change orientation	45.1%	54.9%	54.9%	45.1%
Capacity to generate new ideas	51.9%	48.1%	51.1%	48.9%
Demonstrate leadership skills	45.1%	54.9%	49.6%	50.4%
Capacity to adapt to new situations	72.9%	27.1%	72.9%	27.1%
Orientation to work process improvements	68.4%	31.6%	63.2%	36.8%
Job-related business skills	63.2%	36.8%	72.2%	27.8%

Source: Authors' calculations

More than 60% of the firms note that core employees have unsatisfactory level regarding their readiness to take risk and in 54.9% of firms this category of employees do not manifest sufficient levels of innovation and change orientation, as well as leadership capability. Low levels of these skills are evident among supporting employees too. For illustration, within 54% of firms, supporting employees have unsatisfactory level of risk-taking skills, while in almost half of the firms, leadership skills. Relatively high share of firms (48.9%) stated that their supporting employees need to possess higher capacity to generate new ideas. The level of entrepreneurial skills among managers is significantly better. Still, the results on skill levels of managers should be taken with caution, due to the possibility of some degree of bias in the responses, since the surveys were answered mostly by the managers. Nevertheless, the analysis of the results shows that there is a need for improvement of some entrepreneurial skills of managers, as, for example, their knowledge of finance and business investments, as well as marketing and market research. Namely, around a quarter of analyzed firms consider that these skills of the managers are not at a satisfactory level.

4. FUTURE RESEARCH DIRECTIONS

Further research should focus on in-depth examination of employee skills at an industry level. As noted earlier in this paper, industry characteristics directly impact the level and requirements of all skills among employees. Thus, defining skill demands and requirements for specific industry and identifying the current levels of employee skills shall contribute to developing policies at firm- and industry-level. Future studies should also examine the impact of organizational culture and firm's technology levels in determining the existing skill levels of employees.

5. CONCLUSION

This paper highlights a rather satisfactory level of soft, job-specific, digital and entrepreneurial employee skills. The main challenges that firms face mostly refer to certain aspects of soft, entrepreneurial and digital skills. Hence, SMEs' employees should improve their capacity to analyze work, their initiatives in solving problems, job-related decision making and adopting new working methods and techniques. Firms should also develop training efforts on improving

digital skills of their employees to better understand and use the technology, as well as to accept the introduction of new equipment, machines and software. In addition, developing policies to foster innovation and creativity, work proactivity, risk taking, and initiative and change orientation should be of paramount importance to firms in their efforts to maintain sustainability and competitiveness.

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MULTIDIMENSIONAL MODEL OF EMPLOYEE INTRAPRENEURSHIP AND WORK ENGAGEMENT: THE CASE OF SLOVENIAN COMPANIES

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Abstract: *The main objective of this paper is to analyze the employee intrapreneurship and work engagement in the case of companies in Slovenia. Structural equation modelling has been proven to be useful in exploring the links between these five constructs. The main survey involved 50 companies in Slovenia, and from each company, up to 15 employees participated in our research. Thus, 637 employees responded to the questionnaire. The results show that employee satisfaction, employee motivation and leadership have a positive effect on the employee intrapreneurship and work engagement. The results also show that the employee intrapreneurship and work engagement have a positive effect on employee innovation. By giving employees the right tools, resources, support, and recognition at the workplace, it is easy to create the culture of intrapreneurship. It makes for happy, satisfied, motivated, engaged employees that are more innovative and make businesses more productive. Intrapreneurship can lend itself to new products, services or even processes.*

Keywords: *Employee intrapreneurship, Work engagement, Innovativeness, Structural equation modelling.*

1. INTRODUCTION

Organizational performance, growth and development may depend considerably on entrepreneurship in existing organizations (intrapreneurship) (Auer Antoncic and Antoncic, 2011). Intrapreneurship is a process whereby employees recognize and exploit opportunities by being innovative, proactive and by taking risks, in order for the organization to create new products, processes and services, initiate self-renewal or venture new businesses to enhance the competitiveness and performance of the organization (Neessen et al., 2019). Because of its beneficial effects for organizational performance, employee intrapreneurship has been an important research topic for scholars within the area of management research (Antoncic and Hisrich, 2001; Edú Valsania et al., 2016, Reuther et al., 2017). Although a body of research has been published on how employees' entrepreneurial behavior for their organization relates to innovativeness (Bierwerth et al., 2015) the literature on its effect on employees has received less scrutiny. According to Neessen et al. (2019) attitudinal dimensions of intrapreneurs like employee satisfaction, employee motivation and leadership, have a positive association with intrapreneurship of the organization which increase innovation of employees in companies (see, e.g. Antoncic and Antoncic 2011; Giannikis and Nikandrou 2013; Gawke et al., 2017; Neessen, 2019). Employee satisfaction represents a combination of feelings (positive or negative) that employees have towards their work (Armstrong, 2014). Jex and Britt (2008) argued that satisfied employees commit to work more and have higher rates in productivity. The authors also assert that high satisfaction often means lower level of absenteeism while improving mental or physical health, and higher level of work engagement.

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According to Neessen (2019) motivation and the intention to act intrapreneurially are also important attitudinal dimensions in relation to intrapreneurship. Islam and Ismail (2008) summarize that employee motivation energizes behavior, gives direction to behavior, and underscores the tendency to persist. Thus, motivation is an important aspect by leading function in influence on others to work toward companies' goals. Also, Pang and Lu (2018) argue that motivation is an internal mechanism that guides behavior. This can be referred to the catalyzer for individual employees to enhance their working performance to achieve organizational performance. Rožman (2017), Bakker and Demerouti (2008) emphasize that the goal of motivation is to enable employees to improve productivity, increase efficiency and increase engagement in the workplace. Therefore, work motivation is positively related to employee intrapreneurship and work engagement.

In addition to employee satisfaction and employee motivation, good leadership is also crucial for intrapreneurship (Antoncic and Hisrich, 2001; Alpkhan et al., 2010). Receiving good leadership is very important to the employees willing to undertake intrapreneurial activities. According to Neessen et al. (2019) good leadership refers to the willingness of management to facilitate and promote intrapreneurship including encouraging employees and recognizing that their activities involve some risk-taking and creating a norm within the organization. Castrogiovanni et al. (2011) summarize that open channels of communication and providing mechanisms that allow for ideas to be evaluated, selected and implemented are positively related to intrapreneurship. According to Xu and Cooper-Thomas (2011) good leadership is a key antecedent of engagement and also, leadership have positive impact on work engagement of employees in company.

May et al. (2004) emphasize that employee engagement concerns the degree to which individuals make full use of their cognitive, emotional, and physical resources to perform role-related work. Thus, engaged employees have an energetic, enjoyable, and effective connection with their work (Macey and Schneider, 2008). Furthermore, employees who are engaged in the workplace and behave intrapreneurial, have courage and the driving force to put new and unproven ideas, innovations, into practice (Barlett and Dibben, 2002). Engaged employees see it as their personal mission to contribute the best they can to the organisation's goal. They have a sense of ownership as if it were their own company. They understand how their role adds up to the big picture and they feel appreciated, recognised, and actively maintain a healthy blend of work and life. Moreover, they are also more innovative (see, e.g. Attridge, 2009; Bakker, 2009). Any aspects connected with combining resources in new ways are included in innovation; everything from relatively minor improvements or innovations of services, products, routines and procedures, or organizational design to more radical and revolutionary changes (Westrup, 2013). It is the fact that something has to be changed or developed and someone has to do it that starts the process of intrapreneurship. An innovation is carried out proactively, rather than reactively, in response to an assignment created by the organization (Westrup, 2013). Camelo-Ordaz et al. (2012) underlines the proactiveness, as there is no expectation that something will be done and nobody will enquire about or blame anyone for not taking action. Intrapreneurship is thus created within the existing situation. According Darwin et al. (2018) high levels of employee engagement are positively correlated to high levels of innovation.

The main objective of this paper is to analyze the employee intrapreneurship and work engagement in the case of companies in Slovenia. Flowing from the definition of work engagement as an active positive motivational state, scholars have related work engagement to proactive work behavior in several studies (cf., Bakker, 2011). To determine the impact of three constructs em-

employee satisfaction, employee motivation and leadership on construct employee intrapreneurship and work engagement, as well as to determine the impact of construct employee intrapreneurship and work engagement on construct employee innovation in Slovenian companies, structural equation modelling has been proven. This paper aims to verify the following hypotheses:

- H1:** Employee satisfaction has a significant positive impact on employee intrapreneurship and work engagement in Slovenian companies.
- H2:** Employee motivation has a significant positive impact on employee intrapreneurship and work engagement in Slovenian companies.
- H3:** Leadership has a significant positive impact on employee intrapreneurship and work engagement in Slovenian companies.
- H4:** Employee intrapreneurship and work engagement has a significant positive impact on employee innovation in Slovenian companies.

2. METHODOLOGY

2.1. Sample and data

The main survey that was conducted from December 2019 to February 2020 involved 50 companies in Slovenia, and from each company, up to 15 employees participated in our research. Thus, 637 employees responded to the questionnaire. Table 1 shows the profile of respondents – employees with respect to control variables.

Table 1. Profile of respondents – employers and control variables

Characteristic of respondents – employees		Number of respondents	Percentage
Gender	Female	309	48.5%
	Male	328	51.5%
Age	Up to 30 years	47	7.4%
	From 31 to 40 years	129	20.2%
	From 41 to 50 years	224	35.2%
	From 51 to 60 years	203	31.9%
	More than 61 years	34	5.3%
Company activity	Processing activities	136	21.4 %
	Trade, maintenance and repair of motor vehicles	107	16.8 %
	Professional, scientific and technical activities	94	14.8 %
	Financial and insurance activities	122	19.1 %
	Information and communication activities	64	10.0 %
	Real estate services	54	8.5 %
	Health and social security	39	6.1 %
	Catering	17	2.7 %
	Other activities	4	0.6 %
Size of companies	Small company	146	22.9 %
	Medium-sized company	238	37.4 %
	Large company	253	39.7 %

2.2. Instrument

The respondents indicated on a 5-point Likert-type scale their agreement to the listed statements, where 1 = I completely disagree, 2 = I do not agree, 3 = I partially agree, 4 = I agree and 5 = I completely agree. In the questionnaire employees answered on questions about the employee intrapreneurship and work engagement in Slovenian companies. Items for the con-

struct employee satisfaction were formed by Hayday (2003). Items for the construct employee motivation were formed by Kooij et al. (2011). Items for the construct leadership were formed by Avery et al. (2007). Items for the construct employee intrapreneurship and work engagement were adapted by Robinson et al. (2004) and items for the construct employee innovation were formed by Armstrong (2014).

2.3. Statistical analysis

We established the justification to use the factor analysis based on the Kaiser-Meyer-Olkin measure of sampling adequacy ($KMO \geq 0.5$) and Bartlett's test of sphericity. Also, fulfilment of criteria regarding factor loadings ($\eta \geq 0.5$), communalities of variables ($h > 0.4$), and eigenvalues of factors ($\lambda \geq 1.0$) was analyzed (Tabachnick, Fidell, 2013). The quality of the measurement model was measured by the variance explained for a particular construct. We checked the reliability of measurements within the scope of inner consistency with Cronbach's alpha coefficient (Chronbach, 1951). As part of the convergent validity, we examined average variance extracted (AVE) and composite reliability coefficients (CR), keeping in mind the criteria $AVE > 0.5$ and $CR > 0.7$ and the criterion $CR > AVE$ (Kock, 2019). In order to check for multicollinearity, we used variance inflation factors (VIF), considering the criterion $VIF < 5.0$ (Hair et al., 2010). The quality of the structural model was measured by the R-squared and adjusted R-squared coefficients, reflecting the percentage of explained variance of latent variables in the structural model and the Stone-Geisser Q-squared coefficient. Thus, we examined the predictability value of the structural model. Acceptable predictive validity in connection with an endogenous latent variable is suggested by $Q^2 > 0$ (Kock, 2019). To test the model, the following rules were also applied: average path coefficient (APC, $p < 0.05$), average R-squared (ARS, $p < 0.05$), average adjusted R-squared (AARS, $p < 0.05$), average block variance inflation factor (AVIF < 5.0), average full collinearity VIF (AFVIF < 5.0), goodness-of-fit (GoF ≥ 0.36), Sympson's paradox ratio (SPR ≥ 0.7), the R-squared contribution ratio (RSCR ≥ 0.9), statistical suppression ratio (SSR ≥ 0.7) and nonlinear causality direction ratio (NLBCD ≥ 0.7) (Kock, 2019, Tabachnick, Fidell, 2013). To test the hypotheses, we used the path coefficient associated with a causal link in the model (γ) and indicator of Cohen's effect (f^2), with 0.02, 0.15, and 0.35 indicating the small, medium, and large effect sizes (Kock, 2019; Tabachnick, Fidell, 2013). The Statistical Package for the Social Sciences (SPSS) and WarpPLS software were used for data analysis. According to Kock (2019), SEM is based on the linear or non-linear connections between constructs. The results obtained by WarpPLS show that the observed links in our model are non-linear.

3. RESULTS

The results in Table 2 show that the values of the measure of sampling adequacy and the results of Bartlett's test of sphericity for each construct (employee satisfaction, employee motivation, leadership, employee engagement and employee innovation) suggest that the use of factor analysis is justified. The values of all communalities for all five constructs are higher than 0.40; therefore, we have not eliminated any variable. Also, all factor loadings are higher than 0.70 and significant at the 0.001 level. For each construct, the one-dimensional factor solution was obtained. All measurement scales proved high reliability (all Cronbach's alpha > 0.80). In addition to the results in Table 2, the total variance explained for employee satisfaction is 76.7%, for employee motivation is 67.1%, for leadership is 84.4%, for employee engagement is 85.0% and for employee innovation is 83.7%.

Table 2. Factor analysis results

Statement	Factor label	Cronbach's alpha	Communalities	Factor loadings
At my workplace I am satisfied with working hours and distribution of work obligations.	Employee satisfaction	0.947	0.810	0.900
At my workplace I am satisfied with flexible working hours.			0.820	0.906
At my workplace I am satisfied with the balance between work and private life.			0.632	0.795
At my workplace I am satisfied with the working conditions, such as better light, air conditioning, and bigger inscriptions.			0.675	0.821
At my workplace I am satisfied with the interpersonal relationships in the company.			0.786	0.886
At my workplace I am satisfied with the leadership in the company.			0.847	0.921
At my workplace I am satisfied with enabled self-regulation of speed of work performed.			0.798	0.893
KMO = 0.914; Bartlett's Test of Sphericity: Approx. Chi-Square =7537.944, df = 21, p < 0.001				
The company offers me the possibility of a higher salary for a job well done.	Employee motivation	0.928	0.544	0.738
The employer gives us compliments for the well-done work.			0.802	0.896
The employer gives me the possibility of flexibility in the workplace.			0.787	0.887
The employer gives me the possibility of autonomy at work.			0.714	0.845
The employer gives me the opportunity to provide diverse tasks.			0.574	0.758
The employer gives me the possibility of advancement.			0.735	0.857
The employer gives me the possibility for training and education.			0.712	0.844
The company gives me the opportunity to work from home on certain days of the week.			0.497	0.705
KMO = 0.913; Bartlett's Test of Sphericity: Approx. Chi-Square = 6639.722, df = 28, p < 0.001				
I have all necessary information to perform my work.	Leadership	0.960	0.815	0.903
I have everything I need to carry out my work tasks.			0.808	0.899
The company owner/manager fosters good relationships between employees.			0.890	0.943
The company owner/manager of the company fosters good relationships between employees and superiors.			0.870	0.933
The company owner/manager ensures the work satisfaction and well-being of employees.			0.837	0.915
The company owner/manager emphasizes and encourages employee motivation in the workplace.			0.842	0.918
KMO = 0.878; Bartlett's Test of Sphericity: Approx. Chi-Square = 8706.045, df = 15, p < 0.001				
I do my work proactive and with passion.	Employee intrapreneurship and work engagement	0.966	0.819	0.905
I am engaged to the quality of my work.			0.846	0.920
I am engaged to achieve successful and innovative business results.			0.833	0.913
I feel connection with the company in which I worked.			0.877	0.937
I feel that my work and job are important.			0.869	0.932
I believe in the successful development and operation of our company.			0.862	0.928
I feel very good at my workplace.			0.845	0.919

KMO = 0.929; Bartlett's Test of Sphericity: Approx. Chi-Square = 10265.358, df = 21, p < 0.001				
I am aware of the importance of innovation for our company and I help in the development of the company.	Employee innovation	0.942	0.840	0.917
I am aware the necessity of changes in the company.			0.875	0.936
We are constantly improving and updating our products/services.			0.851	0.922
In the company is expected to make suggestions for improving our products/services by employees - not just by managers.			0.787	0.887
Employees are familiar with how and to whom we submit our proposal or innovative ideas to improve work processes, services or other improvements that could add value to the company.			0.832	0.912
KMO = 0.896; Bartlett's Test of Sphericity: Approx. Chi-Square = 5552.002, df = 10, p < 0.001				

Key quality assessment indicators of research model are presented in Table 3.

Table 3. Model fit and quality indicators

Quality indicators	Criterion of quality indicators	Calculated values of indicators of model
Average path coefficient (APC)	p < 0.05	0.471, p < 0.001
Average R-squared (ARS)	p < 0.05	0.858, p < 0.001
Average adjusted R-squared (AARS)	p < 0.05	0.859, p < 0.001
Average block variance inflation factor (AVIF)	AVIF < 5.0	1.148
Average full collinearity VIF (AFVIF)	AFVIF < 5.0	2.103
Goodness-of-fit (GoF)	GoF ≥ 0.1 (low) GoF ≥ 0.25 (medium) GoF ≥ 0.36 (high)	0.735
Sympson's paradox ratio (SPR)	SPR ≥ 0.7	1.000
R-squared contribution ratio (RSCR)	RSCR ≥ 0.9	1.000
Statistical suppression ratio (SSR)	SSR ≥ 0.7	1.000
Nonlinear causality direction ratio (NLBCD)	NLBCD ≥ 0.7	1.000

Table 3 shows that the indicators APC, ARS, AARS are statistically significant (p < 0.001), and the indicators AVIF and AFVIF are lower than 5.0 and are suitable. Indicator GoF shows the power of the underlying conceptual model (Kock, 2019), and the results of indicator GoF show that the model is highly appropriate. The values of indicators SPR, RSCR, SSR and NLBCD are higher than the minimal prescribed values and are suitable. Table 4 shows the indicators of quality of structural model.

Table 4. Indicators of quality of structural model

Constructs	CR	AVE	R ²	Adj. R ²	Q ²	VIF
Employee satisfaction	0.867	0.735	(-)	(-)	(-)	1.253
Employee motivation	0.846	0.718	(-)	(-)	(-)	1.417
Leadership	0.863	0.752	0.462	0.448	0.463	1.987
Employee engagement Employee innovation	0.871	0.796	0.439	0.426	0.452	2.115

Note: (-) values cannot be calculated because the construct is a baseline

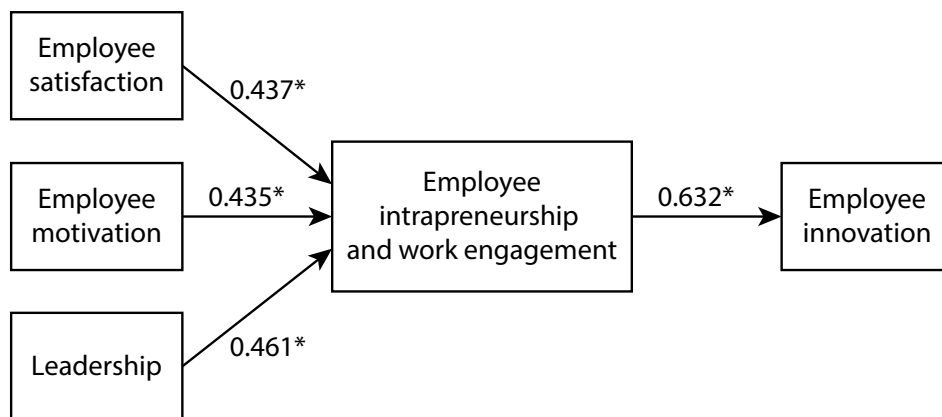
Table 4 indicates that the values of the latent variables' R², adjusted R² and Q² coefficients are greater than zero. Composite reliabilities (CR) for all five constructs are greater than 0.7. Also, values of AVE for all five constructs are greater than 0.5. As all CR values were higher than AVE values, the authors confirmed the convergent validity for all the constructs studied. The VIF values ranged between 1.253 and 2.115 (VIF < 5.0), providing confidence that the structural

model results were not affected by collinearity. The results of SEM and structural coefficients of links of the basic structural model are presented in Table 5. Also, Figure 1 presents the conceptual model with the values of path coefficients.

Table 5. Standardized path coefficients for proposed model

Hypothesized path	Link direction	Shape of link	Path coefficient (γ)	Effect size (f^2)	Standard error
ES → EE	Positive	Nonlinear	0.437*	0.356	0.030
EM → EE	Positive	Nonlinear	0.435*	0.354	0.031
LE → EE	Positive	Nonlinear	0.461*	0.362	0.027
EE → EI	Positive	Nonlinear	0.632*	0.468	0.029

Note: * $p < 0.001$; ES – employee satisfaction, EM – employee motivation, LE – leadership, EE – Employee intrapreneurship and work engagement, EI – employee innovation



Note: * $p < 0.001$

Figure 1. Conceptual model of employee intrapreneurship and work engagement with the values of path coefficients

The results in Table 5 show that employee satisfaction has a positive effect on the employee intrapreneurship and work engagement ($ES \rightarrow EE = 0.437$, $p < 0.001$). The value of Cohen's coefficient ($f^2 = 0.356$) is greater than 0.15 and shows that the effect of predictive latent variables is of high strength. In addition, employee motivation has a positive effect on the employee intrapreneurship and work engagement ($EM \rightarrow EE = 0.435$, $p < 0.001$). The value of Cohen's coefficient ($f^2 = 0.354$) shows that the effect of predictive latent variables is of high strength. The results in Table 5 show that the leadership has a positive effect on employee intrapreneurship and work engagement ($LE \rightarrow EE = 0.461$, $p < 0.001$). The value of Cohen's coefficient ($f^2 = 0.362$) shows that the effect of predictive latent variables is of high strength. The results also show that the employee intrapreneurship and work engagement have a positive effect on employee innovation ($EE \rightarrow EI = 0.632$, $p < 0.001$). The value of Cohen's coefficient ($f^2 = 0.468$) shows that the effect of predictive latent variables is of high strength. The results show that there is a non-linear connection between the individual constructs. Based on the results we confirmed hypothesis 1 (employee satisfaction has a significant positive impact on employee intrapreneurship and work engagement in Slovenian companies), hypothesis 2 (employee motivation has a significant positive impact on employee intrapreneurship and work engagement in Slovenian companies), hypothesis 3 (leadership has a significant positive impact on employee intrapreneurship and work engagement in Slovenian companies) and hypothesis 4 (employee intrapreneurship and work engagement has a significant positive impact on employee innovation in Slovenian companies).

CONCLUSION

The employee intrapreneurship and work engagement has become of strategic importance for the performance of companies. According to Neessen et al. (2019) intrapreneurship is a process whereby employees recognize and exploit opportunities by being innovative, proactive and by taking risks, in order for the organization to create new products, processes and services, initiate self-renewal or venture new businesses to enhance the competitiveness and performance of the organization. Therefore, it is necessary for companies to be aware of the importance of construct of employee satisfaction, employee motivation, leadership which leads to employee intrapreneurship and work engagement and to higher employee innovation.

Based on the results, we found that employee satisfaction, employee motivation and leadership have a positive impact on employee intrapreneurship and work engagement in companies. This is consistent with the findings of Neessen et al. (2019), Daley (2017), Bakker and Demerouti (2008), Xu and Cooper-Thomas (2011). The results of research also show that employee intrapreneurship and work engagement have a significant positive impact on employee innovation in companies, which is in line with findings of Gawke et al. (2017) and Darwin et al. (2018) in which authors found out that employee engagement lead to higher employee innovation. Blanka (2019) emphasizes that human capital plays a significant role when it comes to the success of ventures. Intrapreneurs, defined as entrepreneurial-thinking people within existing companies, are crucial as they think across the boundaries of organizational units. Therefore, intrapreneurial employees are the foundation for innovation and the subsequent competitive advantage of companies.

When companies build an intrapreneurial environment, one that fosters risk-taking and innovation, they gain invisible ways. Enthusiasm increases manifold when people believe they are not only given a real opportunity to think, try and transform but will be rewarded for it. Therefore, employees become more industrious, consistent, content and efficient. Thus, an intrapreneurship culture is not an overnight event. The owner or manager should help to create an intrapreneurial thinking environment and continuously support it. Owner or manager should be aware of the importance of investing and creating intrapreneurial environment, because it allows employees to feel that they are an important part. By giving employees the right tools, resources, support, and recognition at the workplace, it is easy to create the culture of intrapreneurship. It makes for happy, satisfied, motivated, engaged employees that are more innovative and make businesses more productive. Intrapreneurship can lend itself to new products, services or even processes. Companies that foster an intrapreneurship culture are more competitive and successful.

Our study is limited to the focus of employee intrapreneurship and work engagement in Slovenian companies. The limitations of our research are reflected in five constructs, which are employee satisfaction, employee motivation, leadership, employee intrapreneurship and work engagement and employee innovation. Our further research refers to analyzing other constructs among intrapreneurship in companies with structural equation modelling.

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THE IMPACT OF INTERNATIONAL STUDENT MOBILITY ON ENTREPRENEURIAL ATTITUDE

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Abstract: *The Erasmus international mobility programme represent a significant step in a student's development. In the past decades, millions of European students gained experience and lifelong learning period from prestigious universities abroad. Erasmus students are seen as independent people, curious about cultures and languages, open to new ideas and especially predisposed to become entrepreneurs. This study was designed to identify the entrepreneurial attitude of Erasmus students in order to ascertain the contribution of international mobility. For this purpose, the expectations of international students who benefited from the Erasmus Plus Programme were compared to the level of satisfaction after completing the international mobility programme at Institute of Business Administration (IAE), University of Sophia Antipolis, Nice. Factors that most influenced students' departure in Erasmus mobility are academic and professional opportunities abroad. The data for this study was collected using a questionnaire and sent in collaboration with International Relations Office of IAE Nice. The results indicate that international mobility had a high impact on student's self-confidence and relational skills. Regarding professional and social life, the entrepreneurial attitude was increased by the Erasmus experience.*

Keywords: *Entrepreneurial attitude, Entrepreneurship, International mobility, Erasmus.*

1. INTRODUCTION

In the last decades the Erasmus programme become the most important student exchange program and represent significant step in a student's development. Erasmus programme provides scholarships for million students of all ages, helping them develop knowledge and experience at institutions and organisations abroad (European Commission, 2020). Main objective of EU programme is to provide students with academic, cultural and linguistic benefits.

At the academic level, international mobility programme enables students to attend some of the most prestigious universities and benefit from different teaching methods and lifelong learning period. However, the experience of studying abroad extends the students' horizons in a wide range of areas, thus allowing students to gain greater independence, maturity, learn a new culture, new language and make new friends (Almeida, 2018). Regarding professional and social life, student's priority motivation to go abroad is related to a new experience, by acquiring new technical, social and behavioural skills. Erasmus students are seen as independent people, curious, open to new ideas and especially predisposed to become entrepreneurs. Several studies emphasize that it is important to identify the advantages, difficulties and challenges faced by Erasmus students. For this purpose, the objective of this study is to analyse the skills that students gain abroad and impact of international mobility on student's entrepreneurial attitude. The importance of generic skills is highlighted in numerous studies. ... "Generic skills" is used widely to refer to a range of qualities and capacities that are increasingly viewed as important in higher education. These include thinking skills such as logical and analytical reasoning, problem solving and intellectual curiosity; effective communication skills, teamwork skills and capacities to identify, access and manage

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knowledge and information, personal attributes such as imagination, creativity and intellectual rigour and values such as ethical practice, persistence, integrity and tolerance". (Hager, Holland & Beckett 2002, p.2). Entrepreneurial skills are part of these generic skills and they accentuate the students' capacity of thinking critically in real business context, of making successful decisions and solving complex problems, of coming with new ideas in new situations demonstrating originality skills and openness to learn from both successes and failures (Sin, Tavers & Amaral, 2016). On the European level, the importance of entrepreneurship as a generic skill is that the European Union initiated 2009 a new programme called 'Erasmus for Young Entrepreneurs', which gives entrepreneurs acquire relevant skills for business by spending time in one European enterprise. Main benefits of Erasmus for Young Entrepreneurs are: reinforces entrepreneurial attitudes by offering skills, knowledge and experience, increases the number of start-ups, helps to create jobs, cross-border transfer knowledge and cooperation between small firms, helps small firms to innovate and go international (European Commission, 2019).

At the core of entrepreneurship are novelty, uniqueness, creativity and knowledge sensitivity. The entrepreneur creates value, they apply their competences to create something novel of value of use to society (Frederick, O'Connor, Kuratko, 2018). Entrepreneurship is seen as the identification, evaluation and exploitation of opportunities (Shane, 2000 apud Khin & Lim, 2018). The ability of entrepreneurs to identify and evaluate new opportunities, to obtain the necessary resources and to take risks for setting up the company, becomes a „sine qua non” quality for all those involved in the entrepreneurial process (Nhemachena and Murimbika, 2018). Previous studies have identified several factors that influence the individual's intentions to become an entrepreneur. One of the most important factors is attitude, that reflect the individual beliefs and perceptions determined by the individual's personality, formal and informal education, personal values and experiences (Krueger and Carsrud, 1993). A strong and positive relationship between attitude and entrepreneurial intentions has been confirmed by previous studies (Krueger, Reilly and Carsrud, 2000; Franke and Luthje, 2004) being considered the main determinant of entrepreneurial intention (Ajzen, 1991). Akmaliah et al. (2010) highlights that changes in entrepreneurial attitude can be influenced through the process of education, experience, interaction with the environment, as well as with intensive entrepreneurship education program. Yaqub et al. (2015) demonstrate that there is a strong relationship and positive correlation exist between attitude towards entrepreneurship and entrepreneurship education. Souto-Otero & McCoshan, (2006) show that 65-95% students reported that the Erasmus mobility program has had a positive impact on their attitude towards career and aspirations, and accelerate their general knowledge, their personal values, their understanding of persons coming from different cultures or ethnic background, the improvement of their interpersonal relations and their self-confidence. This study was designed to identify the entrepreneurial attitude of Erasmus students in order to ascertain the contribution of international mobility. For this purpose, the expectations of international students who benefited from the Erasmus+ Programme were compared to the level of satisfaction after completing the international mobility programme.

2. METHODOLOGY

2.1. Sample characteristics

The participants of this study are international students (N=25) at Institute of Business Administration (IAE) Nice, who have benefited from the scholarship of Erasmus+ programme. The data for this study were collected using a questionnaire developed in collaboration with Inter-

national Relations Office of IAE. The survey was conducted with incoming Erasmus students during the academic year 2019–2020. Formulated research questions are:

- What is the impact of student's international mobility on entrepreneurship attitude?
- What is the relationship between Erasmus students and entrepreneurs?
- How international mobility affects students' attitudes towards entrepreneurship?

The descriptive statistics was used to gain information about the respondents' gender, age, education background, the factors which influence their departure in Erasmus mobility, impact of international experience on student's entrepreneurial attitude and the satisfaction regarding the study condition in host university. From total of 40 individuals we received 25 responses, 72% of whom were female and 28% male.

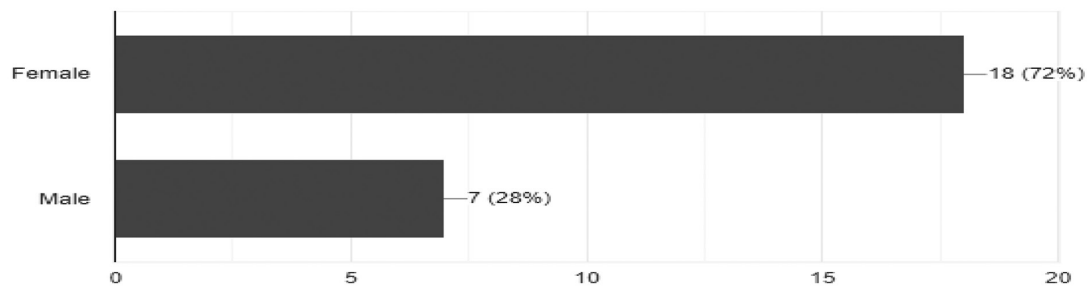


Figure 1. Gender of the respondents

In terms of degrees, 52% of respondents were bachelor degree students, 44% were masters level students and 4% were doctoral students. In terms of respondents age, most were between 19-23 years old (72%), followed by 24-30 years (20%) and 31-35 years (2%). The students' age structure is listed in the following figure (fig.2).

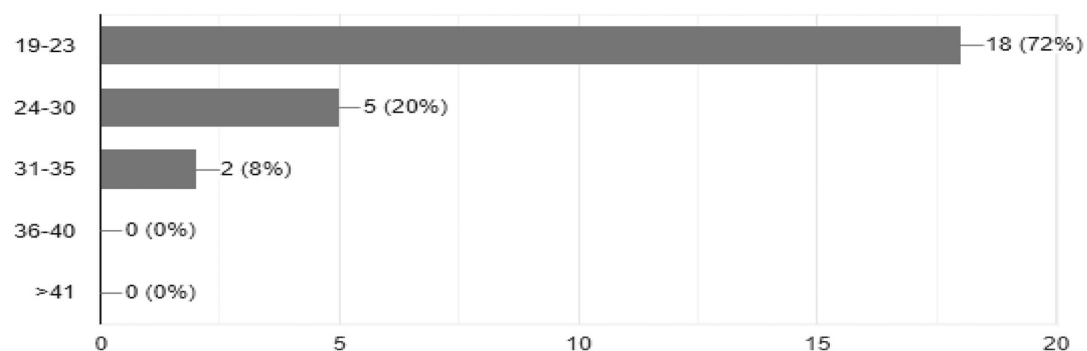


Figure 2. Age frequency distribution

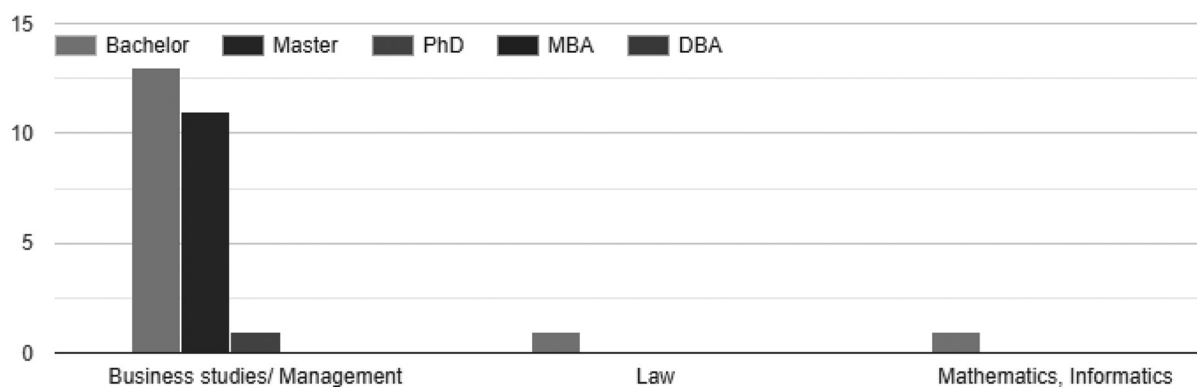


Figure 3. Education background

Regarding the factors that most influenced the departure of students in Erasmus mobility, we identified the following: academic and professional opportunities abroad (40%) the curiosity to find out what is studied in another country (16%), the need for academic training (16%), the curiosity of living in another country (12%), and the need for professional training (8%). Other studies (Pomona, Rodríguez, Sevillano, 2013) mention motivated factors the student to go abroad are: European experience, academic and cultural factors, a new foreign environment, career planning and friendship. According to Mazilescu et al. (2016) priority motivation for young people who apply for Erasmus programmes, are related to new experiences, to learn something about different cultures and to meet new people.

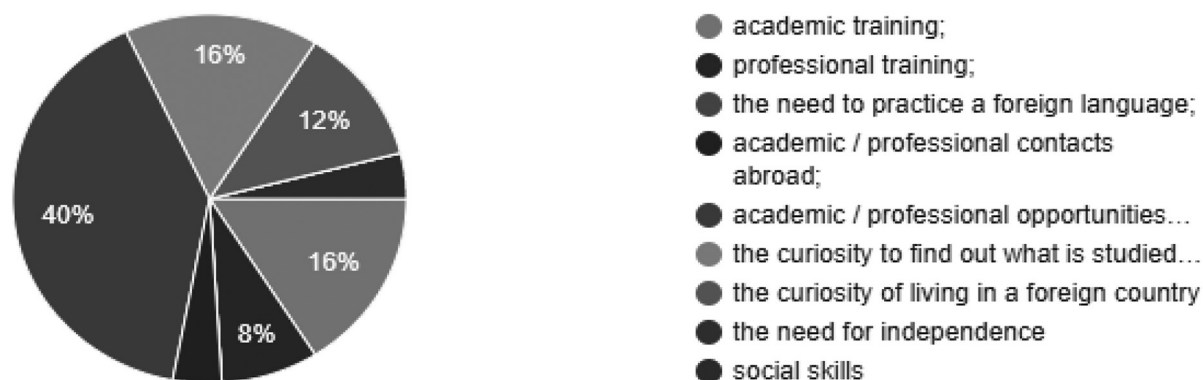


Figure 4. Factors that influence the student's departure in Erasmus mobility

At the level of the difficulties encountered by Erasmus students aboard, respondents highlight language barriers (48%), bureaucracy (44%), lack of support (28%), cultural differences (12%).

3. FINDINGS

The results indicate that international mobility had a high impact on student's relational skills (28%), self-confidence (24%), career opportunities (20%), language skills (12%), professional knowledge and skills (8%) and business opportunities (8%). The following personal traits of Erasmus students changed because of international mobility: problem solving ability, independence, taking the risks and maturity. Here is important to make an observation that these personal characteristics represent entrepreneurs and can be importantly related to entrepreneurial start-up intentions and behaviour. Risk-taking propensity is considered crucial for the decision to enter an entrepreneurial career (Antoncic at al., 2012). Problem-solving skills and need for independence are also mentioned inherent for starting a business. Strong need for autonomy is reflected in people motivation to make decisions independently and take control (Perry, 1990; Kollmann, Christofoer & Kuckertz, 2007).

With regard to the setting up a new business, students claim that international experience changed their attitude toward entrepreneurship (80%). In this regard, we notice that 44% of students indicated that one of the members of their immediate family run own business. According to the fact that most respondents are between 19-23 years old, when asked the question: What would you like to do immediately after finish your degree? The students have answered that they will do internship 56 %, following by entrepreneurs 32%, and employee 24%. It is important to emphasize that most of the students who have entrepreneurs in the family have responded that they want to start a new company and have argued that mobility had a positive influence on their entrepreneurial attitudes.

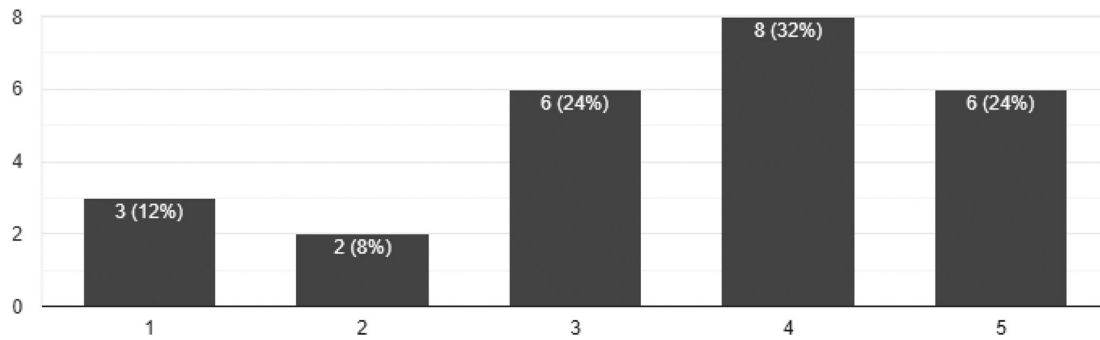


Figure 5. Impact of international experience on student attitude towards setting up own business (1 –no impact, 5-high impact)

The influence of Erasmus program on satisfaction regarding the studying conditions in the host university were positively rated. Moreover, students are highly satisfied (76%) with education at Institute of Business Administration (IAE).

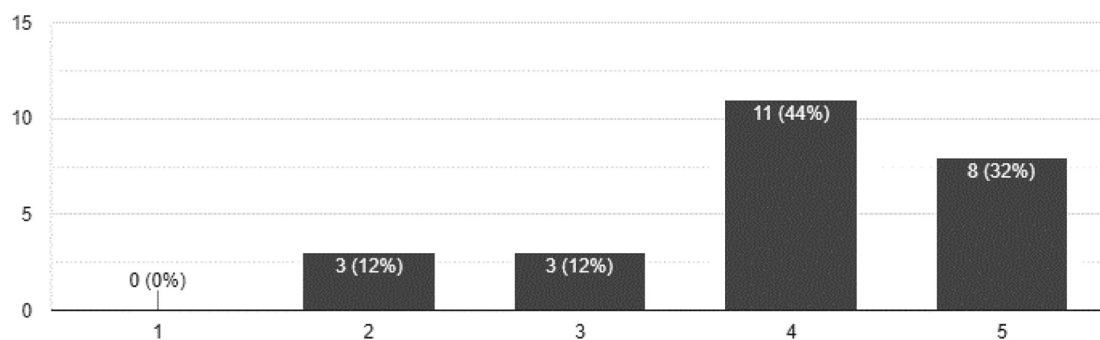


Figure 6. Students satisfaction regarding the studying conditions in the host university (1 – not at all satisfied; 5 – very highly satisfied)

Research contribution is based on identification of research gap (presented in section 1). Managerial implications are showing that by efficient use of student's international mobility program, their entrepreneurial attitudes are increasing and therefore research is significant for Universities and other stakeholders in international student mobility and state employment agencies. Further research is proposed with larger sample size, more countries and different educational background.

CONCLUSION

The results of this study indicate that the international mobility has a positive impact on entrepreneurial attitudes and skills of students, which make students more employable. The international mobility contributes to the development of personal traits (problem solving, independence, taking the risks and maturity) and had a high impact on student's relational skills, self-confidence, career opportunities and language skills. Erasmus students are highly satisfied (76%) with education at host university. Regarding the factors that most influenced the departure of students in international mobility, we identified the following: academic and professional opportunities abroad (40%). With regard to the setting up a new business, students claim that international experience changed their attitude toward entrepreneurship (80%).

Based on managerial implications, it is recommended that educational institutions consider more Erasmus students as future entrepreneurs, to offer more courses related to entrepreneur-

ship and to contribute to the development of students' skills and knowledge which should enable development of student's interest and gaining skills and competences relevant for future entrepreneurs.

ACKNOWLEDGMENT

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IMPLEMENTATION OF CUSTOMER ORIENTATION IN THE HOSPITALITY INDUSTRY: IMPLICATIONS FOR BUSINESS PERFORMANCE

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Abstract: *The purpose of this paper is to examine whether there is a relationship between customer orientation and successful hotel business performance. An empirical study was conducted by examining the marketing management of hotel companies in Primorje-Gorski Kotar County and Istria County. The study found that there is a statistically significant relationship between customer orientation and hotel business performance. The results of the research can be used in practice by the marketing management of hotel companies to determine long-term directions of action. In order to take into account, the wants and needs of the guest and to achieve a competitive advantage, the implementation of customer orientation should be a fundamental postulate in the future business operations of all providers of the hotel offering.*

Keywords: *Customer orientation, Hotel business performance, Croatia.*

1. INTRODUCTION

For hotel enterprises to gain and sustain a competitive advantage in the market in today's business environment, it is essential they introduce and apply customer orientation, a business philosophy based on the needs, wants and demands of customers. Years ago, numerous foreign studies had already suggested that customer orientation was imperative to, as well as the fundamental element of, successful business performance (Narver and Slater, 1990; Deshpandé, Farley and Webster, 1993; Sandvik and Sandvik 2003; Sin et al., 2005; Grisseemann, Plank and Brunner-Sperdin 2013).

Various marketing scholars (Tsiotsou, 2010; Ro and Chen, 2011; Tajeddini and Trueman, 2012; Ziggers and Hensler, 2015) have pointed out that customer orientation is a concept that focuses all business activities on identifying and meeting the needs of customers in order to deliver value to customers. Moreover, customer orientation is the set of values of a company and its employees that puts customers and their needs first (Deshpandé, Farley and Webster, 1993).

Grissemann, Plank and Brunner-Sperdin (2013) point out that although marketing scholars have studied the relationship between customer orientation and business performance, very little of their research has focused on the relationship between customer orientation and hospitality performance. Because there are also very few studies in Croatia dealing with this relationship, this research is considered to be fully justified and will contribute to a deeper understanding of the issue.

The purpose of this paper is to explore the extent to which customer orientation has been adopted by the hospitality industry of Croatia. The paper also seeks to prove that the degree to which hotel enterprises have adopted customer orientation has a positive effect on their business performance.

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The paper consists of six parts. Following the introduction, the second part of the paper provides a literature review and sets the research hypothesis. The third part describes the research methodology. Findings are presented in part four and future researched directions are discussed in part five. The last part of the paper summarizes theoretical and application insights.

2. LITERATURE BACKGROUND

In the marketing literature there are various approaches to and definitions of market orientation. Most authors (Agarwal, Erramilli, and Dev, 2003; Cano, Carrillat, and Jaramillo, 2004; Mahmoud, 2011; Jyoti and Sharma, 2012) agree, however, that market orientation is the implementation of the marketing concept, implying a focus on the needs, wants and demands of customers. According to Narver and Slater (1990), marketing orientation consists of customer orientation, competitor orientation and inter-functional coordination. As one of the three components of marketing orientation, customer orientation “plays a relatively larger role in the firm’s market orientation dynamics” (Mohiuddin Babu, 2018, p. 703). For the purpose of this paper, customer orientation is regarded as “the set of beliefs that puts the customer’s interest first, while not excluding those of all other stakeholders such as owners, managers, and employees, in order to develop a long-term profitable enterprise” (Deshpandé, Farley and Webster, 1993, p. 27). It should be noted that customer orientation is a long-term orientation focused not only on attracting customers but on retaining them as well. Customer retention is the guarantee to successful business performance in the long run, based on value and satisfaction (Racela, 2014).

In the context of the hotel industry, business performance can be expressed through two sets of indicators (Chen, Tsou and Huang 2009): financial and non-financial performance indicators. Financial performance “refers to objective measures such as the average occupancy rate, lodging index, and market share whereas the non-financial measures of hotels refer to perceptual measures such as customer retention and reputation” (Grissemann, Plank and Brunner-Sperdin, 2013, p. 349).

Previous studies have shown that there is a positive relationship between customer orientation and business performance in hospitality (Sin et al., 2005; Wang, Tsitsou, 2010; Chen and Chen, 2012; Grisseman, Plank and Brunner-Sperdin, 2013). Sin et al. (2005) proved that there is a significant and positive relationship between market orientation and hotel business performance. Tsioutsou (2010) examined three main components of market orientation – customer orientation, competitor orientation and inter-functional coordination – and their influence on tourism service performance. His study confirms that only customer orientation has a direct effect on service performance, while the other two components have an indirect effect. Moreover, Wang, Chen and Chen (2012) explored the link between total quality management, market orientation and hotel performance and proved there is a positive relationship between market orientation and hotel performance. Their research also confirmed the moderating effect of market orientation on TQM and hotel performance. Grisseman, Plank and Brunner-Sperdin (2013) examined the relationship between customer orientation, innovation and hotel business performance and found that the effect of customer orientation in hotels exceeds the effect of innovativeness and innovation behavior on hotel business performance. Moreover, they revealed that customer orientation has a direct effect on financial performance but only in 4-star and 5-star hotels and concluded that the managers and owners of such hotels attach greater importance to customer orientation than do the managers and owners of 1- to 3-star hotels.

Accordingly, the following hypothesis is set: Customer orientation has a positive and significant effect on hotel business performance.

3. METHODOLOGY

The survey method was used to conduct research. The research instrument was a questionnaire comprising three parts. The first part contained statements referring to customer orientation, taken from previous studies by Grisseman, Plank and Brunner-Sperdin (2013) and Taghian (2010). The second part of the questionnaire was made up of statements to examine the business performance of the hotel enterprise. A scale was designed according to the previous research of Chen, Tsou and Huang (2009) and respondents were asked to rate statements with a score of 1 to 5 (1=strongly disagree, 5=strongly agree). The questionnaire's third part referred to the general data of hotel enterprises and to the socio-demographic profile of respondents.

The respondents were persons in charge of the planning and execution of marketing activities in hotel enterprises in Croatia (Istria County and Primorje-Gorski Kotar County). The survey was conducted from March to April 2015. The size of the sample corresponds to the total number of 128 hotel enterprises in the above-mentioned counties (according to the list of categorized tourism facilities of the Croatian Ministry of Tourism, 17 February 2015). A total of 62 properly filled out questionnaires (48%) were collected.

4. RESEARCH RESULTS

The description of the sample of hotel enterprises consists of the enterprises' status and way in which they carry out marketing activities. In the sample of 62 hotel enterprises, the respondents who filled out the questionnaire were mostly the heads of sales departments (35.5%), have a university degree (69.4%) and are female (56.5%). Of the 62 hotels, 66.1% are limited liability companies and 33.9%, joint-stock companies. Marketing activities are most often carried out by marketing departments (38.7%), and in 37.1% of cases, there is no special organizational unit in charge of marketing.

Table 1 presents a descriptive analysis of customer orientation.

Table 1. Descriptive analysis of customer orientation

Item	Mean	SD*	Mode	CA**
Customer satisfaction is continuously measured	4.26	1.085	5	-1.572
Market information is quickly analyzed and distributed among the various departments of the enterprise	3.39	1.150	4	-0.482
We respond promptly to the campaigns of competitors	3.19	1.157	4	-0.261
We take account of the future demands of guests (markets) and adjust our offering accordingly	3.87	1.138	4	-1.119
Total average rating	3.68			

* SD – standard deviation

** CA – coefficient of asymmetry

Source: Research results

The above table shows that the average scores for the construct “customer orientation” range from 3.19 to 4.26. The variable “We respond promptly to the campaigns of competitors” has the lowest score and the variable “Customer satisfaction is continuously measured”, the highest. The total average score is 3.68, suggesting that on average the respondents partially agree with the given statements. Standard deviation values are greater than 1, indicating a wider spread of data. For two of the variables the coefficient of asymmetry is in the range of -1 and +1, indicating normal distribution of data, but for the other two variables it is outside that range. The mode

value shows that respondents mostly gave a score of 4 to the observed variables, indicating that for the most part they partially agree with the given statements.

Table 2 presents the results of research pertaining to “business performance”.

Table 2. Descriptive analysis for “business performance”

Item	Mean	SD*	Mode	CA**
We made a profit	3.89	1.415	4	-1.084
We achieved our profit-related objectives	3.63	1.309	4	-0.858
We achieved our sales-related objectives	3.79	1.133	4	-0.970
We enhanced the loyalty of existing guests	3.90	1.097	4	-1.188
We attracted a significant number of new guests	3.94	1.143	4	-1.230
We built a well-perceived image	3.79	1.042	4	-0.819
We increased the occupancy rate of our accommodation capacities	3.89	1.057	4	-1.229
We improved our liquidity	3.79	1.175	4	-1.141
We improved our productivity	4.00	1.040	4	-1.264
We improved our business efficiency	3.82	1.138	4	-1.086
Total average rating	3.84			

* SD – standard deviation

** CA – coefficient of asymmetry

Source: Research results

It can be concluded that the average scores given to variables in the construct “business performance” are relatively high, ranging from 3.79 to 4. The total average score is 3.84, and the most frequent score (mode) is 4. These scores indicate that respondents positively rated the observed indicators of business performance. Respondents in hotel enterprises gave the highest score to “improved productivity” and the lowest to “achieved profit-related objectives”. The standard deviation in all variables is higher than 1, indicating a wider spread of data. The coefficient of asymmetry of three variables is within the interval from -1 to +1, meaning the distribution of scores is symmetrical in those cases.

Correlation analysis was conducted to test the set hypothesis. Prior to testing, Cronbach’s alpha, the coefficient of internal consistency, was calculated. Cronbach’s alpha was 0.807 for the construct “customer orientation” and 0.939 for the construct “business performance”, suggesting high reliability in measuring the individual constructs.

To test the hypothesis, a linear composite was created for each construct, that is, the average value of the individual statements that make up a construct was calculated. The normality of distribution of the observed variables was also tested, as shown in Table 3.

Table 3. Descriptive analysis

Item	Mean	SD*	CA**
Customer orientation	3.68	0.90	-0.80
Business performance	3.84	0.93	-1.28

* SD – standard deviation

** CA – coefficient of asymmetry

Source: Research results

A slight negative asymmetry of the observed variables is seen in the above table. The coefficient of asymmetry of the construct “customer orientation” is, however, within the limits of acceptability for normal distribution (located in the interval from -1 to +1). The distribution of the variable “business performance” is slightly asymmetric. Considering that the variables meet the condition of normality, the hypothesis was tested using Pearson’s correlation coefficient.

The conducted correlation analysis established that there is a significant and positive relationship between customer orientation and business performance ($r = 0.637$; $p < 0.01$). The values of the correlation coefficients suggest that the better the customer orientation, the better the business performance. In view of this, the set hypothesis can be accepted.

Regression analysis was used to test the cause-effect relation between customer orientation and business performance.

Table 4 shows the results of regression analysis.

Table 4. Regression analysis for “customer orientation” and “business performance”

Indicators	Value			
Correlation coefficient R	0.637			
Coefficient of determination R ²	0.406			
F ratio	41.045			
Sig.	0.000			
Independent variable	B	Beta	t	Sig.
Constant	1.421		3.650	0.001
Customer orientation	0.659	0.637	6.407	0.000

Note: Dependent variable – business performance; B – unstandardized coefficient; Beta – standardized coefficient.

Source: Research results

Table 4 indicates a moderate positive relationship between customer orientation and business performance ($r=0.637$). According to the coefficient of determination ($R^2 = 0.406$), the variables in the model share 40.6% of common factors. This means that 40.6% of the variance (information) in variable “business performance” can be explained by the variable “customer orientation”. Furthermore, the results are statistically significant ($F = 41.045$; $p < 0.01$). The unstandardized coefficient B indicates that a result increase of one point in “customer orientation” is linked to an average increase of 0.659 points in the result of “business orientation”. Conversely, a one-score decrease in “customer orientation” results in an average decrease in “business performance” of more than half a score (to be exact, 0.659 of a score). The value of the beta coefficient suggests the relative significance of the independent variable (and corresponds to the correlation coefficient). The t-test leads to the conclusion that customer orientation has a significant effect on business performance ($p < 0.01$).

5. FUTURE RESEARCH DIRECTIONS

This study contributes to a better understanding of customer orientation in the hotel industry and the implications it has on business performance. The research on customer orientation indicates that hotel enterprises are continuously measuring guest satisfaction and adjusting the hotel offering to market demands. In the hotel enterprises, market-related information is relatively quickly analyzed and distributed within the various departments of the enterprises. The study

also established that hotel enterprises are weakest in their responses to the campaigns of competitors. With regard to business performance, hotel enterprises achieve financial and non-financial performance outcomes to the fullest extent, in particular with regard to improving productivity, attracting a significant number of new guests and enhancing the loyalty of existing guests.

The study has some limitations. One is its spatial limitation, considering that research was conducted only in two counties in Croatia. Accordingly, future studies could include hotel enterprises in other counties throughout Croatia. It is also suggested that future studies should seek to make comparisons with best practices in the hotel industry worldwide. To that end, future research should focus on competitive benchmarking with a competitor-to-competitor comparison, generic benchmarking to find the best practice regardless of the industry, and collaborative benchmarking to compare the business performance of those hotel enterprises that have built a partner relationship prior to introducing the benchmarking process. Another limitation refers to the application of a single research method, the survey method. Future research could apply other methods as well (for example, focus groups, in-depth interviews, etc.) to obtain more comprehensive sight into the research problem.

6. CONCLUSION

The results of the conducted study confirm the hypothesis positing that customer orientation has a positive and significant relationship with hotel business performance. This is consistent with the findings of studies by Tsotsou (2010) and Grisseemann, Plank and Brunner-Sperdin (2013) which prove that customer orientation has a direct and positive effect on hotel performance. Furthermore, Zhou et al. (2007) in their study confirmed that customer orientation had a stronger effect on hospitality performance in economically better developed regions as well as in markets with good local business conditions, greater resource availability, and discerning customers.

In adapting to modern trends, it is essential for hotels to become customer oriented, as a fundamental precondition to successful business performance. The marketing managers of hotel enterprises should be able to assess the degree to which strategic marketing plans are carried out because customer orientation is operationalized through those plans. This would also make timely responses to competitors possible, what is important, considering this study has established that hotels are slow in responding to the competition. Preconditions to customer orientation are the existence of an adequate information system and the digitalization of businesses, as suggested in a study by Zhu and Nakata (2015). In designing new products capable of satisfying the increasingly discerning tourism demand, focus should be placed on the selective development of various services, facilities and events that can provide a memorable experience to guests.

The overall hotel offering should be adjusted to the guests and their ever more discerning needs and wants. To this end, hotels can reach out to potential guests through a variety of information and communication-based forms of promotional activities (for example, by promoting services via social networks, storytelling, gamification, etc.). They can provide the latest technological solutions for guests to use during their stay in a hotel (for example, the use of mobile applications to adjust room conditions, make bookings, check-in and check-out, order room service and receive personalized information about a hotel's current offerings and services). To build the market distinctiveness of a hotel enterprise and its brand and image, a specialized hotel offering should be developed, based on themed hotels fully adjusted to the needs of guests (for example, wellness, boutique, historical, children's and eco hotels).

It can be concluded that the implementation of customer orientation in the hotel industry is a demanding and complex task, requiring the continuous adjustment of a hotel enterprise's marketing activities to the specific conditions and requirements of the industry.

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COMPARATIVE ANALYSIS OF VAT REFUNDS SYSTEMS TO FOREIGN TOURISTS IN ARGENTINA, COLOMBIA, ECUADOR, AND URUGUAY. THE CASE OF THE TAX-FREE SHOPPING

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Abstract: *The presented contribution focuses on describing the Value Added Tax refund to foreign tourists, specifically the Tax-Free Shopping incentive, that increases tourists' propensity to buy retail goods where shopping can even sometimes be the primary reason for traveling. To have a practical analysis and comparison, four economies from South America were chosen. Colombia and Ecuador whose tax-refund system is entirely operated by the State and Argentina and Uruguay whose governments have decided to outsource their VAT refund service to tourists having private companies operate them. Adding to this, an evaluation of the main characteristics of these countries regarding the competitiveness of their tourism sector was gathered with data obtained from the Travel & Tourism Competitiveness Index (TTCI) Report (2019). The findings of this research provide a benchmark to tourism policymakers interested in assessing changes overtime on this type of incentive.*

Keywords: *Tax system, Tourism, VAT Refund. Tax-Free Shopping.*

1. INTRODUCTION

The Value Added Tax (VAT) refund to foreign tourists has become more established within world tourism trends, as is the case of Tax-Free Shopping (TFS), which increases the expenditures of international tourism and sales of retail stores (CEBR: 2018). Other independent studies have established that the theoretical cost of the VAT refund to foreign visitors returns to the local economy, and it is offset by benefits, such as greater supervision of the informal economy. Concerning this last point, the efficient operation of TFS encourages merchants to declare their sales and tourists to ask for the invoice in order to obtain the corresponding VAT refund.

Governments consider this measure another essential tool to continue gaining competitiveness in the tourism sector. Entrepreneurs make use of this incentive to design better offers and expand their market. Due to the fact that shopping ranks high in direct tourist expenditures, retail organizations and destination marketing organizations, target international tourists in their efforts to generate sales. Not only is shopping an integral part of many visitors' experiences, but it can also be considered the main reason why people travel (Timothy and Butler, 1994).

The Colombian government, through institutions such as its Directorate of National Taxes and Customs (Dirección de Impuestos y Aduanas Nacionales "DIAN") and the Ministry of Industry and Commerce, has been working for several months on a draft decree to reform and modernize the VAT refund system for foreign tourists entering the country through a more efficient and less expensive system. One of the main reasons is the disparity between the number of return requests submitted and the number of foreign tourists visiting each year. According to the DIAN, these people submitted 28,499 VAT refund requests in 2017, but, in that same period, the country received 3,233,162 foreign visitors and tourists (not accounting for border crossings

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or cruises). This is equivalent to a refund/arrival ratio of 0.88%, lower than the 0.92% recorded in 2016. (Fierro, 2018)

At the regional level, Uruguay received 3,940,790 foreign visitors who were not resident in the same period (according to figures from its Ministry of Tourism) and processed 570,000 requests for VAT refunds, reporting a refund/arrival ratio of the 14.5%. This average is usually similar and even higher globally. (Fierro, 2018)

To evaluate and compare the different VAT refund systems for foreign tourists existing in South America, Colombia and Ecuador will be taken as samples. These countries, whose tax-refund system is entirely operated by the State, assume all operating costs. Geographically they are neighbors and have access to the Pacific Ocean. Contrarily, Argentina and Uruguay decided to outsource the VAT refund service, and private companies operate it.

Table 1 summarizes the main characteristics of these countries in regard to the competitiveness of their tourism sector based on the Travel & Tourism Competitiveness Index (TTCI) Report (2019), and Table 2 is a comparative matrix of VAT refund models to foreign tourists in Argentina, Colombia, Ecuador, and Uruguay.

2. MATERIAL AND METHODS

The main objective of this research is *to identify the main characteristics between the state and outsourced administration of the VAT refund to foreign tourists in the selected countries and to link them with the (TTCI, 2019) report results.*

The research is based on related literature, specialized web portals, relevant websites, and correspondence via email with organizations for up-to-date information on the subject of interest. The methods used in this paper also include analysis and study of documents, both primary and secondary data.

3. THEORETICAL BACKGROUND

The TTCI is produced by the World Economic Forum (WEF) and measures „*the set of factors and policies that enable the sustainable development of the travel and tourism sector, which in turn, contributes to the development and competitiveness of a country.*”(TTCI, 2017) Also, the OECD defined tourism competitiveness for a destination as “*the ability of the place to optimize its attractiveness for residents and non-residents, to deliver quality, innovative, and attractive (e.g., providing good value for money) tourism services to consumers and to gain market shares on the domestic and global market places, while ensuring that the available resources supporting tourism are used efficiently and in a sustainable way.*” (OECD, 2013)

In this context, government policies on taxation directly impact tourism. Whether taxes are applied directly to a tourist (such as an entry or exit tax, visa fees, accommodation taxes - “*room/bed tax*”, or taxes on car rentals), the industry “*tourism businesses and products*” (airports and airlines, hotels, accommodation, food and beverages, and gambling facilities), or indirectly (such as VAT or sales taxes, which can discourage shopping and benefit countries with lower taxes). These sales taxes may even encourage day trips across borders to shop in areas where taxes are lower. (Holloway, 2009). Introducing fiscal relaxation in tourism brings contributions

to the development of this sector, which may compensate the budget deficit through revenue increases brought on by increasing the tourists flows. (Paula, S., Mariana, B., 2016) UNWTO has identified 40 different types of these particular tourism taxes. (Gooroochurn and Sinclair, 2005)

The OECD studied the evolving relationship between taxation and tourism based on comparative information in the form of an inventory (survey) of tourism-related taxes to its members and partner countries (including Chile which is the only South American country member), focuses on indirect tourism-related taxes, fees, and charges that fall under the broad category headings of: i) arrival and departure; ii) air travel; iii) hotel and accommodation; iv) reduced rates of consumption tax; v) environment; and vi) incentives. (OECD, 2014) Based on the OECD report, it was determined that tax rates vary considerably from one country to another. Many countries have introduced reduced rates of consumption tax for tourism-related activities, focusing primarily on hotels and restaurants, to boost tourism and stimulate employment in that sector, or tourist/VAT refund schemes to encourage visitor spending.

In the practice, not all member countries have reduced rates on hotels (such as in Israel and Mexico where the rate is 0%), nor is it carried out in the reduction of tax rates on restaurants. (OECD, 2014) In South America, there are different positions in relation to taxation policy strategies applied to the tourism sector, in which information (according to the author's inventory) was gathered from data of the tourism taxes, fees, and charges in each of those countries. (Honajzrová, 2019) For example, it was found that the Bolivian authorities impose a tax on the arrival of tourists called Contribución Especial para el Fomento, Promoción y Facilitación del Turismo (Special Contribution for the Encouragement, Promotion, and Facilitation of Tourism), dubbed "*Cetur*" (an entry tax). However, in Argentina, they are committed to the reduction of taxes implementing „VAT tax-free" on overnight hotel stays (indirect tax) for foreigners who pay by credit card. It is a measure to attract more visitors, as the growth in the number of tourists visiting the South American country has slowed down in recent years. (INDEC, 2016)

4. RESULTS

According to the data from the TTCI report 2019, we can reach the following conclusions:

- For the third time, Spain remains the global leader, ranking first of 140 countries, followed by France and Germany;
- The Americas is the third-highest scoring region on the TTCI, and South America leads in overall TTCI growth, with the United States holding its position as the region's top-scoring economy and Bolivia showing the most improvement (from 99th to 90th);
- South America scores highest (increasing from previous years) in *international openness* and *price competitiveness*. It scores lowest for *business environment*, deterring Travel and Tourism (T&T) investment, and has poor *safety conditions*. Brazil retains both the region's largest and most competitive T&T industry and environment, thanks to exceptional *natural and cultural resources*. Venezuela experienced the world's most significant deterioration in T&T competitiveness, moving into last place in South America;
- The *biodiversity* of Latin American countries is one of the greatest tourist attractions for foreigners. For this latest report, the (WEF) was able to verify that Mexico and Brazil are leaders in the category. Costa Rica, Peru, and Argentina follow, who occupy positions 8, 13, and 16, respectively. Colombia is located in place 19 and is classified with the previously listed Latin countries as worldwide leaders in this field. One of the

indicators in which several countries in the region achieved good scores was in the *international opening*. There, Latin America is on par with Europe in terms of the number of countries that entered the top 20, which were seven. Chile, Colombia, El Salvador, Peru, Panama, Honduras, and Costa Rica were able to enter the table with scores above 4 (with 7 being the best);

- South American countries have a relatively small T&T economy, defined by disproportionately *low international tourist arrivals*, which helps to explain the sub-region's dependence on domestic T&T markets. One possible reason could be South America's underdeveloped *air and ground transport infrastructure*— which undermines accessibility — with ground infrastructure being the sub-region's most considerable disadvantage relative to the global average;
- Bolivia, Colombia, and Mexico were the Latin American countries that rose most in positions within the general ranking of the (WEF). Colombia managed to climb seven ranks, reaching 55;
- As for the countries that have fallen in the table, Ecuador lost 13 positions compared to the ranking published in 2017.

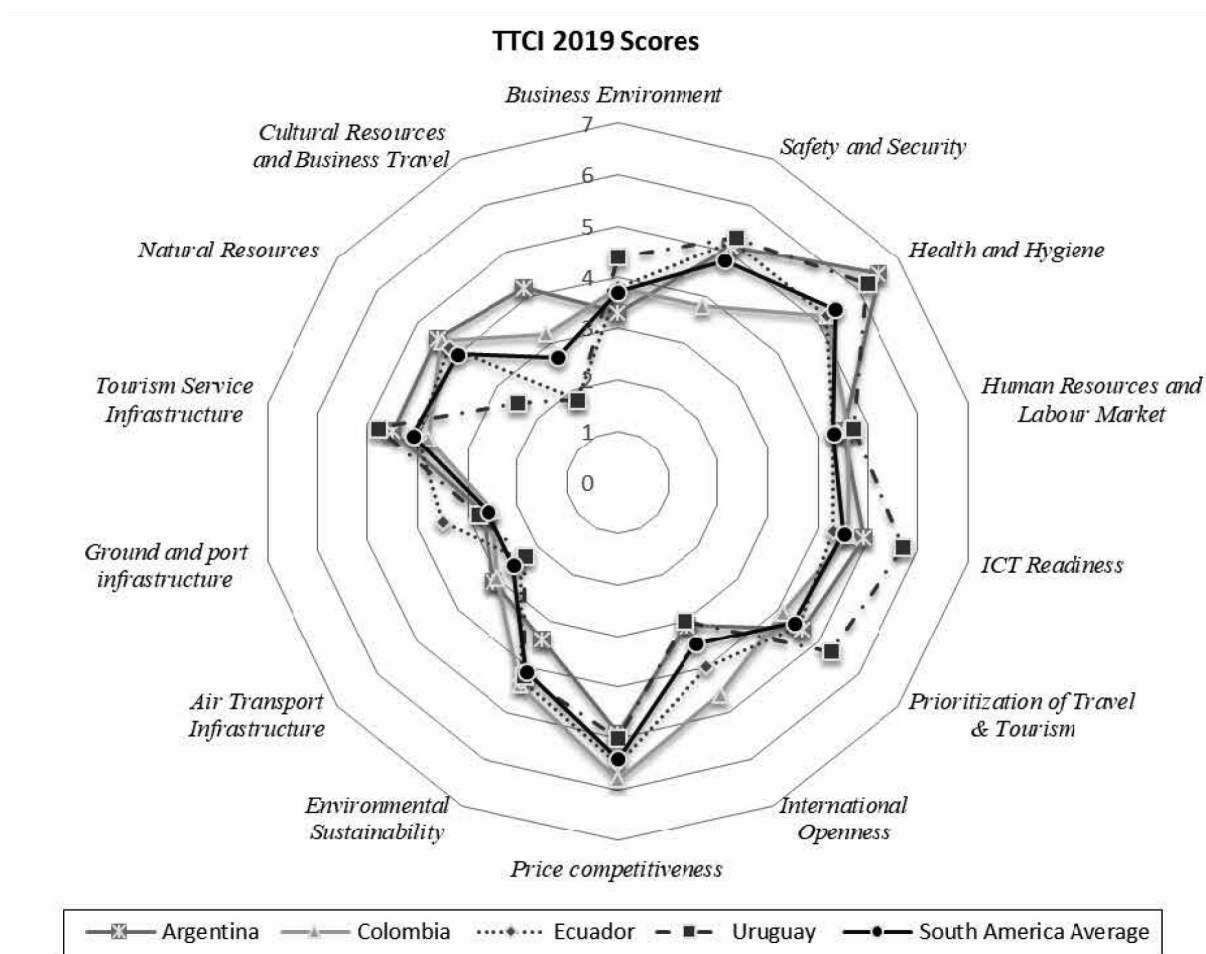
For a better comparison between the studied countries, table No. 1 and graph No. 1 were created, where, based on scores from 1 to 7 (the best), the level of competitiveness in each of the pillars studied in the TTCI report can be observed. **Argentina** holds the 50th position of the 140 nations measured and has the best-ranking status when comparing the studied countries. It exceeds the average of South America and countries studied in the pillars of *Cultural Resources and Business Travel* and *Natural Resources, Health and Hygiene*, and *Air Transport Infrastructure*. Together with Uruguay, they stand out in *Tourism Service Infrastructure* and *ICT Readiness*. Argentina is the country most visited by tourists (see Table 1), and in recent years, as a measure to attract more visitors, there is an initiative to reduce taxes implementing „VAT tax-free” on overnight hotel stays for foreigners who pay by credit card. This equals a 21% decrease in prices. 2.5% of the federal budget is allocated to travel and tourism. On the other hand, this country is among the five countries with the worst climate for business, *business environment* (ranked 135/140), creating a non-business friendly environment. It is identified as the country where medium-sized companies pay the highest percentage of their income in taxes and fees. Also, it has the second-worst economy in terms of encouraging investors because of the high taxation rate. Furthermore, taxes and charges levied on tickets and airport services are among the highest globally. Changing these policies may have a swift and direct effect on boosting the industry. (TTCI, 2017) **Colombia**, the TTCI 2019 report, ranked 29th in world *price competitiveness*, climbing 74 positions compared to 2017. This is attributed to *low hotel prices* and the *reduction in ticket taxes and airport fees* indexes in which it placed 16th and 90th, respectively. These analyzed subcategories influenced so much that the country was located 55th in the general ranking, rising seven places compared to the previous report, when it was 62nd. Paula Cortes Calle, from the *Colombian Association of Travel Agencies and Tourism* (ANATO, 2019), attributes some of this rise because „It has also been allocated resources in *airport infrastructure* with the opening and modernization of airports in Colombia, which has allowed the entry into operation of new connections and with this more routes and frequencies.” Colombia also exceeds the average of South America in *International Openness* and *Environmental Sustainability*. On the other hand, with the *Prioritization of Travel & Tourism, Safety and Security*, and *Tourism Service Infrastructure*, Colombia falls behind the rest of the analyzed countries. In the last year, **Ecuador's** ranking fell from a position of 57 to 70, among 140 countries analyzed. The fall of 13 positions is mainly due to the reduction of state investment in tourism promotion

and the development of projects within the sector added to the realization that marketing campaigns are ineffective. It is observed that, together with Colombia, the *Prioritization of Travel & Tourism* by its governments is lower than that of Uruguay and Argentina. In the case of the indicator of *Marketing Effectiveness and Promotion of the Country Brand*, especially to attract tourists, the poor performance caused it to move from position 48 to position 76. Ecuador excels in *International Openness* and *Price Competitiveness*, as does its neighbor Colombia. It has a high score compared to the South American average in the *Ground and Port Infrastructure* pillar. Ecuador and Uruguay are left behind in the pillars of *Cultural Resources and Business Travel*. However, Ecuador stands out with *Natural Resources*, which is not the case with Uruguay. *Air Transport Infrastructure*, *ICT Readiness*, and *Health and Hygiene* are the pillars that Ecuador has a low score within the studied countries. **Uruguay** went from position 77 in 2017 to rank 74 in 2019. This country stands out for its *Safety and Security*, *Health and Hygiene*, and *ICT Readiness*. In recent years, its government has increasingly prioritized the T&T sector. Its effort to attract more tourists has proven effective since we see the number of received tourists has surpassed those received by Ecuador, which is a similarly sized country. Although its government is the one that most prioritizes T&T and has the highest T&T government expenditure (% government budget), its position in the ranking and overall score has not surpassed the other three analyzed countries. It also ranks low in *Cultural Resources & Business Travel*, along with its *Air, Ground, and Port Transport Infrastructure*, *International Openness*, and *Price Competitiveness*. Two items that have deteriorated substantially are *Business Environment* and *Security*.

Table 1. Characteristics of the countries under study in relation to the competitiveness of their tourism sector, TTCI report, 2019.

Key Indicators	Argentina	Colombia	Ecuador	Uruguay
International tourist arrivals	6,710,400	4,026,900	1,608,500	3,674,100
International tourism inbound receipts	US \$5,374.6 million	US \$4,821.4 million	US \$1,656.9 million	US \$2,558.1 million
Average receipts per arrival	US \$399.5	US \$423.5	US \$432.5	US \$530.5
T&T industry GDP % of total	US \$19,130.9 million 3.7%	US \$6,518.8 million 1.9%	US \$2,929.4 million 2.8%	US \$5,534.0 million 9.1%
T&T industry employment % of total	628,900 jobs 3.3%	505,700 jobs 2.2%	199,700 jobs 2.6%	150,400 jobs 9.1%
Rank and Overall score	50th/140 4.2	55 th /140 4.0	70 th /140 3.9	74th/140 3.8
Prioritization of T&T rank/score	76/4.6	103/4.1	80/4.5	24/5.3
T&T government expenditure (% government budget) rank/%	94/2.5	108/2.1	126/1.2	36/5.2

Source: Own elaboration based on TTCI Report, 2019



Note: Score 1-7 (best)

Graph 1. Travel & Tourism Competitiveness Index 2019 between the studied countries

Source: Own creation based on data of the TTCI report, 2019

Vat refund models to foreign tourists in Argentina, Colombia, Ecuador, and Uruguay.

Currently, two types of returns are applied based on the environment of the country. For the purposes of this investigation, they will be defined as follows: Open and Closed.

Open: this process operates on the fact that the beneficiary can make purchases of goods and/or services in any establishment without any restrictions.

Closed: this process is based on the fact that the beneficiary can make purchases of goods and/or services only in establishments authorized by the agency that is in charge of or is responsible for the VAT refund process to have greater supervision over purchases.

Table 2 summarizes the main criteria of the VAT refund to tourists in the analyzed countries:

Table 2. Comparative matrix of VAT refunds models to foreign tourists in Argentina, Colombia, Ecuador, and Uruguay.

Criteria	Argentina	Colombia	Ecuador	Uruguay
Normative	Value Added Tax Act, 1986 The reimbursement process is currently in force, as well as the regulation with Decree No. 1099/98, amended Decree No. 80/01 and by general resolutions (AFIP) 380 and 381.	Article 39 of Law 300 of 1996 , modified by article 14 of Law 1101 of 2006 and article 28 of Law 191 of 1995, modified by article 70 of Law 1607 of 2012. Resolution No. 09476, Oct. 2nd, 2008, prescribes the official form for the VAT refund request.	Article 30 of the Tourism Law published in the Supplement of Official Registry No. 733 of December 27, 2002 . However, until July 2010, no process was established to meet VAT refunds to foreign tourists; for this reason, requests were manually processed.	Law 18,033 of Tax Reform, art. 32 (law issued on December 27 th , 2006), Decree 333/009 (in which the functionality of the mentioned process is defined) and the extension Decree No.378 / 012
VAT rate	21%	19%	12%	22%
Refund Service Administration	<i>Global Blue Argentina S.A.</i> and <i>Premier Tax-Free S.A.</i> were chosen to provide the refund service via a call to adjudication.	The State entirely operates and assumes all operating costs through the DIAN.	<i>Servicio de Rentas Internas „SRI”</i> and the <i>Instituto Nacional de Patrimonio Cultural „INPC”</i> public sector entities.	<i>Global Blue S.A.</i> is in charge of and responsible for operating the return process.
Return type	Taxed goods produced in the country . Lodging and Breakfast Services.	Refundable goods: clothing, footwear, leather products, CDs, handicrafts, toys, linens and underwear, appliances, jewelry, emeralds, perfumes, hardware items.	Only the VAT of nationally produced goods personally carried when leaving the country, and tourist accommodation services are refunded.	Refunds are paid on all goods exported in the traveler's luggage. Refundable goods: fashion and clothing, leather goods, shoes, beverages, food, souvenirs, knitting, and crafts.
Minimum amount of return	Greater than \$70 Argentine pesos in the taxable base taxed, approx. US \$1.25 (2019)	When the value of the purchases, including VAT, is equal to or greater than ten (10) Tax- Value Units. For 2018 = COP \$331.560 (US\$97).	The VAT refund applies to goods produced in the country and to accommodation services in amounts higher than 50USD per receipt (taxable base)	60 USD or its equivalent in local currency.
Affiliated Shops	Stores affiliated with the system are identified with the logo: TAX-FREE	All merchants registered in the standard sales tax system and are supported by sales receipts that contain the breakdown of the sales tax.	Establishments identified with the VAT REFUND logo.	Authorized dealers with logo: Shop Tax-Free
Type of return	Closed	Open	Closed	Closed
Documentation to present	Tax refund forms, passport, receipts.	Completed form 1344. Passport. Submit a photocopy of the document that accredits the migration status. Submit photocopies of the sales receipt(s) made out to the refund applicant with the corresponding proof of purchase (payment receipt). The purchase of taxed goods must be made in person by a card payment terminal with international credit and/or debit cards issued outside of the country.	Refund application form with receipts enclosed and a passport photocopy in an envelope available at the counters. Deposit the envelope in the mailbox located in the pre-boarding (departure) lounges, after immigration control, in the international airports of Quito and Guayaquil. Request status tracked through the SRI site www.sri.gob.ec	Tax-Free form, receipts, passport.

Control	At the time of submitting the refund request, the customs department must check the objects of the VAT refund.	Colombian Tax and Customs Authority Offices check the goods against the receipts.	The presence of a SENA (National Customs Service) officer must be requested so that goods can be controlled, and appendixes sealed.	Customs must establish the controls to verify the exit of the acquired goods.
Return Time	Immediate refund in cash, by credit card accreditation, or with a bank check that will be sent to the address indicated by the applicant.	Up to 90 days.	According to the law, a maximum of 120 business days to receive a refund via credit card.	Immediate refund via credit card, international check, money transfer, or bank transfer (the last two within South America).
Commission	A percentage of the value to be returned is charged according to a table of value ranges.	The financial costs and notification expenses incurred are deducted from the value.	The administrative cost of 3 USD is deducted from the amount refunded.	The tourist receives an 85% refund of the total requested VAT, and the difference is the operator's commission.

Source: Own research, 2019.

VAT refund model for foreign tourists in Argentina and Uruguay:

From the point of view of the tourist, the current Argentine model managed by the Global Refund company is quite practical because of the different types of accreditation that it offers. It practically covers all possible options, even prompting tourists to spend the recovered value at the airport duty-free shops.

Another benefit to the tourist is having the confidence of knowing that they will receive the described tax refund value based on the form the tax-free shop gave them upon purchase. If any mistake or inconsistency is later found, it is faulted to the affiliated establishment, not the tourist. This benefit is not present in Colombia and Ecuador because their system requires a waiting period where the tourist is not present in the country, so these countries cannot guarantee that the tourist will receive the expected refund amount.

Despite the complications of a closed procedure in Argentina, that is to say, that the purchases made must be made in affiliated establishments, there is a shopping center in Buenos Aires consisting of all tax-free affiliated shops, making the shopping experience comfortable for foreign tourists. Uruguay offers a similar shopping situation for their foreign tourists. Another significant benefit that should be highlighted is that the minimum purchase value is from 70 Argentine pesos (approx. US \$1.25), which constitutes a very accessible value for tourists to purchase national products.

In Uruguay, TFS has intensified from the continuous incorporation of technological innovations, which has given this country one of the most modern systems in the world. The system stands out for being 100% digital and working in real-time, being easy to use, and having user-friendly technology for shops, tourists, and customs. Global Blue announced that starting in October 2019 a pilot plan was implemented consisting of a mobile application called "Global Blue – Shop Tax Free" for the validation of the benefit at the country's exit point, located in Salto. This means that tourists will be able to validate their operations from their mobile phones to obtain the benefit of return, without having to get out of the car when arriving at the international border. (worldshoppingtourism.com, 2019)

Among the disadvantages in the Argentine system is that the establishments that belong to this type of process must pay an annual fee from the moment they are registered in the model. If there is an error in the issuance of the refund document (check), the responsibility will fall directly on the issuing establishment, since the tourist will receive the amount described in the vouchers that he/she presents regardless of inconsistencies due to the issuer's error.

VAT refund model for foreign tourists in Colombia and Ecuador:

Colombia and Ecuador do not have a 100% digital and online VAT refund system. Instead, they use manual procedures with paper forms operated directly by their state offices DIAN and SRI (Servicio de Rentas Internas). One of the main problems in this area relates to the extensive amount of time these public entities take to complete the process. „If you look at the average time for disbursements abroad (usually less than ten days), the inconveniences presented by the Colombian and Ecuadorian system cause these drafts to be extended to more than 90 days (up to a maximum of 120 in Ecuador), which generates a greater number of complaints and queries by travelers, and in the worst case, the apathy on the part of the tourist to make use of this benefit.” (Fierro, 2018) The application of a more efficient and friendly procedure would expedite payments abroad and improve security levels and anti-fraud measures. As these systems are currently functioning, they are underutilized and do not meet two of their main objectives: *to increase the expenditure of foreign visitors, and to help local businesses sell more.*

Additionally, not all international credit cards have an agreement with the Colombian authorities, and therefore, those who use them do not have the right to VAT refunds even if they prove they have bought within the national territory. If it is taken into account that the majority of the countries currently using TFS systems employ private operators to develop and operate the VAT refund process system efficiently, it would be convenient to study this option for Colombia and Ecuador, countries that expect to increase the flow of foreign travelers and the generation of employment linked to tourism services in the coming years.

5. CONCLUSION

Based on data collected from the South American countries, Argentina and Uruguay are unique in terms of their tax system to support tourism. It was determined that their governments reinforce their tourism advertising by focusing on tax system benefits for the tourist. The analysis comes specifically from the categories of VAT tax-free in hotel and accommodation and TFS. (Honajzrová, Petříček, 2019) These results are linked with their competitive strengths since they stand out in *Tourism Service Infrastructure* and *ICT Readiness*, which can be confirmed in the improvements they have made to modernize the TFS incentive. As was mentioned before, the administration of the TFS was outsourced to private companies which cooperates with the Argentinean and Uruguayan governments, who are interested in supporting the better management of this service by decreasing unnecessary bureaucracy to the tourists and accelerating the time of control of the purchased goods (custom department). Also, it is observed that these countries have governments that most prioritize the T&T sector and have the highest T&T government expenditure (% of government budget), compared to Colombia and Ecuador.

Shopping can also be the primary reason for traveling (Ryan 1991). This is certainly the case in some instances for Uruguay, which is focused on attracting tourists from its neighboring countries, Argentina and Brazil. One of the main benefits of the TFS program is that it allows

the state to collect necessary information on international visitors. (Dimanche, 2003). Uruguay has detailed statistical information on the economic impact that the Tax-Free regime represents to its tourism sector. The agency (Uruguay XXI, 2019), with data provided by Global Blue, determined in its report that the TFS has increased its use, reaching more than 450,000 travelers in 2018, with an average annual increase of 58% in the number of transactions and 50% in sales between 2013-2018. The report also provides detailed data on the TFS behavior of international consumers, which according to (Liberato, Silva, 2018) study, *“the demographic profile influences the spending intention, and the satisfaction with the purchase place influences positively the perception regarding the purchase attributes at the destination, observing the increase of the reliability of the products, the decision-making of purchase and the credibility with the increase of the satisfaction, concerning the physical and customer care aspects (attendance).”*

Price competitiveness is a strength of Colombia and Ecuador, mainly due to their low hotel prices. Along with this, they have a lower VAT refund rate (19% and 12% resp.) compared to Argentina and Uruguay. These are possible reasons why these countries have not seen the TFS as an important marketing tool to develop. Certainly, as this study shows, it is recommended that the states of Ecuador and Colombia first answer the question recommended by (Dimanche, 2003), should the amount of taxes refunded to international visitors be seen as a marketing expense? And is it worth the benefits for their economies? By answering these questions, the states studied will have an opportunity to determine whether TFS (refund service administration) should be reformed/modernized and added to their arsenal of international tourism marketing strategies. If yes, outsourcing is an option, but there are cases like Louisiana's tax-free shopping program (LTFS) that has been successfully operated since 1989 by its state and could be seen as an ideal model.

This paper can be used as an initial investigation for future research that can be useful for tourism policy makers. More detailed monitoring, evaluation, and analysis of existing taxes and incentives in South American countries would give policy makers the tools to implement evidence-based policies to support the long-term sustainable growth of the tourism industry.

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THE IMPORTANCE OF MONITORING TRENDS AND CHARACTERISTICS OF TOURIST DEMAND: EMPIRICAL EVIDENCE FROM NOVIGRAD, ISTRIA

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Abstract: *Knowledge of the tourist supply, as well as all its elements and stakeholders, is crucial for managing the tourist supply, and therefore for maintaining the attractiveness and competitiveness of the tourist destination. The town of Novigrad is one of the most famous tourist destinations in Istria, which is constantly recording the growth in tourism turnover, which is made possible by constant investments in tourist supply, preservation of tradition, gastronomic offer and hospitality of the local population. In the purpose of the scientific value of the paper, the authors have conducted empirical research using a questionnaire, in which they explore the elements of the tourism supply and the level of satisfaction of tourists with the tourist offer of Novigrad. The results of the study are presented in tables and graphs followed by interpretation of the results in the form of accompanying text with the main findings and characteristics of the research. The synthesis of the results, findings and conclusions of this research will be used to formulate certain critical recommendations and valuable guidelines for improving the tourist offer in the tourist destination Novigrad.*

Keywords: *Tourist supply, Management tourist destination, City of Novigrad – Istria*

1. MANAGEMENT OF TOURIST SUPPLY IN THE CONTEXT OF DESTINATION MANAGEMENT

The tourist market operates smoothly when tourist supply adapts to the requirements of tourist demand. The tourist market is constantly characterised by entities and resources providing services and offer products, thus contributing to the creation of a tourist product. All entities are in fact participants in the tourist market, which forms a tourist system in the outbound and inbound part of the tourist market (Čavlek et al., 2011).

According to Magaš, tourist supply consists of the following components (Magaš et al., 2018): attractions and activities; accommodation; other tourist facilities and services; transport; other infrastructure; institutional elements. Tourist supply adapts to tourist demand; therefore, the heterogeneity of the tourist supply is a direct consequence of the heterogeneity of the tourist demand. Tourist supply is non-elastic, which means that tourist supply capacities cannot be adjusted to market trends in the tourist demand in a short period of time. Statics of the tourist supply means that the tourist supply is closely related to a specific place. Statics of the supply represents an inability to move the tourist offer from place to place. Tourist supply seasonality is also a consequence of tourist demand seasonality, which represents changes in the level of utilisation of tourist facilities during the year. A tourist supply is diversified, which means that it is different and that it is constantly changing and being enriched with new facilities.

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Tourism turnover has been steadily growing globally, which poses great challenges to tourist supply stakeholders in terms of attractiveness of destinations and their long-term competitiveness and sustainability. Nowadays, the competitiveness of tourist destinations depends mainly on the quality and innovation of the tourist product, with a significant role of destination management. Destination management is responsible for planning and managing the development of tourist destinations. Destination management is a long-term and demanding process, because it is necessary to take into account the interests of all stakeholders in tourism development (Bartoluci, 2013).

Magaš believes that destination management “coordinates all the tourist functions in a destination that cannot be carried out by individual stakeholders in the offer or jointly have better chances to achieve their goals” (Magaš, 2018). Destination management is, in fact, a “result of the involvement of different sectors, groups of stakeholders and partners (...) who through joint work, each from their own perspective, realise the common goals of a particular destination” (Rudančić, 2018).

In Republic of Croatia, destination management organisations are tourist boards at the local, regional and national level. It is important to point out that strategic development goals are defined by destination management organisations at the highest level, while operational and tactical plans are adopted at lower levels. The goals of tourism development between levels, as well as plans and actions, must be harmonised. Destination management organisations encourage and coordinate cooperation among the actors on the side of the tourist offer, aiming to design a quality, market-competitive tourist product and benefiting from the development of tourism for all its stakeholders.

2. NOVIGRAD-ISTRIA

According to the 2013 Development Index, Novigrad has a higher development index than the average of Croatia (Overall Development Programme of the Town of Novigrad — Cittanova for the Period 2015-2020, 2015). The relatively high level of development influenced the possibilities of investing in the improvement of the existing and construction of new transport and tourism infrastructure, which, among other things, increased Novigrad’s competitiveness as a tourist destination.

Novigrad as a tourist destination continuously records tourism turnover growth, which is enabled by constant investments in the tourist supply, preservation of tradition, gastronomic offer and hospitality of the local population. The stakeholders of the tourist offer of Novigrad are local population, local caterers and winemakers, as well as the large hotel company Aminess – Laguna Novigrad d.d., as well as Nautica and the Novigrad Marina. There are eight tourist agencies in Novigrad and about 40 restaurants and catering facilities offering food service. Novigrad is today promoted and developed as a destination for active holiday, sport, recreation, wellness, gastronomy, and nautical tourism through coordinated activities of the tourist offer stakeholders. Nevertheless, according to the results of the survey on the opinion of the local population, Novigrad lacks a variety of tourist offer, sports facilities, music events and entertainment activities, thematic events, and a variety of catering services.

The tourist supply of the town of Novigrad is managed by the Novigrad – Cittanova Tourist Board, as a destination management organisation. In 2018, the Tourist Board of Novigrad launched a project to identify Novigrad’s tourist supply, with the aim of improving the total

tourist supply and visibility of the destination's image. Novigrad Tourist Board, together with other tourist boards of north-western Istria forms the Umag-Novigrad-Brtonigla-Buje cluster, promoted under the name "In All the Colours of Istria". At the cluster level, the tourist supply focuses on the development of cycling, tennis, soccer, gourmet offer and wellness.

Novigrad tourist supply has developed primarily thanks to the comparative advantages of this area. However, by continuous investment in tourist diversity and quality of the tourist supply of the town, by raising the level of quality of accommodation facilities and tourist events in the pre-season and post-season, the Town of Novigrad directs the development of tourism towards creating added value and offering unique experiences to tourists (Novigrad – Cittanova Tourist Board: Work Programme and Financial Plan for 2019, 2018).

Novigrad continuously registers growth of tourism turnover. Over a ten-year period, Novigrad recorded continuous growth in tourism revenues, and the number of overnight stays increased 76%. The increase in tourist turnover was recorded in the peak season, but also in the months of the pre-season and post-season, which means that the seasonality of tourism in the destination has been reduced (Novigrad – Cittanova Tourist Board: Defining the Tourist Offer of Novigrad, 2019). In 2019, Novigrad realised 228,313 tourist arrivals and 1,326,863 overnight stays, which is an increase of 3% in arrivals and an increase in overnight stays of 2% compared to 2018 (<https://www.istra.hr/hr/business-information/Istria-in-media/statistics>). The realised number of overnight stays in the area of the Novigrad Tourist Board accounted for 4.64% of the total number of overnight stays at the level of the County of Istria.

2. RESULTS OF THE SURVEY ON SATISFACTION WITH THE TOURIST OFFER OF THE TOWN OF NOVIGRAD

In 2018 the Novigrad – Cittanova Tourist Board started a project to define the tourist offer of the destination. The ultimate goal of the project was to improve the town's tourist offer and strengthen the image of the destination on the tourist market. The project included tourism development stakeholders in Novigrad, legal and natural persons, local population and tourists. In order to implement the project, an analysis of the current situation of the tourist offer of the town was carried out, which started by examining tourists' satisfaction with the tourist offer of the town, in cooperation with the hotel company Aminess Campsites & Resorts. The research was conducted in 2018 by Eventor, as an expert associate participating in the project. The results of the conducted research based on the survey.

2.1. Research methodology

The research data were collected by primary research through a survey questionnaire, which was available to guests in five languages: Croatian, German, Italian, English, and Slovenian. The structured questionnaire consisted of a total of 15 closed and open questions, to which the respondents responded by selecting the answers offered, answering the questions asked and evaluating individual elements on the Likert scale. At the very end of the questionnaire, there was an empty field in which the respondents could enter their own suggestions. In the first part of the questionnaire, the guests answered questions about the number of visits to the destination, the source of information about the destination, escort on the trip, the motives of arrival to the destination, and the number of overnight stays they planned to spend in the destination. The second part of the survey investigates which contents of the destination would meet the needs

of the respondents, what prevents them from using additional facilities in the destination, what, in their opinion, is missing from Novigrad's tourist offer, how would they like to be informed about the town's offer and whether they had participated in one of the town events. In the third part of the survey, respondents answered questions related to consumption during their stay in the destination, i.e. the estimated consumption and the number of persons to whom this consumption relates. The last part of the survey consists of two Likert scales. On the first scale, respondents rated satisfaction with the total offer in Novigrad as a tourist destination, while on the other scale, they rated satisfaction with individual elements of the tourist offer of the destination. The survey was conducted in the period of peak season and post-season, from August 16 to October 12, 2018. The field research included several key locations: two hotels (Aminess Maestral and Aminess Laguna), one campsite (Mareda), private accommodation, and four events (Street Magicians' Evening, Arterija, Festivity of St. Pelagius, Sardelafest, and one concert).

2.2. Identification of key stakeholders

The largest number of guests participating in the survey were hotel guests, event visitors and campsite guests from the dominant outbound tourist markets of Germany, Slovenia, and Italy. A total of 358 respondents filled in the questionnaire.

The majority of respondents in the research were from German-speaking area, while the share of respondents from Slovenian and Italian-speaking areas is somewhat smaller. German-speaking guests accounted for 61.7% of the total number of respondents. Guests from Slovenia follow with 13.7% of the sample, while guests from Italian-speaking area made 13.4% of the total number of respondents. Croatian speakers account for 3.1%, while English speakers account for 8.1% of the total number of respondents. Considering the high share of respondents from the German-speaking area and hotel respondents, it should be noted that the sample can be less representative from this aspect and not correspond fully to the actual situation, since in the Novigrad area, guests of campsites and private accommodation make a significant number of overnight stays.

The following was investigated in the survey for the purpose of analysing and understanding the behaviour of tourists in the destination (Novigrad – Cittanova Tourist Board: Defining the Tourist Offer of the Town of Novigrad, 2019): frequency of arrival; motives of arrival; escort on the journey; sources of information about the destination; length of stay; consumption.

Below is a synthesised table overview of research results and their interpretation. The motives of the respondents' arrival to Novigrad are shown in Table 1.

Table 1. Motives of the respondents' arrival to Novigrad

Motive of arrival	Share of respondents
Passive rest and relaxation	72%
New experiences and sensations	36%
Natural beauties	33%
Gastronomy	27%
Cultural sights and events	17%
Entertainment	14%
Sports and recreation	12%
Health reasons	5%

Source: Author's systematisation (Novigrad – Cittanova Tourist Board: Defining the Tourist Offer of the Town of Novigrad, 2019)

Regarding the motives of arrival to the destination, the respondents had the possibility to choose several offered answers. The main motives for arrival to the destination are passive rest and relaxation, which is the motive for the arrival of 72% of the surveyed guests. Other important motives for arriving to the destination are new experiences and sensations and natural beauties, which are the motives for arrival of 36% and 33% respondents. Gastronomy is the arrival motive for 27% of guests to Novigrad, while 17% of guests cite cultural sights and events as motives for their arrival. Entertainment is the arrival motive for only 14% of guests, sports and recreation for 12% of guests, and 5% of respondents visit the destination for health reasons. Table 2 shows the frequency of tourist arrivals to Novigrad.

Table 2. Frequency of the respondents' visits to Novigrad

Frequency of visits	Share of respondents
First visit	48%
Second visit	16%
3 To 5 visits	13,5%
6 And more visits	22,5%
Total	100%

Source: Author's systematisation (Novigrad – Cittanova Tourist Board:
Defining the Tourist Offer of the Town of Novigrad, 2019)

The share of respondents who visited Novigrad for the first time was 48%, which is a high share of the first visit to the destination and confirms Novigrad's efforts as a tourist destination that aims to present itself on the new markets. The share of loyal guests is also high, which is proven by 22.5% of the respondents who visited Novigrad six or more times. The second visit to Novigrad was made by 16% of the respondents, while 13.5% of them made three to five visits to the destination. Novigrad is a family destination, as confirmed by the results of the questionnaire, according to which 51.2% of the respondents visit the destination with their family. The share of respondents visiting Novigrad with partners is 35%, while 11.4% of respondents visit Novigrad with friends. Only 2.4% of surveyed tourists arrived in Novigrad unaccompanied. The average daily expenditure per person in the destination is lower than the average at the Croatian level, which amounts to 74 euros. The respondents spend half of daily expenditure on accommodation, and 17% of spending goes to food and drink. Non-accommodation consumption has a relatively low share in the total consumption in the destination; only 8% of the daily expenditure is spent on shopping, 6% on excursions, while the share of spending on souvenirs and sports and recreation is 4%. Very little is spent on culture and entertainment, only about 2%. These results may indicate limited possibilities for non-accommodation consumption in Novigrad, i.e. a lack of additional facilities in the tourist offer. This was examined in the part of the survey relating to interest in additional facilities in the destination and participation in events. Of the total number of respondents, 72% did not participate in Novigrad events at all. The reasons for not participating in events and not using additional facilities are primarily lack of interest, which is present in 22.3% of the respondents. Another reason is lack of recognition of the offer, which is confirmed by the fact that 20.7% of respondents responded that the offer is insufficiently communicated. The price of the offer is too expensive and this is the reason for not using additional facilities for 15.1% of respondents, while busyness due to babysitting is the reason for not participating in events and not using the additional offer for 10.1% of respondents. Only 4.7% of respondents responded that they found the offer uninteresting. The questionnaire also explored associations to Novigrad as a tourist destination, presented in Chart 1.

■ Heritage ■ Details ■ People ■ Nature ■ Supply ■ Activities ■ Food ■ Aesthetics ■ Atmosphere

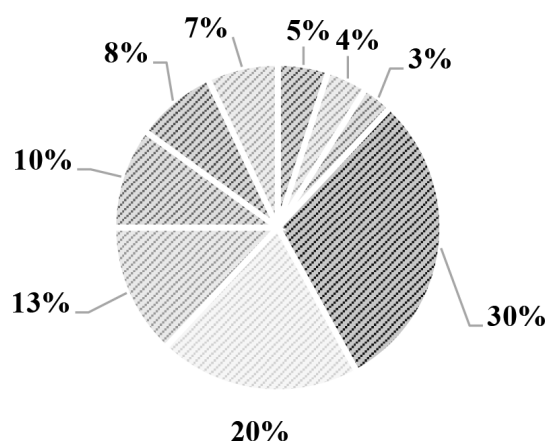


Chart 1. Associations to Novigrad

Source: Author's systematisation (Novigrad – Cittanova Tourist Board: Defining the Tourist Offer of the Town of Novigrad, 2019)

The structure of associations is dominated by nature, which is an association to the destination for 30% of respondents. This is followed by the offer (20% of respondents), activities (13%), food (10%), aesthetics (8%), atmosphere (7%), heritage (5%), details (4%), and people (3%). If individual associations are analysed, the sea and beach dominate, which are associations to Novigrad for 18% and 9.2%, respondents, followed by food (7.3%), the sun (6.8%), and rest (6%). This confirms the view that Novigrad is still primarily a summer tourist destination, the main attractions of which are natural resources.

The results of the research show a high share of respondents who think Novigrad lacks arranged beaches (17.6%), shopping facilities (17%), and nightlife (14.3%). Furthermore, a relatively high number of respondents think the destination lacks diversity of outdoor events (14%) and entertainment (10.6%), sports and recreational facilities (8.1%), and thematic programmes and evenings (7.3%). Cultural and gourmet offer is a missing element in the opinion of 14% of respondents. If the presented results are compared with the data on spending in the destination, it is evident that one of the main causes of lower spending in the destination is the lack and limitations in certain elements of the tourist offer.

2.3. Degree of satisfaction with the tourist offer of the town of Novigrad

The total satisfaction with the tourist offers in Novigrad was rated 4.02 by the respondents. At the same time, the highest degree of satisfaction was expressed with the element of picturesqueness and arrangement of the town. Equipment and arrangement of the beaches were rated 4.0. The participants also expressed a high degree of satisfaction with the element of ecological preservation (3.8), while the programme in case of bad weather was evaluated with average degree of satisfaction (3.3). Table 3 shows a comparison of the satisfaction of the respondents with the tourist offer in Novigrad with the results of the Tomas survey of the satisfaction of tourists with the offer at the level of Croatia from 2017.

The comparison shows that the degree of satisfaction of tourists with the tourist offer in Novigrad is very similar to the satisfaction degree of tourists with the offer at the level of Croatia. In

the three elements of the offer, the respondents expressed a high degree of satisfaction with the offer in both surveys. The element of the offer 'Programme of activities in case of bad weather' at the level of the destination of Novigrad was assessed with average degree of satisfaction, while at the level of Croatia, this element was assessed with a very low degree of satisfaction.

Table 3. Degree of respondents' satisfaction with the elements of the tourist offer of Novigrad and comparison with the Tomas Survey in 2017

Offer element	Results – Novigrad 2018	Results – Tomas 2017
Picturesqueness and arrangement of the town	high satisfaction	high satisfaction
Equipment and arrangement of beaches	high satisfaction	high satisfaction
Ecological preservation	high satisfaction	high satisfaction
Programme of activities in case of bad weather	mean degree of satisfaction	very low degree of satisfaction

Source: Author's systematisation (Novigrad – Cittanova Tourist Board: Defining the Tourist Offer of the Town of Novigrad, 2019)

3. CONCLUSION

Tourist supply is specific because it includes a set of various goods and services, which are offered to tourists in order to meet their needs. Tourist supply is not an offer of a single entity, but a supply of all entities that can participate in the tourist market in order to directly or indirectly meet tourist needs. Along with goods and services, a tourist supply comprises a number of natural, social, economic and cultural elements of the tourist destination, as well as experiences and sensations that the destination offers. Tourist supply is formed in accordance with the requirements of tourist demand; therefore, it is necessary to know and follow trends in the tourist demand for its design. Tourist supply management is a complex and continuous process that must be based on integrated planning, and its purpose is maintaining the competitiveness of the tourist destination, while ensuring long-term sustainable tourist development and improving the living conditions of the local population. Tourist supply management is the task of destination management, which is also responsible for strategic planning and tourist destination management. Tourist destination management is also a demanding process, in which it is necessary to take into account the interests of all stakeholders in tourism development.

Novigrad is a well-established tourist destination for summertime family tourism. Novigrad continuously records the growth of tourism turnover, but the problem of seasonality of tourism and exploitation of natural resources, the sun and the sea, as the basis of the tourist offer is still pronounced. In the past ten years, thanks to the efficient management of the town's tourist offer and the development of the tourist destination in general, Novigrad has achieved significant results in terms of differentiating the tourist supply, its diversity and content. As a long-term goal of tourism development, Novigrad aims to increase the quality of the tourist offer and visibility of the town as a tourist destination on the tourist market. This goal will be achieved by improving the existing and introducing new facilities in the tourist supply. In the future, Novigrad's tourist supply will be based on high-quality content, preservation of local tradition and authentic values and sustainable development principles in the socio-cultural, economic, and environmental aspects.

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MODERN TEACHING TECHNOLOGIES AND DEVELOPING CONSTRUCTIVE THINKING

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Abstract: Numerous researches in the previous period have shown the effectiveness of mathematical learning with the use of information and communication technologies (ICT) and mathematical software packages. Also, through theoretical studies and research results, the quality of mathematics teaching in schools was examined. The results of the research of the authors of this paper showed the lack of a visual-logical approach in solving mathematical problems. Primary and secondary school students are primarily trained in mastering formulas and algebraic procedures that help them solve a given task. In order to develop the ability to perceive lawfulness and logical thinking, we organized introducing elementary and secondary school students to figurative numbers and selected examples that demonstrate the observation of lawfulness among numbers. We applied work in collaborative groups using computers and GeoGebra software. The results showed the students' ability to perceive lawfulness and to successfully solve tasks by applying the observed lawfulness. They also confirmed the effectiveness of mathematical learning with the use of computers, mathematical software and working in collaborative groups.

Keywords: Implementation, Visualization, Representation.

1. INTRODUCTION

The twenty-first century is the era of widespread information and communication technologies. The new age requires technologically educated people, able to actively use modern technologies. Technological advances have also significantly influenced changes in the education system. The volume of teaching resources increased and additional demands placed on teachers (Bozkurt & Ruthven, 2016). Facing new challenges, contemporary teachers must be prepared to use new teaching aids in order to teach more effectively (Tabach, 2012). One of the main tasks of modern education is to introduce students to new technologies and to train them for their active use. A prerequisite for successful teaching and learning is the active role of all participants in the educational process (Doruk, Aktumen & Aytekin, 2013).

Hardware development has also contributed to the development of software packages such as GeoGebra, Cabri Geometry, Geometer's Sketchpad and others. Many researchers have been researching the effectiveness of mathematical learning by applying mathematical software packages (Hohenwarter & Fuchs, 2004; Hohenwarter, Hohenwarter & Lavicza, 2009; Lavicza & Varga, 2010; Mihajlov Carević, Kopanja & Denić, 2018; Takači, Stankov & Milanović, 2015). Research has shown that the integration of information and communication technologies into teaching processes makes teaching effective and interesting for students and also contributes to the development of students' active thinking by stimulating their creative thinking (Allegra,

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Chifari & Ottaviano, 2001; Viamonte, 2010). In their study of the statistical evaluation of the realization of mathematics teaching using computers, the authors (Gavrilović, Denić, Petković, Zivić & Vujičić, 2018) considered 10 factors of influence. The main objective of the research is to analyze the factors that influence the quality of mathematics teaching related to the level of knowledge achieved during one school year as well as at the final exam. An adaptive neuro fuzzy inference system (ANFIS) software package was used to determine the qualitative impact of 10 factors on the performance of mathematics. The survey found that the percentage of students studying with educational software had the greatest influence on the average score on the final exam. Combining 2 factors, the authors of this study came to the conclusion that the results at the final exam would be higher if the classes taught were interesting to the students with the learning through educational software. Combining the three factors, the aforementioned 2 factors have the strongest influence on the grade point average on the final exam, with the factor containing a better grade point average on the initial math test.

The authors of this paper conducted several studies with primary and secondary school students. All research has confirmed the efficiency and interest of mathematics learning using computers and software packages. The students are undoubtedly interested and very much in the mood for innovation in teaching. New approaches to presenting matter in class are welcome. In this context, modern technologies in the education system are of particular importance and contribution. In addition to these positive observations, the authors of this paper stated that primary and secondary school students are not sufficiently well-versed in the visual-logical approach to solving mathematical problems. When asked to elementary school students what is the sum of odd numbers less than 100, a small number of correct answers were obtained. Only 15.8% of the students answered the question correctly. It was noted that most students are trying to come up with a solution by summing all the numbers $1 + 3 + 5 + \dots$. Research with sixth grade students is described in the paper „Numbers to develop a logical approach to solving tasks with numerous strings” (Mihajlov Carević, Petrović & Denić, 2018). Similar results were obtained in research with seventh grade elementary school students (Mihajlov Carević, Kopanja & Denić, 2017). Eighth grade students are not covered by the research because of their involvement in the preparation of the final exam at the end of primary education. The authors of this paper chose the first grade of „gymnasium“ for research in high school. When asked what the sum of the first 1000 natural numbers is, only 12.8% of students gave the correct answer. The complete results of this research are presented in the paper „Figurative numbers contribution to the perception of legality in numerous strings tasks and long-term memory of numerous data” (Mihajlov Carević, Petrović & Denić, 2019). The obtained results showed that elementary and secondary school students were not taught to observe lawfulness and to solve problems by applying the observed lawfulness. Therefore, a survey was conducted in which students were introduced to selected examples demonstrating the recognition of lawfulness among numbers.

2. RESEARCH METHODOLOGY

In order to compare the results at the end of the survey, two groups of students were formed in each survey, experimental and control. Both groups are composed of approximately the same number of students with approximately the same grade point average in mathematics. Both groups organized student collaborative work by forming small collaborative groups. Working in collaborative groups has been recommended by many researchers as an extremely effective approach to learning (Dooly, 2008; Chai, Lin, So & Cheah, 2011; Petrović & Kontrec, 2017). Examples were selected to demonstrate the identification of regularities among numbers and

examples were prepared with figurative numbers used in the experimental groups. Figurative numbers with their pictorial representations and the laws that apply to their members are very interesting, easy to understand for students and can be a very good tool for presenting paradigms and developing students' constructive thinking (Mihajlov Carević, Kopanja & Denić, 2017).

The tasks of the research are to answer the following research questions:

1. Are elementary (middle) high school students able to recognize the regularities among numbers when solving problems with numerous arrays and sets?
2. Do selected examples for demonstrating lawfulness among numbers contribute to developing lawfulness ability?
3. Does working with figurative numbers contribute to recognizing the lawfulness of numbers and developing constructive thinking?

The hypotheses in the research are as follows:

1. It is assumed that less than 25% of students will be able to complete tasks requiring the identification of lawfulness among numbers.
2. Well-chosen examples for demonstrating lawfulness among numbers will contribute to developing the ability to observe lawfulness and solve problems with numerous arrays and sets.
3. Working with figurative numbers will help students solve tasks by applying the observed legality.

At the beginning of each survey, the students solved the initial test, which was to test the students' learning to perceive the regularities among the numbers and to apply the observed regularities to solve the task. The results of the initial test, in all studies, confirmed the authors' first hypothesis. In all groups, less than 25% of students completed the tasks correctly. After that, students were introduced, in all groups, to selected examples to demonstrate the recognition of lawfulness among numbers as well as figurative numbers.

Among the examples selected were the Gaussian procedure for calculating the sum of the first 100 natural numbers (Figure 1_A) and the Pythagoras method for calculating the sum of odd numbers (Figure 1_B).

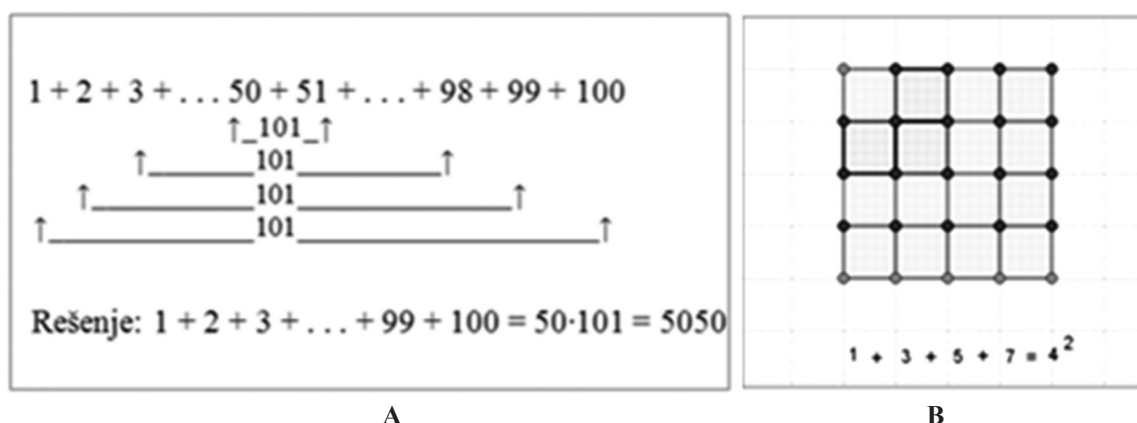


Figure 1. Gaussian procedure for calculating the sum and displaying the sum of odd numbers

Figurative numbers were used in the experimental groups and are represented by triangular and square numbers (in the sixth grade of primary school), pentagonal and hexagonal numbers (in

the other groups). Students are introduced to the graphical representation of triangular numbers (Figure 2), then to the laws that apply to the differences between two adjacent figurative numbers and the differences between the previous differences.

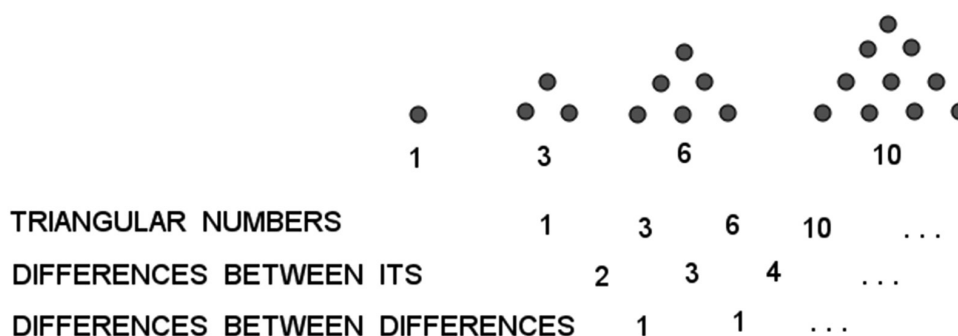


Figure 2. Showing triangular numbers with differences

Then, students were instructed to determine the given triangle number in the series by applying the observed differences between the triangular numbers (Figure 3). The same was done with other figurative numbers.

second triangular number: $3 = 1 + 2$
 third : $6 = 1 + 2 + 3$
 fourth : $10 = 1 + 2 + 3 + 4$
 fifth : $15 = 1 + 2 + 3 + 4 + 5$
 ...
 thirtieth : $x = 1 + 2 + 3 + 4 + 5 + \dots + 30$

$$x = 1 + 2 + 3 + \dots + 15 + 16 + \dots + 28 + 29 + 30$$

It is $x = 15 \cdot 31 = 465$

Figure 3. Procedure for determining the thirtieth triangular number

Upon completion of the planned work (in all studies), both groups, experimental and control, performed a test to verify acquired ability to detect regularities among numbers and to apply observed regularities in solving tasks. The results obtained are summarized and statistically processed. The test results, in all studies, were significantly better than the results of the initial test. This proves the second and third hypotheses in the research that well-chosen examples for demonstrating lawfulness among numbers will contribute to developing the ability to detect lawfulness and solve problems with numerous arrays and sets. Figure 4 shows a graphical comparison of the results of the experimental and control group of sixth grade students.

By comparing the results of the experimental group that worked with the figurative numbers and the control group, it was concluded that the results of the experimental group (in all studies) were better than the results of the control group.

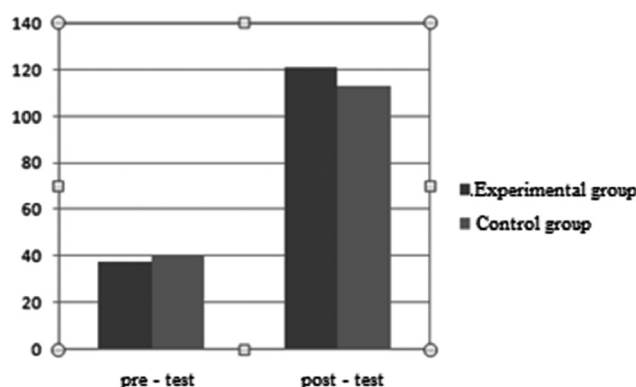


Figure 4. Results on the pre-test and post-test in the experimental and control group

After realizing the planned exercise of a visual-logical approach to solving problems with numerous arrays and sets, both groups, experimental and control (in all studies) made progress. This fact shows that well-chosen examples guide students in visualizing solutions to problems. It also shows that figurative numbers can be an instrument for instructing and practicing students to detect lawfulness among numbers and to solve problems by applying observed lawfulness.

3. FUTURE RESEARCH DIRECTIONS

On the basis of everything presented here, we will continue to research teaching aids to develop students' constructive thinking.

4. CONCLUSION

The realisation of mathematics teaching in the modern age requires the implementation of ICT and educational software. The research of the authors of this paper shows that, in addition, more attention should be paid to the visual-logical approach of solving mathematical problems. Visualization and representation are extremely important and useful in the process of learning and understanding mathematics (Duval, 1999; Arcavi, 2003; Van Garderen & Montague, 2003; Wang, Wu, Kinshuk & Spector, 2013). Researcher results (Gavrilović, Denić, Petković, Živić & Vujičić, 2018) confirm that educational software applications could produce the best results in a math class. Future research should focus on examining educational software that produces a visual-logical approach to solving mathematical problems.

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INTERNET USAGE IN HOUSEHOLDS OF THE SLOVAK REPUBLIC

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Abstract: *The rapid development of information and communication technologies and the development of digital economy and society brings new challenges and opportunities for individuals, companies and the whole society. The huge growth of the Internet, which has contributed to these changes, and causes changes in the living of individuals and households. In addition to new ways of communicating, the Internet brings individuals new opportunities for collaboration, business, but also information retrieval and, last but not least, shopping, contributing to the growth of living standards. In this paper, the authors focus on one aspect of the digital economy – household access to the Internet and its usage for purchasing products and services in the Slovak Republic. The aim of the article is to find out the level and reasons for using the Internet by households of the Slovak Republic. In this paper, the authors use methods: time series analysis, comparison, synthesis. The authors use data from the Statistical Office of the Slovak Republic. The authors have found that the level of Internet usage in the Slovak households is increasing, but it varies depending on gender, age group and type of household. Slovak households buy mainly clothes, sports goods, and households' goods for the private usage.*

Keywords: *Digitalization, Digital economy, Internet, Information and communication technologies.*

1. INTRODUCTION

The significant development of information and communication technologies, which dates back to around the 1980s in developed countries, caused the transition from the industrial to the information society. The use of personal computers and, in particular, their interconnection via the Internet was an impulse for the emergence of the digital economy. The digital economy is based on the widespread use of computers and other electronic devices and the Internet. The Internet has made it possible to increase links between individuals, organizations and communities worldwide. Through it, people communicate, cooperate, seek information, and buy. The Internet and digital technologies thus bring new opportunities to individuals, affecting their way of life, work, family life and leisure. The Internet removes geographic boundaries, shortens distances, and enables flexible and fast communication. Digital technologies can already transform basic social services such as education, health care and people-government interactions (Chaaben, Mansouri, 2017).

The aim of this article is to find out the level and reasons for using the Internet by households of the Slovak Republic. We examine the proportion of households with access to the Internet and the reasons for using the Internet, taking into account the type of household, the economic

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status of the individual and the age group. We also examine what types of goods households in Slovakia for private use purchase over the Internet. To achieve this goal, we use the following methods: time series analysis, comparison, synthesis. Data for time series analysis are taken from the Statistical Office of the Slovak Republic.

2. INTERNET AND DIGITAL ECONOMY

Information, knowledge and new technologies are becoming a source of development in the developed countries of the world at present, in the period of development of the information society, resp. digital economy. Information technology can be understood as the use of any computer, storage device, network, and other physical device, infrastructure and process to create, process, store, secure, and exchange all forms of electronic data (Mayerová, Hyžová, 2019).

The importance and benefits of information and communication technologies for the development of economies are already undeniable. As Fabová (2014) states, advanced information and communication technologies (ICT) designed for processing and transmission of information significantly influence the economic development of developed countries and their competitiveness. Investment in information and communication technologies has a significant impact on economic growth, the creation of new jobs, growth in labour productivity and increasing the overall competitiveness of economies. ICT affects not only the ICT sector itself, but also other sectors that are increasingly using them. The fundamental changes resulting from the development of ICT are called digital transformation. It affects all areas of human life, including the environment, mental and physical work, health, family relationships, and leisure (Červeňová, 2019). The digital transformation process is based on hyper-connectivity, i.e. the growing interconnection of activities, people, machines, companies, organizational and management structures, business models. The result is new activities and processes that lead to greater efficiency and usefulness (Fifeková, Nežinský, 2018).

The Internet as a publicly available worldwide system of interconnected computer networks is of particular importance. Internet is a powerful tool that is a source of information, communication between users, allows browsing electronic catalogues, copying data and program files, e-commerce, e-learning (Halás, 2011). The Internet has made it possible to increase links between individuals, organizations and communities worldwide. Digitization and interconnection have greatly contributed to an exponential increase in computing power, increased number of mobile and intelligent devices, and existence of cloud computing in recent years (Folea, 2018).

The importance of the Internet does not lie only in the benefits for businesses and states; its benefits are undeniable for individuals and households. Internet and modern technologies modify the way of work, living, leisure or shopping. It offers a large number of options for individuals to earn in various market segments. Households currently use the Internet to communicate with each other through e-mail, chat, Internet telephony, discussion forums or social networks. Stoica, Bogoslov (2017) state that digital technologies and Internet became the main forces for transforming the modern world and its economy.

The Digital Economy is related to the rapid advent and penetration of information and communication technologies in all areas of human activity, which also requires new insights into the factors affecting the development and success of the economy. In general, it is an economy based on the widespread use of the Internet, computers and other electronic devices. According

to Leško (2019), the use of modern information technologies leads to an increase in labour productivity, which is reflected in the growth of the whole economy and information and knowledge become a decisive form of capital. Similar views are presented by Chaaben and Mansouri (2017) they state that digital technologies help improve the national economic development, the productivity of businesses across all industries and increase quality of life for human beings.

Fifeková and Nežinský (2018) also point to a close link between the level of digitization and the economic performance of the country. Digital developed countries are generally leaders in the creation, management and use of digital technologies, and these technologies use very effectively. They are able to continually create new digital impulses and create new demand for digital technologies. Maintaining a high level of digital progress promotes the growth of their economic performance, thus supporting the development of digital innovation and technology, thus creating a positive growth circle. Conversely, the low level of digitization generally makes the country less attractive to investors. According to Hučková et al. (2018), the development of new technologies and computer technology brings new dimensions in trading and accelerating business activities. Modern information technologies enable to increasingly digitize the basic functions of the economy and to transform an ever-increasing number of economic activities into digital form (Klinec, 2000). According to Leško (2019), mainly companies that have secured access to key technical, managerial and organizational skills will have great potential for growth. These firms will tend to be more productive compared to others, and digitization will help strengthen their industry leadership. For other companies, this situation will be a possibility of changing the way of organizing, and reassessing the use of their resources.

3. INTERNET USAGE IN HOUSEHOLDS OF THE SLOVAK REPUBLIC

As part of the evaluation of the information society level, the Statistical Office of the SR carries out statistical surveys on information and communication technologies in households and individuals. Its aim is to determine the level of ICT equipment of households and at the same time to determine the level of knowledge of these technologies among individuals. Quantifying the development of the information society in the economy and society is the basis for accepting changes and ensuring development in this area (Statistical Office of the Slovak Republic, 2019). Figure 1 shows the percentage of households with Internet access.

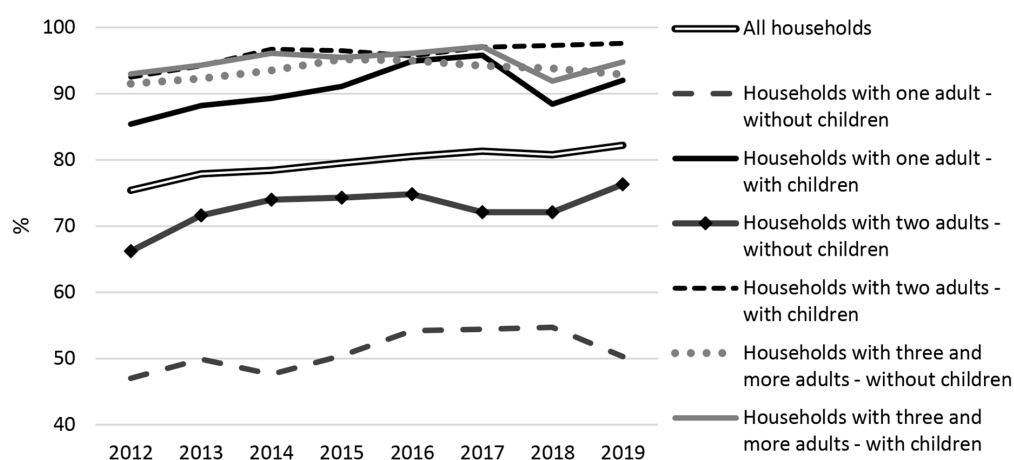


Figure 1. Access to the Internet at home by household structure
(share in total households in %)

Source: own processing, Statistical Office of the Slovak Republic (2019, 2020)

Access to the internet of households of the Slovak Republic is gradually increasing, it was 82.2% in 2019. The percentage of each type of household is considerably different. Households with two adults and children have the highest Internet access, up to 97.6% in 2019. In general, households with children have a higher share of Internet access. By contrast, households with one adult without children have the lowest Internet access (in 2019: 50.3%).

We also examine what activities households use the Internet for in 2019. Figure 2 shows the percentage of all households that have used the Internet for the above activities over the last three months, broken down by the economic activity of a household member.

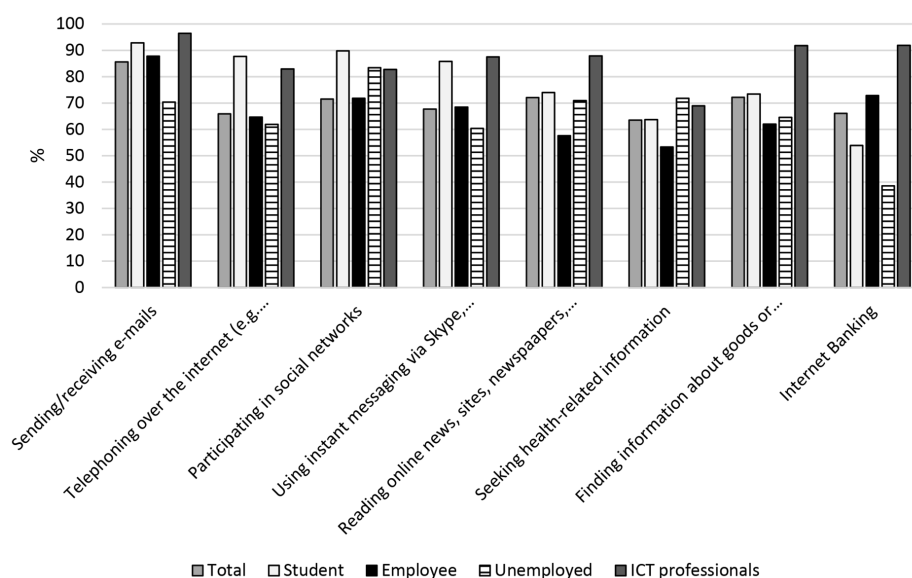


Figure 2. Reasons for using the Internet by households of the Slovak Republic in 2019

Source: own processing, Statistical Office of the Slovak Republic (2019, 2020)

Households in Slovakia use the Internet mostly for sending and receiving mail (85.6%), searching for information on goods and services (72.2%), reading newspapers and magazines (72.1%), participating in social networks (71.5 %). ICT professionals and students mostly use the Internet. The unemployed use the Internet to a lesser extent, except for participation in social networks. The unemployed least use internet banking (38.6%).

Internet usage in Slovak households varies depending on the sex and age group of the individual. Women aged 16-24 are the ones who make the most use of the Internet, most notably for messaging (91.8%), social networking and instant messaging. Men in the 16-24 age group also use the Internet more often than men in other age categories, most often for sending e-mails (90.8%). Men aged 55-74 use the internet the least, specifically for social networking (34.7%) and instant messaging (34.9%).

Figure 3 shows data when each age group last used the Internet (2019).

Most households in the Slovak Republic use the Internet very often, in the last three months it has been used by 82.9% of households. This percentage is reduced by lower internet usage of persons over 55 years of age. The young generation (16-24 years old) has used the Internet 99.3 percentage of them in the last three months. The largest proportion of those who have never used the Internet is in the age group of 65-74 years, up to 52.9%.

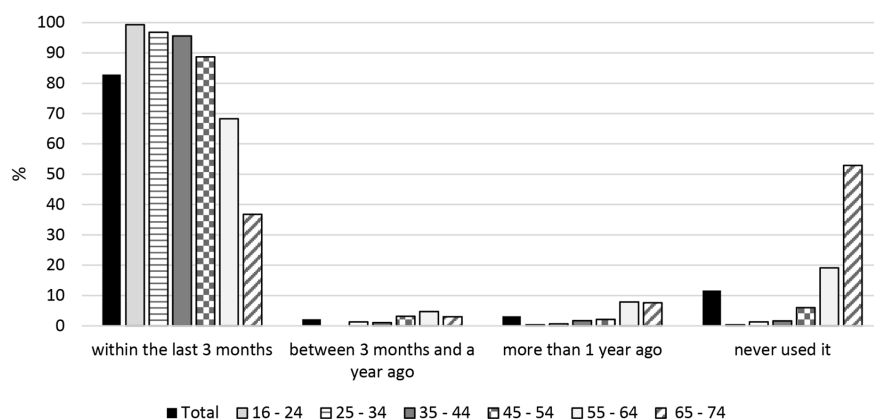


Figure 3. Frequency of the internet use

Source: own processing, Statistical Office of the Slovak Republic (2019, 2020)

If we examined the first group of households that use the Internet very often, we would find interesting facts. 91.4% of those who have used the Internet in the last three months have been using the Internet every day or almost every day. In the 16-24 age group, this proportion is up to 98.6%. The differences between men and women are noticeable only in the age group 65-74, in which 83.8% of men use the Internet every day or almost every day, but only 77.5% of women.

In the next section, we are dealing with the use of the Internet to buy goods and services. Figure 4 shows what kinds of goods and services purchased or ordered for the personal use of the Slovak household in 2012-2019 (percentage of all who ordered/purchased goods and services over the last 12 months via the Internet).

The Slovak households mostly buy clothes and sports goods (67.8% in 2019) and household goods (40.3% in 2019). In recent years, the share of buying tickets for events and holiday accommodation has been increasing. Women shop more often online. In addition to clothing, sports and household goods, women often buy event tickets. In the case of men, electronic devices are in third place.

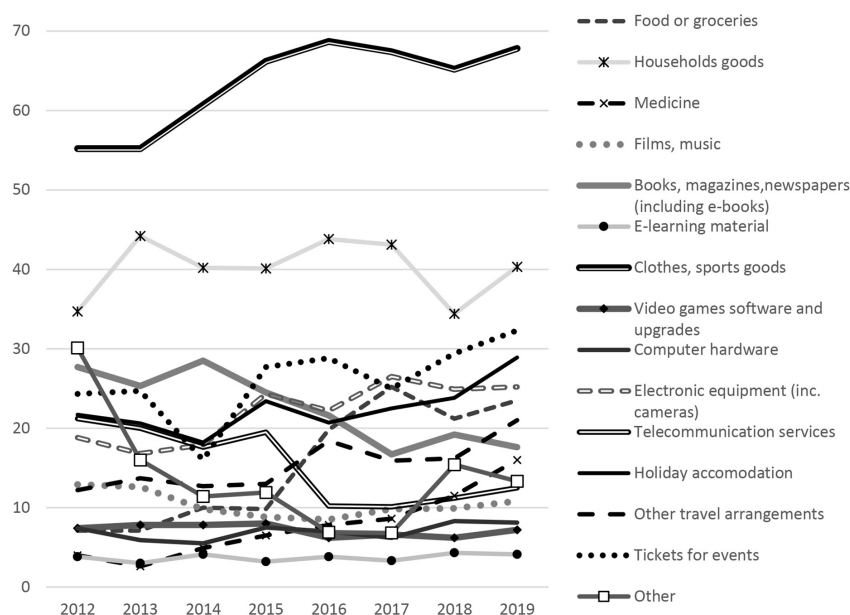


Figure 4. Types of goods or services purchased or ordered via the Internet

Source: own processing, Statistical Office of the Slovak Republic (2019, 2020)

4. FUTURE RESEARCH DIRECTIONS

The Internet and its use open up other areas of research on this issue that we want to focus on in our future research work. In terms of the digitalization of the economy, there are topics such as the use of the Internet in the business sector, public administration, banking, coverage of Slovak regions with Internet networks, security of shared data, their archiving, etc. Intranet use of the Internet in the business world has much greater possibilities than using Internet technology within the enterprise. Intranet applications include marketing and market research, human resource management applications, business communication applications, product development activities, technical support, form sorting and processing, etc. Submitted research work and proposed topics to explore the issue of the level of Internet use should be expanded and compared with other countries.

5. CONCLUSION

Based on our survey, we concluded that the use of Internet in households in the Slovak Republic increased significantly in the period under review compared to the base year 2012 in all monitored categories of households. Households use the Internet to find out about goods and services and order them via e-shop. The greatest increase in Internet use was seen in households with two adult children, approaching 100% Internet coverage, the lowest use is in one-person households without children.

In terms of gender and age, we found that the Internet is used by women aged 16-24 to communicate via social networks and instant messaging at most, almost 92%. Men also use the Internet the most in the age category 16-24 years for email communication; the least used it in the age category 55-74 years. Unemployed household members use the Internet to a lesser extent, except for participation in social networks, while the unemployed use very little internet banking services (38.6%).

At present, the priority issue is not the coverage of the territory by internet connection, but the speed of data transmission. 5G networks that have been successfully tested in several countries around the world are currently developing the future of mobile Internet connectivity.

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