

EDITORS:

Isidora Ljumović

Iskra Stancheva-Gigov

FINANCE, INNOVATION AND TECHNOLOGY:

NEW MODELS AND
STRUCTURES



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**Isidora Ljumović
Iskra Stancheva-Gigov**

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PREFACE

“Innovation distinguishes between a leader and a follower“
-Steve Jobs-

“Innovation is the specific instrument of entrepreneurship...the act that endows resources with a new capacity to create wealth.”
-Peter Drucker-

The book *“Finance, Innovation and Technology: New Models and Structures”* is the result of a joint effort made by researchers, reviewers and editors. We are all witnesses to innovations that have revolutionized the world and the economy. Innovations may be found everywhere, among individuals, creative and inventive employees, as well as entrepreneurs whose fresh ideas launch new businesses that contribute to improving society as a whole. Bearing the importance of innovations in mind, this book has emerged as an attempt to contribute to the analysis of the impact of innovations and rapid technological growth on businesses and society. The collection covers a wide range of topics in innovation following a bottom-down approach, from examining macroeconomic issues, sectors and individual companies. Financial innovations, driving entrepreneurial activity and thus economic growth, are given special attention.

The purpose of the collection is multifield. While it analyses issues and raises critical questions that need to be addressed, it also gives an overview of the current state in the field and presents new innovative ways of addressing them.

Twenty-seven authors prepared eleven manuscripts, contributing to the analysis of the various issues related to the employment of innovation and new technologies. Scientific collaboration of authors from six countries brings this publication to life, confirming the importance of the regional and global approach.

We owe special thanks to the reviewers, distinguished and highly recognized researchers, in taking upon themselves this time-consuming and important task. Their inputs exceedingly contributed to the overall quality of the publication.

Editors

DOES BANK DENSITY STILL MATTER FOR FINANCIAL DEVELOPMENT AND ECONOMIC PERFORMANCE?

Kiril Simeonovski¹, M.Sc.
Elena Naumovska², Ph.D.

***Abstract:** This paper provides evidence about the link between bank density as a form of financial deepening, and financial development and economic performance. The subject of the empirical analysis is to study the effect that the number of bank branches and automated teller machines per capita have on real GDP per capita for a panel of European countries using a dynamic regression model with GDP dynamics up to three lags and a full set of fixed effects. Our ultimate goal is to determine if the number of bank branches and automated teller machines still have positive impact on financial development and economic performance amidst the increasing use of the online banking services. The baseline estimates point out to a weak negative impact of the increased number of bank branches per capita on economic performance by around 0.3 per cent annually. We find similar results from the subsequent IV and GMM estimates as well as when swapping the population basis of the bank density measures with the area. The analysis does not reveal any significant differences between the countries with harmonised regulations and shared currency as a result of the EU and Eurozone membership.*

Keywords: Bank density, financial development, economic performance

JEL Classification: G21, O10

1. INTRODUCTION

An important concept related to financial development and its development with economic growth is that of financial deepening. Levine et al. (2000) show strong evidence that higher financial deepening boosts economic growth and, subsequently, a new strand of literature examining the form and degree to which financial deepening can affect economic growth appeared (see Deidda & Fattouh, 2002; Rousseau & Wachtel, 2002; Rioja & Valev, 2004a, 2004b; Aghion et al., 2005; Demirgüç-Kunt et al., 2011; Arcand et al., 2011; and Barajas et al., 2016).

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Nevertheless, the key question that pops up while analyzing financial deepening is how it can be properly measured. In traditional banking, financial deepening represents the bank density reflected through the greater coverage with branches and ATMs. However, this view does not have the same importance in modern banking. Namely, the period of more than a decade after the financial crisis of 2007–2008 features large structural changes caused by the increased technology use, in particular Internet and mobile telephony. This leads to exponential growth of the number of bank instruments and applications that do not require clients' physical presence, thus making the existence of the traditional business network redundant. From an economic viewpoint, this is a double problem for banks: on the one hand, an increased technology use raises the necessary costs for securing fast and safe transactions through Internet and protection against the related risks; on the other hand, a network of branches in its traditional form continues to generate regular costs that can not be easily sustained. After the financial crisis, the increase of the operational efficiency is a key challenge that the European banks face with the goal of quicker bounce to the adequate profitability levels (Feng & Wang, 2018).

This paper employs bank density as a measure of financial deepening to investigate its linkage with financial development and economic performance in 41 European countries during the period from 2004 to 2018. Our definition of bank density relates the feature of inclusive reach of financial services, which makes up the initial assumption that developed networks of bank branches and automated teller machines, significantly contributes to increased financial development and favourably affects economic performance. We test the validity of this relationship by developing a dynamic panel-regression model. However, the estimation of whether and how bank density affects financial development and economic performance faces several challenges. Firstly, legislation and bank regulations at national level vary across countries and the harmonized regulation of the EU member states along with the shared currency in the Eurozone defines a homogenous area with greater interconnectedness compared to the non-EU member states. Secondly, the bank presence is subject to geographic factors such as population density and urbanization, and their dismissal in the analysis may severely bias the estimation results. Thirdly, the eminent rise of electronic and mobile banking throughout the period weakens the relevance of the initial assumption as increased financial deepening may not have come as a result of the bank presence but rather because of the widespread use of the digital services. In order to address these challenges, we make several extensions of the baseline model to perform robustness checks.

2. LITERATURE REVIEW

The body of economic literature around the changes in the ways of providing financial services by banks has significantly grown over the past decade, which is largely due to the widespread presence of the developing technologies, the need for their integration to banking and changes in customer behaviour.

Dermine (2016) emphasizes three possible areas in which banks can be severely affected to a certain degree: 1) payment systems, 2) bank products and services requiring data analysis and professionalization, and 3) bank's ability to guarantee liquidity and depositors' safety through insurance schemes.

Capgemini et al. (2018) point out three approaches for mass integration of technology in the field of banking: 1) internal development of technological decisions, 2) partnership with fin-tech industry, and 3) complete outsourcing. At each alternative, they observe that banks redirect from products to customers, which allows the assortment of products and services offered to be brought closer to customers' needs.

Kearny (2015) stresses that Internet and mobile banking is of crucial interest for clients who value simplicity, transparency and practicality. At the same time, he points out to the strong position of traditional banks those results from clients' necessity of safety. Therefrom, he opines that a compromise would perhaps be to make a proper combination of traditional banking and the new fin-tech solutions in order to deliver the best service to the clients.

Novantas (2019) indicates on three main redirects in the customer behavior with strong impact on the banks' upcoming distribution and sales strategies: 1) substantial migration from branch dependence to digitization, 2) redefining drivers that influence decisions to purchase bank products and services, and 3) increased interest for e-banking.

Demirgüç-Kunt et al. (2018) point out to the fact that, yet the digital technology is insufficient to attract greater financial inclusion on its own, it is possible that the use of Internet and mobile telephony can integrate the financial transactions even of those who do not own a bank account or it can promote better utilisation of digital financial services by banks' long-term clients.

In an attempt to answer the question 'Why banking is no longer somewhere you go but something you do?', King (2013) argues that a change has occurred in the treatment of banking, which is no longer a question of place or physical locality but

of the utility derived from it. Nowadays, it is necessary for banks to be available to their clients regardless of the time, place and the way that they prefer to use certain bank products and services or to discuss them. The author points out to the fact that the banking sector in the developed economies is facing a sharp decline of business network's utilisation, which can be estimated in the range from 30 to 80 per cent in the next decade. This will especially reflect on the smaller banks that mostly rely on acquiring clients through their branches for which the danger of failure is eminent in case they do not manage to adjust to the new ways of banking.

Nonetheless, the change in the nature of banking as a result of technology imposes a lot of questions related to regulation. The scientific community is divided with regards to the position that regulator have to take in relation to the innovation processes. On the one hand, there are authors who believe that the excessive level of regulation can block the innovation process stirred by digital technology (Phillipon, 2017) and even to prevent the growth and development of the economic system (Levin, 2017). On the other hand, some authors claim that a simplified regulation of the fin-tech sector may lead banks to utilise the opportunities for regulatory arbitrage and undertake riskier activities while facing competitive pressure of the fin-tech sector (Bofondi & Gobbi, 2017).

In conclusion, both the professional and scientific communities argue almost a decade about the developing opportunities of the digital banking. On the one hand, there are extreme scenarios for tectonic changes in the way banks work, which may lead to an end of their existence in the traditional form. In this direction goes Bill Gates' famous quote: 'Banking is necessary, but banks are not.' On the other hand, there is a view that the fin-tech phenomenon is 'just another bubble' predetermined to fail after a few years as a result of a series of unfavorable events with adverse effects on this sector.

3. METHODOLOGY AND RESULTS

3.1. Summary statistics and main movements

We construct a panel of 41 European countries with data collected from World Bank's World Development Indicators database for the period from 2004 to 2018. For the measurement of bank density, we adopt the number of commercial bank branches (CBBs) and the number of automated teller machines (ATMs) per 100,000 adults from the database and additionally introduce two similar measures per 1,000 square kilometers. On the other side, we use domestic credit extended by financial sector as proxy for financial development and the real GDP per capita to measure economic performance. We also include a set of additional variables to study the

potential endogeneity of bank density such as the share of urban population and share of Internet users.

Although the countries in our sample belong to a single geographic region and share many commonalities, there is pronounced heterogeneity in regulation and development stemming from the history of economic systems and mutual integration. Therefrom, we tell apart the countries that are part of the European Union and the Eurozone from those that are not in order to examine the existence of patterns that might be familiar with process of integration. Furthermore, we construct a set of two dummy variables that capture country's EU and Eurozone membership at the end of the year, respectively, and use them as additional inputs in the model to test the extent of the differences between country groups.

Summary statistics for the main variables in our analysis are reported in Table 1. EU members clearly have substantially greater bank density on average with regards to all four measures and the means for the other variables are also higher for this group of countries. The statistics for the group of non-EU countries should be taken with a grain of salt, though, as it combines high-income EFTA members with middle-income countries from Southeast and East Europe, which can be plausibly concluded from the greater volatility expressed through the standard variations relative to the means.

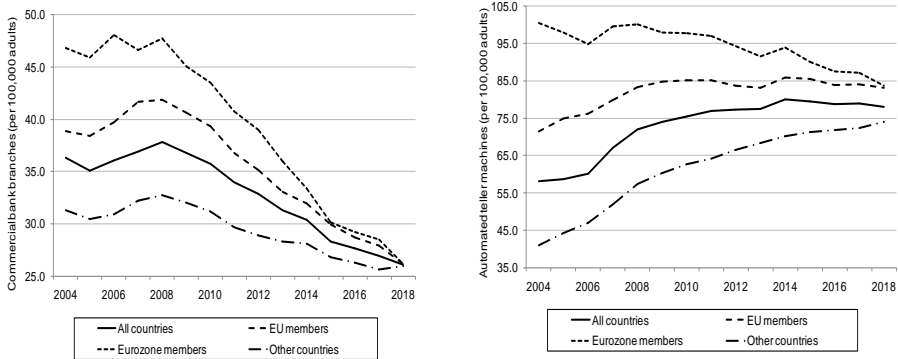
Table 1. Summary statistics for the main variables used in the model

Variable	EU members			Other countries		
	<i>Obs.</i>	<i>Mean</i>	<i>St. Dev.</i>	<i>Obs.</i>	<i>Mean</i>	<i>St. Dev.</i>
CBBs (per 100,000 adults)	383	35.296	21.607	215	28.555	17.312
ATMs (per 100,000 adults)	380	82.348	36.068	217	57.193	33.600
CBBs (per 1,000 sq. km)	383	39.034	37.031	215	18.256	19.949
ATMs (per 1,000 sq. km)	380	91.894	76.089	217	34.189	37.408
Domestic credit of GDP (in per cent)	375	128.037	61.585	223	38.586	52.687
Real GDP per capita (in intl. dollars)	390	34,060	21,367	225	18,962	27,087
Urban population (share of total pop.)	390	0.722	0.119	225	0.636	0.133
Internet users (share of total pop.)	390	0.696	0.173	220	0.517	0.271

Notes: The sample is split into two sub-samples depending on the value of the EU dummy (1 for EU members and 0 for non-EU members). Statistics are calculated after all variables have been previously normalised to address the bias from differences between countries in terms of population and area.

The time series of the average numbers of CBBs and ATMs per capita are plotted in Figure 1. For the sake of greater detail, apart from the sub-samples of EU members and other countries based on the values of the EU dummy, we make a further step in sampling a new group of Eurozone countries based on the values of the Eurozone dummy.

Figure 1. Average number of CBBs and ATMs per 100,000 adults



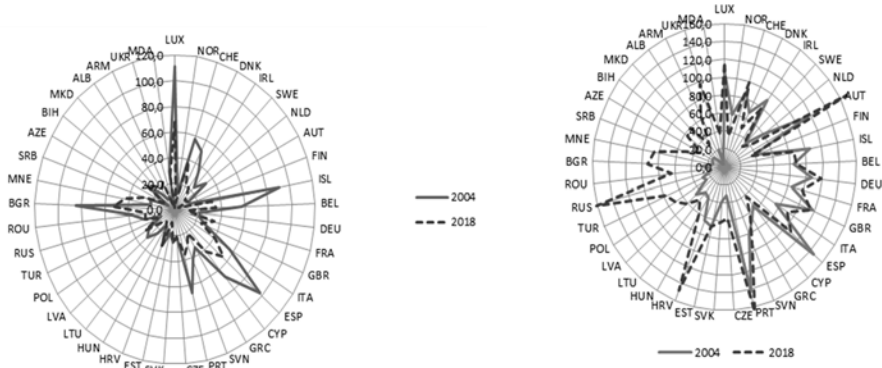
Source: World Databank, World Development Indicators

Notes: Montenegro has unilaterally adopted the euro as its official currency but it is not part of the Eurozone and is included in the other countries group rather than the Eurozone members as such.

The charts clearly show that there is convergence in both the average number of CBBs and ATMs per capita across all groups. We note that the convergence is stronger when CBBs is an underlying variable, where the averages for all groups in the end year are almost equal, while there is still some gap between EU and non-EU members when observing the ATMs. Furthermore, we also find different patterns in the convergence processes. That is, the average number of CBBs per capita follows a decline after 2008 with sharpest fall at the EU member states as opposed to the upward trend in the average number of ATMs at all groups but the Eurozone members with that of the non-EU members being the most pronounced.

Figure 2 presents radar charts to depict the distribution of the number of bank branches and ATMs per capita across all sampled countries in two years — namely, 2004 and 2008 as start and end years, respectively. Countries are ordered according to the level of GDP per capita, starting with Luxemburg as a country with highest and ending with Moldova as a country with the lowest GDP per capita in the analysed period.

Figure 2. The numbers of CBBs (left chart) and ATMs (right chart) per 100,000 adults across sampled countries ordered according to GDP per capita



Source: World Databank, World Development Indicators

From the left chart, it is obvious that in 2004, countries with higher level of GDP per capita had more branches per capita compared to countries with lower level of GDP per capita. In the period between 2004 and 2018, the countries with higher level of GDP per capita faced a decrease of the number of branches per capita, while this figure increased for the low-income countries mostly due to their catching-up process. In the second chart that refers to the number of ATMs per capita, the comparison between the states in 2004 and 2018 reveals that the figures for the high-income countries mostly remained unchanged or slightly decreased, whereas low-income countries recorded a surge in the number of ATMs per capita. The decreasing figures for the number of bank branches per capita and the non-increasing figures for the number of ATMs per capita can also be viewed as a result of the satiation due to the already achieved high level of globalization and outreach in the banking sector.

3.2. Baseline model

The baseline model that we use to estimate the effect of bank density on economic performance is a dynamic panel regression of the form

$$y_{c,t} = \beta d_{c,t} + \sum_{i=1}^p \gamma_i y_{c,t-i} + \alpha_c + \delta_t + \varepsilon_{c,t}, \quad (1)$$

where the $y_{c,t}$ denotes real GDP per capita for country c in year t , $d_{c,t}$ is the bank density measure with respect to population, α_c is a full set of time-invariant country

fixed effects, δ_t is a full set of year fixed effects and $\varepsilon_{c,t}$ is the error term. We include p lags of the dependent variable in this specification to examine the GDP dynamics.

We impose the following assumptions on the specified model above.

Assumption 1 (Sequential exogeneity):

$$\mathbb{E}(\varepsilon_{c,t} | y_{c,t}, \dots, y_{c,t_0}, d_{c,t}, \dots, d_{c,t_0}, \alpha_c, \delta_t) = 0.$$

This assumption is a standard one when working with dynamic panel regression models, which implies that the past values of real GDP per capita and the bank density measure are orthogonal to the error term in the current period. Importantly, the assumed exogeneity is not strict because of the inclusion of lagged values of the real GDP per capita.

Assumption 2 (No serial correlation):

$$\mathbb{E}(\varepsilon_{c,t} | \varepsilon_{c,t-1}, \dots, \varepsilon_{c,t_0}) = 0.$$

Along with Assumption 1, this is another standard assumption made and it essentially states the same with the difference that orthogonality should be established between the error term in the current period and its past values. In order to obey Assumption 2, we opine that the inclusion of lagged values of real GDP per capita, albeit violating strict exogeneity, is helpful in eliminating the residual serial correlation.

Assumption 3 (Stationarity):

The characteristic equation $r^p - \sum_{i=1}^{p-1} \gamma_i r^{p-i} = 0$ of the time series $y_{c,t} = \sum_{i=1}^p \gamma_i y_{c,t-i} + \varepsilon_{c,t}$ does not have a root $r = 1$.

The notion of stationarity is important in time-series analyses, although it is frequently dropped when $C > T$. In that light, we simplify our baseline model with the assumption that the characteristic equation of our dependent variable has no unit root that is the time series is stationary, but later we test the validity of this assumption using the panel unit root test by Levin, Lin and Chu (2002).

Table 2. Effect of bank density measured per capita on economic performance

Independent variable	Dependent variable: log GDP per capita					
	(1)	(2)	(3)	(4)	(5)	(6)
log GDP per capita 1st lag	0.720*** (0.039)	0.999*** (0.057)	1.050*** (0.060)	0.761** *	1.067*** (0.056)	1.165*** (0.048)
log GDP per capita 2nd lag		-0.223*** (0.044)	-0.405*** (0.075)	(0.068)	-0.261*** (0.051)	-0.515*** (0.060)
log GDP per capita 3rd lag			0.138*** (0.050)			0.239*** (0.042)
CBBs (per 100,000 adults)	-0.117*** (0.034)	-0.141*** (0.038)	-0.131*** (0.042)			
ATMs (per 100,000 adults)				-0.049 (0.032)	-0.014 (0.027)	-0.045 (0.031)
European Union dummy	0.053 (0.066)	-0.064 (0.079)	0.013 (0.083)	0.131* (0.076)	0.084 (0.059)	0.299 (0.284)
Eurozone dummy	0.015 (0.014)	0.002 (0.015)	0.001 (0.012)	0.035** (0.015)	0.015 (0.016)	-0.002 (0.013)
Unit root test adjusted <i>t</i> -statistic	-7.444	-8.977	-7.860	-7.444	-8.977	-7.860
<i>p</i> -value (rejects unit root)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	520	480	440	525	488	448
Countries	41	41	41	41	41	41

Notes: The reported coefficient of bank density is multiplied by 100. All specifications include a full set of country fixed and year effects. Standard errors robust against heteroscedasticity and serial correlation at country level are reported in parentheses. Symbols *, ** and *** denote statistical significance at the level of 1, 5 and 10 per cent, respectively.

Table 2 reports the estimation results from the baseline model. The results show statistically significant coefficients on the GDP dynamics in all equations, implying alternating impact with growing magnitude of the first lag coefficient as the GDP dynamics gets enriched with additional lags, while the magnitude of the last lags asymptotically diminishes. Bank density measured through the number of CBBs has negative effect on economic performance. The estimated coefficients ranging from -0.117 to -0.141 point out that any unit in the number of CBBs per 100,000 adults adversely affects economic performance by 0.269 to 0.324 per cent. When the number of ATMs is used as a bank density measure, we again find negative effect but with less intensity and much higher standard errors. Statistically insignificant results are found for the dummies as well in all but the specification with one lag and the ATMs as bank density measure, indicating to a better economic performance of EU and Eurozone members under the given circumstances. Finally, the panel unit root test on a demeaned time series of the GDP measure strongly rejects the existence of a unit root, thus confirming the validity of Assumption 3.

An important issue that needs to be addressed in a dynamic panel regression is the failure of the LSDV estimator known as the Nickell's bias (see Nickell, 1981; and

Anderson and Hsiao, 1982). These results from the violation of the strict exogeneity with the introduction of lagged values of the dependent variable and, in our case, it might severely affect the validity of results considering that it is of asymptotic order $1/T$ and our observation period is $T = 15$. There are several techniques developed as solutions to this bias but the most common ones when working with macroeconomic data are the IV approach (Anderson and Hsiao, 1982) and the GMM approach (Arellano and Bond, 1991) that we elaborate in greater detail in the rest of the paper.

3.2.1. IV estimates

Apart from the failure of strict exogeneity in a dynamic-panel setup, the general notion of exogeneity per Assumption 1 may not hold, which leads to measurement errors in the effects of bank density on economic performance. For the purpose of solving this potential issue, we develop an IV strategy with the lagged values of the share of urban population and share of Internet users used as instrumental variables. The selection of the two variables was made under two reasonable considerations: firstly, banks operating in regions with different level of urbanisation are likely to exhibit different preferences towards their presence; and secondly, differences in the number of Internet users may be linked with higher use of the online e-banking platforms and that might severely affect the use of bank services provided through other means. There is one additional assumption that the instruments have to obey.

Assumption 4 (Exclusion restriction):

$$\mathbb{E}(\varepsilon_{c,t} | x_{c,t-i}, z_{c,t-i}, \alpha_c, \delta_t) = 0.$$

This assumption is nothing new but an extension of Assumption 1 in the sense that there has to be a specification for which exogeneity holds. In other words, if exogeneity fails for the bank density measures in the model, then we are in the search of variables impacting the endogenous bank density measure that are orthogonal to the error term.

Given that we use lagged values of two variables as instruments to a single bank density measure, we over-identify the model that allows us to implement the 2SLS approach with the following two stages. In the first stage, we estimate the equation of the form

$$d_{c,t} = \sum_{i=1}^p \tau_i y_{c,t-i} + \xi_i x_{c,t-i} + \zeta_i z_{c,t-i} + \eta_c + \theta_t + u_{c,t}, \quad (2)$$

where the bank density measure $d_{c,t}$ is treated as an endogenous variable and is regressed on the GDP dynamics with $p = 3$, and $x_{c,t-i}$ and $z_{c,t-i}$ denote the instrumental variables with up to three lags. We opt for the GDP dynamics with three lags given the statistically significant regression coefficients that reveal the patterns already discussed. Then, we re-run a slightly modified version of the model specified in (1) in the form

$$y_{c,t} = \beta d_{c,t} + \sum_{i=1}^p \gamma_i y_{c,t-i} + \alpha_c + \delta_t + \epsilon \hat{u}_{c,t} + \varepsilon_{c,t}, \quad (3)$$

where the key difference is the decomposition of the error term to $\epsilon \hat{u}_{c,t}$ and $\varepsilon_{c,t}$. In order to remove endogeneity from the model, we use the Durbin-Wu-Hausman test (see Durbin, 1954; Wu, 1973; and Hausman, 1978) on the coefficient ϵ . In the second stage, we estimate the regression coefficients of the model in (3).

The estimation results from the IV strategy are presented in Table 3. In the first stage of the 2SLS approach, we identify strong endogeneity of both bank density measures with respect to the selected instruments in any specification up to three lags. Subsequently, we find general consistency of the results in the second stage with those from the baseline model.

Table 3. Instrumental variables estimates on the effect of bank density on economic performance

Endogeneity test estimates (stage one of 2SLS)						
$H_0: \epsilon = 0, H_1: \epsilon \neq 0$						
Instrument	Endogenous variable					
	Share of urban population			Share of Internet users		
	Instrumental lags					
	One lag	Two lags	Three lags	One lag	Two lags	Three lags
	(1)	(2)	(3)	(4)	(5)	(6)
Share of urban population	-1.321*** (0.276)	-1.344*** (0.281)	-1.352*** (0.291)	-2.772*** (0.691)	-3.015*** (0.546)	-3.213*** (0.570)
Share of Internet users	-0.120*** (0.025)	-0.167*** (0.025)	-0.206*** (0.025)	0.691*** (0.046)	0.593*** (0.047)	0.482*** (0.048)
IV regression estimates (stage two of 2SLS)						
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
log GDP per capita 1st lag	1.169*** (0.048)	1.169*** (0.048)	1.156*** (0.048)	1.211*** (0.048)	1.211*** (0.048)	1.200*** (0.048)
log GDP per capita 2nd lag	-0.423*** (0.071)	-0.423*** (0.071)	-0.407*** (0.071)	0.131*** (0.048)	-0.484*** (0.070)	0.147*** (0.050)
log GDP per capita 3rd lag	0.124*** (0.043)	0.124*** (0.043)	0.135*** (0.043)			
CBBs (per 100,000 adults)	-0.095*** (0.020)	-0.094*** (0.019)	-0.096*** (0.019)			
ATMs (per 100,000 adults)				0.013 (0.020)	0.013 (0.020)	0.011 (0.021)

European Union dummy	0.009 (0.009)	0.009 (0.009)	0.009 (0.009)	0.007 (0.011)	0.007 (0.011)	0.008 (0.011)
Eurozone dummy	0.002 (0.005)	0.002 (0.005)	0.001 (0.005)	0.013** (0.006)	0.013** (0.006)	0.011* (0.006)
Observations	520	480	440	525	488	448
Countries	41	41	41	41	41	41

Notes: The reported coefficient of bank density is multiplied by 100. All specifications include a full set of country fixed and year effects. Symbols *, ** and *** denote statistical significance at the level of 1, 5 and 10 per cent, respectively.

In fact, very similar results are obtained in the equations where the endogenous variable is instrumented with one or two lags, while differences are noticeable in those with three lags of the instrumental variables. GDP dynamics still shows alternating impact that asymptotically diminishes as the number of lags increases. Bank density has statistically significant negative impact when measured through the number of CBBs, which is slightly less than the baseline estimates, ranging from -0.094 to -0.096. This implies an adverse impact by 0.216 to 0.221 per cent. The Eurozone dummy coefficient has statistically significant positive impact only in the specifications with the number of ATMs as bank density measure.

3.3. GMM estimates

Although the IV approach developed by Anderson and Hsiao (1982) solves the problems posed by violating Assumption 1, it has a low asymptotic efficiency due to the somewhat large asymptotic variance. In order to attain higher asymptotic efficiency of the estimated results, we move on to the GMM estimator proposed by Arellano and Bond (1991), which has lower asymptotic variance and might provide more efficient estimates.

Table 4. General method of moments estimates on the effect of bank density on economic performance

Independent variable	Dependent variable: log GDP per capita					
	(1)	(2)	(3)	(4)	(5)	(6)
log GDP per capita 1st lag	0.703*** (0.039)	0.878*** (0.057)	0.924*** (0.063)	0.745*** (0.053)	0.959*** (0.058)	1.027*** (0.062)
log GDP per capita 2nd lag		-0.176*** (0.046)	-0.363*** (0.060)		-0.226*** (0.042)	-0.443*** (0.061)
log GDP per capita 3rd lag			0.144*** (0.038)			0.186*** (0.040)
CBBs (per 100,000 adults)	-0.122*** (0.029)	-0.118*** (0.029)	-0.123*** (0.032)			
ATMs (per 100,000 adults)				-0.016 (0.018)	- $\beta < 0.001$ (0.015)	-0.011 (0.016)
European Union dummy	0.012* (0.007)	0.017** (0.008)	0.025 (0.021)	0.026*** (0.010)	0.022*** (0.008)	0.072 (0.062)
Eurozone dummy	0.009 (0.010)	0.013 (0.009)	0.013 (0.010)	0.025** (0.012)	0.027** (0.011)	0.022** (0.011)

Independent variable	Dependent variable: log GDP per capita					
	(1)	(2)	(3)	(4)	(5)	(6)
AR (2) z-statistic	-4.288	-3.772	0.679	-4.048	-3.525	0.813
p-value (serial correlation)	[0.000]	[0.000]	[0.497]	[0.000]	[0.000]	[0.416]
Observations	520	480	440	525	488	448
Countries	41	41	41	41	41	41

Notes: The reported coefficient of bank density is multiplied by 100. All specifications include a full set of country and year fixed effects. Standard errors robust against heteroscedasticity and serial correlation at country level are reported in parentheses. Symbols *, ** and *** denote statistical significance at the level of 1, 5 and 10 per cent, respectively.

Table 4 reports the GMM estimation results. The findings are generally consistent with those from the baseline model in terms of statistical significance, the sign of the effect and its magnitude. Differences can be noted for the dummy coefficients with evidence of positive statistically significant effect, especially in the specifications with the number of ATMs as bank density measure. Yet the consistency in the estimation results, the AR (2) test shows no serial correlation only in the specification with three lags.

3.4. Bank density and financial development

We used the financial development measure in all previous equations as a fixed explanatory variable that potentially accounts for a large portion of the impact on economic performance. Since financial deepening underpins the concept of financial development, it is reasonable to shed light on bank density as potential driver of financial development. In the context of this discussion, we reverse our baseline model in (1) so that real GDP per capita is the fixed explanatory variable and domestic credit of GDP by the financial sector is taken as a dependent variable. Then, the model takes the form

$$f_{c,t} = \beta d_{c,t} + \sum_{i=1}^p \varphi_i f_{c,t-i} + \alpha_c + \delta_t + \varepsilon_{c,t}. \quad (4)$$

Table 5. Effect of bank density per capita on financial development

Independent variable	Dependent variable: Domestic credit of GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Domestic credit of GDP 1st lag	0.696*** (0.052)	1.021*** (0.132)	1.013*** (0.138)	0.653*** (0.063)	1.154*** (0.114)	1.115*** (0.122)
Domestic credit of GDP 2nd lag		-0.200* (0.106)	-0.082 (0.112)		-0.343*** (0.083)	-0.108 (0.135)
Domestic credit of GDP 3rd lag			-0.151* (0.080)			-0.225*** (0.080)
CBBs (per 100,000 adults)	1.163*** (0.325)	1.030*** (0.241)	0.815*** (0.222)			
ATMs (per 100,000 adults)				0.592* (0.311)	0.703** (0.311)	0.658** (0.323)

Independent variable	Dependent variable: Domestic credit of GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
European Union dummy	65.726 (95.451)	136.544 (148.477)	87.644 (119.534)	-139.093 (132.985)	-174.633 (155.648)	-48.288 (84.906)
Eurozone dummy	-1.579 (12.722)	-1.118 (8.616)	4.646 (4.989)	-12.567 (17.837)	0.360 (7.462)	-1.591 (4.216)
Observations	503	463	423	508	471	431
Countries	41	41	41	41	41	41

Notes: The reported coefficient of bank density is multiplied by 100. All specifications include a full set of country fixed and year effects. Standard errors robust against heteroscedasticity and serial correlation at country level are reported in parentheses. Symbols *, ** and *** denote statistical significance at the level of 1, 5 and 10 per cent, respectively.

The estimation results from the reversed model are presented in Table 5. The financial development dynamics exhibits statistically significant coefficients with opposite signs for the first and third lags, while the coefficient for the second lag loses statistical significance and changes sign as the number of lags gets increased. Both bank density measures have positive statistically significant impact on financial development. For the number of CBBs, it suggests that a unit increase leads to higher financial development in the range from 0.815 to 1.163 percentage points; and for the number of ATMs, the increase caused by a unit change upwards is between 0.592 and 0.703 percentage points. Given the unbalanced data for the lagged variable, we could not verify Assumption 3 with the panel unit root test.

4. CONCLUSION

The Financial crisis of 2007–2008 led to deformation of banks’ business models. The sustainability of banking strategies has become a source of concern for regulations in order to stimulate and revise the current business models. Yet the absence of unilaterally accepted model as superior compared to all others, it is generally agreed that financial technology has significant impact on the revision of banks’ business models and the nature of banking. The financial technology is one of the largest challenges that banks will likely face in the upcoming period. That is, the development of the fin-tech sector – which implies an increased use of technology for executing different types of financial activities.

The empirical results in this paper confirm the importance of the developing technologies on the nature of banking and they differ from the orthodox view of traditional banking. The baseline dynamic regression model that we develop to study the effect of bank density on economic performance measured by real GDP per capita reveals a weak negative statistically significant impact of 0.269 to 0.324 per cent annually for a unit increase of the number of bank branches and no statistically significant impact for the ATMs. The estimation results from our subsequent IV

estimates with 2SLS approach and Arellano-Bond GMM estimator largely verify the consistency of the results from the baseline model. In the first stage of the 2SLS approach, we find that our bank density measures are both endogenous with respect to the level of urbanization and the share of Internet users; and in the second stage, we obtain a weaker negative statistical significant impact in the range of 0.216 to 0.221 per cent annually for the bank branches. From the regressions on domestic credit of GDP as a dependent variable, we find that both measures are drivers of financial development with a unit increase in the number of bank branches contributing to higher financial development by 0.815 to 1.163 percentage points and from 0.592 to 0.703 for a unit increase of ATMs. In all specifications, we estimate positive impact of the dummy coefficients for EU and Eurozone membership but we safely dismiss its overall validity due to the lack of statistical significance in most cases.

Our empirical findings show that the numbers of bank branches and ATMs, albeit important drivers of financial development, do not contribute to better economic performance across Europe. This can be explained through the increased number of Internet users and growing use of e-banking services. There is also no strong evidence that the harmonized bank regulation across EU countries and the shared currency help these countries perform better than the rest.

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EXPANDING FINANCIAL INCLUSION FOR YOUTH: DOES DIGITALIZATION MATTER?

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***Abstract:** This paper analyzes how the digitalization of financial services contributes to the expansion of financial inclusion for youth by exploring its effects in Western Balkans. Its aim is to establish what indicators may have the most substantial influence on financial access in the region. Data for this study were collected from the 2017 Global Findex database for Albania, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia and Serbia. Data on the availability and use of mobile and Internet technologies were also applied. Three Probit estimations analyzed the data to find significance for factors wherein all variables were discrete and binary. The results indicate that being older, achieving a higher education and already being a user of digital technologies are all significant indicators of formal financial inclusion for the Western Balkans. Moreover, it is found that youth (15 - 29 years of age) are severely underbanked compared to their EU counterparts.*

***Keywords:** Financial inclusion, youth, digitalization, Western Balkans*

1. INTRODUCTION

Financial inclusion refers to accessing and using formal financial services. It is related to provision of affordable, accessible and relevant financial products and services to individuals and firms (Kumar & Mohanty, 2011), regardless of age, gender, social status, net worth or company size. Financial inclusions strive to remove barriers within the financial sector in order to drive development and improve living conditions equally for corporate entities and individual persons alike.

The level of financial inclusion varies. While start-ups find it difficult to gain a foothold into using financial services, companies that already have established credit histories are offered ease of access due to their prior inclusion into the financial market. In a similar manner, individuals also experience such issues. Those who have shown stable employment and a good credit history have access to a much wider range of more favorable financial services, possessing neither of these facets, youth

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(for this paper, from the age of 15 to 29) generally face problems when trying to access formal financial systems. They are also less likely to be included into the formal financial system, as they are less prone to own bank accounts, have savings or be able to borrow from financial institutions. Their lack of financial inclusion hinders their ability to secure funds for their education, start their own business or manage their own assets. Financial inclusion may also be stymied by other factors such as the economic development and financial system of one's country of residence, as well as gender and cultural trends of saving and borrowing (Kim, 2016).

The development of information technologies, digitalization and the development of widespread mobile solutions has had a high impact in the world of finance (Demigurc-Kunt & Klapper, 2013). Not only has burgeoning change influenced the products and services themselves, but it has revolutionized the distribution of financial services, lowered the costs of providing services and contributed to the increased access to finance. The use of information know-hows, such as mobile technologies (phones and smart devices) is widespread among youth enabling a catalyzation of their inclusion into more formal financial institutions. Affordability, as well as providing uninterrupted service and customer protection to customers is the basis of financial service quality. Usage, particularly denoting the consumer's financial literacy, is characterized by the consumer's ability to interact with and understand the service provided which may yield both positive and negative results determined by the understanding of usury laws related to the service (Naumenkova et al., 2019).

Accessing finance as well as the availability of financial resources and financial inclusion are all issues affecting companies and the economy itself, particularly in emerging and developing economies. Through the use of financial services, individuals and companies are able to invest in themselves through the purchase of goods or services that may lead to further growth. However, a fine distinction must be made between access to financial services and the need to use them in order to make a difference who may be counted as an active participant in a financial market. To illustrate, individuals may have access to formal channels of finance but choose not to use them due to having sufficient savings, cultural or religious reasons, cash economies, among other reasons. Having access to finance but opting not to use it is not relevant to general analysis since such individuals would generally have no need to include themselves into the financial markets and thereby not be "active" in it. Involuntary exclusion, on the other hand, is another matter. When one, whether an individual or corporate entity, wishes to access the formal financial system but is unable, it points to an inability to be active within the financial market. The most common reasons are given as insufficient income or collateral to assure repayment,

low credit scores, prohibitively high interest rates (Ljumovic et al., 2015). Recent research from Jaksic & Ljumovic (2020) showed that access to finance for the companies in the WB region is limited and lagging back compared to the EU countries. Vast majority of companies are financed from internal funds, and friends and family loans (Jaksic & Ljumovic, 2020).

This paper aims to analyze whether the digitalization of financial services contributes to the expansion of financial inclusion for youth through exploring its effects in the Western Balkans (WB). In particular, the paper seeks to establish what indicators have the biggest impact on financial access in the WB.

2. LITERATURE REVIEW

There had been no global database on individual financial status until 2011 when the Global Findex database (GFD) was established. The GFD, shedding light into how adults in more than 140 economies use formal financial channels to use bank accounts, conduct payments, build up saving, access loans and credit, and manage risk, has served as an outstanding resource to carry out data interpolation. Economies face their own challenges, and have their own achievements within financial inclusion. Reducing poverty, hunger and gender inequality have all been shown repeatedly and reliably within the literature to be an effective method to improve the financial lives of all. UN member states now use the GFD to track sustainable development goals (Global Findex Database, 2017).

One key policy tool utilized to promote prosperity, reduce poverty and improve macroeconomic stability (Kim, 2016), the GFD has fostered numerous empirical studies to be performed into the roots, causes and effects of financial inclusion. Financial inclusion itself is determined through quantitative and qualitative methods that characterize 1) financial access, 2) quality, 3) usage and impact. Access is understood to be the availability of service infrastructure, that is financial institutions, their branch offices and other representatives as well as internet and mobile access (Naumenkova et al., 2019).

Financial inclusion is generally seen as a rising tide that will float all boats. Yalaman-Oz (2019) specifically concludes financial inclusion to be critical to ending poverty. By entering a financial system, incomes grow over time, which likely results in larger revenues.

Examining 37 developing Asian countries, Park and Mercado (2015) find that financial inclusion both decreases poverty and lessens income equality. In an analysis of maximizing welfare policy, Mehrotra and Yetman (2014) examine the

effect of financial inclusion on welfare-maximizing monetary policy, reporting helps to remove volatility with the market, stabilizing both inflation and GDP, as well as boosts monetary policy.

Greater financial inclusion is associated with lower account costs, increases savings (Aportela, 1999), poverty reduction and economic growth (Beck, Demirgüç-Kunt, & Levine, 2007; Bruhn and Love, 2014) and investment of entrepreneurs (Dupas & Robinson, 2009). There is also a consensus in the literature that an increased level of financial inclusion may also provide considerable benefits for one's social well-being.

Altarawneh et al. (2020) also suggests that income and education together lead to expanded financial inclusion as those who have achieved a higher level of employment may also share stronger need to be included actively into financial services, thereby providing evidence that policies promoting financial inclusion should target marginalized segments of the population, such as youth and women.

For India, Kohli (2013) has underscored those factors bettering financial inclusion. Through the identification of the relationship shared between financial inclusion and human development in India, Kohli concludes that socio-economic factors, such as one's income level, were influential factors for financial inclusion.

On the basis of data reported within the 2014 GFD, Rojas-Suárez (2016) analyzed inclusion levels in Latin America according to three indicators by percentage of adults who have: 1) an account through a formal financial institution, 2) been using a financial institution to save over the past year and 3) borrowed from a formal financial institution over the past year. The inclusion gap was then shown to result from institutional weaknesses, poor enforcement of the law and tendencies for the sector to be dominated by financial cartels.

According to the latest data from the GFD, globally, about 1.2 billion adults remain unbanked, not possessing an account at a financial institution or through a mobile money provider (WB, 2017). The same database shows significant differences by age group, where unbanked adults are disproportionately young, with 30 percent of unbanked adults between 15 and 24 years old. This percentage is lower in developing economies and amounts to 23 percent, showing that financial inclusion depends to a great extent on economic development levels.

2.1. Are youth underbanked?

The share of youth in relation to the total population varies from country to country. Nations such as Ireland, Cyprus, Slovakia and Poland have the highest, where those 15 to 29 years of age comprise 24% of the population. Whereas, in Denmark, Germany and Italy, the share of the same segment comprises less than 18% of the total population. Matching the general trend of population decline of the Balkans, those 15 to 29 years of age comprise only roughly 10.5% of Serbia's population.

Compared from 2015 to the present day, there has been a drastic decrease in the number of young people in Serbia by about 7%, while the largest decline has been recorded in Croatia (9.39%) and Northern Macedonia (8.1%). The smallest has been in Montenegro (5.3%), which, while the lowest of the Western Balkans, is still significantly higher than the EU average (2.7%) (Table 1) (Eurostat, 2019). The 2013 census shows that the youth population in Bosnia and Herzegovina is also declining. Compared to the 1971 census, the percentage of young people in the total population was 34.4%, while the 2013 census shows a share of only 15.4%, more than halving over the last four decades (Kujović & Müller-Hennig, 2019).

The increase of the number of young people also affects the youth unemployment rate (Pavlovic et al., 2019). On the other hand, numerous problems limit youth access to the labor market, but they are dominated by insufficient work experience, low wages, migration, regional differences and similar (Pavlovic & Ljumovic, 2016).

Table 1. Population aged 15 to 29 in Europe and WB countries, 2015-2019.

15-29	2015	2016	2017	2018	2019	2015/2019
EU (28 individual MS)	88,965,765	88,669,272	87,951,040	87,210,746	86,531,328	-2.74
Croatia	755,363	739,397	720,498	699,788	684,437	-9.39
Montenegro	126,508	124,565	123,018	121,276	119,822	-5.29
North Macedonia	448,272	440,516	432,146	421,796	411,979	-8.10
Albania	723,550	716,315	705,327	695,836	681,552	-5.80
Serbia	1,244,924	1,217,682	1,197,357	1,176,212	1,156,611	-88.313

Source: Eurostat, 2019

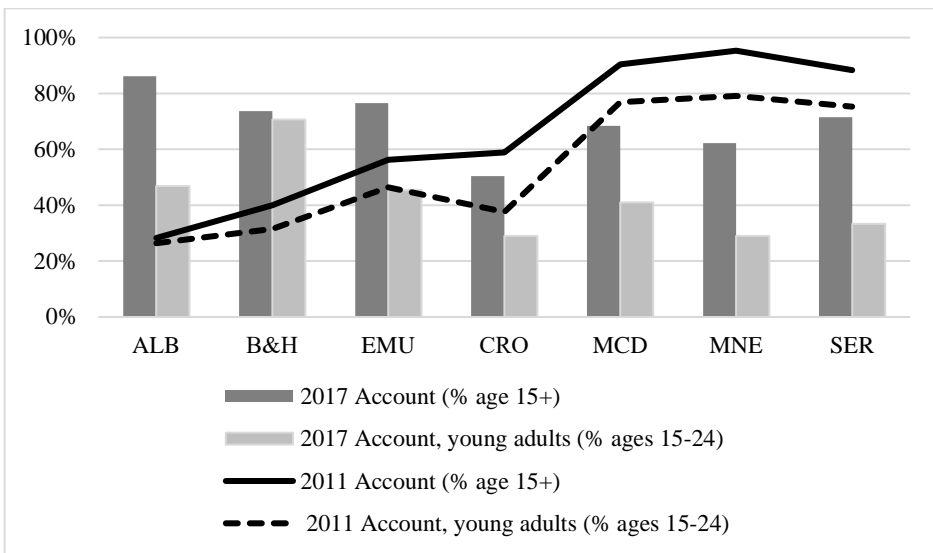
Youth in developing countries are less likely to have access to digital technologies than their contemporaries in developed countries (United Nations, 2019). Among all segments of the population, those 18 to 35 years of age use the Internet to a greater

extent than those older than 36. Van Rooij et al. (2011) and van Rooij et al. (2012) both note that financial literacy fosters good stockholding and act as a boost to wealth accumulation.

The results showed that 50% of adults have a bank account, but that this is largely influenced by determinant factors, such as development of the area in which they live and their respective level of income. While barriers to financial inclusion are its high cost, physical distance and inability to provide the proper documentation (Demirguc-Kunt & Klapper, 2012).

Having a bank account varies globally. While adults may be more likely to have an account at a formal financial institution in developed countries, it is only 41 percent in developing economies. The Middle East and North Africa have the lowest penetration of financial inclusion into a formal financial institution, with only 18 percent of adults reporting a formal account (Zins & Weill, 2016). Authors who used the DNB Household Survey in their research with market data on account-specific interest rates and characteristics came to the conclusion that knowing specifics may prevent households from securing the highest possible interest rate for the invested amount (Deuflhard et al., 2015).

Figure 1. Bank Account Holders (2011 vs. 2017)



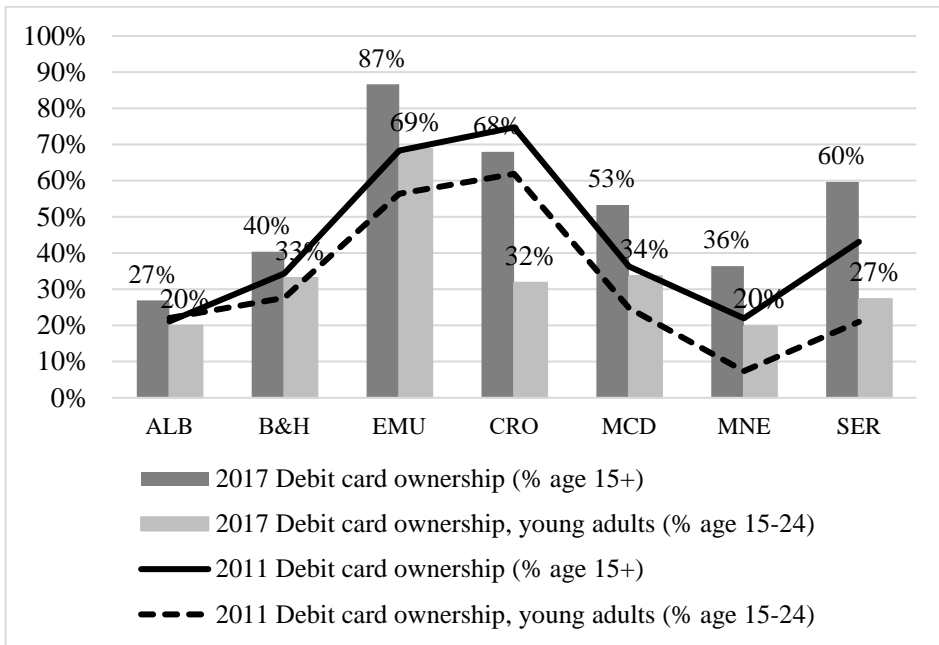
Source: Demirgüç-Kunt et al., 2018, based on the authors' calculation

Fig. 1 shows the share of account holders from 2011 and 2017 in the EMU and WB. Among account holders, Albania had the highest number in 2017 overall, while

B&H had the highest for those 15 to 24 years of age. Whereas the same group was lowest in Croatia, Montenegro and Serbia (<30%). More striking is the decrease among those 15 to 24 years of age who are account holders in 2017 compared to 2011 which almost halved for North Macedonia, Montenegro and Serbia as well as that the total account number significantly shrank in this same timeframe. Only in B&H and Albania did account rise regardless of age group, and only in the EMU was there an increase in account holders. Croatian saw the steepest decline.

In 2017, 87% of all adults in the EMU were debit card owners while 69% of youth were. This shows a general increase for all age groups compared to 2011. Croatia had the highest percentage of debit-card owners in 2017 (69%) in the WB but it also had the largest decline among youth debit card holders among those 15 to 24 years of age. Serbia showed the largest increase among all debit-card holders from 2011 to 2017, growing from 43% to 60%. Among those 15 to 24 years of age, debit card ownership in 2017 was lowest in North Macedonia (34%), Bosnia and Herzegovina (33%) and Croatia (32%) and Montenegro (20%) and Albania (20%) which was half that of the EMU.

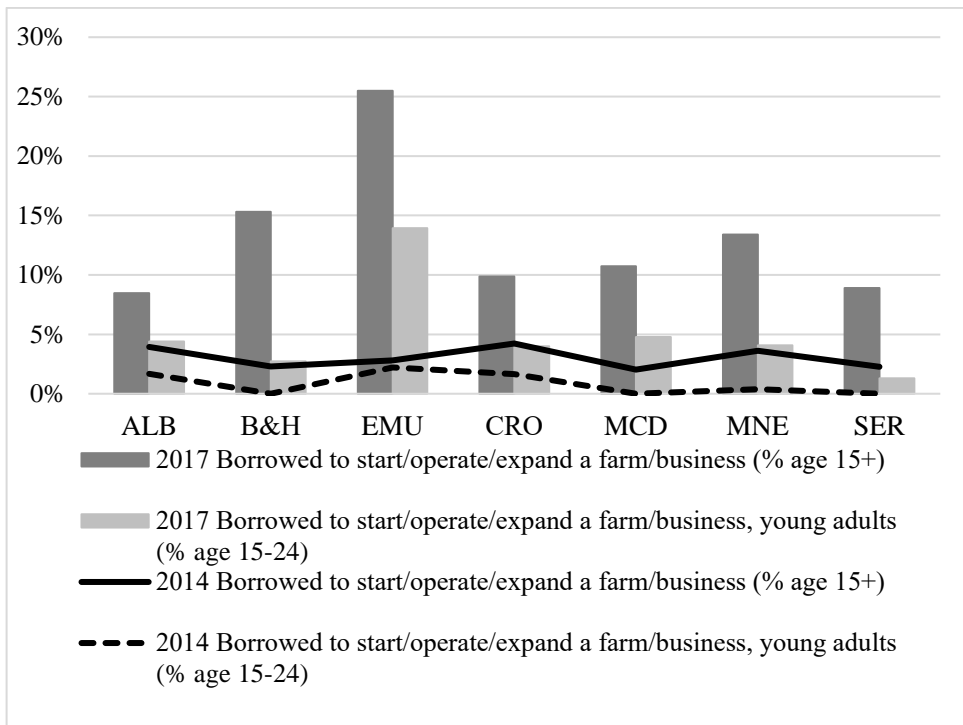
Figure 2. Debit card owners (2011 vs. 2017)



Source: Demirgüç-Kunt et al., 2018, based on the authors' calculation

Those 15 to 24 years of age generally did not borrow for business purposes within the WB. For instance, borrowing for such purposes was flat for youth from 2011 to 2017, while it only grew slightly from 0% in North Macedonia, Montenegro and Serbia, never rising above 4%. The WB stands in stark contrast to the EMU whose borrowing had markedly increased from 2011 to 2017, among all ages. For youth, in the EMU, borrowing rose from 2% to 13%. When excluding youth, for all age groups, borrowing significantly rose regardless of country.

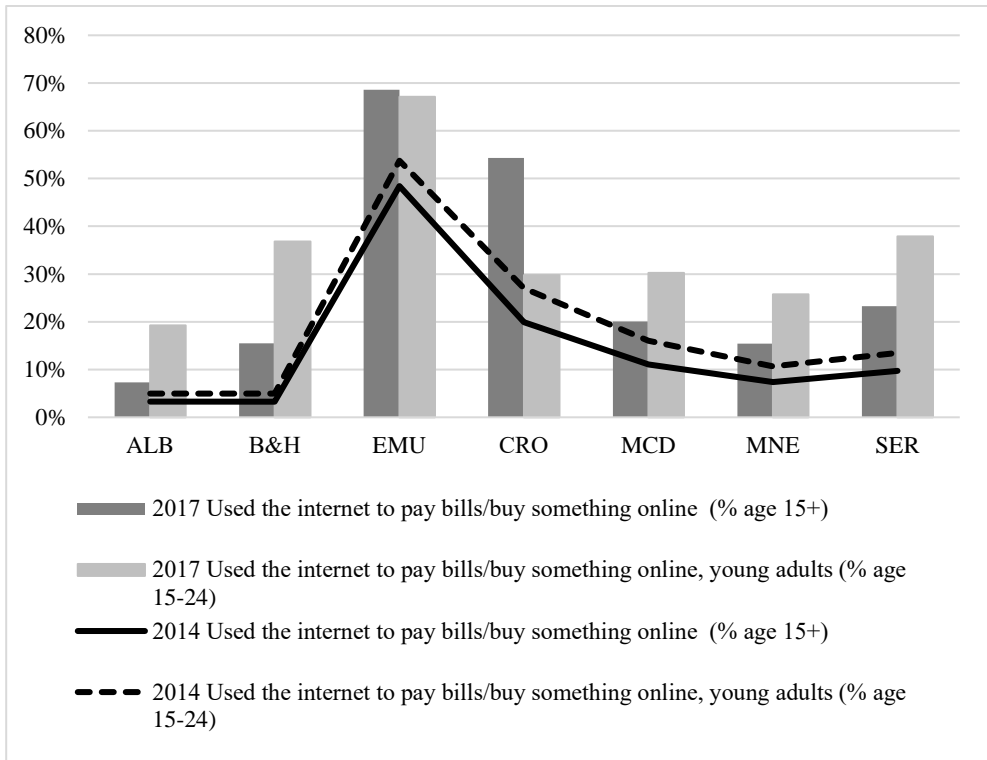
Figure 3. Borrowed to Start, Operate or Expand a Farm or Business (2014 vs. 2017)



Source: Demirgüç-Kunt et al., 2018, based on the authors' calculation

In 2017, in the EMU, approximately 70% paid bills or purchased items online regardless of age. There was a general increase in the use of online bill payments and online purchases from 2014 to 2017, with Serbian and B&H youth being the most substantial from roughly under 10 percent for Serbia and under 55 percent for B&H to being the highest in the WB in 2017 (both slightly lower than 40%) While the lowest percentage is recorded in Albania (roughly 20% among all and lower than 10% among youth), there has been a general increase for youth of all countries to use online payments or purchasing.

Figure 4. Used the internet to pay bills or to buy something online (2014 vs. 2017)



Source: Demirgüç-Kunt et al., 2018, authors calculation

Several studies have noted that access to finance for commercial entities in Serbia is limited, not adjusted to the needs of the SME and generally operates under unfavorable terms to the borrower. The capital market and alternative intermediaries are lacking where both corporate and individual borrowers are limited to lines of credit as sources of financing (Ljumovic et al. 2015, Ljumovic & Jaksic, 2020).

2.2. The determinants of financial inclusion

Individual socio-economic characteristics may influence the level of financial inclusion. Allen et al. (2016) has identified income, education, age, employment and marital status as bearing the highest influence globally. Studies from China have found income, education and age to be factors that positively influence financial inclusion, while gender is a limiting factor (for women) (Fungáčová & Weill, 2015). There is a gender gap in financial inclusion in account ownership, formal savings and formal credit, wherein women are less likely to own an account, have formal

savings and formal credit (Demirgüç-Kunt et al., 2013b). Gender, income, education and age are factors influencing higher levels of financial inclusion. Education has been identified as one of the major factors influencing financial inclusion. Individuals attained a secondary-school education or lower are more likely to have access to informal credit (Klapper et al., 2012; Cole et al., 2009) and no savings or retirement accounts (Herd et al., 2012). In the context of educational achievement, those who have attained a university degree or higher are also more likely to have a bank account (Klapper et al., 2012; Cole et al., 2009). According to Cole et al., those who earn a higher income from financial investments are also much more likely to have saved for retirement, have higher credit scores and are less likely to declare bankruptcy in the USA (Cole et al., 2012). Credit card use has been reported to be equally prevalent across all age groups but not used for the same purposes by age group (Allgood & Walstad, 2013). Although young respondents are more likely to have less costly credit card behavior, they are also less likely to plan out purchasing items on credit in advance (Lusardi & Mitchell, 2011). From the Visegrad group, older respondents are also more likely to exhibit less costly credit card behavior (Allgood & Walstad, 2013). Financial behavior correlates to the demographic characteristics of age and gender within the economy, income quintile and education level (Thiessen, 2012). In research related to the Visegrad group counties, frequency of borrowing was linked to credit card ownership. In the same study, saving patterns also were found to influence financial inclusion. However, it was concluded that the findings are not universal. Qamruzzaman and Wei (2019) found a strong presence of bidirectional causality between long-term financial innovation and financial inclusion throughout Asia.

A number of studies have confirmed a positive relationship between the use of digital financial services, such as payment cards, paying online, mobile money services and financial inclusion. Digital financial services lower the cost of receiving payments and assists in managing financial risk by facilitating informal money transfers or remittances (Demirgüç-Kunt et al., 2018). Mobile money users may help to have a stabilising role to counteract unforeseen interruptions in income (Jack & Suri, 2014). In Niger, the introduction of mobile payments for government issued benefits reduced waiting times substantially (Aker et al., 2016).

Data from 2020 (Internet World Statistics, 2020) shows that there are a total of 397,988,114 Internet users in the EU, 89.4% of the total population. The extent of internet use and for what purpose is largely determined by economic and social factors (Pavlovic, Bjelica, 2019). In the WB, Croatia had approximately 3 million internet users in 2020 (92.3% of the total population), followed by Albania, 82.2 percent of households have internet access and Serbia, where 80.1% population has Internet access in their households (Republic Statistical Office, 2019). In North

Macedonia, Montenegro and B&H internet penetration is slightly lower, 78% (Statista, 2019), 74.3% (Monstat, 2019) and 70% (Knoema, 2019), respectively. Education is probably the most consistent global predictor of the use of ICT, particularly in terms of internet proficiency (Van Deursen & Van Dijk, 2009).

Low financial literacy is not being aware or educated on how basic elements of finance work, such as interest rates, and how financial tools function, such as credit cards or loans. Low financial literacy is not a localized but rather a globalized phenomenon. Low literacy has been found to be prevalent among US consumers (Huston, 2012), among developed economies (Lusardi & Mitchell, 2011), as well as among students from OECD countries (Lusardi, 2015).

The more educated one is, the more likely they are to be familiar with the financial tools and access offered to them. Financial literacy has been found to be related to financial behavior, which bears a direct impact on saving, borrowing, spending and investing decisions (Lusardi et al., 2010).

In 2010, Lusardi et al. (2010) came to the conclusion that youth are not financially literate, finding that fewer than one-third of young adults in the Netherlands understand how basic interest rates, inflation and risk diversification function. Moreover, they also claimed that socio-economic factors play an important role in determining financial literacy. In their study, college-educated males whose parents had both a stock portfolio and retirement savings were roughly 45% more likely to know about risk diversification than their female counterparts who had not completed their secondary school education and whose parents did not have retirement savings or public investments.

3. METHODS

The general hypothesis of this research is based on the assumption that youth in the WB is underbanked where the use of digital technologies can influence financial inclusion. The use of digital technologies refers to the electronic tools, systems, devices and resources to process a task, while financial inclusion indicates access and using formal financial services.

Our empirical specification focuses on three dimensions of financial inclusion, defined as (a) having an account at a financial institution, (b) saving using an account at a financial institution and (c) borrowing from a financial institution. In line with the literature analysed, we have focused on the individuals having an account at a financial institution, saving using an account at a financial institution or borrowing from a financial institution as measures of financial inclusion.

3.1. Sample

Data for this study were collected from the 2017 Global Findex database, described in Demircuc-Kunt and Klapper (2013). In the study, we used data for six countries of the WB (Albania, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia and Serbia). The Global Findex database is built, based on the surveys conducted using randomly selected, nationally representative samples in 144 countries and covering roughly 1000 people in each economy. The survey was carried out by Gallup, Inc., in association with its annual Gallup World Poll. The target population is the entire civilian, noninstitutionalized population aged 15 and above (Demircuc-Kunt et al., 2018). The database provides micro-level data, containing socio-demographic and economic indicators, such as gender, age, income, education, data on employment, as well as indicators on the financial inclusion and the use of digital services. In our analysis, only the data for WB countries was extracted first, thereafter all data referring to the population of youth was collected (age 15-29). 1,364 samples were thus collected.

3.2. Variables

The individual characteristics represent socio-demographic and economic characteristics of the individuals participating in the survey. Gender is a dummy variable equal to one if the individual is a woman (female) and zero if not. We expect this variable to be negatively associated with the likelihood of financial inclusion. The income variable categorically takes the value of 1 for the poorest 20%, 2 for the second 20%, 3 for the third 20%, 4 for the fourth 20% and 5 for the fifth richest quintile. The education variable is also categorical, taking the value 1 for primary school or less, 2 for secondary education and 3 for tertiary education. We have also checked for employment, i.e., whether the respondent is active in the workforce or not. The employment dummy variable equals one if the individual is in the workforce and zero if not. We expect these variables to be positively associated with the likelihood of financial inclusion.

In order to investigate the influence of digitalization on financial inclusion, we used the information provided on the availability and use of mobile and Internet technologies. The variables “Made bill payments online using the Internet” and “Bought something online using the Internet” were both used to capture the use of digital technologies. All variables are equal to one if the answer was “yes” and zero if not. We expect these variables to be positively associated with the likelihood of financial inclusion.

Table 2. Variable definition

Variable	Definition
account	Dummy = 1 if the person reported to have an account at a financial institution (a bank, credit union, cooperative, post office, or microfinance institution); 0 if not.
saving	Dummy = 1 if the person reported to have an account and uses it to save at a financial institution; 0 if not.
borrowing	Dummy = 1 if the person reported to have an account and uses it to borrow at a financial institution; 0 if not.
gender	Dummy = 1 if the respondent is female; 0 if not
age	Age of the respondent in years
education	Categorically, takes a value from 1 to 3 depending on the level of education
income	Categorically, takes a value from 1 to 5 depending on the income quintile
workforce	Dummy = 1 if the respondent is employed; 0 if not
Made_bills_online	Dummy = 1 if the respondent has paid bills online; 0 if not
Bought_on_line	Dummy = 1 if the respondent has a bought product/service on-line; 0 if not

3.3. Descriptive statistics

In the sample, 828 individuals stated that they have an account at a financial institution (60.7%), while 536 claimed that they do not own an account (39.3%). There are 367 individuals who have savings accounts (44.3%), while 393 respondents claimed that they have an account and borrow from a formal financial institution. The countries are represented as: Albania 246 samples (17.8%), B&H 222 samples (16.1%), Croatia 320 samples (23.2%), North Macedonia 171 (12.4%), Montenegro 280 (20.3) and Serbia 143 (10.3%). Descriptive statistics of independent variables are presented in Table 3. Women are more represented in the sample. The average age of the respondents is 22.59 years. More than 60% of the respondents have a secondary education, while more than 50% are employed. Only 14.8% of young individuals made bills on-line using the Internet, while 31.9% bought something on-line using the Internet.

Table 3. Descriptive statistics for the independent variables (by estimation)

	N	Mean	Std. Deviation
Gender	1362	0.513	0.500
Age	1362	22.590	4.058
Primary education	1362	0.179	0.383
Secondary education	1362	0.601	0.490
Tertiary education	1362	0.221	0.415
Income: poorest 20%	1362	0.155	0.362
Income: second 20%	1362	0.167	0.373
Income: third 20%	1362	0.181	0.385
Income: fourth 20%	1362	0.199	0.399
Income: fifth 20%	1362	0.298	0.458
Respondent is in the workforce	1362	0.520	0.500
Made Bills Online	1362	0.148	0.355
Bought On Line	1362	0.319	0.466

In order to evaluate the socio-demographic and economic determinants of financial inclusion in the WB region and to analyze the influence of digital technologies on financial inclusion, we performed three probit estimations since all variables are discrete and binary.

The dependent variable y_{1ij} defines owning a account, y_{2ij} defines a savings account at a financial institution and y_{3ij} defines borrowing from a financial institution

$$y_{nij}^* = x_{nij}\beta + \varepsilon_{1ij}$$

$$y_{nij} = 1, \text{ if } y_{nij}^* > 0$$

$$y_{nij} = 0, \text{ if } y_{nij}^* \leq 0,$$

where countries and individuals are indexed by i and j respectively, and n is index referring to 1 - owning an account at financial institution, 2 - a savings account at a financial institution and 3 - borrowing from a financial institution; y_{nij}^* is a latent variable, x is a vector of individual level characteristics, β is a vector of parameters and ε_{1ij} is a normally distributed error term with zero mean and variance equal to 1. For 2 and 3, the variable is required for individual to be included already into a formal financial institution, the estimate includes only respondents who already own an account. The account variable is dummy equal to one if the person responded “yes” and zero if not. The variable savings is dummy equal to 1 if the individual has an account and uses it to save. The variable Borrowing is dummy equal to 1 if the individual has an account and uses it as a savings account.

Individual characteristics (gender, age, income, education and employment), data on use of digital technologies (paid bills on-line, bought something on-line) and financial behavior (savings and borrowing) are explanatory variables.

Data in Table 4 present the results and the marginal effects of the probit estimations for the three chosen indicators representing financial inclusion: ownership of an account, formal savings and borrowings. Several dependent variables grouped as socio-demographic and economic factors are found to have a significant relationship with owning an account: education, age and employment. Moreover, the dependent variables grouped as factors pointing to the use of digital technologies all bear a significant relationship to owning an account: *made_bills_online*, *bought_on_line*. Being a woman is not a significant result when interpreting the relationship to owning an account. Age is statistically significant, with a positive coefficient corresponds to the likelihood of a young person to have an account increases with age, with an 11.18% chance of owning an account as age increases. Education is positively associated with financial inclusion, with larger coefficients for higher education level attained, pointing out that the likelihood to own an account increases with the level of education completed. The chances for respondents with tertiary education are 1.5 times higher than for that of only achieving a primary education. The likelihood of owning an account is also higher among the employed, where employment status increases the odds of owning an account by around 58.4 per cent. Income is also positively related to financial inclusion, with larger coefficients for wealthier respondents. The only exception is the third quintile, which we did not find statistically significant. In other words, as the income increases, the odds of having an account in a financial institution also increases.

All indicators related to the use of digital technology have positive coefficients. Young people who pay bills on-line increase the likelihood of owning an account approximately 1.6 times. If they have bought something on-line using, the likelihood increases 43.47% for being financially included. Overall, these results point to the relationship between the use of digital technologies among youth and having an account.

Savings at the financial institution is statistically significant partially to certain factor from variable education and income, to employment and all factors related to the use of mobile and internet technologies. Education is negatively related to savings, but it is only significant for secondary education, decreasing the odds of savings for respondents with secondary education for 37.93 percent. Also, results are partially for the income. Statistically significant is only fifth quintile, where the odds of savings increase for 48.43 per cent for each increase in the quantity of income. Savings is also related to the status of employment, increasing the odd of having a

savings for 38.12% if the respondent is employed. As in the previous two variables, we found a statistically strong relationship between savings at formal financial institutions and use of mobile and internet technologies. Both factors are positively correlated with savings, increasing the odds for 29.17 if they pay bills on-line and 43.04 per cent if they bought something on-line.

Finally, education, income, gender, age and employment status are not significant results when interpreting the relationship to borrowing from a financial institution. However, results point to a positive statistically significant result of all factors related to use of mobile and internet technologies. The odds of borrowing at a financial institution for youth increases if they pay bills on-line using the internet or if they bought something on-line using the Internet, for 84.58 and 23.86 per cent respectively.

Table 4. Estimations for the likelihood of the indicators related to the financial inclusion

Variable Model Model Individual determinants	(1) Account Probit Yes	2) Savings Probit (selected) Yes	(3) Borrowing Probit (selected) Yes
(Intercept)	-3.555* (0.284)	0.131 (0.405)	-0.893* (0.404)
[educ=3]	0.922* (0.161)	-0.361 (0.235)	-0.209 (0.232)
[educ=2]	0.704* (0.120)	-0.477* (0.215)	-0.212 (0.212)
[educ=1]	0a .	0a .	0a .
[inc_q=5]	0.480* (0.128)	0.395* (0.162)	0.146 (0.161)
[inc_q=4]	0.448* (0.134)	0.316 (0.172)	0.138 (0.171)
[inc_q=3]	0.235* (0.136)	0.074 (0.181)	0.220 (0.177)
[inc_q=2]	0.394* (0.138)	0.123 (0.181)	0.149 (0.178)

Variable Model	(1)	(2)	(3)
Model Individual determinants	Account Probit Yes	Savings Probit (selected) Yes	Borrowing Probit (selected) Yes
[inc_q=1]	0a	0a	0a
Gender	0.141 (0.083)	-0.059 (0.093)	-0.016 (0.092)
Age	0.106* (0.013)	-0.021 (0.016)	0.024 (0.016)
Emp_in	0.460* (0.088)	0.323* (0.106)	0.141 (0.105)
BoughtOnLine	0.361* (0.096)	0.358* (0.098)	0.214* (0.029)
MadeBillsOnline	0.947* (0.166)	0.256* (0.115)	0.613* (0.117)
<i>Observations</i>	<i>1364</i>	<i>828</i>	<i>828</i>

Notes: Columns represent estimation results of a logistic regression of financial inclusion variables as defined. Standard errors are in parentheses and * denotes significance at the 5% level.

It is important to note that due to the cross-sectional nature of the data we can only interpret these results as significant correlations between individual characteristics and measures of financial inclusion and not as causal relationships. We can conclude that among youth in the WB countries the likelihood of having account, and as such being financially included increases with age, education, partially with income, employment status, use of digital technologies. Several studies point out to the relation between gender and financial inclusion, pointing out that the female population is generally experiencing lower levels of financial inclusion. Vast of them point out to cultural reasons Aterido et al. (2013), legal and social norms (Demirgüç-Kunt et al., 2013b), while market failures are overall not responsible for gender discrimination (Zins & Weill, 2016). Our results are partially consistent, with research dealing with general population (rather than youth) Allen et al. (2016); Fungáčová & Weill, 2015; Demirgüç-Kunt et al. (2013b); Zins & Weill (2016); Klapper et al., (2012); Cole et al., (2009). However, based on our finding, opposite to the mentioned research, we did not find statistically important correlation between gender and financial inclusion among youth in the WB countries. Nevertheless, there is a great connection between the level of development of society and the inclusion of women in public and private, political and economic life of the country (Pavlović & Ljumović, 2016).

Several prior studies confirm positive relation between the use of digital financial services, and financial inclusion (Demirgüç-Kunt et al., 2018; Jack & Suri 2014; Qamruzzaman & Wei, 2019; Aker et al., 2016; Muralidharan, Niehaus, & Sukhtankar, 2016). The finding of this research on a sample of youth from WB countries supports prior quantitative studies in addressing the connections between the use of digital financial services and financial inclusion.

4. CONCLUSION

As has been found within this research, the countries of the WB (Croatia, Serbia, Bosnia & Herzegovina, Albania, Montenegro and North Macedonia) have not achieved the same level of financial inclusion in comparison to that present within the EU. As increased levels of financial inclusion can substantially improve living standards, this is evidence of lower living standards in the WB. However, with the rise in use of digital technologies, more inclusion through online payment and mobile banking has been generated in the formal financial sector. In our research, we investigated whether youth people in the WB are underbanked and whether digitalization of financial services is able to increase their financial inclusion. The results found that, compared to the general population, youth are underbanked. A correlation was also found to exist between the use of digital technologies among youth and financial inclusion. More crucially, it was also concluded that one is more likely to be financially included if they are older, more educated and employed, as well as if they are a user of digital technologies. These results can be useful for future research as well as for decision makers to find methods to study inclusion form existing data as well as to craft policies that will aim for more inclusion within the formal financial sector.

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SIGNING SOUTH AMERICAN FOOTBALLERS REPRESENTS A GOOD INVESTMENT: ELECTRONIC GAME FOOTBALL MANAGER'S PERSPECTIVE

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***Abstract:** The central question: Thinking about acquiring athletes to improve the team's performance, taking into account the transfer of players, the use of the electronic game 'Football Manager' (FM) can be an interesting alternative to improve actions, since its reports integrates a high quantity of numbers and statistics, allowing more refined decision makes inside the clubs. Thus, the objective of this article was to verify the development of a group of South American footballers (Brazilians and Argentines) using the FM, comparing the data of these athletes in two different seasons (2015/2016 x 2020/2021), in addition to checking for possible differences in results depending on the athletes' playing position. **Methods:** The study counted with the use of generated reports by FM of 56 South American athletes (Brazilians and Argentines), divided into three groups according to their field's position, with average age of 21,57 years ($\pm 3,474$ years), of seasons 2015/2016 and 2020/2021. The variables analysed were: current ability, potential ability and financial appraisal. **Results:** Between groups analysis demonstrated no difference among them for any variable. However, the intragroup analyses showed that for all groups the variable Potential Capacity was the only one that showed significant differences ($p < 0.05$), with the 2015/2016 season showing values statistically higher than the 2020/2021 season, for the three groups. **Discussion:** Based on the results presented in this study, it is possible to conclude that the position in which the player plays in the game did not influence the results, because in the analyses between groups there were no significant differences and, in the intra-group comparisons, the three groups showed similarity in the findings. The absence of significant differences can also indicate the relevance of FM to identify players with potential to be explored.*

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1. INTRODUCTION

Football is not only the most popular sport in the world, but also a global product which footballers can become international icons, furthermore topics like gender, race and socio-economic situation get transcended in order to bring entertainment to supporters (Soriano, 2013; Trost, 2015). On that way, it is possible to understand these footballers and their respective featured abilities as a special value, which can result in a business opportunity, making clubs richer than their opponents with the transfer fees, if that is the main objective.

According to that, literature besides defining the transfer fee as a compensation for a contract's termination paid by the institution the player is going to represent to his old club (Pavlovic, Milacic, & Ljumovic, 2014), also strengthens that the clubs work as transnational companies consolidating the athletes' international trades, which are seen as special expatriates because they are, at the same time, merchandise and labor in a scenario with no price restrictions (Lago, Lago-Peñas, & Lago-Peñas, 2016; Marx, 1978; Robertson & Giulianotti, 2006) and a high footballers' mobility (Poli, Ravenel, & Besson, 2018).

Moreover, looking forward to buy the best players to a make a stronger team and get financial benefits for the institution, it's vital to consider all footballers' characteristics, not only their talent, because it won't be enough to measure their adaptation's ability. In this current line, despite of talent keeps playing a critical role in most athletes development models (Baker, Schorer, & Wattie, 2018), talent identification and development processes are large fields in football and in science (Ford et al., 2020), have become more professionalized (Reeves & Roberts, 2020) and are seen as integral to success in football as well (Berber, McLean, Beanland, Read, & Salmon, 2020), with components like see field's position, age, nationality, language and possibilities to have an adequate adaptation – not feeling homesick, for example -, besides talent, being equally important to determine a successful footballers' transfers (Tomkins, Riley, & Fulcher, 2010).

Even though those topics must be analysed, it is also vital to find the players before the rivals in order to make the own teams stronger and not to pay exceeded prices. For this purpose, the use of the electronic game 'Football Manager' (FM) can be an interesting alternative to help on that. Since virtual reality is seen as a widespread technology that brings tools to simulate, analyse and practice situations (Faure, Limballe, Bideau, & Kulpa, 2020), developed from the reports of approximately

1.300 scouts situated in 51 countries, furthermore already in used by professional football teams like Everton – English club – and analysis companies, like Prozone, FM is becoming more complex in each of its new version, always integrating a high quantity of numbers and statistics, allowing more refined decision makes about salaries, staff, line-ups, training sessions and footballers' transfers, demonstrating that is possible to access technical, tactical, physical and psychological information in a simplified and wide way (Anderson & Sally, 2013; Esteve, 2015; Stuart, 2014).

On that way, about signing footballers from other Football clubs, this present article treats the territory's relevance, precisely the South American continent, where Brazil and Argentina appear with emphasis in the scenario, being a searched place by European clubs to sign promising players. Considering the existence of a growing tendency of specialization in American youth sport, represented by the quantity of youth competitions (Waldron, DeFreese, Register-Mihalik, Pietrosimone, & Barczak, 2020), it is reported on literature that Argentina exported until 2009, the quantity of 1.716 footballers, and, between 1992 and 2005, the percentage of Brazilians players leaving their origin country increased 392% (Bertolotto, 2014).

Moreover, exactly after eight years and in accordance with the same author, beside the respective clubs and agents gaining US\$139 million with the sales of Neymar, Paulinho and Bernard, CBF – Football Brazilian Confederation – estimated the number of 1.530 players leaving the country, almost twice than the previous decade, that amounted 804, with England being the biggest purchaser, investing, until three years ago, the amount of US\$913 million in expatriates, where Brazilians like Fernandinho and Paulinho, moved to Manchester City and Tottenham, respectively, appears to exemplify the scenario and the financial power exercised by big European clubs.

So, in account of these aspects and considering that, the Football Manager's use can be useful because of its wide and detailed database, allowing clubs to identify the correct players for each reality experienced and to anticipate the opponents in transfer market actions on that current area, the objective of this article was to verify the development of a group of South American footballers (Brazilians and Argentines) using the Electronic Game Football Manager (FM), comparing the data of these athletes in two different seasons (2015/2016 x 2020/2021), in addition to checking for possible differences in results depending on the athletes' playing position.

2. METHODOLOGY

2.1. Participantes

The research counted with the use of reports generated by Football Manager's simulator of 56 men footballers, with average age of 21,57 years ($\pm 3,474$ years), of seasons 2015/2016 and 2020/2021. It should be noted that the age of the athletes was considered in relation to the 2015/2016 season. All of them are South American footballers and played inside their respective continent. As this research is made with available information's inside the FM, there was no need of authorization from an ethics and research committee.

Footballers were divided into three investigation groups to meet the objective of the study: G1, that contained defenders; G2, represented by midfielders; and G3, which the strikers were situated. Those have, respectively, 18 (20,44 \pm 2,695 years), 19(21,78 \pm 3,324 years) e 19 (20,88 \pm 3,756 years) footballers.

2.2. Instrument

The 2015/2016 and 2020/2021 seasons reports, which contained the skills and financial assessment of the selected players, provided by the FM, were used as a tool for this article. These two seasons were compared in order to verify the development of the players within the FM, so that they could discuss the findings.

The variables analysed were: (a) current ability (the current expected performance of the players); (b) potential ability (the expected performance to be achieved by the players); (c) financial appraisal (refers to economic value of the players).

2.3. Procedures

Research's development was conducted by three steps, respecting the legal principles that data collect involves. The first step consisted in the sample's selection, which was made by a non-probabilistic way, looking forward an adequate phenomenon's representation (Thomas, Nelson, & Silverman, 2012). In addition, birth's area selection furthermore the country they current play were taken into account, with all of the 56 players being born and also playing at South American countries, with focus on Brazil and Argentina.

Next movements were about dividing the players by the main field's position they do play. In other words, defense – central defenders, right and also left backs -;

midfield – defensive midfielders, central midfielders and offensive (central, left and right) midfielders -; and attack, composed by strikers.

Final research' step was the data collect from the players chosen. The individual reports of all athletes were generated in both seasons – 2015/2016 and 2020/2021 – in order to examine the possible changes into the current and potential ability, furthermore the economical position informed by FM.

2.4. Results' analysis

Results were analysed in two ways: between groups and intragroup. The measures used were all intervals and the data about the economical appraisal of each football player was put into one of these three following categories at season 2015/2016: €0 to €4 million (1); €4.000.001 to €8 million (2); €8.000.001 to 12 million (3). At the same time, season 2020/2021 also counted with similar, but with higher values classification, represented for: €0 to €20 million (1); €20.000.001 to €40 million (2); €40.000.001 to €60.000.001 (3). On that way, data has kept intervallic, but were converted into better phenomenon analysis' categories.

For the between groups' analysis, Anova one-way (Group 3 x Variable 1) was adopted. Post hoc tests were conducted in order to find the differences. Complementarily, to fail's control type 1, the Holm-Bonferroni method was adopted (Green, Salkind, & Akey, 2000). Regarding the intragroups' analysis, the Paired Samples T Test and Pearson's Correlation were used, on this following way: (a) Current ability at season 2015/2016 X Current ability at season 2020/2021; (b) Potential ability at season 2015/2016 X Potential ability 2020/2021; (c) Financial appraisal at season 2015/2016 X Financial appraisal at season 2020/2021.

Considering that the variables were interval, mean and standard deviation were used for statistical procedures. This present data was analysed through the IBM SPSS Statistics' software, version 20, assuming the alpha value of 0,05 to significant differences.

3. RESULTS

Observing the averages of each variable, for each group, assuming the 2015/2016 season in this first moment, it is possible to observe that the G1 group presented the best values in comparison to the other groups (Table 1) for the Current Ability variable. However, this observation was not confirmed by Anova one-way, since the Anova one-way test hasn't shown significant differences between groups for this variable, with $f(0,282) = 0,546$ and $p = 0,756$.

Table 1. Mean and Standard for each variable (Current Ability, Potential Ability and Financial Appraisal)

Variables	Groups		
	G1	G2	G3
Current Ability 2015/2016	3,61 ($\pm 0,979$)	3,47 ($\pm 0,841$)	3,37 ($\pm 1,116$)
Potential Ability 2015/2016	6,06 ($\pm 1,731$)	7,00 ($\pm 2,357$)	6,79 ($\pm 2,250$)
Financial Appraisal 2015/2016	1,22 ($\pm 0,6470$)	1,42 ($\pm 0,692$)	1,53 ($\pm 0,697$)
Current Ability 2020/2021	3,78 ($\pm 1,060$)	3,95 ($\pm 0,848$)	3,74 ($\pm 1,046$)
Potential Ability 2020/2021	4,17 ($\pm 1,425$)	4,89 ($\pm 1,243$)	4,58 ($\pm 1,502$)
Financial Appraisal 2020/2021	1,33 ($\pm 0,594$)	1,63 ($\pm 0,684$)	1,63 ($\pm 0,761$)

Source: IBM SPSS Statistics' software, version 20.

Regarding the Potential Ability variable, for the same season (2015/2016), the averages presented in Table 1 suggest that the G2 group was superior to the other groups, which was not confirmed by Anova one-way, as the results did not show significant differences between the groups, with $f(0,988) = 9,023$ and $p = 0,379$. Finally, in relation the Financial Appraisal variable, the Table 1 suggests that the G3 group presented the highest values. However, this observation was not confirmed by Anova one-way, since the test did not demonstrated significant differences between groups for this variable, with $f(0,950) = 0,878$ e $p = 0,393$.

Now observing the values in Table 1 related to the 2020/2021 season, it can be observed that the G2 Group presented the highest values for the Current Ability variable, which was not supported by inferential analyses (Anova one-way), since the results of the analyses did not show significant differences between the groups, with $f(0,242) = 0,472$ e $p = 0,786$. Regarding the Potential Ability variable, for the same season (2020/2021), the averages presented in Table 1 suggest that the G2 group was superior to the other groups, which was not confirmed by Anova one-way, as the results did not show significant differences between the groups, with $f(1,266) = 4,918$ e $p = 0,290$. In relation the Financial Appraisal variable, the Table 1 suggests that the G1 group presented the worst values. However, this observation was not confirmed by Anova one-way, since the test did not demonstrated significant differences between groups for this variable, with $f(1,159) = 1,086$ e $p = 0,322$.

Assuming the intragroup analyses, it can be seen in Table 1 that Group G1, referring to the comparison between Current Ability 2015/2016 x Current Ability 2020/2021, presented higher values in the last season. This observation was not supported by the inferential analyses (Paired Samples T Test), as no significant difference was found between seasons ($p=0,437$). Regarding the comparison between the variables: Potential Ability 2015/2016 x Potential Ability 2020/2021, the averages shown in

table 1 suggest that the group was better in the first season, which was confirmed by the Paired Samples T Test ($p=0,019$).

Comparing Financial Appraisal 2015/2016 with Financial Appraisal 2020/2021, it can be seen in Table 1 that the G1 group obtained the best results last season, which was not confirmed by inferential analyses (Paired Samples T Test), as no significant difference was found between seasons ($p=0,417$).

Now looking at the data from the G2 group, it can be seen in Table 1 that for the Current Ability variable, G2 had the highest averages for the 2020/2021 season. However, these observations were not corroborated by inferential analyses, as the Paired Samples T Test found no significant differences ($p=0,881$). Regarding Potential Ability, the averages in Table 1 suggest that the G2 group obtained the highest values in the 2015/2016 season, which was confirmed by inferential analyses ($p=0,015$). Finally, assuming the Financial Appraisal variable, the averages in table 1 indicate that the G2 group had the highest values in the 2020/2021 season. However, inferential analyses did not show significant differences between seasons ($p=0,321$).

Finally, the averages in table 1 for the G3 group, considering the current ability, suggest that the 2020/2021 season had the highest values, which was confirmed by the Paired Samples T Test ($p=0,024$). Regarding Potential Ability, the averages in Table 1 suggest that the G3 group obtained the highest values in the 2015/2016 season, which was confirmed by inferential analyses ($p<0,001$). Finally, assuming the Financial Appraisal variable, the averages in table 1 indicate that the G3 group had the highest values in the 2020/2021 season. However, inferential analyses did not show significant differences between seasons ($p=0,243$).

In summary, the results showed no differences between groups (Anova one-way) for any variable in this study ($p> 0,05$), in the two seasons evaluated, that is, the position in which the athlete acts in the game did not influence the results of analyses between groups. Regarding the intragroup analyses, the inferential analyses (Paired Samples T Test) demonstrated that for all groups only the Potential Ability variable showed significant differences ($p<0,05$), and for the three groups the 2015/2016 season presented values statistically superior to the 2020/2021 season, suggesting that the acting position in play, again, did not influence the results.

Assuming the summary of the results, some aspects can be considered in order to justify the absence of significant differences, being age one of them, since the age studied in this research is adequate to modern football, which needs young and strong athletes because of their physical conditions (Carravetta, 2006; Damo, 2005;

Rodrigues, 2003). Besides, any position on the field can present players with those characteristics.

In addition, young football players need to get participation in matches to improve their own abilities, although, if they are not ready to play for specific institutions, they can be loaned to lower division clubs, what can also be a good option to allow players to develop themselves (Tomkins et al., 2010), if they get the minutes to play that they need. So, the absence of minutes played, in a loan situation or in a situation without a transfer occurrence, for young football players, can help to justify the absence of significant differences, as previously mentioned.

Complementarily, literature indicates that midfielders tend to reach early their top performance, as strikers and wingers usually do, according to Tomkins et al. (2010), who estimate around 27 years old for that. However, the results presented in this research do not corroborate to these appointments, because no differences were found between the positions of the game and, in addition, as already mentioned, a possible explanation for this absence of differences between athletes in different positions is linked to the age of the athletes, given that the groups are formed by athletes of the same age group.

Another aspect to be considered in order to justify the absence of significant differences in this research, is the football players ability to adapt in the context they are inserted. According to literature, English clubs, for example, do not make such a big investment in Brazilians football players, justly because they usually don't speak the language, dislike cold weather and think difficult to comprehend English football's tradition, becoming tough the adaptation's process for them (Kuper & Szymanski, 2014). To meet these appointments, it is predictable that troubles in the adaptation process can cause performance drops, less minutes played gained and help to understand the no significant differences found.

Sequentially, the higher values of potential ability in the first season of this research than in the second season, can be justified not only by the age and the adaptation aspects, as previously discussed, but also by other aspects present in football, despite talent, which is not enough if the players do not have the ideal conditions to develop themselves in this sport. The expected potential can decrease, as the results of this research point, as well as the literature (Baker et al., 2018; Baker, Wattie, & Schorer, 2019; Frick, 2007; Larkin & Reeves, 2018). According to literature, talent is not enough, lots of variables, like goals, matches played, age, position and national team appearances are suggested to be considered (Frick, 2007).

In addition, literature also emphasizes that identifying and developing footballers represents a complicated process, which is vital to recognize that the identification moment consists on the first step of this process (Baker et al., 2018, 2019; Larkin & Reeves, 2018) and the need to integrate the talent development environment and how the mechanisms, processes and decisions related to talent identification and selection operate (Collins, MacNamara, & Cruickshank, 2019).

Finally, the absence of significant differences in the financial aspect can also be justified by age and adaptation ability. Despite literature points that revenues, salaries and success are aspects to be considered (Coates, Frick, & Jewell, 2016; Kringstad & Olsen, 2016) and that South American footballers tend to have a higher transfer fee value in comparison with their own field's performance (Sæbø & Hvattum, 2015), results presented in this research do not corroborate to these appointments. In addition, literature also supports that the most expensive footballers have between 21 and 25 years, moreover, already with 22 or 23, they can count with a full international experience, providing high quality services maybe for a decade, or also becoming a good sale's alternative after 4 or 5 years of good performances (Tomkins et al., 2010), although, the present research do not confirm these arguments.

4. CONCLUSION

By the end, since the objective of this article was to verify the development of a group of South American footballers (Brazilians and Argentines) using the Electronic Game Football Manager (FM), comparing the data of these athletes in two different seasons (2015/2016 x 2020/2021), in addition to checking for possible differences in results depending on the athletes' playing position., it is possible to conclude that no significant differences were found among the variables obtained.

However, it is important to emphasize that the absence of significant differences can also indicate the relevance of FM to identify players with potential to be explored, since there was no indication of some players better than others that might be more influenced by media. The stabilized pattern among groups can indicate the presence of qualified players, regardless of birth country, field position and media attention.

As study limitations, the use of a reduced number of athletes is pointed out, as well as the non-relationship of the FM data with the data of other tools or with the data of the real world. That way, for further investigations, it is recommended to make relations between FM and matches data, such as the data presented at specialized websites, like Transfermarkt (www.transfermarkt.com), in order to obtain more variables to bring knowledge about developing players potential ability.

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NEW WAY OF THINKING/DOING - CRYPTOCURRENCIES

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***Abstract:** Cryptocurrencies are a very interesting and attractive area of research, which is constantly evolving and upgrading. This paper investigates cryptocurrencies, its determinants and movements during COVID-19 pandemic. Secondary data were used during the study. The collection of secondary data includes the collection of data from the coinmarketcap website on cryptocurrencies, prices and their potential determinants. In the data collection, the analysis of the content will be used, which is used to research scientific - theoretical knowledge, relevant literature and modern business practice. Further, descriptive analysis was used in order to drive conclusions and get insight into research problem. Results of this research have shown that, cryptocurrency trading is not secure during this pandemic. It is human nature to protect their wealth and money. At the same time, during this pandemic in which economic status has declined, no crypto trader will trade when the chance of recovery from the damage caused by the pandemic is uncertain.*

***Keywords:** Cryptocurrencies, bitcoin, technology*

1. INTRODUCTION

Intensive development of information and communication technologies is the foundation of business globalization. The main goal has become to connect clients and information flows as quickly and efficiently as possible, regardless of geographical distances. As a consequence, the last two decades have been characterized by a radical transformation and expansion of financial markets and institutions. Factors that have been and remain the determinants of these changes include: the development of telecommunications, the development and spread of the Internet and its transparency, falling prices for IT equipment, the development of

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mobile telephony and smartphones, the development of software and various applications. All these technological changes, whose implementation increasingly occurring in the financial sector, create significant potential for market expansion, efficiency gains and cost reductions (Bažant et al., 2007).

Blockchain technologies on which cryptocurrencies are based lead to financial innovations. The expansion of cryptocurrencies as private digital money began after the last financial crisis (2008), with the aim of creating money that is independent of states, ie. central banks. Many financial experts believe that it has more features of securities than money (Fabris, 2018). However, regardless of the opinions of financial analysts and experts, these currencies are still building their value and are increasingly taking on the characteristics of money and they are increasingly being used for various transactions. As stated previously, all cryptocurrencies rely on blockchain technology, the use of which enables full transparency of transactions, since the data transmitted by this technology cannot be falsified.

Cryptocurrencies are a very interesting and attractive area of research, which is constantly evolving and upgrading. The speed of their development is supported by the fact that the number of these currencies has increased 33 times in just a few years, as well as the fact that their value has increased at one point by 100%.⁴ Furthermore, the attention attracted by these currencies by both financial and non-financial institutions is undeniable. On the other hand, the academic community and researchers around the world are particularly interested in this area, which is reflected in the significant expansion of papers on this topic in recent years.

2. METHODOLOGY

In scientific research, formulation and presentation of research results, a combination of numerous general scientific methods will be used, such as: analysis and synthesis methods, inductive and deductive methods, abstraction and concretization methods, specialization and generalization methods, and comparison methods. In the data collection, the analysis of the content will be used, which is used to research scientific - theoretical knowledge, relevant literature and modern business practice. Therefore, the main goal of this paper is to investigate cryptocurrencies, their characteristics, determinants and value changes during COVID-19.

Secondary data were used during the study. The collection of secondary data includes the collection of data from the coinmarketcap⁵ website on cryptocurrencies,

⁴ <https://www.coinbase.com/price>

⁵ <https://coinmarketcap.com>

prices and their potential determinants. Using the synthesis method, all individual conclusions will be combined into one global conclusion. The umbrella method that will unite everything that has been done so far is the method of generalization. The analysis of literature, studies and other relevant sources will serve as a source of data for the development of the theoretical framework. At the end descriptive analysis was used in order to drive adequate conclusions.

3. LITERATURE REVIEW

With its inception, cryptocurrencies have caused much controversy, condemnation, acceptance and non-acceptance. Today, almost a decade after the first cryptocurrencies, controversies have not diminished, and cryptocurrencies are gaining more and more growth and importance. Sharma, Moon & Par (2017) believes that the blockchain technology on which cryptocurrencies rest could completely revolutionize the financial world and services, given their decentralized nature. On the other hand, Bojić B. (2017) presents the facts that cryptocurrencies are an undefined category, a new and unknown instrument, and as such provide greater opportunities for certain malversations and the use of cryptocurrencies for criminal activities. Accordingly, we can conclude that cryptocurrencies certainly have the potential to revolutionize the financial world, but whether this will be in a positive or negative sense is not possible to say with certainty.

Given that today there are several types of cryptocurrencies that have different factors, technologies and business models, it is necessary to look at each cryptocurrency individually. Therefore, different cryptocurrencies carry with them different levels of risk. The main advantage of cryptocurrencies is that they are completely independent of any institutions, unlike fiscal money which directly depends on gold, silver, leading world currencies, political events in the world, etc. As such, they are not subject to inflation and with a unique code are completely protected (Antipova and Rocha, 2018). However, the fact is that people need a certain level of knowledge and education to know how to use cryptocurrencies. Certain companies accept Bitcoin as a means of payment due to the aforementioned benefits, but this percentage is not significant. Also, cryptocurrency prices have a high rate of volatility and as such do not have a high chance of being a universally accepted means of payment (Nguyen et al., 2019). Cryptocurrencies have managed to gain the attention of financial organizations, governments and the general public as a major turning point in the financial world. Academic attention is mostly focused on Bitcoin - which is actually just one type of cryptocurrency, and also the most popular. However, insufficient attention is paid to cryptocurrencies as a class of financial assets. If we look in the context of a portfolio, in order for an investor to enjoy all the benefits of diversification, it is necessary to invest in several different

types of cryptocurrencies. Although cryptocurrencies are considered independent currencies, they can still be the subjects of behavioral or rational economic events (Dinh et al., 2019).

Even if opinions about cryptocurrencies are mainly negative, it is important to emphasize cryptocurrencies advantages. The fact is that the transaction costs of cryptocurrencies are less than the costs of credit cards (Hayes, 2016). Some countries, such as Denmark, China, Great Britain, Spain, Estonia, are considering integrating the entire blockchain technology with their banking system and administration. These costs can be as high as 5% per transaction, depending on the amount of data sent (Blystone, 2020). However, if cryptocurrencies included anti-theft protection only then could the transaction costs of cryptocurrencies increase (Franco, 2014). Also, all cryptocurrency payments are completed within a time period of ten to a maximum of thirty minutes while individual banking transactions take up to a few days (Seaman, 2013). Centralized cryptocurrency services such as e-wallet services are not completely anonymous. Current protocols used in cryptocurrencies do not sufficiently cover the anonymity and privacy of users (Reid and Harrigan, 2011). The owner of the electric wallet accesses his wallet with a private key. If that same key is lost or stolen, the owner cannot access his wallet in any way (Dumitrescu, 2017).

The world of cryptocurrencies is divided into several different areas of interest and this applies to trading, use, regulation and mining. A lot of focus is placed on the exchange itself, i.e., trade and transactions with these "coins" on the market, which change from day to day. Law enforcement organizations as well as government agencies today are still developing and researching ways to regulate taxes and track transactions made with cryptocurrencies, but what is at the heart of it all is that there must be a 'coin' that drives this whole system because without the mining aspect of the system there would be no such digital coin either. The sustainability of cryptocurrencies is still debated but what is certain is that the growing popularity and continued focus on the system itself from various sources such as governments, entrepreneurs, financial institutions, and especially small firms and individuals, ensure the survival of this concept. With cryptocurrencies jumping from a purely technological community to the mainstream, it shows that this system that everything goes through is not just a "black box" and that within that "box" there are very important components that help trade, use, mine and regulate cryptocurrencies (McIntyre et al., 2015).

There is growing debate as to whether cryptocurrencies are generally disrupting the economy or whether they represent a single bubble that can always crash and burn, and it is even speculated that they are a good tool for criminal activity. It is often

argued that cryptocurrencies meet market needs for a faster and more secure payment and transaction system, separating monopolies, banks and credit cards. Critics, on the other hand, point out that the volatile value of cryptocurrencies gives more of an impression of speculative assets than the feeling that it is a new kind of money. But what is certain is that the reality is somewhere between these two positions, cryptocurrencies perform some useful functions and therefore add economic value, but again they are potentially very unstable and their value is unpredictable (Giudici et al., 2020). So, cryptocurrencies open up many possibilities, such as fast, efficient and secure transactions, but they also have disadvantages such as inherent risk, technological and financial difficulties in their use and an uncertain social perception of owning them. The US Federal Reserve has long considered the traditional payment system to be slow, insecure and inefficient (Arias-Oliva et al., 2019), and that cryptocurrencies are an instrument for solving all these problems (Deloitte, 2015). It is very important to emphasize that cryptocurrencies do not have a bank as the main center to regulate the money supply or control every action, and this is one of the items that separates cryptocurrencies from traditional ways of trading, transactions and the like (Dourado & Brito, 2016).

On the other hand, most government institutions note the added risk arising from the great instability associated with cryptocurrencies and the fact that many organizations that enable such transactions are not regulated. It is also noted that people who invest in cryptocurrencies do so at their own risk and that no legal “remedy” is available to them in the event of any loss. Many of the warnings issued by various countries also refer to the possibilities associated with cryptocurrencies creating space for illegal activities, such as money laundering and terrorism (Global Legal Research Directorate, 2018). On the other hand, there are countries where the legalization of cryptocurrencies has led to cryptocurrencies and numerous exchanges being used for payment and trading purposes without any speculation about illegal activities (Gupta, 2019). But still, according to research conducted by Alqaryouti et al. (2020) on the impact of cryptocurrency use on perceived benefits and user behavior, the results showed that although users perceive cryptocurrency as useful and easy to use, they still hesitate to use it as often as they intend.

But what does the future of cryptocurrencies contain ... Or, more precisely, what does it hold to be its most popular and "founding" cryptocurrency - Bitcoin? Bitcoin has experienced strong explosive growth in the past few weeks and days, reaching a historic high on December 16, 2020.⁶ However, before this is taken into account, a few basic principles regarding the way this cryptocurrency works and how it is used must be understood. Generally speaking, when the word "Bitcoin" appears in

⁶ <https://www.trtworld.com/business/bitcoin-surges-past-record-20-000-for-first-time-42420>

everyday conversation, most identify it with the currency they would use in everyday life, such as a USD, EUR or similar. However, that is not the right perspective. While on a comprehensive level Bitcoin does indeed function as something resembling electronic money - for example, Bitcoins can be exchanged for the national currency in Sweden - Bitcoin should not be considered “digital money”. In other words, this cryptocurrency is not a digital banknote or a digital coin and therefore should not be compared to ordinary banknotes and coins; moreover, because Bitcoins in any form do not form so-called “digital units of value” that are stored on a computer. Instead, Bitcoin simply needs to be viewed through the prism of the funds in the account; when a certain payment is made, the payer's account is debited and the payee's account is posted because there is no sending of digital banknotes and coins (Segendorf, 2014).

Considering this, then, what is the actual use of Bitcoin? Although not used as a standard currency, it has continued to show widespread benefit in the past and present. For example, during its first days after its founding, Bitcoin was mainly used for illegal activities (Houben and Snyers, 2018). Reason? Because there was a lack of rules and general regulations for cryptocurrency, it was much easier to use it for activities that were to go under the radar of government control. For example, buying narcotics over the Internet has been one of the driving forces behind the rise in Bitcoin's "popularity" (Greenberg, 2013). Today, however, it is noticeable that Bitcoin has a certain - albeit limited - legitimate use. An example would be that the use of Bitcoin can benefit traders, as processing Bitcoin payments is less demanding than is the case with a regular payment. In addition, using this cryptocurrency could circumvent debit and credit card fees; because it could offer an alternative that would force the companies behind the cards to further lower prices to merchants (Bohme et al., 2015)

As we have already mentioned, Bitcoin has certain advantages. This is most noticeable through the nature of the amount of Bitcoin available; they are limited in number, a total of 21 million of them exist (Phillips, 2020). Namely, due to its limited amount, it is not possible for inflation to occur in the way it does with "ordinary" currencies; that is, it is impossible for an excessive number of Bitcoins to be created. In view of this, Bitcoin - side by side with other cryptocurrencies - is likely to be shielded from inflation stemming from government decisions. This is an exceptional opportunity for investors, because they can invest their funds in something that does not lose value due to inflation. However, it is important to stress that these same investors are also distrustful of Bitcoin due to the general uncertainty of cryptocurrencies. The example of Mt Gox, the world's primary Bitcoin exchange that went bankrupt after being hacked by hackers and took away about \$ 460 million, is why there is no wider adoption of Bitcoin and other cryptocurrencies. In addition,

Bitcoin's ability to trade it as a commodity is also a source of potential weaknesses; because commodity-based markets show strong fluctuations in value due to market events, and therefore this fluctuation in value undermines investor confidence to turn more to commodities (DeVries, 2016). Given these considerations, what is the future of Bitcoin? One thing is for sure: and that is progress. In other words, although the above-mentioned problems still plague Bitcoin today - mostly a security problem - this cryptocurrency will continue to evolve and adapt. This adjustment, as some argue, would also be ensured at the individual level (because there is a high probability that Bitcoin will not be able to last long as a decentralized entity); but also, on a general level. Most importantly, because of its size and adaptability, Bitcoin will likely be able to adopt any news that emerges, which will help it maintain its influence (Extance, 2015).

The possibility of a bright future ahead of Bitcoin can be further strengthened by the recent huge growth in the value of this cryptocurrency. Just a few days ago (30. November), Bitcoin reached a value of \$ 20,000.00 for the first time in history.⁷ But that doesn't mean it will stay at this record high; Bitcoin is likely to continue to rise, as some experts claim it will break the \$ 30,000.00 mark as early as 2021 - though not without the danger of experiencing a big drop or falls again; just as was the case in 2016, two weeks after she reached the record at the time.⁸ So the main question at the moment is: will the price of Bitcoin remain stable this time, unlike what history has shown? Will it continue to increase? Some analysts have optimistic predictions, saying that - just as pandemics have historically been "motivators" of financial growth - so is Bitcoin, which saw its growth during the coronavirus crisis. However, it is equally important to be careful and not necessarily optimistic. The reason for this is that the volume of trade in the cryptocurrency market represents only a part of the main, ie the main, markets. Fewer actors are involved, there is much less transparency, while state regulation is almost non-existent (Sharma, 2020). Poyser (2017) lists two types of factors that affect the price of cryptocurrencies: internal and external. The main internal factors are supply and demand, while external factors are divided into crypto-market (attractiveness, trend and speculation), macro-financial (money exchange rate, interest rate, gold price, etc.), and political (legality, prohibitions, etc.).

⁷ <https://coinmarketcap.com/>

⁸ <https://www.trtworld.com/business/bitcoin-surges-past-record-20-000-for-first-time-42420>

4. CRYPTOCURRENCIES

Cryptocurrencies are a means of exchange in digital format, i.e., the digital equivalent of money. The main feature of cryptocurrencies is the absence of a central institution that issues or monitors them and controls all transactions that occur during the exchange. Due to the lack of a central institution that would further regulate the cash flows that take place, cryptocurrencies are the currency of a decentralized system. With such a system, cryptocurrencies have the potential to become the leading global currency that will not be prone to inflation or the influence of central banks. However, the decentralized and unregulated cryptocurrency systems are precisely the main cause of high cryptocurrency volatility because their price depends solely on supply and demand (Buterin, 2015).

The first foundations of cryptocurrencies appeared in the 1980s with the advent of the algorithm of the American cryptographer David Chaum. Its algorithm remains central to modern network encryption. This algorithm enables secure, unchangeable exchange of information between the parties. Along with the development of this algorithm, Chaum also founded DigiCash, a company that produced currency units based on the aforementioned algorithm. The next wave of online money, probably better known to us than the previous ones, is PayPal and e-Gold. PayPal provides a peer-to-peer transfer mechanism and an easy way to pay. E-gold was an alternative to PayPal and accepted gold deposits from users and issued gold certificates (Turudić et al., 2017) first cryptocurrency ever made was Bitcoin (BTC), first mentioned in a paper published in 2008, entitled “Bitcoin: A peer-to-peer Electronic Cash System” by a certain author Satoshi Nakamoto (Buterin et al., 2015). For years, the identity of a certain Satoshi was unknown to the public when information recently came to light that the creator was Australian Craig Wright (Kaye & Wagstaff, 2020). Bitcoin is a Peer-to-peer system based on complex cryptographic algorithms, without a central authority that issues money or monitors all transactions. Also, in this system there is no single owner of the bitcoin network, but each user has an insight into their own transactions and the transactions of other participants. Each completed transaction contains a digital signature of the user who initiated that transaction. Thanks to this signature, which differs in each message, forgery and misuse is impossible without the original private key. Thus, each user also has a public key that is mathematically related to the private key. Basically, as we said before, digital money is bought and sold online. It has no banknotes or coins, is not based on other assets like gold and does not pass through traditional financial institutions like banks. Instead, these currencies operate in a fully decentralized system that uses so-called blockchain technology to track transactions to see how it works.

Bitcoin is in many ways recognizable as digital gold. Although gold must be extracted from physical earth, bitcoin must be "extracted" by computer means. The Bitcoin protocol provides for the creation of a predetermined number of Bitcoins when each block of transactions is created, with a cross-section every four years: 50 bitcoins in 2009, 25 in 2013, 12.5 in 2016 and so on, up to a total of 21 million in 2140. The idea of this algorithm is to create a property that has a rarity, similar to precious metals, and that it is increasingly difficult to "extract" it (Hayes, 2020). Virtual currencies are not tied to any real currency. Thus, for example, the exchange rate of a convertible mark (BAM) is linked to the exchange rate of the euro (EUR), while unlike them, the value of cryptocurrencies is caused by supply and demand. The total value of the global crypto market capitalization on December 15, according to CoinMarketCap, was more than 1.07 trillion dollars.

Cryptocurrency markets are global and decentralized, which means that no country issues, supports or controls them, so all political developments have little impact on them. Instead, cryptocurrencies circulate over a computer network, but they can still be bought and sold through exchanges and stored in 'wallets' (Đorđević & Todorović, 2018). As we have said, unlike traditional currencies, cryptocurrencies exist only as a common digital record of ownership and it is stored on the blockchain. When one user wants to send cryptocurrency units to another user, he then sends it to that user's digital wallet. The transaction is not final until it is confirmed and added to the blockchain through a process called mining. In this way, new cryptocurrency tokens are created. Blockchain is one of the most important technical inventions in recent years and represents a transparent money exchange system that has transformed the way of doing business (Agrawal et al., 2018). The blockchain is a common digital register of recorded data. For cryptocurrencies, this is the transaction history for each cryptocurrency unit, which shows how ownership has changed over time. Blockchain works by recording transactions in 'blocks', with new blocks added at the front of the chain.

As for network consensus, a blockchain file is always stored on multiple computers on the network, not just in one place - and is usually read by everyone on the network. This makes it transparent and very difficult to modify, it is not vulnerable to hacking or human or software errors. The blocks are connected by cryptography - complex mathematics and computing. Any attempt to change the data disrupts the cryptographic connections between the blocks and the computers on the network can quickly recognize them as fake. To conclude, blockchain is a relatively new technology that provides the ability to securely transfer information between two parties without the mediation of a third party. Cryptocurrency mining records transactions in the public book, ie in blockchain. Although this technology has

become known in the world due to the popularity of cryptocurrencies, it is not its only application (Pejčić, 2018).

It is the miners who add transactions to the blockchain, but different cryptocurrencies use different mining methods, if they use mining at all. It should be noted that not all cryptocurrencies use the mining method. Different mining and consensus methods are used to determine how new blocks of data are created and exactly how blocks are added to the blockchain. Although the methods are different, the goal is the same, which is to create a secure system, and that the state of cryptocurrencies is updated at all times and that transactions are correctly written to the blockchain. Mining is the process of obtaining cryptocurrency using a computer program that solves a complex algorithm. Due to the complexity of the algorithm, the weight of mining is increasing, so that specialized equipment is needed today. In addition to generating cryptocurrencies by mining, mining also adds records of transactions to the public book, i.e., blockchain (Prypto, 2016). In order for the mining method to take place, it is necessary to develop mining software that can work with other operating systems (Multiminer, niceHash and Honeyminer) or that are sometimes a replacement for the entire operating system (ethOS and Brain OS). The work performed by miners consists of several main activities:

- verification and confirmation of new transactions,
- collecting these transactions and transferring them to a new block,
- adding a block to the blockchain,
- broadcasting a new block on the cryptocurrency network of nodes.

This mining process is a key business, required for the continuous expansion of the blockchain and associated transactions. Without this the blockchain could not function. For the work performed by miners, they receive a certain reward, which, for example, in the case of bitcoin is a combination of compensation and subsidy, while in other cryptocurrencies it is regulated slightly differently (Kent & Bain, 2019).

5. THE IMPACT OF CRYPTOCURRENCIES ON BANKING POLICIES

With the development of information technologies, cryptocurrencies have become an increasingly important factor in the economy, and with their development, Central Banks have become increasingly concerned (Zemunik, 2016). Cryptocurrencies currently do not have the capacity to threaten the international monetary system, but that does not mean that their emergence is completely irrelevant for monetary policy makers. Given the maturity of the market and the steady increase in the number of

participants, it can be concluded that in the foreseeable future, cryptocurrencies could affect certain aspects of monetary policy. Central banks in countries with volatile national currencies are believed to have problems before others. Something similar is already happening in Venezuela (Mihaljek, 2019). The causes of such behavior do not have to be monetary - so individuals may choose to transfer their assets to private cryptocurrencies for privacy reasons to avoid tracking transactions. In this case, even the Central Banks in countries with stable currencies may have problems (Tomić et al., 2020).

What is certain is that the emergence and growth of blockchain technology and cryptocurrencies has had a major impact on the entire financial market. Cryptocurrencies have changed the way people conduct financial transactions globally and crypto banking is expected to become an integral part of the financial industry due to its high acceptance. This is a major improvement over traditional banking settings, which have a centralized system. Because cryptocurrencies are decentralized systems, they not only offer services that will be found in conventional banks, but also guarantee greater efficiency, reduced bureaucracy, transparency and security. Some of the ways cryptocurrencies are revolutionizing the banking industry below:

- They eliminate previous imperfections in the banking system where traditional banking is considered an appropriate way to conduct financial transactions. Cryptocurrencies play a major role in addressing these imperfections where, for example, cryptocurrencies are more secure when it comes to data hacking compared to traditional banks. In addition, cryptocurrencies are anonymous and secure, and if someone makes a payment with paper money, there is a possibility that the money may be counterfeit which of course is not the case with crypto-cash because cryptocurrency cannot be counterfeited.
- They eliminated the need for intermediaries because cryptocurrencies are primarily based as we already know on a decentralized system in the sense that blockchains allow secure and independent transactions without the involvement of intermediaries, which is not the case in a traditional banking system where money is stored in the bank. only transactions sanctioned by banks.
- Transaction costs are reduced mainly because transactions are cheaper than traditional money transfers. For example, if a vendor is paid \$ 4,000 by credit card, additional costs will be charged along the way, as a result of other entities being involved in the transaction. On the other hand, crypto-cash transactions are often either free or incredibly low.

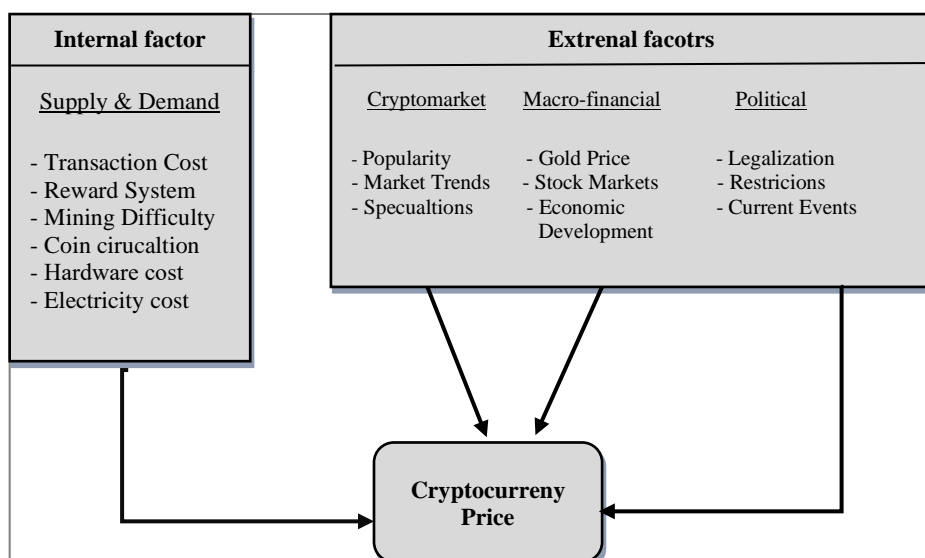
- Ease of use where they expect financial transactions to be faster, cheaper and easier. One of the changes that cryptocurrencies will undoubtedly bring to the banking industry is convenience. Blockchain technology offers the ability to store currency in digital wallets that are protected by secure passwords. While it is still possible for a user to lose cryptocurrency, it would take a lot of stupid mistakes.
- Cryptocurrencies appear to be a safer and fairer investment option. The traditional banking system is designed to work for the benefit of those who have the money and good financial knowledge. That's why we still have people who prefer to keep cash at home, not at the bank. With cryptocurrencies, money remains safe because banks or government agencies cannot devalue it. Once cryptocurrencies achieve widespread acceptance in financial markets, will help people with minimal financial knowledge to invest well without worry and the like, individuals will then be able to control their finances without the involvement of intermediaries (Down, 2019).

Companies from different industries decentralize their processes in order to save costs and achieve profitability, which is the essence of blockchain technology. Inevitably then, traditional banks will also follow their example and decentralize their operations due to fierce competition from cryptocurrencies.

6. DETERMINANTS OF CRYPTOCURRENCY DEVELOPMENT

The drivers of cryptocurrency values and prices are very complex, but there have been many studies examining the formation of prices for Bitcoin and other cryptocurrencies. Yermack (2013) argues that cryptocurrencies are not real currency because they have no intrinsic value. Hanley (2018) also sees no core value in Bitcoin and argues that its price is purely speculative. The determinants of cryptocurrency prices are divided into internal and external factors. Supply and demand are an internal factor and have a direct impact on the price of cryptocurrency. External factors are divided into crypto market, macro financial and political factors.

Figure 1. Determinants that affect the price of cryptocurrency



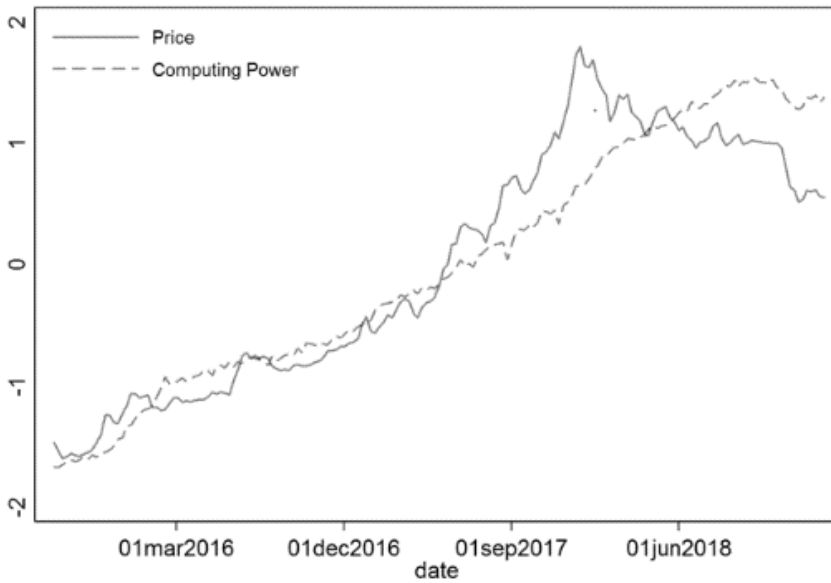
Source: Yhlas (2018). *Factors Influencing Cryptocurrency Prices: Evidence from Bitcoin, Ethereum, Dash, Litecoin, and Monero*

It is very difficult to identify determinants of cryptocurrencies prices. For example, studies by Cheah & Fry (2015) and Corbet et al. (2018) argue that Bitcoin has no intrinsic value and that its price persistently shows bubble-like behavior. Bhambhwani et al. (2019) identify two key blockchain measures that affect cryptocurrency prices. In particular, the theory suggests that the reliability and transactional benefits of blockchain are important determinants of the value of cryptocurrencies. Pagnotta & Buraschi (2018) connects reliability to computing power dedicated to blockchain. Biais et al. (2018) connects the benefits of cryptocurrency transactions to the size of its network.

The importance of computing power and networking for cryptocurrency prices is intuitive. On the supply side, computing power is provided by geographically dispersed blockchain-driven miners who are stimulated to do so because they are rewarded in units of the cryptocurrency, they ‘dig up’. High levels of computing power enable efficient transactions, secure the blockchain from "attackers" and thus increase the reliability of the blockchain. On the demand side, consumers value the blockchain because it provides resistance to censorship, borderless and secure transactions. A larger network of users implies greater acceptance of cryptocurrency as a medium of exchange, as well as greater liquidity. Overall, computing power and network should be positively related to pricing.

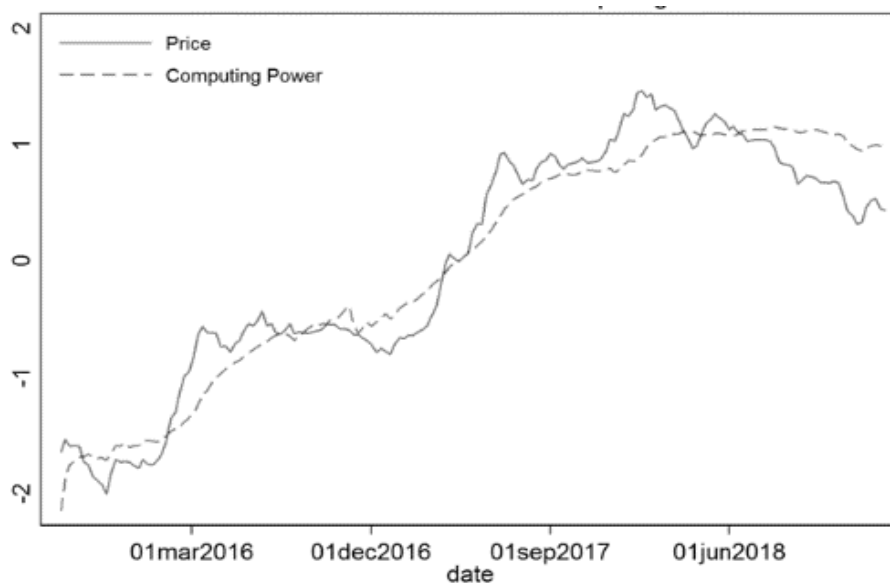
Figures 2 and 3 show a close mapping of Bitcoin and Ethereum prices with their respective computational values. Figures 4 and 5 show an even stronger mapping of Bitcoin and Ethereum prices with their network values. Interestingly, these charts also show that when prices significantly exceed the trend in computing power or network, prices eventually fall and follow the trend fundamentally. Price-to-trend convergence with fundamentals suggests that fundamentals are the ultimate, long-term determinants of prices.

Figure 2. Bitcoin price and computing power



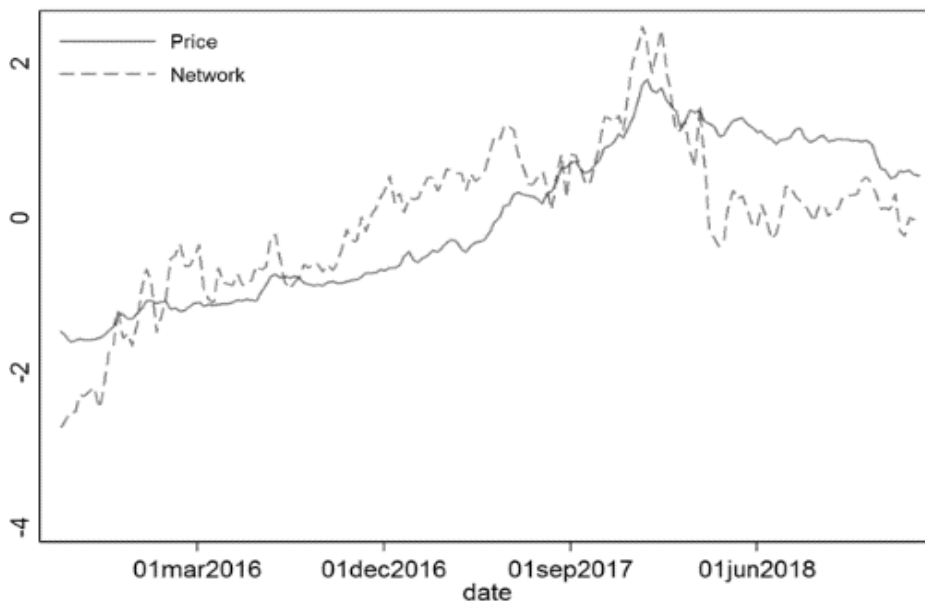
Source: <https://voxeu.org/article/fundamental-drivers-cryptocurrency-prices>

Figure 3. Ehtereum price and computing power



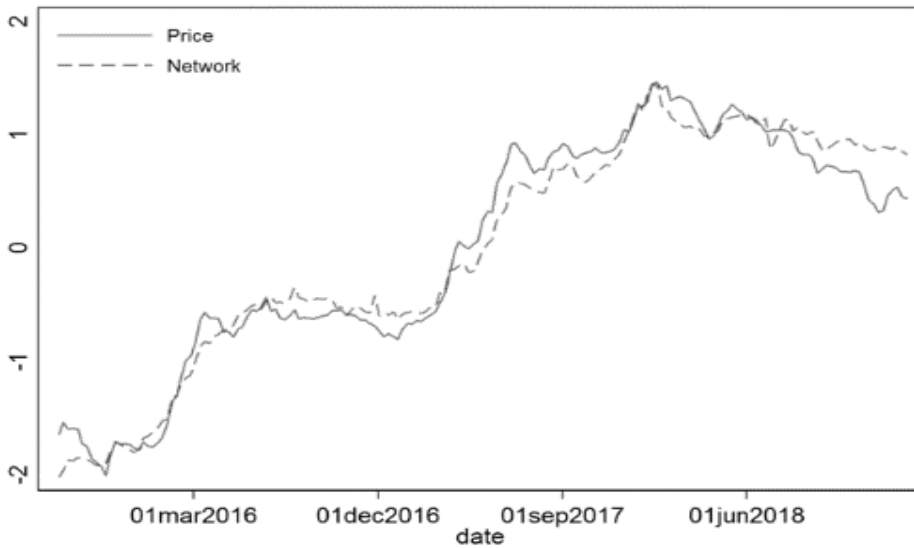
Source: <https://voxeu.org/article/fundamental-drivers-cryptocurrency-prices>

Figure 4. Bitcoin price and network



Source: <https://voxeu.org/article/fundamental-drivers-cryptocurrency-prices>

Figure 5. Ethereum price and network



Source: <https://voxeu.org/article/fundamental-drivers-cryptocurrency-prices>

Also, two additional factors are taken into account that explain why in some period's prices deviate from the basics. The first factor is the return of Bitcoin. Bitcoin is the largest cryptocurrency traded the most, the most sensitive to sentiment and speculative trading by investors. Therefore, as a factor, it can record periods when non-fundamentally trading forces are strongest. The second factor is the cryptocurrency price impulse factor.

Asset price theory Cochrane (2005) suggests that if aggregate computing power and network factors are significant risk factors for cryptocurrencies, then they should earn positive risk premiums. Consistent with this hypothesis, basis-based ACP and ANET factors have a positive risk premium relative to the yield of a 30-day treasury bill. In particular, the average weekly yield of ACP and ANET factors is 1.95% and 1.63%, respectively. Also, it was found that all cryptocurrency factors have higher average returns and standard deviations from the US stock market. For example, Sharpe's ACP factor ratio is 14.9%, while the U.S. stock market is 11%. Overall, cryptocurrency factors reflect high risk sharing in this high-risk market.

7. CRYPTOCURRENCIES AND COVID-19

In early 2020, the value of Bitcoin was \$ 7,229, and since then its value has grown steadily. That level grew until February 14, when the value of Bitcoin was 10,399

US dollars, and that is the most significant growth and the highest value recorded in the first half of 2020. From mid-February until March, which is considered the peak of the pandemic, the value of Bitcoin declined and on February 16 the value dropped to \$ 4,904. Compared to a month earlier, this is the lowest value recorded, which is 53% lower than in February.

Figure 6. Bitcoin value trends in early 2020



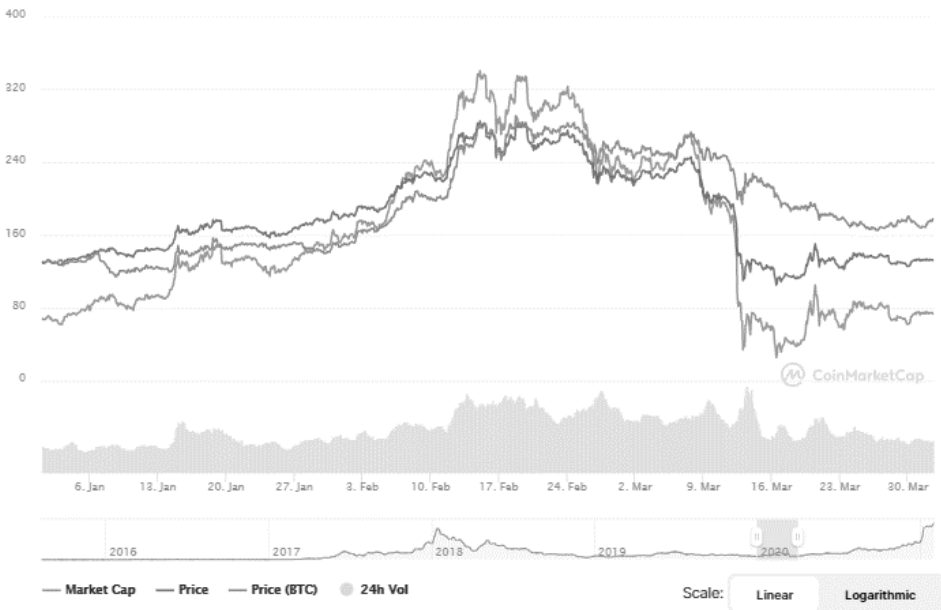
Source: <https://coinmarketcap.com/currencies/bitcoin/>

The reason for such a low decline was that the so-called escape to liquidity, so many investors had marginal differences in capital that had to be covered by the liquidation of other assets such as Bitcoin in cash. The problem is that the liquidity crisis in mid-March scared some crypto investors, but also others who were worried about their investments. It has not yet been felt that we are in an economic crisis but the initial shock has led to a so-called liquidity crisis, due to which investors are liquidating their shares, so that they can cash them.

Ethereum is the second largest currency in Market Cap in December 2020 and is just below Bitcoin with a value of Market Cap of 67 billion. Market Cap is a metric that measures the relative size of a cryptocurrency. The Market Cap value is calculated by multiplying the current value of a particular coin by the number of coins in circulation. As in the case of Bitcoin, the value of the Ethereum currency rose from

the beginning of the year until its peak in mid-February, with the value having the biggest drop on March 16 two days later relative to the recorded lowest value of Bitcoin.

Figure 7. Ethereum value trends in early 2020



Source: <https://coinmarketcap.com/currencies/bitcoin/>

The value of Ethereum on January 1, 2020 was \$ 131.52 and grew until February 14 to \$ 282.92. Then the price fell slightly with a couple of daily increases, until February 16 when the price was 109.21 USD, which is a decrease of 63% compared to the highest value recorded in the first half of this year. It is also a decrease of 17% compared to the value from the beginning of the year.

8. CONCLUSION

Cryptocurrencies, as a new concept, are still in the process of being understood and accepted by consumers, traders and financial institutions. With the development of Bitcoin and its derivatives, as well as the general increase in interest in their use, it is certain that the problem and the risks that are currently imposed will be eliminated in the future. In addition to all the controversies and skepticism that accompany cryptocurrencies, it is clear that their appearance and ability to survive in this period

marks the beginning of a new chapter in the financial world. With the development of information technologies, cryptocurrencies are becoming an increasingly important factor in the economy. Decentralization and lack of regulation of the system is considered to be the biggest advantage of cryptocurrencies, but it has also been shown to be the main cause of high volatility because the price of Bitcoin and other cryptocurrencies depends exclusively on the supply-demand ratio. At the same time, blockchain technology - on which the work of cryptocurrencies is based - promises to solve some of the biggest problems in financial technology.

According to research, cryptocurrency trading is not secure during this pandemic. It is human nature to protect their wealth and money. At the same time, during this pandemic in which economic status has declined, no crypto trader will trade when the chance of recovery from the damage caused by the pandemic is uncertain. Everyone is aware of the possible effects of coronavirus on human health and the economic status of the state. In order to improve this research, it will be interesting to compare values of cryptocurrencies during the pandemic to the pre-pandemic and post-pandemic world. Also, it will be significant to compare value trends of currencies and cryptocurrencies in order to find out if there is any law and connection between these two types. That would lead to some prediction models using machine learning technologies like Long Short-Term Memory network. That model might be used to predict movements of most popular cryptocurrencies.

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ADOPTION OF MOBILE BANKING IN THE REPUBLIC OF SERBIA

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***Abstract:** The aim of this study is to determine which factors significantly influence the adoption of mobile banking application in the Republic of Serbia based on Technology acceptance model (TAM). The study was conducted using an online questionnaire during June-July 2020 on a sample of 167 respondents who are users of mobile banking application. Authors used the software package SPSS 25 for the analysis. Factor analysis with the principal component method and varimax rotation was used to group questions into the corresponding factors, i.e., information on m-banking, perceived usefulness, perceived security, perceived ease of use, and technological proficiency and conditions. After that, binary logistic regression was approached where the dependent variable was represented by the intention to use the mobile banking application in the future, while the independent variables were five factors defined based on factor analysis. The results show that the statistically significant factors that influence the intention to use mobile banking application in the future are information on m-banking ($p=0.046$), perceived usefulness ($p=0.000$), and perceived security ($p=0.008$).*

***Keywords:** Mobile banking, adoption, banking sector, TAM, Serbia*

1. INTRODUCTION

The technological revolution in the financial sector has led to changes in how financial institutions operate. To achieve success on the market, the speed of adapting to constant changes is essential. The trend of the increasing use of mobile phones, as well as the continuous improvements of applications, has significantly changed the interaction of people with the financial system. In order to achieve a better market position banks need to create various technological solutions to meet clients' needs and expectations (Petrović, 2011, 261). Also, the personalization of services is recognized as an essential activity in the future operations of banks (Đorđević, 2007, 39). Providing opportunities for existing and potential bank clients

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to access several functions through the mobile banking application, as well as the constant improvement of the application by banks are the consequences of the increasing use of mobile phones in everyday life. In EU, 11% of households accessed the internet only via mobile devices in 2019. Comparing with 2010 this is an increase of 6.9 pp. (European Commission, 2020). According to the data of the Statistical Office of the Republic of Serbia on a sample of 2,800 individuals in 2019, when accessing the internet outside the home, 79.8% of respondents used mobile phone, 8.7% laptop and 6.9% tablet. In terms of frequency of use, as many as 93.2% used the internet every day or almost every day for the last three months (Kovačević et al., 2019). Everything mentioned indicates that mobile phones are becoming a significant device for performing daily activities as well as for banking purposes.

Changes in the banking sector that involve switching the focus from branches and ATM (local-centric) to internet banking (place-centric), and to access anywhere 24/7 (equipment-centric) contributes to saving time and reducing queues in banks (Tam, Oliveira, 2017, 5). Also, Jović (2014) pointed out that the difference between mobile banking and visiting a branch is simplicity, mobility, and a cheaper way of using services via a mobile application. This claim is confirmed by the results of a study conducted in the United States on 1,643 clients since the largest number of respondents prefer the digital experience using mobile banking (42%). This study also showed that respondents preferred to a lesser extent in-branch experience (31%) and e-banking (27%) (Coconut Software and WBR Insights, 2019). However, a survey published in 2019 conducted by IMAS International for Erste Group including seven CEE countries (Austria, Czech Republic, Serbia, Croatia, Slovakia, Romania, and Hungary) revealed that the combination of in-branch and digital channels was dominant. The analysis also showed that Serbia and Croatia were the countries where the fastest growing was "digital and branch" approach. In these countries wherein the previous period in-branch experience was predominant, can be noticed that more and more users are becoming interested in the use of digital channels such as m-banking and e-banking (Erste Group, 2019).

E-banking (online or internet banking) is considered to be the forerunner and represent the basis for creating mobile banking adapted to the habits of clients. E-banking can be defined as the delivery of information and services to customers of the banks via different devices such as a PC and a mobile phone with browser or desktop software, telephone, or digital television (Daniel, 1999, 72). So, m-banking is the closest alternative to e-banking as a self-service channel (Thakur, 2014, 629). According to European Commission estimation, mobile devices will reduce the use and role of computers to access various online content (European Commission, 2017), indicating that mobile banking is an important part of banks' strategy. Juniper Research forecasts from 2014 indicated that by 2019 there would be over 1.75 billion

mobile banking users, representing 32% of the global adult population (Juniper Research, 2014). Unfortunately, data related to the number of mobile banking users in 2019 are not available, so we can't determine whether these predictions were correct. Recent estimation from March 2020 has shown that by 2024 there will be over 3.6 billion digital banking users, which is an increase of 54% compared to 2020 (Juniper Research, 2020).

The advantages and disadvantages of mobile banking were explained in detail by Chandran (2014). He stated that the advantages are: 1. Time-saving (client can check account balance, receive payments, transfer money, etc. without going to bank branch); 2. Convenience (clients can perform banking transactions at any time and from anywhere); 3. Security (well-secured applications usually have a security guarantee or send a verification code via SMS. Mobile banking is considered to be better secured than e-banking); 4. Easy access to finances (clients can access their financial information regardless of the end of the bank's working hours); 5. Increased efficiency (contributes to reducing congestion in banks and the use of paper for both, the client and the bank); 6. Fraud reduction; 7. Availability (clients can access 24/7/365, which is very important for those who are living in rural areas). On the other hand, the disadvantages which the author mentioned are: 1. The risk that the client will receive a false SMS message; 2. The loss of a mobile phone; 3. Problems with an internet connection or due to runs out of battery on the phone; 4. Incompatibility of the phone with antivirus software. Otamurodov (2017) noted that clients should focus and pay attention to the background of the bank and check security-related information when using the application. This shows the potential security impact on the use of mobile banking service.

It should also be mentioned that mobile banking has a particular effect in terms of banks' costs. Research conducted by Javelin Strategy & Research revealed that financial institutions could make savings given that the average cost per mobile transaction is 10 cents. In contrast, in the case of a personal visit to the bank, this cost is \$4.25 (Fiserv, 2016). KPMG study also confirms this claim. Their results indicated that the transaction costs for the bank were, compared to a mobile channel, 43 times higher in the case of a branch, 13 times in the cases of call centre and ATM, and two times in the case of online banking (KPMG, 2015). Authors noted that banks in cooperation with IT companies create and enable clients to use mobile banking applications, which, to some extent, contribute to increasing the operational risk of their business. Therefore, it is vital that banks carefully choose which company to outsource as a third party, having in mind the consequences it may also cause because of system errors.

When we talk about the banking sector of Serbia, in October 2020, 22 (out of 26), banks offer mobile applications to their clients. This means that most banks operating in Serbia have recognized the importance of mobile banking in their operations and have adapted to this trend. Authors note that one of the banks (Bank of China) does business only with legal entities. Banks which did not have mobile banking were Opportunity bank, Expo bank, and Srpska bank. In order to determine the interest in the application of mobile banking in Serbia and their average rating, the authors analyzed data from Google Play store. According to the authors' research in October 2020, more than 1,700,000 times mobile banking applications were downloaded (but it should be considered that some users have been able to download the application several times due to installation problems). The applications which had the most downloads were Banca Intesa and Mobi bank (each bank more than 500,000 times). Mobi bank (former Telenor bank) is the first online bank in the region which was started operating in Serbia in 2014. (Mobi bank, 2014). Mobi Bank's business strategy is based on the use of digital channels in customer relations; there are no branches, which means that there are specific savings in terms of employee and rental costs. However, clients can also use ATMs located throughout Serbia so they can perform some of the transactions according to their needs which represent some physical relationship with the bank. The average rating of all mobile banking applications was 3.85 based on reviews of about 27,000 users. Eurobank had the best-rated application (4.6) based on the reviews of 1,000 users, while Vojvođanska bank had the lowest rating (3.0) based on 514 user reviews. The authors can assume, based on the data of the Statistical Office of Serbia (2020), that there is a growing interest in the use of mobile banking applications, given that there has been an increase in the number of mobile payment users (1,764,819 in the first quarter of 2020 compared to 1,921,347 in the second quarter of 2020).

Based on the above, we can conclude that most banks in Serbia offer mobile banking. The success of the implementation of mobile banking application depends on whether the application is recognized by existing and potential clients as adequate for use. Therefore, it is crucial that the bank appropriately informs about this service regarding benefits, how the application works, etc. Accordingly, this research aims to determine which factors significantly influence the adoption of mobile banking in the Republic of Serbia.

This research could be used as a literature source because it will suggest areas and directions for further analysis. Hence, these results will enable more information that could help banks to adequately adapt their business to bring the user experience to a satisfactory level, as well as developing and improving applications. The results of this study could help banks in creating a suitable marketing strategy which should generate an application's popularization.

2. LITERATURE REVIEW

In recent years in the academic literature, special attention has been concentrated on studies related to the adoption of mobile banking. For that reason, due to insufficient research on this topic in the Republic of Serbia, we consider that it is necessary to expand the literature and conduct a study in order to obtain additional information.

Mobile banking application can be defined as a service offered by a bank via mobile phone or tablet to meet customers' needs (Muñoz-Leiva et al., 2017, 2). The most common functions provided by mobile banking are checking account balance, paying bills, sending money to relatives or friends, transferring money between two accounts, and locating ATM or branch. However, constant improvement of technology leads to the development of more convenient and new functions of m-banking (Dahlber et al., 2008). For this paper, we defined user of mobile banking application as a person who currently has a mobile banking application installed on his smartphone or tablet and uses it to some extent.

This research is based on the technology acceptance model (TAM) since this is the most commonly used theoretical framework for mobile banking (Lai, 2017). TAM is based on the Theory of Reasoned Action (TRA), which was introduced by Fishbein and Eisen in 1975. The first version of TAM was presented by Fred Davis in 1985 in his doctoral dissertation. This model implied system features and capabilities as a stimulus which affected users' motivation to use the system. In the end, the result of that motivation is the actual use of the system. Two primary constructs of the original TAM model were perceived ease of use and perceived usefulness. Davis (1986) defined ease of use as the degree of free of effort when using the system. Also, this referred to the level of stress when the person using a particular system. He defined usefulness as "the degree to which a person believes that using a system would enhance his or her job performance" (Davis, 1986). Over time, the original TAM was modified in 1989 by adding behavioral intention to use the system which was affected by perceived usefulness and perceived ease of use (Davis, 1989). To validate that modified model Davis et al. (1989) conducted a survey on 107 respondents. That study revealed that perceived usefulness and perceived ease of use had little significance. In 1996 the final TAM was presented. That version included external variables, i.e., characteristics of the system, participation of the user, user training and implementation of process (Venkatesh, Davis 1996). In order to test the validity of that model, the researchers conducted the study which revealed that TAM predicted very well the user adoption.

Perceived ease of use has been an element of numerous studies that have examined this topic (Hanafizadeh et al., 2014; Gu et al., 2009; Raza et al., 2017; Akturan,

Tezcan, 2012; Singh et al., 2010, Jeong, Yoon, 2013; Lukić et al., 2019). In addition to the definition given by Davis, perceived ease of use, according to Lin (2011) represents the extent to which a mobile banking application service can be considered easy to understand and use. Since the use of the application must be tailored to the needs of clients, it is also important that it does not require a particular mental effort when using it. In order to make a decision about using the mobile application, clients take into account the benefits that are realized in terms of costs and time in relation to other channels of communication with the bank. Accordingly, it is necessary to include in the analysis the variable perceived usefulness, which has been the subject of many studies (Gu et al., 2009; Akturan, Tezcan, 2012; Hanafizadeh et al., 2014; Luarn, Lin, 2005; Wessels, Drennan, 2010; Lukić, 2019). It can be noticed that perceived ease of use and perceived usefulness are the most significant drivers of intentions to adopt m-banking (Tam, Oliveira, 2017). TAM is usually extended with the risk component (Herzenstein et al., 2007). Risk refers to the security fears that a client must overcome in order to be able to use the mobile banking application service (Akturan, Tezcan, 2012, 488). Kleijnen et al. (2009) consider that functional and psychological barriers hinder the adoption of innovations. For that reason, perceived risk can be considered a predictor of future user behavior (Alalwan et al., 2016, 120). There is also empirical evidence of a significant impact of perceived security on attitudes towards mobile banking (Akturan, Tezcan, 2012; Zhang, 2019; Lukić et al., 2019). Generally, trust is a crucial segment because clients expect some security of their privacy as well as the functioning of the application following the protection in case of attempted fraud. Laukkanen & Kiviniemi (2010) argue that guidance information about the functions of using play a significant role. To be able to use the mobile banking application, current clients or potential clients must be informed about the characteristics and benefits that using an application provides.

It should be noted that one of the characteristics of non-adopters is the lack of information (Kuisma et al., 2007). Because of that, it is essential to be informed as before and during the usage (Filotto et al., 1997). In order to adequately and without a hitch use the application, the appropriate conditions must be met in terms of owning a mobile device as well as availability and access to the internet. In general, the experience and habit of using applications on mobile devices will, to some extent, contribute to understanding better the way the mobile banking application works.

The results of the survey based on extended and the trust-based TAM conducted in Korea using a web questionnaire on the Woori Bank site confirmed the impact of ease of use, trust, and perceived usefulness on the intentions to use mobile banking. The survey was conducted on a sample of 910 mobile banking users (64.9% men), 43% of respondents belong to the age group thirties, and about 65% of respondents

were employees (Gu et al., 2009). The study conducted in India by Kumar et al. (2017, 244) revealed that perceived ease of use, perceived usefulness, trust, and social influence affected the intention to use mobile banking. According to Arif et al. (2016), there was a significant positive impact of perceived ease of use and perceived usefulness on users' attitude towards m-banking. Also, the authors analyze risk factors such as security, privacy, time, and financial risk. Results revealed that there was a negative impact of these factors on users' attitude. Karjaluoto et al. (2010) stated that the adoption of mobile banking was significantly affected by compatibility, perceived usefulness, and risk. Alalwan et al. (2016) found that perceived usefulness, perceived ease of use, self-efficacy and perceived risk had an impact on intention to use m-banking in Jordan based on a sample of 343 respondents. Alsamydai (2014) conducted research on a sample of 238 customers of the Jordan Banks and revealed that the strongest correlation was identified between perceived ease of use and experience. Lule et al. (2012) found that, based on 395 valid responses of M-Kesho users, perceived ease of use, perceived usefulness, perceived self-efficacy, and perceived credibility significantly influences customer's attitude towards using of m-banking. The structure of respondents was 52% male, and 48% female. Most of them were 21-30 years old (47.6%) and married (46.8%). However, it is also essential to consider the barriers for not adopt mobile banking pointed out by Cruz et al. (2010). From their point of view, the main barriers are risks, costs, and when it is not simple to use.

The latest research about mobile banking in Serbia was conducted in May 2019. The study included 100 respondents, with the majority of the population of younger and middle-aged, i.e., 41% of those aged 21-30 and 41% of those aged 31-40. Results showed that 59% of respondents used the mobile banking application. In terms of perceived security, about 38% of users thought that the mobile banking application was completely secure, which shows that there is still not enough trust from the clients. The most common reasons for not using the application were: uncertainty regarding the security of money and data (56%), insufficient knowledge of the conditions of use of the application (19.5%), as well as insufficient knowledge of the existence of the application (4.9%) (Soleša, Brkić, 2019). This confirms the previously mentioned that it is important to inform both potential and current users of mobile banking. On the other hand, results of the study conducted on a sample of 100 respondents in December 2016 indicated that 85% of respondents have a mobile phone that has Internet access, while 62% use mobile banking services. From the aspect of perceived security when using the application, 22% of respondents considered that the application is completely safe. As reasons for not using the application, respondents stated that they were not aware of its existence, but that they intend to be users (38%), while 9% of respondents not knowing about the existence and not want to be a user (Todić, Dajić, 2018). If we compared these two research

results, we could conclude that perceived security plays a significant role in the adoption of mobile banking in Serbia. This is confirmed by the results of research published in 2019 by Lukić et al. (2019). That study was conducted using an online questionnaire on a sample of 134 Serbian students. The authors concluded that the factors that have the highest impact on the intention to use mobile banking in the future were perceived security (Lukić et al., 2019). Having in mind all the above mentioned, the main objective of this study is to determine more precisely which factors have a statistically significant influence on the adoption of mobile banking in Serbia, mostly based on the research of Lukić et al. (2019).

3. METHODOLOGY

Data and methods

In order to identify the factors that influence the adoption of mobile banking, authors created an online questionnaire which was shared in the period June – July 2020 mainly via social media services: Instagram, LinkedIn, Facebook, WhatsApp and Viber. On the other hand, two people helped with sharing via corporate emails of their firms. The authors can estimate that more than 2,500 people have seen the survey link. For each social network, the authors analyzed the time interval of maximum user engagement. The survey link was posted on social media based on this statistic. The questionnaire has consisted of two parts: general questions about respondents and questions related to mobile banking. To identify those who use mobile banking, the first question was: *Do you use mobile banking?* The total number of responses is 420 (included both yes and no answers), but 167 of them use mobile banking, i.e., about 40% of all respondents. Those who responded *yes* were redirected to the part with relevant questions related to mobile banking and they represent the main subject of our analysis. Since the authors noticed in the pilot testing that the respondents have ambiguities related to the terms e-banking and m-banking, within the special section of the questionnaire authors added text and picture explanation for these two terms in order to be more precise.

The structure of respondents who use mobile banking application is showed in the table below.

Table 1. The gender structure of those respondents who use the mobile banking application

Gender	Number of respondents	% of respondents
Female	133	79.64
Male	34	20.36
Total	167	100

Source: Authors' research

As we can see from Table 1, the majority of respondents who use mobile banking application are female. According to the data of Statista the percentage of male Instagram users in the Republic of Serbia in November 2020 was slightly higher (52.9%) than female users (Statista, 2020), so our sample structure may be a consequence of that the person who posted the survey link on Instagram has the largest number of female followers. The summary of the sample structure is presented in Table 2.

Table 2. Sample structure

Age			Level of education			Work status		
Group	Number of users	% of users	Level of education	Number of users	% of users	Work status	Number of users	% of users
18-24	75	44.91	Bachelor's degree	100	60	Employed	99	59.28
25-34	57	34.13	Associate 's degree	24	14	Student	53	31.74
35-44	19	11.38	High school diploma	42	25	Unemployed	12	7.186
45-54	10	5.99	Elementary school	1	1	Other	3	1.80
55+	6	3.59						
Total	167	100		167	100		167	100

Source: Authors' research

The largest number of respondents (79.04%) belongs to the age group 18-35, and about 60% of the sample is those who work. Also, most of the respondents have a bachelor's degree. Thus, mobile banking is recognized as a useful tool for young people who work or study with regard to their lifestyle and compatibility with new technologies.

The frequency of using mobile banking application will be shown in the Table 3.

Table 3. Frequency of using mobile banking application

How often do you use m - banking app?	Percentage of respondents
Everyday	28.14
2-5 times a week	33.53
Once a week	17.37
2-3 times in a month	13.17
Once a month	4.19
Less than once a month	3.52
Total	100

Source: Authors' research

As you can see from the table above, most of the respondents use mobile banking application 2-5 times a week, which means that application is significant and necessary for performing banking transactions. In order to determine for which purposes they use the application, we asked them to check all the functions they usually use. The most commonly used functions of mobile banking applications will be shown in Table 4.

Table 4. The most frequently used functions of mobile banking

Which functions of mobile banking do you usually use?	Percentage of respondents
Checking account balance	95.21
Paying bills	74.85
Sending money to relatives or friends	61.68
Transferring money between two accounts	46.11
Exchange to other currency	32.34
QR code payment	14.97
Locating ATM or branch	14.37

Source: Authors' research

Results revealed that the largest number of respondents uses mobile banking application to check account balance and for paying bills, which means that mobile banking allows users to make payments without going to the bank, post office or through other payment service providers. So, they can make savings on fees and commission, as well as the time they would waste waiting in the queue. Also, we expected an increase in the percentage of use of the QR code since most banks introduced this service in 2020. We also examined the satisfaction of the users of the m-banking application, so the average rate given by the respondents is 4.49. The average rate is close to the maximum of 5. However, having in mind that this result is based on 167 responses, for more precise information it is necessary to increase

the sample size, given that a significantly lower average score was identified by observing data from Google Play for each bank.

For the analysis, the authors used software SPSS Statistics 25 and 95% confidence interval was applied.

In the first phase, authors used factor analysis with the principal component method and varimax rotation to identify questions which were significant and to group them into the corresponding factors. The analysis identified five factors, i.e., information on m-banking, perceived usefulness, perceived security, perceived ease of use, and technological proficiency and conditions. The questions were defined and based on the five-points Likert scale following the study conducted by Lukić et al. (2019). The list of questions and the correlation between the variables are presented in Table 5.

Table 5. Results of factor analysis

Question – statement	1- Information on m-banking	2- Perceived usefulness	3- Perceived security	4- Perceived ease of use	5- Technological proficiency and conditions
I believe I am well informed about banking services in general	0.842				
I believe I am well informed about mobile banking	0.892				
I believe I am well informed about the advantages of mobile banking	0.866				
I frequently access the internet using my mobile phone					0.640
I have adequate access to the internet during the whole day				0.506	
I like using downloadable applications on my mobile phone					0.732
I learn quickly how to use applications on my mobile phone					0.675

Conducting banking transactions using a mobile phone application contributes to cutting my banking costs		0.622			
Conducting banking transactions using a mobile phone application gives me free time for doing other activities		0.771			
Conducting banking transactions using a mobile phone application requires less effort compared to visiting a branch or using online banking		0.800			
Conducting banking transactions using a mobile phone application is more convenient compared to visiting a branch or using online banking		0.806			
Learning how to use a mobile banking application is not difficult				0.553	
Interaction with the bank using a mobile banking application is simple				0.774	
Interaction with the bank over mobile banking application is clear and understandable				0.805	
I consider mobile banking to be safe			0.799		
I consider my personal data to be protected when using mobile banking			0.839		
I consider mobile banking application to be more secure than online banking			0.590		

In general, I have trust in the Serbian banking system			0.684		
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Extraction method: Principal Component Analysis
 Rotation Method: Varimax with Kaiser Normalization.

Source: Authors' research

The results presented in the Table 5, show us that only difference comparing to Lukic et al. (2019) is in statement *I have adequate access the internet during the whole day* which belong to *Perceived ease of use* in this research, but in their study belonged to *Technological proficiency and conditions*. This means that users have understood this statement differently and linked its meaning to the effort of using the application.

To determine which factors significantly influence the intention to use mobile banking application, in the second stage, authors approached binary logistic regression analysis using the Enter method. Independent variable is the intention to use mobile banking in the future. This variable was measured initially on 5 points Likert scale (1 = "strongly disagree"; 5 = "strongly agree"), but in this part, it was coded into binary (0 = "not sure about using in the future ", 1 = "sure about using in the future "), i.e., 0 referred to the values 1,2,3 or 4, while 1 referred to answers marked with 5. Dependent variables are all five factors which are identified in the first stage. Detailed information about variables and their measurement is presented below in Table 6.

Table 6. Summary of the variables

Type of Variable	Name of Variable	Measurement scale	
		Factor analysis	Regression analysis
Dependent	Intention to use mobile banking in the future	Likert scale 1 = "strongly disagree" 5 = "strongly agree"	0=not sure about using mobile banking in the future* 1= sure about using mobile banking in the future**
Independent	Information on m-banking Perceived usefulness Perceived security Perceived ease of use Technological proficiency and conditions		Likert scale 1 = "strongly disagree" 5 = "strongly agree"

* 0 referred to the marked values 1,2,3 or 4

**1 referred to the answers marked with 5.

Source: Authors' research

Before the results of the regression, we needed to see whether this model can be used. Regarding that, the regression model is significantly based on the results of Omnibus model coefficient tests ($p < 0.05$) so it can be used in the next stage (see Table 7).

Table 7. Omnibus tests of model coefficients

		Chi-square	df	Sig.
Step 1	Step	30.852	5	.000
	Block	30.852	5	.000
	Model	30.852	5	.000

Source: Authors' research

Also, Nagelkerke R Square is higher than 0.3, which means that this model is appropriate for further analysis (see Table 8).

Table 8. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	87.495 ^a	.169	.333

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Source: Authors' research

The results of the regression analysis indicate that the factors that significantly influence the intention to use mobile banking in the future are *information on m-banking* ($p=0.046$), *perceived usefulness* ($p=0.000$) and *perceived security* ($p=0.008$). Authors found no statistical significance of the factors *perceived ease of use* and *technological proficiency and conditions* ($p > 0.05$). These results are presented in Table 9.

Table 9. Regression analysis

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Information on m-banking	.504	.253	3.967	1	.046	1.656
	Perceived usefulness	.856	.224	14.608	1	.000	2.354
	Perceived security	.750	.284	6.980	1	.008	2.116
	Perceived ease of use	.364	.237	2.359	1	.125	1.439
	Technological proficiency and conditions	.337	.256	1.724	1	.189	1.400
	Constant	2.685	.373	51.880	1	.000	14.658

Source: Authors' research

Analyzing the obtained results, the authors conclude that the coefficients B for the variables information on m-banking, perceived usefulness and perceived security are positive, which means that these factors increase the probability of response that clients will use for sure the application in the future. The value Exp (B) indicate that the odds of intention to use mobile banking application in the future is 2.354 times more likely for each one-point increase in the respondent's perceived usefulness score (from strongly disagree to strongly agree), holding all other variables constant. The value Exp (B) for perceived security indicate that the odds of intention to use mobile banking application in the future is 2.116 times more likely for each one-point increase in the respondent's perceived security score, holding all other variables constant; while the odds of intention to use mobile banking application for sure in the future is 1.656 times more likely for each one-point increase in the respondent's information on m-banking score, holding all other variables constant.

The significance of perceived usefulness has been confirmed in many studies (Gu et al., 2009; Karjaluoto et al., 2010; Lule et al., 2012; Alalwan et al., 2016; Arif et al., 2016; Kumar et al., 2017; Tam & Oliviera, 2017; Lukić et al., 2019). Generally, perceived usefulness plays an essential role in the adoption of mobile banking because it is crucial for clients to have some benefits when using the application in terms of costs, time and compatibility compared to other channels of communication with the bank. If we analyze perceived security most studies indicated the importance of this variable (Akturan & Tezcan, 2012; Arif et al., 2016; Alalwan et al., 2016; Zhang, 2019; Lukić et al., 2019). A significant impact of perceived security is expected given the previously conducted research related to Serbia and the fact that there is not enough user trust when using mobile banking application. Although results of research conducted by Lukić et al. do not coincide with the results of this study in terms of information on m-banking, we consider that clients should be informed promptly about existing and new services that are offered by the and that they should be aware of all the advantages and disadvantages of using this service.

Numerous studies indicated the importance of variable perceived ease of use (Gu et al., 2009; Singh et al., 2010; Akturan & Tezcan, 2012; Jeong & Yoon, 2013; Hanafizadeh et al., 2014; Raza et al., 2017; Lukić et al., 2019), but this is not in line with our results. Also, variable technological proficiency and conditions are not recognized as significant in contrast to the study conducted by Lukić et al. We consider that statistical significance of the factors perceived ease of use and technological proficiency and conditions is a consequence of the fact that the largest number of respondents belong to the age group 18-34. This category is familiar with mobile devices, so we assume that they learn quickly how to use application. Also, we believe that they have modern mobile devices and have an adequate quality of the Internet connection, which is a consequence of the modern way of life.

4. CONCLUSION

Over the last ten years the banking sector has undergone a significant transformation, which means that digital channels are increasingly replacing the traditional business model. This is a consequence of the increasing use of mobile phones in people's daily lives. For that reason, banks need to continue follow the trends and needs of existing and potential customers to ensure their market position.

In this paper, we analyzed which factors, based on Technology acceptance model, significantly influence the intention to use the mobile banking application. Respondents were users of the mobile banking application in Serbia. In the first step of the analysis, we identified five factors that are assumed to predetermine the intention for future use of the mobile banking application. For this purpose, we used factor analysis with the principal component method and varimax rotation. Authors identified five factors: information on m-banking, perceived usefulness, perceived security, perceived ease of use, and technological proficiency and conditions. In the second step of the analysis, regression analysis was approached, i.e., binary logistic regression, where the dependent variable was the intention to use the mobile banking application in the future. The independent variables were all five factors identified in the previous step.

The results of the research show that the factors which significantly influence the intention to use mobile banking application in the future are *perceived usefulness*, *perceived security*, and *information on m-banking*. The authors found no statistical significance of the factors *perceived ease of use* and *technological proficiency and conditions*.

The results of this research can help decision-makers in making public policies given that the banking sector is essential for economic development. Also, these results are important for those working in the banking sector because they can improve the quality of banking services or create new ones that meet customers' needs. Having in mind that perceived security has been identified as the factor with high influence on the intention to use the application in the future, it is important that regulators, i.e., policymakers, focus on monitoring and improving regulation in the field of digital financial services. Therefore, the policymakers, in collaboration with the banks, need to take appropriate measures to protect the users' privacy data in order to regain the trust in the system.

Based on these results banks should focus their promotional activities on the following: 1. timely notification of new products/services they offer, 2. highlighting

the benefits of using the application 3. pointing out the small number of theft cases of financial resources and user data through mobile banking.

Although the sample used in this research is not nationally representative, this paper can be an appropriate basis for future studies. Further research should include a larger number of respondents to get a better and more realistic picture of the population. It would be useful to analyze this study from the aspect of gender structure, as well as to make a comparative analysis with other banking markets in the region, i.e., Croatia, Slovenia, Slovakia, etc.

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THE RELATIONSHIP BETWEEN INNOVATION, FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN THE SELECTED EU AND EU CANDIDATE COUNTRIES

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***Abstract:** The aim of this paper is to investigate the cause and effect relationship between economic growth, innovation (R&D expenditure) and foreign direct investment (FDI) for the selected EU members (Bulgaria, Croatia, Hungary, Romania, Slovakia, and Slovenia) and EU candidates (North Macedonia, Serbia, and Turkey) for the period 2000 - 2017. Additionally, we analysed innovation by using Summary innovation index, Capacity innovation index, and Global innovation index. All three indexes show that Slovenia is best ranked by innovation. According to Summary innovation index countries such as Bulgaria, Romania and North Macedonia are “modest innovator” countries, while Slovenia, Slovakia, Hungary, Serbia, Turkey, and Croatia belong to “moderate innovator” group of countries. According to Capacity for innovation index, Serbia shows the lowest capacity for innovation, although a considerable growth of this index has been recorded since 2012. Global innovation index shows that Serbia and North Macedonia have the lowest values of this index. The results obtained by using Granger causality test reveal that a two-way relationship exists between economic growth and FDI, economic growth and innovation, and FDI and innovation.*

***Keywords:** Innovation, R&D expenditure, foreign direct investment, economic growth, causality*

1. INTRODUCTION

Innovation, investing in R&D, and technology are the basis for providing competitiveness of a country as well as sustainable economic growth (Weresa, 2018). Gerguri and Ramadani (2010) define innovation as the activity of creating a new product or service, new technological process, new organisation as well as

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improving the existing product or service, existing technological process and the existing organisation. Bilbao-Osorio and Rodríguez-Pose (2004) consider traditional investing into R&D as one of the key strategies for fulfilling technological potential, and therefore innovation and economic growth. The authors state that technology and technological progress represent crucial components of innovation and economic growth. Solow (1956) shows a positive relationship between technological progress and economic growth (Omri, 2020). Cameron (1996) points out that according to the theory of economic growth, the innovation rate is the result of economic agents selected to maximise profits, which enables constant differences in the levels of productivity and growth rates. Among other authors, Bae and Yoo (2015) and Andergassen et al. (2009) claim that innovation can be regarded as a considerable potential for economic growth.

Hasan and Tucci (2010) mention that Romer (1986) and Lucas (1988) were among the first authors who emphasised the role of knowledge as an input in production. Their models show that technological development and industrial innovation generate long-term development. There is reliable empirical evidence supporting the fact that innovation contributes to economic growth (Hasan and Tucci, 2010).

Increasing innovation, encouraging investment into R&D and developing efficiency have become important factors in globalisation and they affect economic status and the prospect of economic development (Dzemyda and Melnikas, 2009). Kacprzyk and Doryń (2017) state that in the early 1990s Romer (1990), Grossman and Helpman (1991), and Aghion and Howitt (1992) developed endogenous growth models based on the general growth mechanism that operates through technological progress, which is the result of targeted activities of R&D. Gerguri and Ramadani (2010) reveal that the best way for a company to achieve competitiveness is to apply innovation. The authors view innovation as a major factor in sustainable growth and economic development, but also in creating well-being and employment. Moreover, the gap between western and eastern economies can be diminished by investing in innovation, as Petrariu et al. (2013) reveal.

The paper presents the analysis of causality between economic growth, innovation and FDI based on the panel technique. Granger non-causality test was used to examine causality. The aim of the paper is to investigate innovation interdependence (measured by R&D expenditure), FDI and economic growth (measured by GDP) for the observed period from 2000 to 2017 for the selected EU members (Bulgaria, Croatia, Hungary, Romania, Slovakia, and Slovenia) and EU candidates (North Macedonia, Serbia, and Turkey).

The remainder of the paper comprises several sections. Section 2 is dedicated to literature survey. It is divided into three sub-sections and examines the connections between innovation and economic growth, innovation and FDI, and FDI and economic growth. Section 3 describes innovation using Summary Innovation Index, Capacity Innovation Index and Global Innovation Index for the selected EU and EU candidate countries. Section 4 presents data and methodology. Results and discussion are in Section 5. Finally, the paper is concluded in Section 6.

2. THEORETICAL BACKGROUND

2.1. Innovation and economic growth

A positive correlation between innovation and economic growth has been discovered in both empirical and theoretical research. Kacprzyk and Doryń (2017) investigated the relation between innovation and economic growth in EU countries for the period 1993 – 2011. The authors estimated whether patent activities and various R&D expenditures affect old (EU-15) and new (EU-13) members. They also investigated how various types of investment in R&D, with different funding sources, influence economic growth. Kacprzyk and Doryń (2017) did not find any significant influence of R&D on economic growth. However, patents proved to be an important indicator of growth in GDP per capita in new EU member countries. EU innovation policies as well as financial and managing instruments that implement these policies were analysed by Dzemyda and Melnikas (2009). Using the correlation analysis method these authors researched the need for EU investment in R&D and measured the influence of the investment on the economies of EU member countries. The relationship between innovation and economic growth in 19 European countries for the period 1989 – 2014 was investigated by Maradana et al. (2017). The authors used six different indicators for innovation: patents-nonresidents, patents-residents, R&D expenditure, researchers in R&D activities, high-technology exports, and scientific and technical journal articles. Maradana et al. (2017) showed that the results vary from country to country, depending on the type of indicator used in the process of empirical research. Bilbao-Osorio and Rodríguez-Pose (2004) also investigated connection between R&D, innovation and economic growth in EU countries, while Cvetanović et al. (2014) analysed innovation in the countries of Western Balkans in 2012, and Pala (2019) examined the relation between innovation and economic growth in 25 developing countries. Pala (2019) obtained different results regarding investment in R&D and economic growth in different countries. For example, this author found a negative correlation between investment in R&D and economic growth in China, Egypt, Iran, Moldova, Panama, Serbia and Uzbekistan. Furthermore, the results of this author confirm that the number of R&D researchers has a significant negative influence on economic growth in u Iran, Mexico, Tunisia,

and Uzbekistan, while the number of R&D researchers has a significant positive influence on economic growth in Ukraine, Turkey, Russia and China. Pece et al. (2015) and Petrariu et al. (2013) investigated the relationship between innovation and economic growth in CEE countries. Namely, Pece et al. (2015) applied regression analysis to observe how innovation potential of an economy has a long-term influence on economic growth in Poland, Czech Republic and Hungary. Pece et al. (2015) used various variables to quantify innovation, such as: the number of patents, the number of trademarks, and R&D spending. The authors found a positive relationship between economic growth and innovation. Petrariu et al. (2013) used different indicators to quantify innovation, such as: R&D spending, patenting, or the number of researchers, but also companies' characteristics, mergers, and acquisitions. In a similar way to Pece et al. (2015), Petrariu et al. (2013) also found that innovation significantly contributes to national competitiveness and economic growth.

Sesay et al. (2018) discussed whether national innovation system encourages economic growth in BRICS countries. The authors used quartile data for the period 2000 – 2013 and applied panel technique. Sesay et al. (2018) showed that national innovation system has an overall positive influence on economic growth in BRICS countries. Duarte and Carvalho (2020) compared national innovation system of Portugal with 92 other countries for the period 2013 – 2018. The authors came to a conclusion that the policy directed towards improving the capacities for absorbing the knowledge of domestic companies will boost innovative results of Portugal.

Ulku (2004) focused on the relationship between innovation and economic growth in 20 OECD and 10 non-OECD countries. She used the panel technique on patent and R&D data on economic growth for the period 1981 – 1997. Ulku (2004) found a positive relationship between GDP per capita and innovation (patent stock) for OECD and non-OECD countries, while only OECD countries with larger markets proved capable of improving their innovation by investing in R&D. However, Ulku (2004) concluded that innovation does not bring about constant economic growth. Cameron (1996) also concluded that innovation significantly contributes to economic growth. He took into consideration a range of different innovation measures, such as growth of R&D spending, number of patents and innovation as well as widespread effects of technological spillovers among companies, industries and countries. Cameron (1996) found considerable spillovers among countries, industries and countries and their tendencies to localise. The significance of innovation and the stock of knowledge in the process of economic growth was discussed by Uppenberg (2009). The author also investigated the mechanisms that induce companies to invest in R&D and the stock of knowledge. Uppenberg (2009) concluded that innovation generates increased productivity primarily due to enabling

more efficient organisation of economy, which is often combined with relocating resources towards industries with good growth prospects. He therefore pointed out that inflexible economies could lose many potential economic benefits that come from creating new knowledge and innovation. Parežanin et al. (2014) showed that economic activity is influenced by using knowledge and technology in a sector that will lead to the rise of productivity in European economies.

Hasan and Tucci (2010) empirically researched the importance of innovation on economic growth by using panel regression. They observed a sample of 58 countries for the period 1980 – 2003. As approximation of innovation they used data on patents. These authors came out with the results that the countries with high quality of patents record larger economic growth. Furthermore, their results confirmed that the countries which increase the patenting level will witness increased economic growth. Omri (2020) studied the capacity of technological innovation to promote economic growth and improve social and ecological conditions on the sample of 75 countries with low, middle and high income. The author used the analysis of causality by applying VECM method. The results showed that technological innovation simultaneously contributes to the three pillars of sustainable development only in the case of developed countries. However, they influence both ecological and economic dimensions in middle-income countries, while no influence was recorded in the countries with low income. Omri (2020) concluded that the influence of technological innovation on sustainable development of a country depends on its phase of development or the level of its income.

2.2. Innovation and foreign direct investment

Various theories on economic growth are based on certain determinants. Different methods and different indicators of economic growth and development are used to rank countries according to the level economic growth (Jednak et al., 2018). It is considered that FDI is the precondition for achieving economic growth and development in many developing countries, particularly in Eastern European transition countries. The transfer of technology and knowledge that should improve economic growth of the host countries is conducted through various types of FDI. If this is observed on the enterprise level, companies in host countries upgrade and catch-up the development level of their industries and technologies.

Technology transfer and establishing R&D centres of multinational companies in host countries encourage innovation. The combination of local R&D and innovation activities with foreign knowledge and R&D networks helps upgrading of technology and obtaining economic growth. Nowadays, smart specialisation is one of the innovation policies closely related to R&D and based on FDI, which lead EU

developing countries towards higher progress (Radosevic & Stancova, 2018). Furthermore, domestic institutions are the crucial factor in attracting innovation-intensive FDI in emerging economies (Egan, 2017). EU FDI inflows in China are determined by Chinese institutions and R&D (Cai et al., 2019). That is why R&D which is related to FDI is one of the most up-to-date research topics.

Günther et al. (2008) estimated whether there is a systemic relation between foreign investors' technological activities, their interaction with the performers of East German innovative system and the volume of technological externalities from FDI. The authors state that technological activity of foreign subsidiaries positively correlates to the importance of the chosen external network partners from Eastern German innovative system. Furthermore, Günther et al. (2008) found that the potential for spillovers rises with foreign subsidiaries' technological activity only for the suppliers from East Germany.

Erdal & Göçer (2015) used panel causality and cointegration method to explore the effects of FDI on R&D and innovation in 10 Asian economies during the period 1996 - 2013. They found that FDI inflows raise R&D and innovation activities in the host country. Doruk (2016) investigated the relationship between innovation and FDI in Turkey in the post-1980s. The results show that FDI has no contribution to innovation. However, innovation development attracts FDI. Weresa & Napiórkowski (2018) investigated how inward FDI affects innovation in the Visegrad countries. The results show no impact of inward FDI on innovation (number of patent applications), and no causal relationship between patent applications and R&D. Arun & Yıldırım (2017) confirmed that FDI is a crucial factor of the level of innovation in Azerbaijan and Georgia, but not in Turkey. The results are obtained by using panel analysis. Li et al. (2020) used a panel cointegration method, including structural breaks to explore the long-run equilibrium link between innovation and FDI in the selected OECD countries for the period 1999-2018. They revealed the equilibrium relation with structural breaks between innovation and FDI, and the positive influence of FDI on innovation and vice versa in 30 OECD countries. Omidi et al. (2020) compared theories on the drivers of innovation in 24 developing countries during 2011-2016 and found out that FDI and institutional quality have a positive influence on innovation.

Khachoo and Sharma (2016) investigated the influence of FDI spillover on innovativeness of performances in the companies that operate in Indian production sector, using panel technique on 514 companies. They found that FDI has a moderate influence on innovative performance in the enterprises of the identical industry. Khachoo et al. (2018) explored the impact of FDI spillover on innovation (R&D and patenting) and productivity in the manufacturing sector in India using DEA method.

They found that FDI affects innovation and productivity. Damijan et al. (2003) analysed 8000 companies in transition economies to explore the importance of technology transfer channels through FDI and productivity by using GMM approach. They confirmed that FDI has a direct impact on the productivity of companies due to technology transfer. Positive FDI spillover affected company innovation in China in the period 2005 - 2015 (Guo & Ning, 2020). Meyborg (2010) investigated the importance of technology transfer and modernisation by FDI in CEE countries. The results show that FDI supports innovation and networking activities in the observed countries. Furthermore, Sivalogathan and Wu (2014) explored FDI as a channel for technology transfer in emerging economies during the period 2000 - 2011. The results show that knowledge and skilled human resources influence innovation capability. R&D expenditure is also a factor of innovation capability.

2.3. Foreign direct investment and economic growth

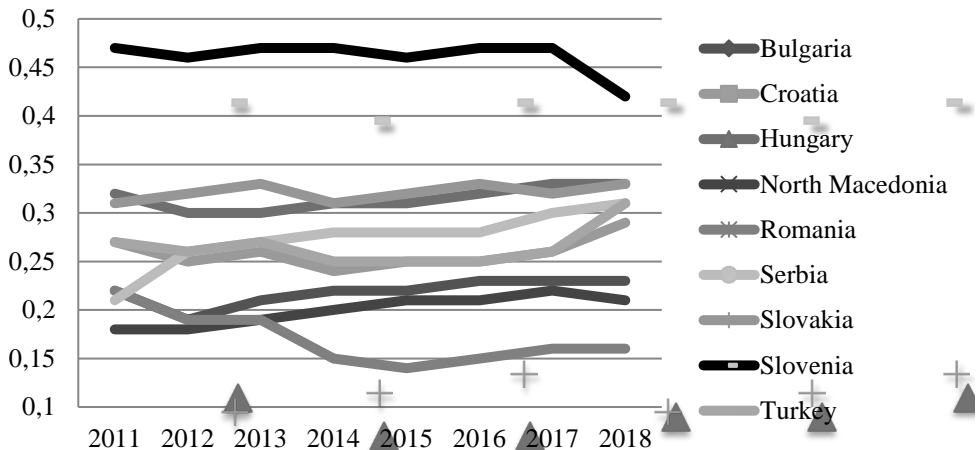
In literature, the influence of FDI on economic growth is discussed in different ways. Some research papers show positive effects, and other negative. There are also research papers that show either positive or negative effects depending on the conditions found in host countries and the type of FDI. Forte and Moura (2013), Herzer et al. (2008), Alfaro et al. (2008), and Borensztein et al. (1998) think that FDI will increase economic growth only if certain economic criteria have been fulfilled in the host countries. The main idea presented by these authors is that the effects of FDI on economic growth depend on the present or subsequently developed internal conditions of the host country (economic, social, political, cultural, technological, and the degree of economic openness). Asheghian (2004) claims that the reason for different FDI effects on economic growth lies in using different variables as well as the possible lack of analyses in the FDI host countries. Wang and Wong (2009) found different influences of FDI on GDP depending on the type of FDI (greenfield investment or acquisition). Furthermore, Chowdhury and Mavrotas (2006) had mixed results regarding the relationship between FDI and GDP. For example, the authors showed that high GDP causes FDI in Chile, and not vice versa. Parežanin et al. (2016) confirm the correlation between FDI inflows and economic growth in Serbia during 2000 - 2007 and no correlation between FDI and macroeconomic indicators after economic crisis. One may conclude that causal relation between FDI and economic growth is characterised by a high level of heterogeneity (Nair-Reichert and Weinhold, 2001). Minović (2017) studied the causality by applying Granger test between total investment portfolio and GDP in Serbia. The author found a positive correlation between the two variables. In order to adequately investigate interrelation between FDI and GDP variables it is necessary to conduct several separate studies, and the causality between FDI and GDP growth is specific for each country (Chowdhury and Mavrotas, 2006).

There are many discrepancies in opinions of different authors and their empirical findings regarding the causality between FDI and economic growth. The following authors found that FDI have positive effects on economic growth: Pegkas (2015) in the Eurozone countries, Raheem and Ogebe (2014) in the countries of Sub-Saharan Africa, Wang (2009) in Asian countries, Har et al. (2008) in Malaysia, Hansen and Rand (2006) in developing countries, Mullen and Williams (2005) in the USA, Choe (2003) in 80 countries throughout the world. Negative correlation between FDI and economic growth was found by: Vissak and Roolaht (2005) in Estonian economy, Mencinger (2003), and Globerman and Shapiro (2003) in Canada. The following authors do not think that FDI has significant effects on economic growth: Belloumi (2014) in Tunisia, Carkovic and Levine (2005) in different countries around the world, Smarzynska Javorcik (2004) in Lithuania, and Haddad and Harrison (1993) in Morocco.

3. MEASURING INNOVATION

Different variables are used in literature for measuring innovation including investment in R&D, Global Innovation Index, patent numbers, etc. This section is dedicated to presenting innovation according to different indexes for each of the selected EU member and EU candidate countries for different periods of time, depending on the available data. Figure 1 presents Summary innovation index for the period 2011 – 2018 published by European Commission (2020). According to this index, the first ranked of all the selected countries by innovation is Slovenia, while the last rank belongs to Romania.

Figure 1. Summary innovation index in the period 2011-2018

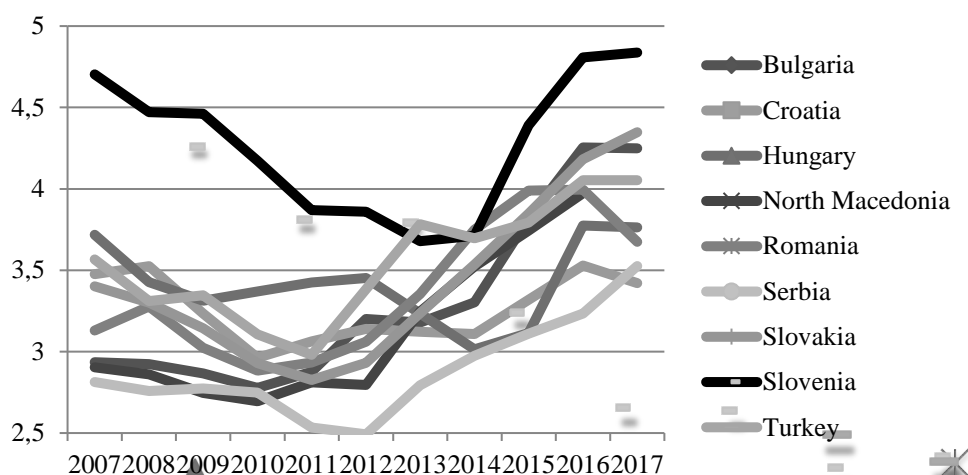


Source: Authors' presentation based on the European Commission (2020) data.

According to Summary innovation index - Bulgaria, Romania and North Macedonia belong to “modest innovator”, while Slovenia, Slovakia, Hungary, Serbia, Turkey, and Croatia belong to “moderate innovator” group.

Figure 2 presents the index of capacity for innovation in the period 2007 – 2017. Most countries have recorded a growing trend of this index since 2012 and 2013. According to this index the first ranked country is still Slovenia, which has recorded innovation capacity growth since 2014. Serbia has the smallest capacity for innovation, although this index has significantly grown since 2012.

Figure 2. Capacity for innovation in the period 2007-2017

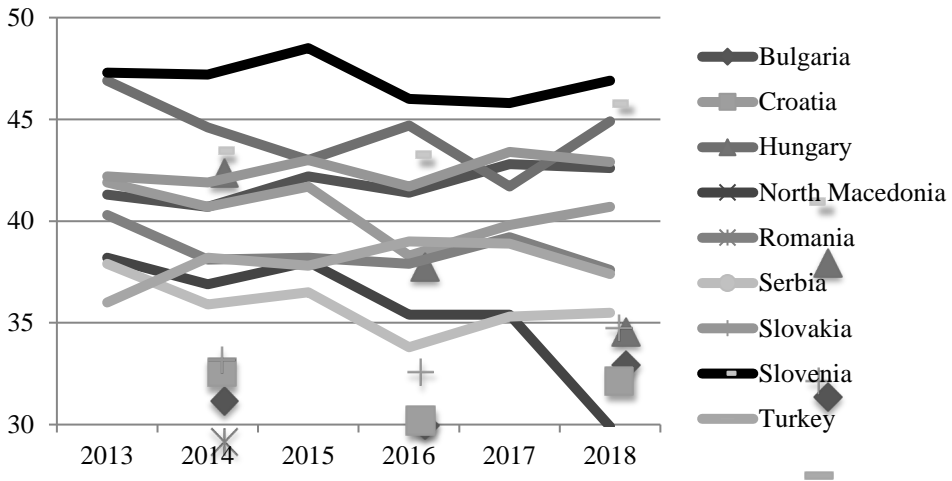


Note: Score is from 1 to 7 (the best).

Source: Authors' presentation based on the World Bank (2020) data.

According to Global innovation index for the period 2013 – 2018, Slovenia is ahead of the rest of the countries, while Serbia and North Macedonia have the lowest values (see Figure 3).

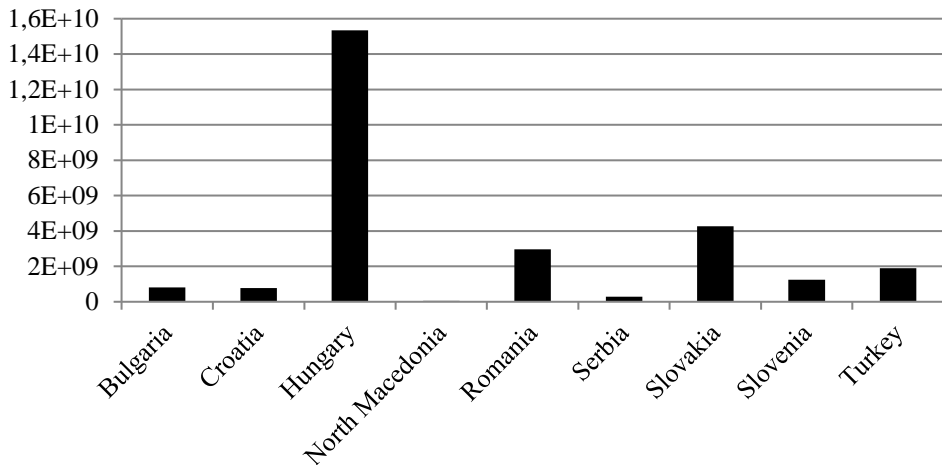
Figure 3. Global innovation index in the period 2013-2018



Source: Authors' presentation based on the WDI (2020) data.

Figure 4 shows the average value of High-technology exports (current US\$) for the period 2000 – 2018. According to this indicator, Hungary is far ahead of all the selected countries. Hungary is followed by Slovakia and then Romania. The smallest values of this indicator are recorded in Serbia and North Macedonia.

Figure 4. Average High-technology exports (current US\$) in the period 2000-2018



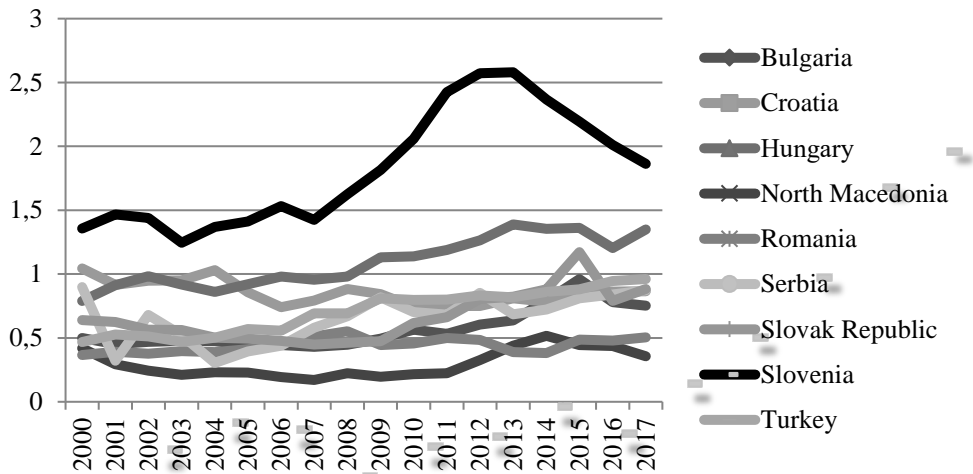
Source: Authors' presentation based on the WDI (2020) data.

4. DATA AND METHODOLOGY

Research and development expenditure (% of GDP), published by the World Bank, is used to quantify innovation. Kacprzyk & Doryń (2017) point out that R&D expenditures are often used as approximation of innovation. R&D expenditures used for the selected EU member and EU candidate countries in the period 2000 - 2017 are presented in Figure 5. The data for FDI and GDP are taken from the World Bank website and the data are World Development Indicators (WDI).

If one observes Figure 5, it is clear that Slovenia is ahead of all the other countries when investing in R&D is concerned, while North Macedonia lags behind the rest of the countries by this indicator.

Figure 5. Research and development expenditure (% of GDP) in the period 2000-2017



Source: Authors' presentation based on World Bank data.

Table 1 presents descriptive statistics of the variables employed in empirical analysis. The largest average economic growth measured by GDP is recorded in Turkey. However, its volatility is also the largest in Turkey. According to GDP level, Turkey is followed by Romania, but Romania also records a high volatility value of GDP. Of all the observed countries, Croatia has the lowest average economic growth and it is followed by Slovenia. However, the mutual characteristic of both countries is that the volatility of GDP is significantly higher than their average economic growth.

Table 1. Descriptive statistics (2000-2017)

	GDP (%)		R&D (% GDP)		FDI (% GDP)	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
Bulgaria	3.704	2.925	0.570	0.154	9.004	8.080
Croatia	1.938	3.377	0.856	0.094	3.784	2.265
Hungary	2.368	2.912	1.093	0.195	11.833	20.080
North Macedonia	2.781	2.453	0.298	0.109	4.591	2.780
Romania	4.042	4.042	0.443	0.057	3.771	2.395
Serbia	3.806	3.606	0.655	0.190	5.792	3.261
Slovakia	3.870	3.468	0.660	0.196	4.551	3.066
Slovenia	2.315	3.335	1.820	0.454	2.167	1.911
Turkey	5.247	4.538	0.705	0.171	1.626	0.903

Source: Authors' calculation

Average value of investing in R&D is the highest in Slovenia, and it is followed by Hungary. The highest volatility of this indicator is also recorded in Slovenia. As has been confirmed several times, North Macedonia has the lowest average value of innovation (measured by investing in R&D). Average value of FDI (% GDP) is the highest in Hungary, but the volatility of this indicator is also significantly higher in comparison to the rest of the countries. By the level of FDI (%GDP) Hungary is followed by Bulgaria, while Turkey has the lowest level of this indicator.

The analysis of causality between economic growth, innovation and FDI is based on the panel technique. Granger non-causality test was used to examine the causality. Since input variables have to be stationary, the stationarity of the used variables was also examined (GDP, FDI, R&D) by applying different panel unit root tests (Levin, Lin & Chu; Im, Pesaran and Shin; ADF - Fisher Chi-square, and PP - Fisher Chi-square). Minović et al. (2021) used the same panel unit root tests for the Western Balkan countries, but for other variables as well.

5. RESULTS AND DISCUSSION

Panel unit root test results (Levin, Lin & Chu; Im, Pesaran and Shin; ADF - Fisher Chi-square, and PP - Fisher Chi-square) are summed up in Table 2.

Table 2. Panel unit root test results (2000-2017)

Variables	Level		First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
Levin, Lin & Chu t*				
GDP	-3.034 (0.001)	-2.916 (0.002)	-8.111 (0.000)	-6.196 (0.000)
FDI	-2.146 (0.016)	-2.320 (0.010)	-8.415 (0.000)	-7.319 (0.000)
R&D	0.398 (0.655)	-1.678 (0.047)	-5.493 (0.000)	-5.735 (0.000)
Im, Pesaran and Shin W-stat				
GDP	-0.545 (0.293)	0.354 (0.638)	-6.263 (0.000)	-4.022 (0.000)
FDI	-2.202 (0.014)	-1.917 (0.028)	-4.847 (0.000)	-2.908 (0.002)
R&D	1.923 (0.973)	0.299 (0.617)	-4.228 (0.000)	-4.666 (0.000)
ADF - Fisher Chi-square				
GDP	15.673 (0.615)	11.430 (0.875)	70.962 (0.000)	46.160 (0.000)
FDI	28.786 (0.051)	27.311 (0.073)	55.410 (0.000)	35.943 (0.007)
R&D	4.675 (0.999)	11.736 (0.861)	48.810 (0.000)	52.293 (0.000)
PP - Fisher Chi-square				
GDP	26.493 (0.089)	17.665 (0.478)	125.609 (0.000)	92.185 (0.000)
FDI	8.953 (0.961)	7.406 (0.986)	33.437 (0.015)	16.983 (0.024)
R&D	3.971 (0.999)	12.188 (0.837)	77.632 (0.000)	49.705 (0.000)

Source: Authors' calculation

Note: Schwarz automatic selection of the lag length is applied for the unit root tests; probabilities for Fisher tests are calculated using an asymptotic Chi-square distribution. All other tests suppose asymptotic normality; p-values are presented in the parentheses.

Table 2 indicates that stationarity results of the variables differ both from the used test and the variable. However, in order to get stationary variables, we differentiated the existing ones and the results show that variables are stationary in the first differences.

After obtaining stationary variables we started examining the causality among the variables: economic growth (GDP), innovation (Investing in R&D) and foreign direct investment (FDI). The results are presented in Table 3.

Table 3. Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision
Δ FDI does not Granger Cause Δ GDP	126	111.154	0.000	Reject
Δ GDP does not Granger Cause Δ FDI		20.112	0.000	Reject
Δ R&D does not Granger Cause Δ GDP	126	5.348	0.002	Reject
Δ GDP does not Granger Cause Δ R&D		9.946	0.000	Reject
Δ R&D does not Granger Cause Δ FDI	126	16.573	0.000	Reject
Δ FDI does not Granger Cause Δ R&D		4.801	0.003	Reject

Source: Authors' calculation

Note: Δ is the first difference operator. We used lag=3 based on different criterion (Akaike, Schwarz and Hannan-Quinn information criterion).

The results presented in Table 3 show a bidirectional relationship between FDI and GDP, R&D and GDP, and FDI and R&D. Our result, which confirms the existence of significant R&D influence on economic growth, does not correspond to the result of Kacprzyk and Doryń (2017), while it only partially corresponds to the results of Pala (2019). The results of Pala (2019) vary from country to country when investing in R&D and economic growth are concerned. Furthermore, our result showing that innovation contributes to economic growth corresponds to the result of Pece et al. (2015), Petrariu et al. (2013), Cameron (1996), Ulku (2004), and Hasan and Tucci (2010). Our result that shows the relationship between FDI and R&D is in accordance with the result of Erdal and Göçer (2015), Arun and Yıldırım (2017), Li et al. (2020), Omidi et al. (2020), and partially with Doruk (2016) who did not find the relationship between FDI and innovation, but confirmed that innovation development attracts FDI. Our result concerning the relationship between FDI and R&D do not correspond to the results of Weresa & Napiórkowski (2018), since they found no causal relationship between these variables. Finally, our result which confirms the existence of bidirectional relationship between FDI inflow and economic growth corresponds to the result of Chowdhury and Mavrotas (2006) for Malaysia and Thailand, and Parežanin et al. (2016) for Serbia during the period 2000-2007.

6. CONCLUSION

The paper provides the analysis of causal relationship between economic growth, innovation (R&D expenditure) and foreign direct investment (FDI) by using Granger causality test. Causal relationship between the selected variables is investigated for the following countries: EU members (Bulgaria, Croatia, Hungary, Romania, Slovakia, and Slovenia) and EU candidates (North Macedonia, Serbia, and Turkey) for the period 2000 – 2017.

Prior to examining causality for the selected EU and EU candidate countries, we analysed innovation by using Summary innovation index, Capacity innovation index, and Global innovation index. All three indexes show that Slovenia is best ranked by innovation. According to Summary innovation index, the last ranked of all the selected countries is Romania. This index places Bulgaria, Romania and North Macedonia among “modest innovator” countries, while Slovenia, Slovakia, Hungary, Serbia, Turkey, and Croatia belong to “moderate innovator” group of countries. According to Capacity for innovation index, Serbia shows the lowest capacity for innovation, although a considerable growth of this index has been recorded since 2012. Global innovation index shows that Serbia and North Macedonia have the lowest values of this index.

As far as the causality results for the selected EU and EU candidate countries are concerned, they reveal that a two-way relationship exists between economic growth and FDI, economic growth and innovation, and FDI and innovation. This result indicates that investing in innovation influences more FDI inflow and GDP growth and vice versa – more FDI and GDP will generate more innovation. A direct implication of this result for economic decision makers, either in EU member or EU candidate countries, is that they have to pay more attention to investing in R&D and innovation in order to create better conditions for higher FDI inflow. This will consequently lead towards higher economic growth. Future research could include a different group of countries as well as different measures of innovation, such as the number of patents or the number of researchers.

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THEORETICAL ANALYSIS OF DIGITAL INNOVATIVE FINTECH INITIATIVES WITH SUCCESS FACTORS IDENTIFICATION

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***Abstract:** This paper presents research of innovative edges of financial technologies (FinTech) and gives theoretical analysis, as state of the art of literature, for digital transformation in the financial technologies era. Analysis is addressed to the challenges of the financial sector where are new entrants such as technology companies and technology startups that offer new digital innovative technologies as FinTech products and FinTech services. The paper contributes in the field of research of digital innovation and their implementation as FinTech products in financial sector. Given that FinTech products are mainly results of FinTech startup companies, identification of the success factors (SFs), as potential measurable indicators of the model for determining the FinTech success potential, is done as useful for the next stage of the research.*

***Keywords:** Financial technologies (FinTech), digital innovation, success factor, FinTech products.*

1. INTRODUCTION

The Financial Technologies (FinTech) have built a new appearance for the financial world after the global economic crisis in 2008 (The Economist 2015). In fact, it has not only created the positive influences and innovations for the businesses but also, changed the way people handle the money. During the last decade, financial technologies have built a new appearance for the financial world, where consumers are the most beneficiary from the rapid development of the FinTech industry (Siegel 2016).

Financial was considered as a conservative industry with its stable structure, business models and defined boundaries. However, this traditional structure began to change

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in the beginning of 90s. Actually, major changes in customers' essential needs such as depositing, sending and withdrawing money or financial advising didn't occur. The way to execute these activities and developing innovations has radically changed. Unstable nature of markets, rapid growth of new information and communication technologies, digitalization as new (fourth) industrial revolution (Industry 4.0) and changes in demographics, are some reasons lying behind this situation. Changes in customer demographics and their requirements triggered a new trend for innovation and new business opportunities (Gulamhuseinwala, 2016).

Mentioned conditions fostered financial innovation and many new products and services were offered to customers after 2008, mainly based on IT innovation and software tools. Services in financial sector are not based on physical goods where the innovations in financial sector are substantially intangible (Mention and Torkkeli, 2014). Innovation in financial services can be defined as innovation in products or organizational structures which result in cost or risk reduction and improve financial services (Ansari and Krop, 2012). These innovations also modified roles of financial institutions that are not the only organizations developing innovations in financial sector. They also benefit developments in other industries, especially in information technologies and digitalization. In this view (Chesbrough and Rosenbloom, 2012), there are often build collaboration of financial sector with software companies for reaching expertise and reducing costs.

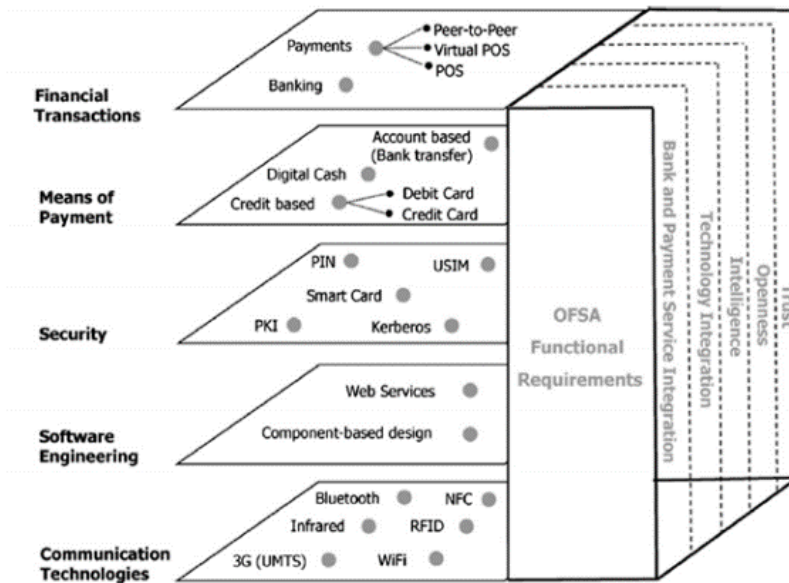
Financial technologies (FinTech), as benchmark of innovation and digitalization in financial services, lead fundamental changes in that sector enabling customers to access in faster and customer-friendly manner (Fasnacht, 2009). FinTech companies (FTCs) are the trigger for new era of fast-growing digital financial products & services and operate usually as new startups offering own innovative products in payment, lending or crowdfunding. Identification the factors of FTCs' business model (BM) (Vermeulen, 2014) with highest impact on the venture success is one goal of this paper.

2. LITERATURE REVIEW

A wide range of financial products of services were introduced, where financial innovations contribute to increase efficiency of financial institutions (Mention and Torkkeli, 2014). From that reason, many financial institutions regard innovation as a tool for reaching their strategic goals (Hydle et al., 2014). But conservative culture, constraints of existing systems, different goals of departments and limited use of new development tools can limit the scope of product innovation in financial services (Vermeulen, 2014).

In the beginning of 2000s, open architecture term was promoted regarding opening boundaries of financial institutions, according to changes in financial legislations that offer possibilities for variety of products (Fasnacht, 2009). According to (Kousaridas et al., 2014) Open Financial Services Architecture (OFSA) is a strategic innovation in financial products based on information technologies and digitalization, refers to a system which manages financial services through mobile devices, as presented at Fig.1.

Figure 1. Open Financial Services Architecture (OFSA) based on intelligent devices



Source: Kousaridas at all., 2014

These financial services have included mobile payments and have made new integration of payment and banking systems, where:

- trust factor between user and banking organization and between user and mobile device is regarded as the primary principle in this system,
- big data transfer takes place between these systems and core banking systems,
- every transaction requires security for authentication, integrity, confidentiality and authorization (Kousaridas et al., 2014).

2.1. Innovative digital Fintech products

Regarding to the new financial products and services based on innovations in financial services, collaborations between financial institutions and information and communications technologies companies become more important (Salampasis et al., 2014). It is financial technologies (FinTech) area that offers new products and services based on IT and digitalization in financial industry. There are developed different products, briefly presented in the follow section.

Mobile payment solution where customers can use their smartphones as digital wallets (Pham and Ho, 2015) that enables cards and terminals to make transactions without any physical contact. Technology developments play important role in the payments services, where invention of mobile devices enabled the development of mobile payment services. Mobil payment refers to the use of mobile device for initiation, authorization and confirmation of any payment in return for goods and services (Liu at al., 2015). Contactless technologies and application of these technologies in payments services, as are mobile wallets, peer-to-peer (P2P) apps, retailer-based closed loop applications and mobile money, are the leading developments. Design of the digital platforms is important as the timing of entry in mobile payments. In this sense, the ability of the new digital platform to evolve is a significant contributor to its success. According to (Parker and Ondrus, 2018), classify mobile payment platforms as one-sided, two-sided and multi-sided and posit that they are evolving to two-sided and multi-sided platforms. One-sided platforms are designed for specific groups and have limited features, they are easy to manage and they can be transformed to two-sided and multi-sided platforms according to needs. Two-sided and multi-sided platforms aggregate different groups in the same platform.

Big data as an enormous amount of information created every day that brings new technologies and methods for data management, processing and analyzing. Deployment of data standards, electronic data interchange formats, fast global connections, advanced databases and information systems facilitated the growth and development in this field (Chen et al., 2012), with overcoming challenges regarding data' volume (large datasets of data), variety (multiple data formats), veracity (complex structure and anonymities), velocity (high rate of data flow), variability, visualization and value. Data acquisition and warehousing, data mining, data aggregation and integration, data analysis, modelling and data interpretation are the process challenges. Lastly, privacy, security, sharing, ownership and cost of data are management challenges (Sivarajah et al., 2016).

Cloud computing refers to the delivery of different IT resources and services over Internet with ubiquitous and on demand access model, where users don't have to own data-centres, IT infrastructure and software services and payment structures are more flexible than other services. It lowers the costs enormously by leveraging economies of scale (Cai et al., 2009). There are three type of service models offered by cloud computing. These are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). SaaS refers to the deployment of software applications to consumers on a cloud infrastructure. These models can be deployed over private cloud, public cloud and hybrid cloud infrastructures. Cloud technology offers many opportunities for financial sectors due to their huge customer bases and database requirements, where private cloud deployments are for almost 70% of cloud initiatives in 2014 (Capgemini, 2016).

Application Programming Interface (API) is a set of procedures and tools enabling different software systems to communicate each other efficiently. Those are being used to facilitate the engagement of Fintech companies as innovation suppliers with finance institutions by building blocks of flexible services, combining different services and creating additional value (Chishti and Barberis, 2016). They offer secure, controlled and cost-effective access to data and functionality by third parties (EBA, 2016). Boundaries can be established for the access of APIs. While "Closed APIs" or "Private APIs" can only be accessed in an organization, it is possible for third parties to access "Open APIs". In terms of the openness of API, it can be classified as Private APIs, Partner APIs, Member APIs, Acquaintance APIs and Public APIs. Financial information systems consist of three layers. They are respectively user layer, user contract layer and financial system layer. While user account layer represents platforms such as internet banking, financial system layer represents financial systems such as account or data system. Data flow between user layer and user contract layer is possible with APIs (Kim et al., 2016).

Blockchain technology relies on the white paper, A Peer-to-Peer Electronic Cash System, published by an individual or a group under the name of Satoshi Nakamoto in 2008, as is explained in (Crosby et al, 2016). The most profound change in the global payment was the appearance of Blockchain, as a data structure that allows users to create a digital book for their transactions and share it widely through a distribution network of computers. Blockchain term represents a distributed database or public ledger which is executed and shared among participants, with consensus to verify each transaction in the public ledger without to erase the information. It enables anonymous transactions without any control from third party, opposite to traditional finance, where is need a third entity as a certain trusted authority to secure assets and for verification of a digital certificate for transaction. Third parties in traditional online finance are important for validating entries, safeguard entries and

preserving historical record in transactions, where this increases the cost of transactions. Blockchain technology can revolutionize digital world through distributed consensus for every transaction. It enables this without any involvement of third parties, based on cryptographic proof. Main features of blockchain technology are distributed consensus and anonymity (Crosby et al, 2015). According to an Oliver Wyman report (2015), systems for peer-to-peer transactions work near-certainly correctly, distributed ledgers eliminate supervision and IT infrastructure costs, but out of official regulation. Better understanding of new technologies can contribute to comprehend the investment movements, new business models, collaboration and relationships between parties in FinTech space.

3. METHODOLOGY

Research methodology has applied in two phases:

- Analysis of literature for different FinTech initiatives (FinTech products and services) taking into consideration their interconnection with information technologies (IT) applied in business processes, where identified four fundamental components are: value identification, value architecture, value network and value finance.
- In the synthesis phase, the digital innovative FinTech products and services are elaborate as revenue potential of business models.

Creative approaches of innovation inspire and guide cross-functional teams within an organization in order to identify new revenue streams, define new products or services and stimulate new business relationships and rethink current business practices. Identified key components, for financial technologies based companies, are: customer value proposition, technologies of production and revenue mechanisms.

In the paper section dedicated to the results, identification of the success factors (SFs,) as potential measurable indicators of the model for determining the FinTech success potential, is done as useful for the next stage of the research.

3.1. Business models for FinTech

FinTech startups have innovative business models leveraging advanced technology. They eliminate intermediaries in financial system with their lean and agile organizations, reduce costs with digital technologies such as blockchain and cloud infrastructure and enhance user experience and assess with complex big data and

complex algorithms. Less regulatory burden and lack of organizational legacies also facilitate their agile movement in the sector (Chishti and Barberis, 2016).

FinTech space embraces startups which are focused to specific areas with establishing e-commerce and technology companies (Arner et al., 2016). According to DaSilva (2014), success of these companies is dependent on combining cutting-edge technology capabilities and flexibility in changing laws and regulations. Success factors of companies are their low profit margin, asset light, scalable, innovative and compliance easy business models. Users have low willingness to pay for services in a world of wide-spread internet access and most of the services are free. Companies which built the explosion in smartphone usage and innovations in mobile technology are the main foundations of success in FinTech movement. Payments, money transfer and peer-to-peer lending services are the most disruptive ones among FinTech environment (KPMG, 2016).

3.1.1. Payment

Technology developments play important role in the payments services, where invention of mobile devices enabled the development of mobile payment services. Mobil payment refers to the use of mobile device for initiation, authorization and confirmation of any payment in return for goods and services (Liu et al., 2015). It mostly relies on the use of smartphones and tokenization, where it is regarded as the accelerator of mobile commerce with big contribution to peer-to-peer payment, sharing economy and growth of economies (Liu et al., 2015).

Mobile service providers, technology manufacturers, consumers and merchants are the primary actors in mobile payments. Mobile payments, with new payments infrastructure and legislations, integrate many parties from different industries which didn't have any interaction before, for example, mobile network operators and financial institutions are working hand in hand (Shrier, 2016). Front-end innovation, contactless technologies and application of these technologies in payments services, as are mobile wallets, peer-to-peer (P2P) apps, retailer-based closed loop applications and mobile money, are the leading developments (Arner et al., 2016; Capgemini, 2016).

For companies, timing for entrance and expansion are equally important in mobile payments. Design of the digital platforms, as a tool of expansion, is important as the timing of entry in mobile payments. In this sense, the ability of the new digital platform to evolve is a significant contributor to its success. Staykova and Damsgaard (2015) classify mobile payment platforms as one-sided, two-sided and multi-sided and posit that they are evolving to two-sided and multi-sided platforms. One-sided platforms are designed for specific groups and have limited features, they are easy to manage and they can be transformed to two-sided and multi-sided

platforms according to needs. Two-sided platforms aggregate different groups in the same platform.

3.1.2. Crowdfunding

It is possible to utilize internet for collecting small amounts of funding from a large number of people especially for particular projects. Crowdfunding campaigns give the opportunity to set the fundraising period and cancel the campaign, if targeted amount of money isn't collected. Zopa.com initiated crowdfunding activities first in 2005 and Indiegogo used first "crowdfunding" term (Lee and Kim, 2015). Crowdfunding websites are open platforms to raise money and builds the interaction between fundraiser and the crowd. According to European Commission (2016), crowdfunding can offer additional benefits such as project and idea validation to the project applicants and it enables large number of individuals to be entrepreneurs (EU Commission, 2016).

Different business models are carried out in crowdfunding. Companies issue equity or debt instruments to investors in investment-based crowdfunding method. Companies or individuals may also seek funding in the form of a loan agreement. This is called "crowdlending", "marketplace lending" or "peer-to-peer lending". It is also possible just to donate without receiving any return in donation-based crowdfunding platforms. Some platforms may combine various models in a single platform (EU Commission, 2016).

3.1.3. Technology acquisition and collaboration

Financial markets gives opportunities many industries with extend of revenue and level of competition. Total annual revenue of top banks in the world, it holds potential of thousands new FinTech start-ups. They can be both partners and rivals for traditional organizations in many services including payments, funding and management. Both parties require each other's collaboration in order to exploit new opportunities in the market. According to Kropotkin, who contributed Darwin's theory for evolutionary biology states that progressive development and mutual aid go hand in hand (Kropotkin, 1902). In that line, financial institutions can strengthen their competitive position by collaborating with Fintech startups (Accenture, 2014).

3.1.4. Policy and regulations

Regulations shape innovation and finance in terms of market entry, competition policy, monopoly and pricing (Liu et al., 2015). When it comes to banking or finance, it is impossible to rule out regulations and legislations, where without compliance and regulations, financial markets would be chaotic and more unstable. Prieger

(2012) puts forward that stricter regulations may have negative effects for innovation. On the other hand, regulators give importance to the relation between innovations and consumer welfare. The primary purpose of regulations is ensuring stability, efficiency and security in the marketplace by mitigating possible negative effects of the regulations. As technology advances, financial regulators may also find it difficult to understand innovations. In this regard, inflexible regulations may reduce their benefits. In contrast, successful regulations can enhance their benefits (Liu et al., 2015).

Regulatory technology (Regtech) term was promoted after the emergence of Fintech. It refers to the use of technology for regulatory monitoring, compliance and reporting. As a combination of technology and regulations, it offers enormous cost savings both for financial institutions and regulators.

3.1.5. Risks about FinTech

There are various issues and challenges regarding risks in FinTech space. Thousands of FinTech startups emerged after 2008, but most of them failed. Many analysts are skeptical about services of FinTech in terms of cyber security, data privacy, protection of big data and intellectual property. In addition, failures in FinTech space such as stolen bitcoins, bankruptcy, problems in P2P marketplaces, increase the doubts about FinTech. Technology and services change so fast and it is hard for legislators to comprehend benefits and possible abuses of innovations in FinTech area. In this sense, FinTech startups should prove themselves to answer these reservations.

4. RESULTS

In the context of FinTech, business model are developed around implementation of novel technology for producing customer centric products & services with introduction of different mechanisms for revenue generation. However, the scientific literature has not yet agreed on a universal success factors for FinTech business models.

Based on analyzed FinTech BM components: dominant used technology, delivery channel, revenue stream, customer value proposition and P&S offering, this research has suggested six success factors (SFs): customer centricity, low profit margin, agility, scalable, innovative and compliance easy BMs.

FinTech refers to innovative financial services or products delivered via technology where many companies or startups have worked on FinTech-related products and major disruptions in financial services are expected.

CSFs are critical factors or activities required for ensuring the success of an initiative and for ICT initiatives usually there are not in connection with specific financial services. The FinTech products, developed as ICT systems follow a process known as the software development life cycle and is normally managed as a project. A project is a grouping of related activities that consume some of the limited resources of an organization for a fixed period and that has a measurable objective as its goal.

The following factors describe the components of the SFs model. These components can successfully harness FinTech initiatives to reach the objectives of creating a sustainable financial technology business.

- *Customer centricity* means creating a positive customer experience at all the physical or virtual contact points with the organization and adding value to the organization. A customer-centric approach can add value to a fintech initiative by enabling a differentiation from competitors that do not offer the same experience.
- *Profit margin* is part of a category of profitability ratios calculated as net income divided by revenue, or net profits divided by sales. Low-profit margins are a characteristic of successful fintech initiatives. Most of the web accesses are available free. Fintech customers tend to have low willingness to pay for services providers of any type.
- *Agility* is the ability to thrive in an environment of continuous and often unanticipated change. Agility is vital for innovation and the competitive performance of companies in the contemporary business environment and FinTech initiatives, which are agile, have a competitive tool. With agility, a FinTech initiative can continuously improve the processes of creation and competitiveness introducing innovations in products, services and business models adapting to a changing environment.
- *Scalability* is the capability of a system, network, or process to handle a growing amount of work or its potential to be enlarged in order to accommodate that growth. Any FinTech business needs to be scalable in order to achieve the full benefits of the network effect. It is important that such a business be capable of developing new technology that it needs to be able to increase in scale without compromising the effectiveness, efficiency, and economics of the starting idea.
- Successful FinTech businesses need to be *innovative* in their products, processes, organization, and business model. With the increasingly

widespread use of mobile phones and internet services, much innovation can be made in new technologies, such as mobility, Big Data, Analytics, IoT, social networks, cloud computing, and AI in the FinTech space.

- In general, *compliance* means conforming to a rule, such as a specification, policy, standard, or law. Regulatory compliance describes the goal that organizations aspire to achieve in their efforts to ensure that they are aware of and take steps to comply with relevant laws and regulations. Compliance with legal financial regulations is not optional, but mandatory and when FinTech initiatives operate in several markets, they need to comply with complex multilevel regulations undertaken by different regulators.

In order to compare different FinTech initiatives from the point of view of CSFs, model for their modeling can be made with using a radar chart where the comparison of factor's influence shall be made for each FinTech initiative.

5. CONCLUSIONS

Theoretical analysis of key components for FinTech business models and contribution in research of SFs, as open question in literature, are in line with scientific research gap for new high tech venture. Numerous literature sources have identified that product specific factors represent crucial determinants of venture success that rely on innovation to generate competitive advantages, as it is also the case for FinTech companies.

FinTech companies, especially startups, are in growing by the day. A large amount of money has been invested in them and will likely be invested in the future. It is very important to find the method for identification success factors in order for early measure probability of success or failure of the business model to the FinTech initiative.

FinTech startups have innovative business models, eliminate intermediaries in financial system with agile organizations and reduce costs with digital technologies such as blockchain, cloud infrastructure, big data and complex algorithms. Financial industry has interest to invest in FinTech companies and finding success factors that can contribute in evaluation process of business models relating FinTech venture success is more than useful tool for investors.

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GENDER REPRESENTATION ON CORPORATE BOARDS AS AN INNOVATIVE APPROACH TO CORPORATE GOVERNANCE: CURRENT STATE IN THE SERBIAN'S FINANCIAL SECTOR

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***Abstract:** The idea of proposing 40% of women as board members of private companies whose shares are listed at the EU stock exchanges is almost 9 years old and it is still not effective. In this paper we have tried to put light on that problem by providing descriptive statistics of women inclusion in the Board of financial sector governing bodies in the EU and data show that constant improvement has been made after the directive proposal was issued (mean value ranges from 16% up to 28%), but it is still far away from what being proposed (40%). In terms of private companies from non- financial sector mean value ranges from 14% up to 25%. Wide public consultations on the matter can be considered as light enforcement mechanism without having the Directive to be transposed to domestic laws of EU member countries.*

***Keywords:** Corporate boards, corporate governance, gender equality, gender quota, financial sector*

1. INTRODUCTION

Corporate governance includes external and internal mechanisms, and both have been widely explored (Marai et al., 2017). A huge number of scholars have investigated whether corporate governance practices influenced firms operating performance and market performance. The most of them find that good corporate governance improve operating performance, while the results are not so clear concerning the effect on market performance (Bhagat, & Bolton, 2008). So, “in the contemporary business environment, there is a plausible consensus among researchers and practitioners about the significant role of good corporate governance

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(CG) policies in an organization's success (Zaid et al., 2020, p. 939). As Sheikh and Wang (2012) argue, countries that have implemented good CG mechanisms generally experienced enormous growth in the corporate sector and therefore attract more capital (Zaid et al., 2020, p. 940). "A stream of prior studies emphasizes that CG, particularly the role of board structure, is vital in maintaining shareholders' confidence, whose loyalty can assist in the realization of high-level financial performance and market growth (Bonn et al., 2004; Hermalin and Weisbach, 1991; Jackling and Johl, 2009)" (Zaid et al., 2020, p. 940). But, as Bhagat and Bolton (2019, p. 144), ingenuously state, it is unknown how these variables interact; "it is possible that better performance leads to better governance, just as it is possible that better governance leads to better performance." Scholars should be also award that different methods for measuring corporate governance could lead to different results of that influence (Bhagat, & Bolton, 2008).

Due to the fact that board characteristics play an essential role in organizations to improve their corporate governance and firm performance (Hassan et al., 2015) an increasing number of scholars have explored different characteristics of the board on performance. Many of these studies analyzed the effect of CEO overconfidence level (CEOOF), age, education, experience, tenure, network, founder, and gender on performance. These studies are based on the upper echelon theory or the revisited upper echelon theory (Ting et al., 2015). Gender-related corporate social responsibility (CSR) practices are as well receiving increasing attention from all stakeholders (Gutiérrez-Fernández, & Fernández-Torres, 2020), and therefore scholars. "Most of the studies show that corporate boards with female directors produce better governance outcomes than all-male boards and therefore, the most of scholars and regulators have advocated for board gender diversity as a means of promoting better governance and improving transparency among listed firms" (Srinidhi, et al., 2020, p. 1). "Some studies in Serbia show that age (Pavlović et al., 2019b) and gender (Pavlović et al., 2018) of CEO members do not affect ethical conduct or impact financial performance. (Knežević et al., 2017; Pavlović et al., 2019)"

"Gender Studies is distinctive as a practice and as an historical event of the 20th and 21st century, and challenges the most obvious understandings of these terms" (Pulkkinen, 2015, p. 183). But, gender issues have been explored for a long time in the religion context (Harrer, 2020; Pematana, 2020; Jurgens, 2020; Rahbari, 2020). As Guimaraes (2020, p. 3) point out, "gender ideology emerged as a response to the feminist movement that was gaining great political strengthening, expressed in the importance of the IV World Conference on Women held in 1995 by the UN in Beijing, but it also quickly became a persecution of movements that question compulsory heterosexuality, combining in its agenda the attack on movements that

challenged the normativity of patriarchy.” Gender equality has been on EU agenda for a very long time and is still considered as a priority issue. “This is the case because “accumulated evidence identifies discernible gender gaps across many dimensions of professional academic careers including salaries, publication rates, journal placement, career progress, and academic service” (Dion et al., 2018, p. 312.).

2. GENDER EQUALITY REGULATION IN THE EUROPEAN UNION

The term ‘EU gender equality acquis’ refers to all the relevant EU Treaty and EU Charter of Fundamental Rights provisions, legislation and the case law of the CJEU in relation to gender equality” (Timmer, & Senden, 2019, p. 7). In the legal structure of the EU two most important legal regulations are treaties. Treaty of Rome in 1957 introduced in the Article 119 equal pay principle (Fagan & Rubery, 2018). This article clears the path for gender topics as one of the most dominant topics in EU policy agenda. In recent history two new treaties were passed: Treaty on European Union or Maastricht treaty (TEU) in 1992 and Treaty on the functioning of the EU (TFEU) in 2012 as well as the Charter of Fundamental rights which went into effect in 2009. Charter has the same legal values as the treaties itself. Treaties and Charter contain constitutional principles that all legal acts passed in the EU should take into consideration.

TFEU Article 19 provides legal basis to combat sex discrimination stating that “European Parliament...may take appropriate action to combat discrimination based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation.” Article 157 of TFEU asks for equal pay between men and women. In the Article J.1 of TEU it is stated that EU has an aim to “develop and consolidate democracy and the rule of law, and respect for human rights and fundamental freedoms”.

Charter of Fundamental Rights of the European Union in Article 21 prohibits discrimination on any kind. Article 21 states that “Any discrimination based on any ground such as sex, race, color, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited.” Article 23 of the Charter recognizes positive action as a way to promote gender equality. Positive action is a tool to fight the collective dimension of discrimination (Nuria, 2014). Those measures are called affirmative measures as well and their goal is that under-represented sex should be compensated for disadvantages in their career.

All of the Directives and strategies always call for alignment with Treaties and Charter of fundamental rights. Treaties and Charter are based on the rules of law meaning that every action taken by the EU must be based on those rules. For example, if the policy area is not cited in the Treaty it cannot be passed as a law in the EU arena.

Gender policy in terms of non-discrimination between men and women and equal pay of men and women has been promoted in the treaty and charter, therefore other rules and regulations in this area can be passed in the EU. Gender policy consists of many different aspects: increasing female labor market participation, reducing gender pay gap, combating gender-based violence etc. One aspect of gender policy namely, imbalance between men and women in economic decision making is our primary concern and in the next paragraphs we are exclusively focusing on that aspect of gender policies. Imbalance between man and women consists of the following areas according to the European Institute for Gender Equality (<https://eige.europa.eu/gender-statistics/dgs>): women and men members and presidents of the highest decision making bodies of the largest nationally recognized companies; women and men among CEO, executives and non-executives of the largest nationally registered companies; women and men in the single lower houses of the national parliament; women and men in the national government, and women and men in the Commission senior and middle management.

All of the efforts made in the EU history to combat gender discrimination resulted with the EC COM/2012/0299 Proposal of Directive on improving gender balance among non-executive directors of companies listed on stock exchange and related measures (European Commission, 2012b). Directive under Article 4, par 1 calls for "... listed companies in whose boards members of the under-represented sex hold less than 40 per cent of the non-executive director positions make the appointments to those positions on the basis of a comparative analysis of the qualifications of each candidate, by applying pre-established, clear, neutrally formulated and unambiguous criteria, in order to attain the said percentage at the latest by 1 January 2020 or at the latest by 1 January 2018." (European Commission, 2012b).

When it comes to public influence on the proposal of the Directive, Commission organized very wide public consultations regarding the Directive. The total number of replies was 485, out of which 324 sent by organizations from 13 Member States, 79 companies, 56 business associations at EU and national level and 53 non-governmental organizations NGOs (women organizations) and others. Consultations help the European Commission to understand positions of various stakeholders especially business stakeholders whose views oppose to the views of the rest of the public. Stakeholders from business organizations favor more self-regulation instead of imposing quotas, while regional and municipal authorities and

NGOs vote for more binding objectives. After it was proposed by the Commission in 2012 and after the EU Parliament support given to the Directive itself it was never passed to the EU level, because it raises various questions about economic justification of the gender quota, affecting freedom of choice of private listed companies and not providing evidence of how women affect corporate results and performance (Szydło, 2014). In December 2015 Council asks for this topic to be discussed again. It was the same year 2015 when Gender equality strategy 2015-2020 made gender as one of primary goals of the EU. Besides support given, additional five years passes by and new Gender Equality strategy 2020-2025 reaffirms the proposed Directive implementation again. Commission in this new strategy strongly pushes forward the Directive on improving the gender balance on corporate board which set the aim of a minimum of 40% of non-executive members on board. At the same time in this new Strategy Commission also asks European Parliament and Council to adopt proposal Directive and measures to improve gender balance at all levels and Member States to transpose and implement Directive about board gender diversity into their domestic laws and regulations.

The so called “Draft Directive” calls for a political and academic debate on each five years when gender equality strategy covering additional five-year period is to be adopted. After certain measures are made regarding progress achieved by Member States in appointing more women as board members real action is still set aside. From 2011 up to 2015 Council of the EU discussed the Directive during presidency of the following countries: Italy, Latvia and Luxembourg. Italian presidency focuses on more flexibility in the Directive, Latvian presidency supported the proposal but did not reach the agreement and Luxembourg presidency said it would give big attention to gender balance in political and economic decision making and it reached an agreement but again without real effects.

Despite the “Women on Boards” directive proposal has not be adopted, some European countries include mandatory directorship quotas in their national legislative. Norway introduced a quota of 40% percent of women on boards, Sweden and Spain introduced a quota of 25% percent of women on boards, France introduced legislation requiring 50% representation, and Germany prescribed a 30% quota for women on supervisory boards (Srinidhi, et al., 2020, p. 1). Some non-European countries introduced mandatory gender quota as well. For example, the state of California in the United States recently also mandated female board representation (Srinidhi, et al., 2020, p. 1).

Although the directive proposal “Women on boards” has not been passed, the European Union has not given up on prescribing a gender quota “The Commission President, Ursula von der Leyen, stated in her Political Guidelines that she will seek

to build a majority to unblock the Directive. It is one of the priorities in the European Commission's new EU Gender Equality Strategy 2020-2025 adopted on 5 March 2020” (European Commission, 2020). Therefore, the knowledge of this directive proposal seems to be very important for the countries considered to be EU candidates as well.

In the next paragraph we are going to give an overview of the most important topics covered in the proposal of the Directive.

3. DRAFT DIRECTIVE ON GENDER BALANCE IN DECISION MAKING

Proposal of Directive itself rests on the quantitative indicator that on average “only 13.7% of corporate seats in the largest listed companies are currently held by women (15% among non-executive directors” (European Commission, 2012b). Besides this quantitative indicator as a reason for proposing this Directive, other soft criteria influence the decision to prepare the text of the Proposal of Directive. Member States apply gender equality rules differently in terms of companies on which the regulation is imposed (listed, all large companies, state-owned companies included) and types of measures to improve gender balance (legal objective with sanctions and explanation model in which company needs to give reasons for not being aligned with the objective). These divergent practices among Member States make internal single market less efficient, therefore, imposing many legal obstacles for the companies when doing business in different jurisdictions or in mergers and acquisition transactions. Besides the above mentioned, having no clear criteria for the selection of board members precludes women to actively participate and apply for board positions in different Member States. This could lead to under-utilization of human capital in those companies and less board diversity and more group thinking in the board. All of these could lead to less efficient decision-making system in EU companies and making them less competitive in the global market.

Purpose of the Directive is established as follows: to increase number of women on the corporate board throughout the EU, to fully exploit existing talent pool of candidates, establishing minimum harmonization for listed companies, to minimize the interference with day to day management, and focusing only public listed companies with high visibility.

The main requirement of the Directive of having 40% of underrepresented sex on the board is established between 30% of women on board which is the lower threshold and 50% which is full gender parity. In the Article 4, par. 2 of the proposed Directive it is clearly stated that this number should be closest to 40%, but no

exceeding 49%. Women inclusion in the board should be based on (Article, 4, par. 3) “if that candidate is equally qualified as a candidate of the other sex in terms of suitability, competence and professional performance” and companies have an obligation to disclose the selection criteria. The same Article 4 suspends the Directive for listed companies in which under represented sex represents less than 10% of workforce. Article 5 of the proposed Directive explains the reporting criteria for the companies. According to Article 5, par. 2 listed companies are required to provide information to national authorities once a year about gender representation in the board and measures used by those companies to comply with Article 4 of the Directive. Gender representation in the board should be published on the website. Article 6 requires sanctions to be imposed on listed companies from not being in compliance with Article 4 and quotas. Those sanctions can be divided into administrative fines and nullity by the judicial body of the appointment of non-executive directors. Article 8 sets up implementation procedures required to be done by Member States and those procedures are to be aligned with their laws, regulations and provisions with the Directive two years after the adoption. Article 9, par. 1 required Member States to communicate a report on implementation every two years.

4. ASSESSMENT OF PROPOSED DIRECTIVE POLICY OPTIONS ABOUT GENDER BALANCE

As being discussed previously proposal of the Directive vote for the policy option in which 40% of board members (non-executives) should be women in large EU companies listed on stock exchanges. In preliminary consultations this option has been highly promoted by various stakeholders such as NGOs and women organizations, but less accepted by business associations. In order to be implemented, this option requires at least 5 years of implementation (European Commission, 2012a). Long time frame for the implementation of this policy is given because of the large differences in gender policies among EU Member States. This obligation will force companies to proactively find suitable women candidate for this position from the available talent pool. On the other hand, the forcible dismissal of already appointed male board members whose membership has not expired so that women can be appointed in their place certainly cannot be a good solution.

Policy option of having at least 40% of female member in the board (non-executive members) has been assessed (justified) from the point of effectiveness, economic impact and social impact.

Regarding effectiveness it is predicted that this policy option by 2020 will generate an increase of 32.58% of women on boards, which is an increase of 11.74% points

compared to the baseline scenario (European Commission, 2012a). Baseline scenario is to have no changes in gender balance policy at the level of Member States.

Economic impact of this policy is considered from the corporate governance perspective taking into consideration several elements (European Commission, 2012a): accountability and audit risk, monitoring and control, innovation and creativity, work environment and values, direction and leadership, pay policies, corporate reputation and CSR, understanding of the market and board dynamics. This policy affects specifically board dynamics because many female board members will be included in the board.

Based on the articles showing positive influence of board diversity on performance indicators, according to the calculation this policy should increase return on equity by 0.28 percentage points for the listed companies in the Member States and would increase net income by 15.7 billion EUR (European Commission, 2012a). For an individual company it means increase in net income of approximately 3 million EUR compared to the baseline scenario or no policy implementation. According to the calculation the investment in this policy option is 16.6 million EUR at the EU level for the 3 years of implementation and additional 3 million in the next three years (European Commission, 2012a). Monitoring costs and administrative costs for the policy implementation are expected to be 100,000 EUR. (European Commission, 2012a).

But it is very important to notice that a respectable number of studies have shown a null or negative effect of female board representation on firm's market value, i.e. firms with more female directors are penalized by the stock markets (Solal, & Snellman, 2019), while a number of studies found a negative effect of mandated female representation on firm performance.

Regarding social impact this policy option will positively affect fundamental rights of equality between men and women, women's freedom to choose an occupation and right to engage in work.

5. DESCRIPTIVE STATISTICS REGARDING WOMEN PARTICIPATION IN THE FINANCIAL INSTITUTIONS

For the purposes of this article, in addition to describing the influence of regulation on gender balance, quantitative data is also provided. The data will show and explain to what extent the gender initiative is being implemented and what measures are likely to need to be taken to improve and balance the number of women appointed to the boards of financial and other institutions in Serbia. "However, it is important

to highlight that “banks are the dominant institutions in the Serbian financial system” (Knežević, et al, 2018, p. 169). Therefore, a comparison with annual EU averages is also given.

In the next table data for women participation on board of European financial institutions is presented for the period 2003-2019.

Table 1. Descriptive Statistics % of women on board of European financial institutions in the period 2003-2019

	N	Minimum	Maximum	Mean	Std. Deviation
Years 2003-2019	17	3.90	15.00	8.7765	3.19091
Valid N (listwise)	17				

Source: Eurostat data

Data show that minimum was 3.90% while maximum is 15% with the mean value of 8.7765% and standard deviation of 3.190091%.

In the next table we present descriptive statistics about the percentage of women as members of key decision-making bodies in central banks across the EU arena from the period 2003-2019. The total numbers of observations (countries) vary from 33 up to 38 countries that presented their data to the Eurostat. It means that besides the EU member countries data cover other countries as well such as non-EU members and countries with candidate status.

Table 2. Descriptive Statistics - women in central banks - governors, deputy vice governors, members in EU area (Women% of total in decision making bodies) in the period 2003-2019

	N	Minimum	Maximum	Mean	Std. Deviation
Y03	33	.00	50.00	12.2545	15.06322
Y04	37	.00	50.00	13.4378	15.00551
Y05	36	.00	42.90	13.7306	13.02801
Y06	36	.00	42.90	13.1111	11.77847
Y07	37	.00	45.50	13.3568	12.55334
Y08	37	.00	41.20	14.6297	12.19357
Y09	37	.00	41.20	15.7757	12.17585
Y10	37	.00	40.90	16.3324	12.13851
Y11	37	.00	40.90	16.4649	12.83927
Y12	37	.00	50.00	16.3703	14.38218
Y13	37	.00	50.00	16.7946	13.96139
Y14	37	.00	40.00	15.5378	11.72735
Y15	37	.00	45.50	17.1865	13.77068

	N	Minimum	Maximum	Mean	Std. Deviation
Y16	37	.00	57.10	18.0243	14.73598
Y17	37	.00	57.10	17.6432	14.45240
Y18	38	.00	57.10	20.4053	15.34652
Y19	34	.00	60.00	28.5794	13.65585

Source: Eurostat data

Data show that the mean percentage of number of women of Central bank highest decision-making bodies rose from 12.2545% in the year 2003 up to 28.5794% in the year 2019. Standard deviation varies over time showing that there are a large number of countries with very different percentages of women included in the highest decision-making bodies of Central banks in the EU. Minimum number of women in the board is 0 (which usually means that some of the countries do not present data for that period of time) and the highest is 57.10%.

In Table 3 we exclude 0% of women in the Central banks highest bodies and the data show the following:

Table 3. Descriptive Statistics women in Central banks highest decision -making bodies, data that are not available are excluded

	N	Minimum	Maximum	Mean	Std. Deviation
Y03	17	5.90	50.00	23.7882	12.73921
Y04	21	8.30	50.00	23.6762	12.27892
Y05	24	5.90	42.90	20.5958	10.52329
Y06	24	5.90	42.90	19.6667	8.75118
Y07	24	7.10	45.50	20.5917	9.54991
Y08	27	7.10	41.20	20.0481	9.64686
Y09	28	5.60	41.20	20.8464	9.38330
Y10	29	5.60	40.90	20.8379	9.60225
Y11	29	5.60	40.90	21.0069	10.63599
Y12	27	5.60	50.00	22.4333	12.04814
Y13	28	5.60	50.00	22.1929	11.64706
Y14	27	8.30	40.00	21.2926	7.94863
Y15	26	11.10	45.50	24.4577	9.38719
Y16	27	11.10	57.10	24.7000	11.37703
Y17	28	8.30	57.10	23.3143	11.89045
Y18	30	8.30	57.10	25.8467	12.44964
Y19	34	7.70	60.00	28.5794	13.65585

Source: Eurostat data

After excluding countries not providing gender data minimum percentage of women included in Central bank bodies is 5.60 in the year 2009-2013. After that minimum

% rose to 8.30 in the year 2014 then it rose even more to 11.10% in 2015-2016 but then it decreased to 7.70 in the last observed year 2019. It seems that minimum number of women included in the Central bank bodies was lowest after global financial crisis in 2008. Maximum % of women appointed in different bodies in Central banks in the year 2019 was 60%. Maximum in the year 2014 was 40% which was the lowest number in the maximum column. The highest standard deviation is reached in the Year 2019 and it is 13.65585, which is considered to be in line with the numbers because in the year 2019 there is a large number of countries providing data and minimum was 7.70% while max was 60%.

In Table 4, Serbian data are extracted and this table represents the percentage of women in Serbian Central bank bodies from the period 2008-2019.

Table 4. Descriptive statistics for Serbia (Percent of women in Central bank – governors, deputy vice governors and members in the period 2008-2019)

Year	Percent of women in Central bank bodies
2008	37.5
2009	37.5
2010	33.3
2011	33.3
2012	40.0
2013	33.3
2014	30.0
2015	30.0
2016	30.0
2017	22.2
2018	22.2
2019	33.3

Source: Eurostat data

The minimum percentage of women in the year 2017 and 2018 was 22.2% while maximum was experienced in the year 2012 which was 40%. This is quite different than in other countries where percentage of women in the Central bank bodies was the lowest in the post crisis period.

Percentage of women on board of large EU companies is presented in Table 5. It covers annual period from 2003-2011.

6. WOMEN IN BOARD OF DIRECTORS (EXECUTIVE AND NON-EXECUTIVE) -COMPARISON BETWEEN SERBIA AND EU

The following data are descriptors of women participation in board of directors in large companies from the EU area. This is in line with our paper as well in terms that the proposed Directive refers to proposing quotas for large companies' boards, specifically stock exchange companies.

Table 5. Descriptive Statistics % of women on board large companies EU, all sectors from the period 2003-2011 annual data

	N	Minimum	Maximum	Mean	Std. Deviation
Y03	30	.00	22.90	9.5633	6.23840
Y04	34	.00	22.40	9.5029	5.89974
Y05	36	.00	28.80	10.4028	6.65915
Y06	36	.00	34.50	10.6972	7.52525
Y07	36	.00	34.20	11.7611	7.35870
Y08	39	.00	42.90	11.9897	8.58778
Y09	39	.00	41.60	12.4769	8.62257
Y10	39	.00	38.90	13.1744	8.51097
Y11	39	.00	41.30	14.1564	8.91550
Valid N (listwise)	30				

Source: Eurostat data

What is considered to be interesting is that in the crisis period (2008) there was the highest percentage of women appointed on the largest company's board of directors (42.90). Mean number of women on board ranges from 9.5029 up to 14.1564 percent.

In Table 6, we can see the percentage of women on board of large EU companies in the semiannual periods starting from 2012 and ending in 2020 (first semiannual period).

Table 6. Descriptive Statistics % of women on board large companies all sectors, EU, semiannual periods from 2012-2020

	N	Minimum	Maximum	Mean	Std. Deviation
Y12	39	.00	42.00	14.2051	9.09499
Y122	39	.00	43.70	15.8744	9.88704
Y131	39	.00	48.90	17.0513	10.78988
Y132	39	.00	48.10	17.3949	10.94231
Y141	39	.00	45.60	17.5513	10.59441
Y142	39	.00	44.80	18.2462	10.53418

	N	Minimum	Maximum	Mean	Std. Deviation
Y151	39	.00	44.40	19.3051	9.77483
Y152	39	.00	44.20	20.5256	9.94053
Y161	39	.00	44.40	20.7718	10.51152
Y162	39	.00	45.10	21.3692	10.97248
Y171	39	.00	44.20	21.9846	10.94961
Y172	38	7.40	43.50	23.0342	10.22795
Y181	38	7.40	46.30	23.6868	10.46260
Y182	39	8.00	45.70	23.6513	10.34532
Y191	39	8.40	45.90	24.5308	10.45995
Y192	39	9.40	45.90	25.2256	10.55858
Y201	39	8.10	45.00	25.0769	10.33116
Valid N (listwise)	38				

Source: Eurostat data

Data show that mean value reached was 14.2051 in the year 2012 and maximum mean value is 25.22 in the year 2019 (second semiannual period). Data show improvement in appointing women on board of large companies from the EU area.

We have extracted data for Serbian percent of women on board of large companies in the period 2008-2020.

Table 7. Serbia - Percent of women as board member of largest companies from all sectors

Year	Percent of women as board members of large companies in Serbia
2008-B2	13.5
2009-B2	14.3
2010-B2	12.4
2011-B2	17.3
2012-B1	16.5
2012-B2	17.6
2013-B1	19.4
2013-B2	17.0
2014-B1	15.3
2014-B2	15.3
2015-B1	15.3
2015-B2	21.4
2016-B1	19.8
2016-B2	20.0
2017-B1	20.3
2017-B2	19.1
2018-B1	19.7

Year	Percent of women as board members of large companies in Serbia
2018-B2	21.2
2019-B1	17.9
2019-B2	15.6
2020-B1	15.3

Source: Eurostat data

Data show that in the second half of the year 2010 only 12.4 % of women were included in the board, while the maximum of 21.4% was reached in the second half of the year 2015. Compared with the EU companies' average data Serbian large companies show tendency not to include women on the board. In the year 2020 Serbian companies have 15.3% of women on the board, while in the same year EU average was 25.0769. Only in the best year for Serbian inclusion of women in the board such as year 2017- period 1 Serbia has 20.3% of women on board which was close to EU average of 21.9846.

Specific aspect of gender nexus is the appointment of women as the executive directors.

Table 8. Serbia - Descriptive Statistics % of women on executive position large companies EU period 2012-2020, semiannual

Y122	39	.00	32.40	11.2795	7.14493
Y131	39	.00	25.60	12.1487	6.65459
Y132	39	.00	35.40	12.8487	7.10666
Y141	39	.00	27.70	12.5872	6.37364
Y142	39	.00	28.80	13.0436	6.38212
Y151	39	.00	30.00	14.7692	6.56005
Y152	39	.00	29.70	15.3256	6.60883
Y161	39	.00	27.00	15.6128	6.26785
Y162	39	.00	34.80	16.0667	7.00873
Y171	39	.00	28.60	16.4333	6.50900
Y172	39	.00	32.10	16.8231	7.06915
Y181	39	.00	34.90	17.1308	7.24043
Y182	39	5.10	34.50	18.4590	6.44057
Y191	39	5.20	33.80	19.4641	7.13732
Y1922	39	6.00	33.80	19.8744	6.94829
Y20	39	6.10	32.40	20.3795	6.96877
Valid N (listwise)	39				

Source: Eurostat data

There is a data showing that mean value ranges from 11.2795% in the year 2012 up to 20.3795% in the year 2020. Data show that the percentage of women as executive directors rises on average, but there is a big variation in the sample (St. deviation ranges from 6.37364 up to 7.14493).

From the data above we have extracted data for Serbia. Serbian women are less than average appointed as executive directors.

Table 9. Serbia women executives on board of large companies

Year	%
2012-B2	18.3
2013-B1	25.0
2013-B2	21.1
2014-B1	23.9
2014-B2	23.0
2015-B1	29.2
2015-B2	29.7
2016-B1	27.0
2016-B2	24.1
2017-B1	22.4
2017-B2	19.3
2018-B1	19.0
2018-B2	21.7
2019-B1	21.9
2019-B2	20.7
2020-B1	20.7

Source: Eurostat data

In the year 2012 only 18.3% of women are appointed as directors of Serbian big companies, while in the year 2015 it was 29.7%. After that data deteriorate and in the year 2019 and 2020 it is close to 21%. When we compare those data to EU average, we can observe that in the year 2012 EU average was 11.2795% while Serbia has 18.3% of women executives, higher than the EU average. In the year 2020 Serbia is in line with the EU average.

5. CONCLUSION

Inclusion of women in the board of directors in companies and bank governing bodies is only one dimension in which we can place the consideration of the Proposal of the Directive which was reaffirmed several times after it was issued. Obviously, to vote for the policy option in which 40% of board members (non-executives)

should be women in large EU companies listed on stock exchanges did not gain much of the attention in Member States and candidate countries not only because private shareholders oppose to be influenced by the fixed quota, but also the academic researches are not showing that having more women in the board will make difference in terms of corporate performance. Being faced with the fact that implementation of this proposal of Directive requires huge investment made in the business in terms of finding the adequate female representatives for the position in the board that will have higher than average skills and knowledge about business itself than the male counterparts is very difficult and for some industries almost impossible task, many private companies' shareholders and directors find the cost benefit criteria to be more aligned with the cost side than with the benefits coming out from this Proposal. But without the implementation of the Directive observation of the data show that in EU companies from all sectors women are more and more placed in the board with the mean value reached of 14.2051 in the year 2012 and maximum mean value is 25.22 in the year 2019. From the perspective of our country data shows the following: in the year 2012 16.5% of women are appointed on average as board members while in the last year mean rose to 20%. It is less than the EU average value but improvement is still obvious. When considering executive board membership Serbia is in the year 2020 in line with the EU average value of 20%. Although, numbers are quite far away from what Directive proposes (40%) but constant improvement is obvious. It seems that rising awareness of women inclusion in the board by many initiatives, public consultations and forcing gender equality strategies at the EU level can be considered as light enforcement mechanism for including more women in the board in private companies.

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IT TOOLS AND TECHNIQUES FOR INTERNAL AUDIT IN CONDITIONS OF COVID-19 PANDEMIC

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***Abstract:** With the onset of the COVID-19 pandemic, an internal audit in the public sector in North Macedonia faces new challenges. Internal auditors had to adapt to the new situation and work in a variety of ways, including remotely working. Many internal auditors have had problems performing remote audits. Remotely work makes it hard to build rapport with auditees. The components of a remote audit are in many ways analogous to an in-person audit, with a greater focus on the use of IT tools and techniques. The paper analysis shows that not many internal auditors use IT tools and techniques to perform audit-related activities. During the COVID-19 pandemic, half of the internal auditors did not conduct a risk assessment, which reflects on the implementation of the annual plan. Internal auditors also faced problems with collecting documents because a database system was not used. Internal auditors also had problems collecting sufficient evidence for the findings. There is no unified internal audit software in North Macedonia. This paper aims to present the challenges and problems faced by internal auditors from the public sector in North Macedonia in conditions of COVID-19 and remote work as well as the benefits of using IT tools and techniques in performing an internal audit. The use of IT tools and techniques will improve the efficiency and effectiveness in the work of internal auditors.*

***Keywords:** Public sector, internal audit, COVID-19*

1. INTRODUCTION

With the occurrence of the COVID-19 pandemic, the world has changed completely, new norms of social interaction have emerged. The way of working has changed with a greater focus on working remotely. A "new normal" appeared to which the internal audit had to adapt. Before the COVID-19 pandemic, public sector internal auditors in North Macedonia operated in similar ways, following the same code of conduct, adhering to the same standards and using the same internal audit methods. Now, public sector auditors in North Macedonia have one more thing in common,

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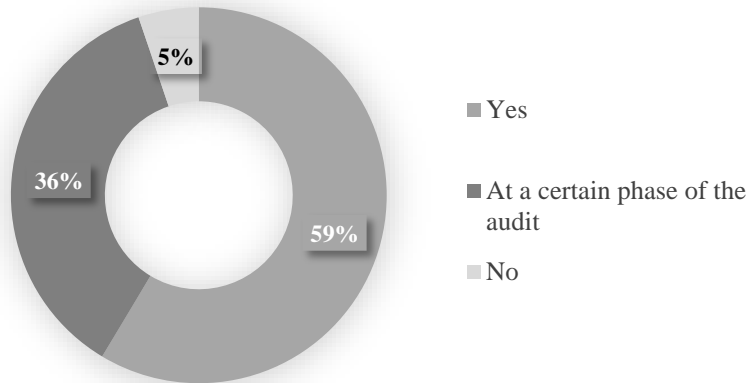
and that is the need to adapt to the "new normal" and often changing working conditions. In the condition of the COVID-19 pandemic, the whole world and North Macedonia focused on Internet communication and increased use of IT tools and techniques. Before the internal audit in the condition of the COVID-19 pandemic, major challenges arose, including how to plan internal audits, how to conduct internal audits, and how to report on the results of internal audits. Internal auditors in the condition of the COVID-19 pandemic need to find an appropriate way to function smoothly and help their organizational units achieve their goals. Embracing technology is critical at this time. The paper describes the benefits of using IT tools and techniques in internal audit as well as unified internal audit software in planning internal audit, conducting internal audit and performing internal audit. Innovation and transformation is a focus of businesses and audit programs throughout the world today (Remote auditing for COVID-19 and beyond, The IIA, 2020, p.10). Given the above situation and the challenges faced by internal auditors in the public sector in North Macedonia, it is important to see the benefits of using IT tools and techniques for remote work under COVID -19 pandemic. The paper describes the benefits of using IT tools and techniques in internal audit in planning internal audit, conducting internal audit and performing internal audit. The methodological approach to the analysis is based on the use of several methods of scientific research work, such as induction, deduction, logical, statistical method and comparative analysis. The paper collects primary data using a questionnaire based on a survey. The questionnaire was distributed electronically to internal auditors at the central and local level in North Macedonia. From a total of 199 questionnaires sent to public sector internal auditors, 60 responses were received.

2. INTERNAL AUDIT IN THE PUBLIC SECTOR THROUGH THE USE OF IT TOOLS AND TECHNIQUES IN THE CONDITIONS OF THE COVID-19 PANDEMIC

Internal Audit is considered as an important tool to control governance and operation of an organization (Turetken, Jethefer, Ozkan, 2019). The aim of internal audit is an independent and objective assessment of the internal control system and providing assurance and advice to improve the effectiveness of risk management processes, controls and operations management. To achieve this, the focus of many audit teams should be on improving the quality of their work and the effectiveness of the department using IT tools and techniques. As people around the world continue to work from home during the COVID-19 pandemic, internal auditors from the public sector in North Macedonia are adapting to the challenges of virtual engagement. Remote auditing is not a new concept, but this way of working brings certain challenges and problems at the same time. Performing and managing remote auditing

requires specific logistical considerations and balancing the needs of multiple stakeholders and this can make the internal auditor's job more difficult (Figure 1).

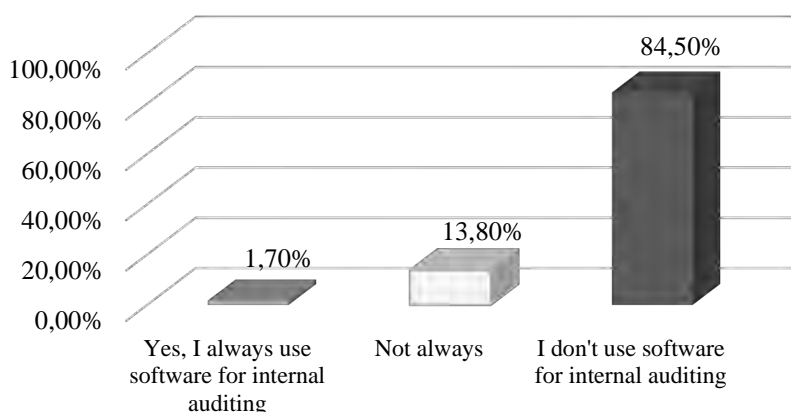
Figure 1. Does performing remote auditing make the auditor's work more difficult?



Source: Own research based on a conducted survey questionnaire (2020)

The analysis of the results shows that a high percentage of internal auditors stated that performing remote auditing makes the work of auditors more difficult. Most of the internal auditors (59%) stated that the performing remote auditing was completely difficult and a part of internal auditors (36%) stated that they had problems in a certain phase of the audit. Only a minor percentage (5%) stated that performing remote auditing does not make the auditor's work more difficult. In the condition of the COVID-19 pandemic, internal auditors need to think about to find a way how to perform remote auditing and how to rely upon more on the use of IT tools and techniques. Change can be difficult for everyone. This is incredibly true when it comes to moving beyond the tried and tested method of manual internal audit to using IT tools and techniques in auditing and using them for data analysis. The use of data analysis technology is part of the bigger technology armour that assists auditors in increasing audit coverage, performing more thorough and consistent audits, and ultimately increasing the levels of assurance that they provide their organizations (Global Technology Audit Guide Data Analysis Technologies, The IIA, 2011, p.2). In North Macedonia, there is no unified software for the internal audit that internal auditors would use in performing internal audits. The research in Figure 2 shows what percentage of internal auditors who use internal audit software in the public sector.

Figure 2. Do you use software for internal audit?



Source: Own research based on a conducted survey questionnaire (2020)

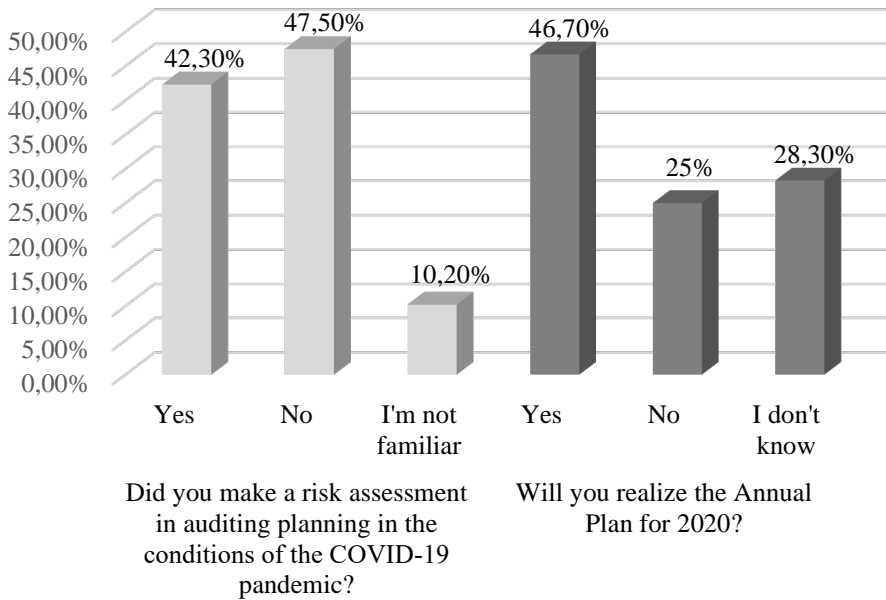
The results of the analysis clearly show that a high percentage (84.5%) of the internal auditors stated that they do not use internal audit software when performing audits in the public sector. We can conclude that the internal audit process is performed manually without the use of audit software by the internal auditors in North Macedonia. Using internal audit software as a tool will greatly assist in performing the audit. Internal audit software will facilitate certain operations while performing the audit. The software can provide automation for every step of the audit, and visibility in all aspects of performing the audit. According to the standard 1220.A2 – In exercising due professional care internal auditors must consider the use of technology-based audit and other data analysis techniques (International Standards for the Professional Practice of Internal Auditing, The IIA Global, Revised: October 2016, Effective: January 2017, p.7). Internal audit software should include the International Professional Practices Framework (IPPF) and the regulations governing internal audit in the public sector of North Macedonia.

2.1. Audit planning

The work of the internal audit is performed according to the Strategic Audit Plan for a period of three years, the Annual Audit Plan and the Individual Audit Plan. Based on the risk assessment, the chief audit executive proposes the strategic and Annual Audit Plan and their appropriate changes, and the head of the entity approves them. According to the standard 2010 – Planning, The chief audit executive must establish a risk-based plan to determine the priorities of the internal audit activity, consistent with the organization's goals (Implementation Guides for The IIA's Code of Ethics

and the International Standards for the Professional Practice of Internal Auditing The institute of Internal Auditors Global, 2019). Figure 3 shows what percentage of internal auditors assessed the risks and implementation of the Annual Plan in the condition of the COVID-19 pandemic.

Figure 3. Internal audit planning in the condition of the COVID-19 pandemic



Source: Own research based on a conducted survey questionnaire (2020)

The analysis of the results shows that half of the internal auditors do not have or are not know whether a risk assessment has been performed. This situation results in half of the internal auditors not realizing or not knowing whether to implement the Annual Internal Audit Plan. Audit plan achievement is usually a key indicator of the performance of an internal audit unit (The Impact of COVID-19 on the role and activities of internal audit, Internal Audit Community of Practice, April 2020, p.14). In the condition of a COVID-19 pandemic, when all processes are slowed down, internal auditors should review the Annual Audit Plan, and based on an assessment of emerging risks, if they can not realize it, to make a change. International Standards for Professional Practice of Internal Auditing allow this. Internal auditors in public sector rely on stand-alone solutions and manual processes for conducting a risk assessment. In a COVID-19 pandemic when many processes in the public sector are slowed down, auditors are hesitant to make changes to the annual plan or attempt to carry out planned audits. Internal audit software would play an important role in

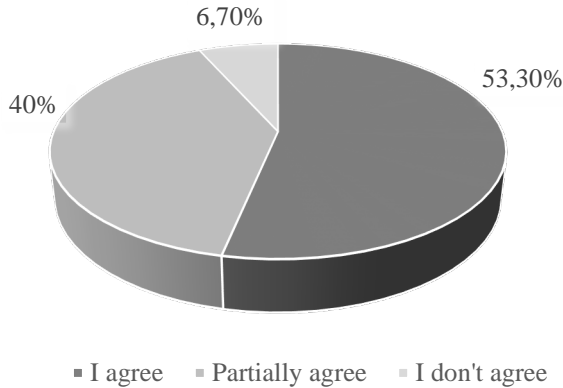
reviewing the Annual Audit Plan in the condition of the COVID-19 pandemic and would facilitate the internal auditor's work in assessing risks. The internal audit software would have a significant role in reviewing the Annual Audit Plan in the condition of the COVID-19 pandemic and it would facilitate the work of the internal auditor in assessing risks. If internal audit software is used, analyzing the database of risks and controls that are related to policies can very effectively help identify the risk indicators or the risk that arises in the organization in the condition of a COVID-19 pandemic. Analyzing data with internal audit software can greatly help internal auditors to more easily define whether to make changes to the Annual Plan. Internal audit can create an audit plan that focuses on the areas of highest risk assessment in the condition of the COVID-19 pandemic. With the identified risks that occur in conditions of COVID-19 pandemic from different processes, it is easier to select the risk areas and elaborate them to the head of the entity to change the Annual Audit Plan.

2.2. Identified obstacles in internal audit in practice in the COVID-19 pandemic and remote work

In conditions of COVID - 19 pandemic and remote work, the internal auditor should hold the initial meeting online (Zoom, Microsoft Teams, Skype, etc.). Initial meeting auditors must take the time to explain the approach to remote auditing. The audited entity should be explained what technology will be used, what materials and data and in what form it should provide, and what the limited areas. Restrictions on remote auditing should also be discussed. Experience has shown that internal auditors in the condition of the COVID-19 pandemic need to spend twice as much time planning remotely as compared to the traditional way of auditing. In such situations, the use of internal audit software should be considered to increase the effectiveness of the internal auditor. Conducting a remote interview can be done in the same way as the interview with the physical presence in the office with the persons from the audited entity. The interview with the persons from the audited entity can be done by making video calls. The time interval of the type of interview calls should range from 30-90 minutes. (Remote auditing for COVID-19 and beyond, The IIA, 2020, p.5). If the internal auditor has specific information and needs to confirm it, the interview may be shorter. For a remote interview, video calls are preferred over voice-only calls, because non-verbal signals are an important part of communication and if we do not see the other person, we cannot notice them. Preparing for a remote interview requires extra time for the auditor. The auditor should be prepared with a list of questions through which additional answers will be obtained for information obtained from the review of documents. When conducting a video call interview, the auditor should be aware that many people may not enjoy video calling. If the auditor finds such a situation, he should interview a comfortable

tone and may change his body language. Remote document reviews are in many ways analogous to reviewing documents at the facility, with a couple of major caveats (Remote auditing for COVID-19 and beyond, The IIA, 2020, p.3).

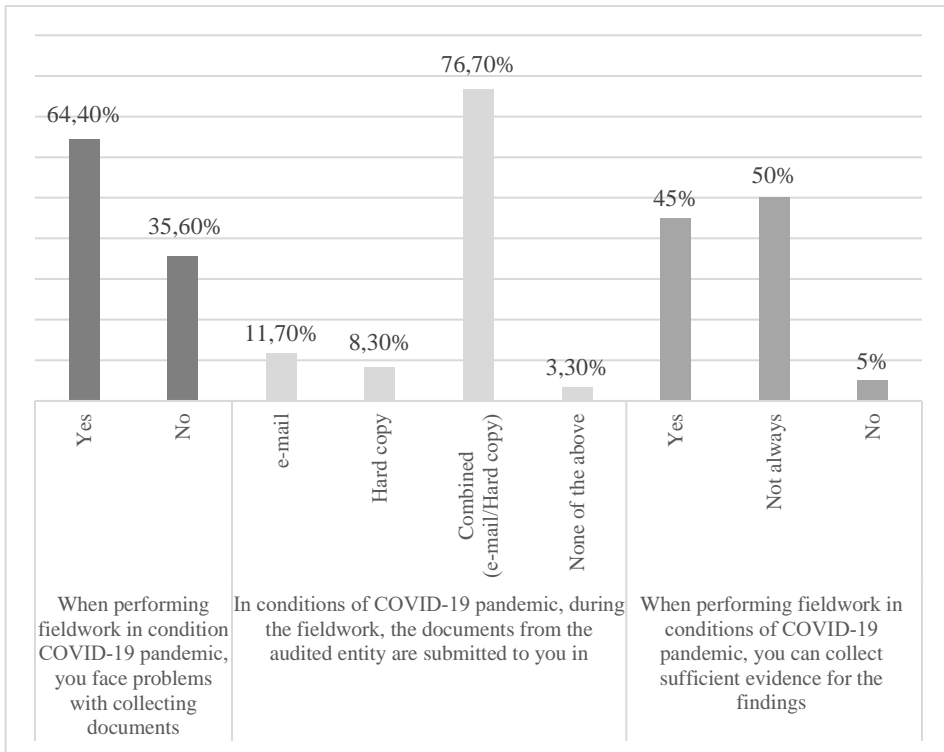
Figure 4. Collecting sufficient evidence to support the findings in conditions of the COVID-19 pandemic is difficult because most of the documents in the audited entity are in hard copy



Source: Own research based on a conducted survey questionnaire (2020)

The analysis of the data shows that a large number of auditors (93.30%) in the public sector in North Macedonia had problems or partially had problems in providing sufficient documents to support the findings because most of the documents in the audited entity are in hard copy. According to the standard 2310 Identifying Information - Internal auditors must identify sufficient, reliable, relevant, and useful information to achieve the engagement's objectives (International Standards for the Professional Practice of Internal Auditing, The IIA Global, Revised: October 2016, Effective: January 2017, p.16). If the documents are in hard copy it will be necessary for the internal auditor to ask the audited entity to scan the documents and transfer them to a format through which they can be easily reviewed (for example PDF).

Figure 4. Problem with collecting documents in conditions of COVID-19 pandemic in the public sector in North Macedonia



Source: Own research based on a conducted survey questionnaire (2020)

From the analysis of the data in Figure 4 we will notice that a large part of the internal auditors (64%) in conditions of COVID-19 pandemic faced problems in collecting documents. A high percentage of the internal auditors in the public sector (76,7%) collect the documents in combined (e-mail/Hard copy). Half of the internal auditors not always be able to collect sufficient evidence for the findings during the fieldwork. This situation is because many of the processes in the public sector institutions in North Macedonia are not automated through software solutions and very few IT tools are used by the employees in the institutions. Internal auditors should be open to cooperation and receive documents in electronic form in any format so as not to distract the audited entity with additional work. For the documents to be scanned or transferred from hard copy to electronic form, the audited entity will need to allocate staff. For that operation, the audited entity may need a longer period of time to prepare and send the documents to a file-sharing platform. The internal auditor should consider the availability of the digital file system used by the audited entity where the records are stored. Direct access can be granted temporarily,

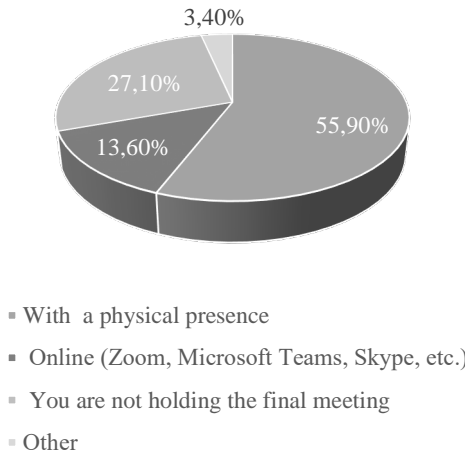
solely for the duration of the audit. Depending on the type and number of records for analysis, a sample of the data from the database system can be taken or the entire database of records can be withdrawn. Careful consideration should be given to building effective strategies for reviewing data remotely. Whether reviewing all or part of the available data, the strategy should be discussed with auditees to ensure they provide the correct information to support the sampling strategy. When the auditor reviews the documents remotely, he should take notes and write down all the questions that he should additionally ask the audited entity. However, the auditor may make a video call to the audited entity that will allow the documents to be reviewed, and asking questions and receiving answers will be conducted in real-time. To improve the quality of conducting an internal audit in the condition of a COVID-19 pandemic, a manual manner of auditing should be avoided. Advances in technology and software solutions enable internal auditors to fundamentally change the way audits are performed. Application-level audit analytics usage is defined as the extent to which audit analytics software is used in the audit process (Li, Dai, Gershberg, A.Vasarhelyi, 2018, p.61). The software solution for performing the internal audit has a great role in the effectiveness of the performance of the internal audit. If the manual data processing is used for certain audit processes, more time and resources are spent. To achieve the purpose of the internal audit, data collecting and processing can be done through internal audit software. Analytical techniques and methods through the internal audit software enable the audit teams to start analyzing the data of the audited entity at the very beginning of the audit process and to start identifying areas that need further research. This allows problems to be identified as early as possible, and the auditor can adjust the audit approach to perform a more relevant audit by adjusting the audit plan accordingly. The data can be collected in electronic form, to processed and over testing to draw certain conclusions about the findings. Data analysis as used by internal auditors is the process of identifying, gathering, validating, analyzing, and interpreting various forms of data within an organization to further the purpose and mission of internal auditing (Global Technology Audit Guide Data Analysis Technologies, The IIA, 2011, p.2). Data Analysis can help internal auditors meet their auditing objectives. Data analysis using internal audit software enables an advanced, dynamic process of identifying anomalies, trends, correlations, and fluctuations, directing auditors to where risks may be present. By analyzing data within key organizational processes, internal audit can detect changes or vulnerabilities in organizational processes and potential weaknesses that could expose the institution to undue or unplanned risk. This helps identify emerging risk and target audit resources to effectively safeguard the institution from excessive risk and improve overall performance. Data analysis using for internal audit software helps internal auditors better understand the audited entity's business activities and provide further insight into risk assessments and controls. Data analysis through internal audit software enables auditors to access and

query data by themselves, thereby decreasing their reliance on busy IT personnel having to run data extracts. This helps provide a higher degree of confidence in the accuracy and completeness. Data analysis technology also can be used to determine if semi-automated or manual controls are being followed by seeking indicators in the data. By analyzing 100 per cent of relevant transactions and comparing data from diverse sources, internal audit can identify instances of fraud, errors, inefficiencies, or noncompliance. According to the standard 2320 Analysis and Evaluation - Internal auditors must base conclusions and engagement results on appropriate analyses and evaluations (International Standards for the Professional Practice of Internal Auditing, The IIA Global, Revised: October 2016, Effective: January 2017, p.17). Internal audit software can shorten the time it takes to prepare working papers as it may have created templates from working papers in which data will be automatically generated or documented. This will make the auditor more effective and will shorten the time in performing the audit. In addition to templates, the auditor can freely create documents using the accompanying IT tools through the internal audit software. Working papers should support audit evidence and manage the quality assurance process.

2.3. Informing for results of audit

The results of the individual audit are reported in the form of an audit report, which consists of audit findings, audit opinion, audit recommendations and action plan for implementation of the internal audit recommendations. According to the standard 2400 – Communicating Results, Internal auditors must communicate the results of engagements (International Standards for the Professional Practice of Internal Auditing, The IIA Global, Revised: October 2016, Effective: January 2017, p.17).

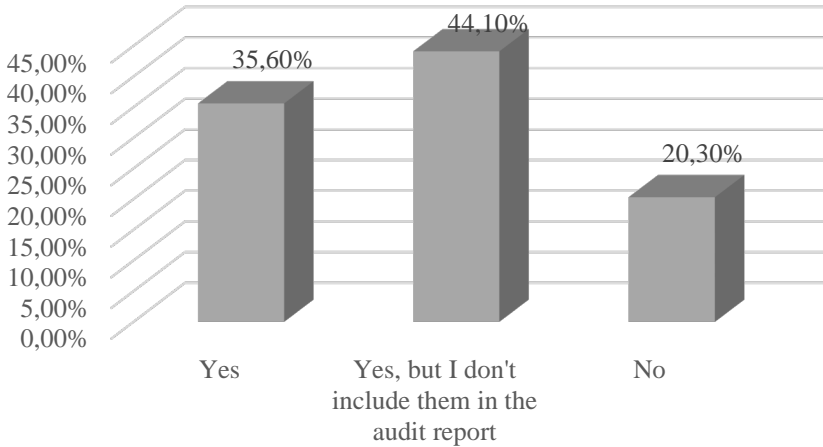
Figure 5. Holding a final meeting, in the condition of COVID-19 pandemic



Source: Own research based on a conducted survey questionnaire (2020)

The analysis of the data (Figure 5) shows that a very small percentage of internal auditors use IT technology to perform audit-related activities. The analysis of the results shows that only 13.6% of internal auditors held the final meeting through an on-line (Zoom, Microsoft Teams, Skype, etc.). The final meeting for a remote audit is much the same as the closing meeting for an in-person audit. It is suggested to schedule the closing meeting one to two days following the remote interviews. This allows the audit team members to review their own notes and findings, as well as have a remote audit team meeting to compile preliminary draft audit results. The audit closing meeting is an opportunity to present these preliminary draft audit results to the stakeholder audience, resolve any questions or concerns, and discuss the path forward to audit result finalization and continuous improvement (Remote auditing for COVID-19 and beyond, The IIA, 2020, p.3). Reporting on the results of the internal audit includes the preparation of a draft audit report, compliance of the draft audit report with the audited entities, preparation of the final audit report and submission of the final audit report. When preparing reports and communicating results it is necessary to take into account significant findings and significant risks that affect the institution's objectives at the engagement level. It is necessary to take into account an acceptable risk level when agreeing on corrective measures and determining action plans. During the follow-up of recommendation, measures and activities implementation it is necessary to take into account timing and risk significance covered by the corrective measures.

Figure 6. Did you take in to account the new risks that arose during the COVID-19 pandemic during the audit, and did you include them in the audit report?



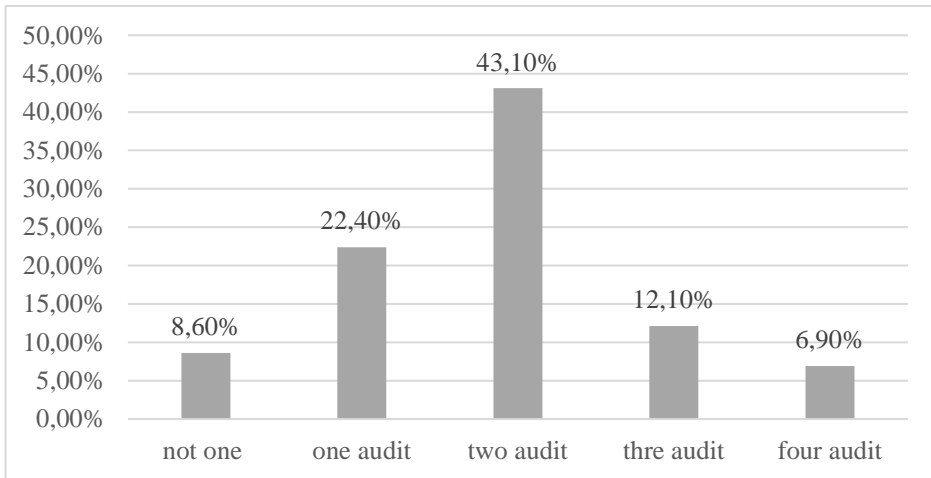
Source: Own research based on a conducted survey questionnaire (2020)

The analysis of the results shows that 20.3% of the internal auditors did not assess the risks during the COVID-19 pandemic, and 64.4% of the internal auditors did not enter the risks in the Final Report. If internal audit software is used, it will enable the assessment of the risks that will be part of the risk database and will be gone in automatically when creating the Final Report. Internal audit software in the part of writing the audit report will be able to automatically transfer the findings based on audit procedures to the audit report to support the completeness and validity of the report of the finding and thus the auditor will be able to make recommendations for overcoming the situation.

2.4. Performed audits in the conditions of COVID-19 pandemic

The value and relevance of internal audit should be demonstrated by the ongoing activities of the internal auditors. Internal audit through its activities in conditions of COVID-19 pandemic should add value to the organization. Figure 7 shows the implementation of internal audits in the public sector in conditions of COVID-19 pandemic in North Macedonia.

Figure 7. From the start of COVID-19 pandemic until the completion of this survey, you have performed a total of internal audits



Source: Own research based on a conducted survey questionnaire (2020)

From the beginning of the pandemic until the closing of the questionnaire, most of the internal auditors have performed two audits. This is followed by auditors who have performed one audit each, and some auditors have not performed any audits. However, some of them are covered by the measures related to the COVID-19 pandemic adopted by the Government of North Macedonia. If internal auditors in North Macedonia use internal audit software can help them to optimize work activities. The internal audit software can monitor the execution of audit activities as well as the auditor himself to monitor workload in real-time. Internal audit software can be linked to a calendar of activities as well as tracking it in real-time. Internal audit software can provide the chief audit executive with real-time clarity on the current and upcoming status of audit work, audit findings and audit summaries. The validity of the notion that Internal Audit could add value to organisations rests on the implied the assumption that internal audit is effective (Getie Mihret, James, M Mula, 2010). Monitoring the auditor's activities in real-time through software for an internal audit can optimize the audit work, making it more effective. Through the internal audit software using a survey in the form of a checklist, the internal auditor can receive feedback on the satisfaction of the audited entity from the performed audit. Internal audit software can also enable the audit unit to self-assessment their compliance with IIA Standards. Internal audit software will enable internal audit units to comply with Quality assurance and improvement program.

3. CONCLUSION

From the performed analysis we can conclude that the internal auditors in the public sector in North Macedonia face challenges and problems in performing the internal audit in conditions of COVID-19 pandemic. Many internal auditors stated that performing internal audit remotely makes it difficult for auditors to operate. Data analysis shows that a very small percentage of internal auditors use IT tools and technique to perform audit-related activities. In the condition of the COVID-19 pandemic, internal auditors should be using IT tools (Zoom, Microsoft Teams, Skype, etc.) for their initial meeting, interview, and final meeting to be more effective. Half of the internal auditors do not know or are not familiar with whether a risk assessment has been performed. This situation results in half of the internal auditors not realizing or not knowing whether will realize it the Annual Internal Audit Plan. Internal auditors in a condition of the COVID-19 pandemic also faced problems with collecting documents. Half of the internal auditors not always be able to collect sufficient evidence for the findings during the fieldwork. Many of the internal auditors in the public sector provide the documents combined (email / Hard copy) without using a digital file system. This situation is for the reasons that many of the processes in the public sector institutions in North Macedonia are not automated through software solutions and very few IT tools are used by the employees in the institutions. When providing documents, internal auditors should take action to provide the documents in a scanned form (PDF) through a digital file system. As most internal auditors did not perform a risk assessment, no-risks entry was made in the audit report. In North Macedonia, there is no unified internal audit software that internal auditors would use in performing an internal audit. The use of internal audit software will allow certain activities that are performed manually (performing risk assessment, testing, reporting, monitoring the work of the auditor, etc.) to be automated. Internal audit software will increase the effectiveness and efficiency of internal auditors. In general, we can conclude that the internal auditors in the public sector in North Macedonia need to adapt to the "new normal", to use IT tools and auditing software to be effective and efficient. The Central Harmonization Unit should undertake activities for the development of internal audit software. The development of internal audit software is a long-term process that requires resources and funds which can be provided through certain projects. Internal audit software should be unified and used by all internal auditors in the public sector. The use of internal audit software should ensure compliance of internal audit units with the Quality assurance and improvement program.

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FINANCIAL STRUCTURE OF INNOVATIVE ORGANIZATIONS IN SERBIA

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***Abstract:** This paper analyses the financial structure of organizations engaged in Serbia's innovation activities that are included in the Register of Innovation Activities. The paper's specific objective refers to the assessment of sustainable financing of innovative organizations classified as development and production centres, research and development centres and innovation centres. The research is based on the financial structure analysis of 68 national innovative organizations selected from the Register of Innovation Activities. We observed the period 2015-2018 and used official financial statements from the Serbian Business Registers Agency. Our research results based on aggregate data indicate that their own financing sources predominantly finance innovation organizations. Approximately half of the individual organizations notice a higher share of liabilities in the total financing sources. Innovation organizations' activities are stimulated through budget support, cooperation with international financial organizations, funds from the Innovation Fund of the Republic of Serbia, and other funds. Financing of innovative organizations by the different national funds and international financial organizations' funds is treated as short-term liabilities until the defined criteria are realized.*

***Keywords:** Innovation organizations, financial structure, funds, financial statements, Serbia*

1. INTRODUCTION

Innovation represents a significant determinant of competitiveness and progress of individual economies. Innovation as a driver of economic development can be defined as the practical application of new or improvement of existing goods, technologies, and services. The focus on knowledge-based activities becomes essential for gaining a competitive advantage and a prerequisite for sustainable development. The innovation activities can be identified and measured, as it seems in the European Union through the conduct of the Community Innovation Survey.

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The results are used for change analysis in the EU and individual level (Kutlača and Semenčenko, 2015, 11).

In the EU countries, the focus is on creating revolutionary innovations representing technological penetration and bringing significant technical and technological changes to the market. These innovation projects require huge investments but carry high business risk. According to the Community Innovation Survey 2016, more than 51% of business entities in the European Union with ten or more employees reported innovative activity in 2014-2016. The share of the innovative companies in the total number of companies increased or remained the same in twenty EU countries, while a decrease was recorded in eight countries. The largest share of innovative companies in the total number of companies was recorded in Belgium (68%), Portugal (67%), Finland (65%), as well as both Luxembourg and Germany (64%). On the other side, the lowest share was recorded in Romania (10%), while the share was below 30% in Poland, Bulgaria, Hungary, 22%, 27% and 29% respectively (Eurostat, 2020). Serbia belongs to the group of countries that prioritise a series of small and successive improvements to the existing products, technologies, or services. The reason for this is the limited financial resources. According to the data for the period 2008-2010, the share of innovative companies in the total number of entities in Serbia was 51.7%, of which 24.9% cooperate in the development of innovations (Mosurović Ružičić et al., 2015, 40).

Having in mind the importance of innovative activities for the competitiveness, growth and development of the national economy, the authors research the financial structure quality of national innovative organizations and their financial performances. This paper aims to analyse the financial structure and assess sustainable financing of organizations doing innovative business and registered in the Register of Innovation Activities. A significantly higher share of equity than the debt indicates a good precondition for sustaining financial stability. According to that, the research's primary hypothesis postulates that innovative organizations in Serbia are significantly financed from their own sources of funding. The research methodology includes desk research and the financial analysis that is appropriate to the research goal. The paper contributes to both innovation organizations' literature and financial structure literature.

This paper consists of five sections. The introduction is the first section, while the comprehensive summary of previous research is presented in the second section. After a literature review, the methodology and used data are explained in the third section. The fourth section summarizes the results and discussions.

2. REVIEW OF LITERATURE

Innovation activities represent all activities undertaken to create and apply new or improvement of existing technologies, products, services, and processes. Innovative organizations and other business entities will perform these activities. Kamberović et al. (2015) point out that invention and innovation represent two similar, but still fundamentally different terms in the legislation and professional literature. According to the Law on Innovation Activity, the invention is defined as a concept, idea and method for new product and process creating, including new technologies to exploit the national resources. Innovative organizations and other business entities will perform these activities. Innovation means any conversion of knowledge and ideas into a benefit in terms of new or improved products, services, or processes intended for commercial use or represents a public good. Creation new or modification of existing products aims to meet the consumers' needs, and requests and the process innovation leads to an increase in productivity (Beraha, 2019, 138).

Following the definition of innovation, the Law on Innovation Activity classifies innovations as product innovation, process innovation, organizational innovation, and marketing innovation. Hall (2010) highlights that investment in innovation usually includes the Research and Development costs, design, and marketing costs to generate a new product, investment in the new equipment and training.

Caseiro and Simões (2019) point out that technological progress and innovation drive economic growth, supported by the neoclassical theory of exogenous growth, and endogenous growth models. Innovation activities are the leading drivers of economic growth. Still, these activities carry a certain level of risks because the innovative firms face the degree of uncertainty associated with their output and generating future earnings in a dynamic and turbulent environment. Czarnitzkia and Kraft (2009) point out that "in the context of investment into R&D, the uncertainty of outcome is certainly present". Also, the bankruptcy costs are likely to be higher for innovative companies with a significant proportion of intangible assets (Philippe et al., 2004, 278). Finally, organizations doing business in the research and development field are exposed to the asymmetric-information problem. Its essence is reflected in that potential investor has less information about innovation projects and processes than an inventor.

Innovation firms face the funding source dilemma, and which optimal combination of debt and equity financing brings the most significant profit and reduces the risks. The optimal structure of debt and equity is in the function of generating a profit and net cash flows that provide the preconditions for a strong financial position (Vukelić et al., 2014, 681). Generally, equity financing carries fewer risks relative to debt

financing because equity represents the guarantee substance of a business entity. This is especially true for young and small innovative firms that are financially constrained. Credit constraints for small organizations arise because of information asymmetries and higher transaction costs (Wilson, 2015, 15). The optimal capital structure is the precondition for companies' growth and development. In the case of dominant use own sources of financing and limited access to loans from commercial banks, primarily in terms of their price and conditions of use, companies need to find alternative solutions for financing. Alternative sources of financing could be in the form of state funds and international financial support programs (Đuričin et al., 2013, 152).

Business entities make financing decisions depending on the amount of capital costs. Diaconu (2012) states that “the innovation firm will choose an investment level to finance so that the financial structure to be established at the lowest cost of capital”. It is generally known that the tax considerations yield variations in capital costs. Due to the tax benefit, we can say that debt finance is more attractive than the reliance on the own funding sources. Hall (2010) points out that “tax considerations suggest that debt finance will be cheapest, followed by retained earnings, and lastly by new share issues”. Despite the tax advantage, companies that introduce the innovations will rely more on their own funding sources (retained earnings or equity). The reason is that the “low salvage values relative to the original investment make these assets unsuitable for finance by debt” (Hall, 2010, 6). More innovative companies, i.e., firms with a higher proportion of intangible assets are likely to be less reliant on debt finance to reduce the risk of bankruptcy (Philippe et al., 2004, 278). At the same time, servicing debt needs a stable cash flow “which makes it more difficult to find the funds for innovation program” (Hall, 2010, 20). Czarnitzkia and Kraft (2009) concluded that if the management cannot pay the current liabilities, “the maximum penalty is bankruptcy.

Some empirical data show that only a low proportion of small innovative firms use external financing. It can result from managerial decisions rather than a lack of external financing (Diaconu, 2012, 71). Bartoloni (2011) points out that small innovative entities are more likely to rely on internal financing sources instead of debt to finance innovative projects.

Aghion et al. (2008) compared the innovative organizations by the R&D intensity. They concluded that entities with positive R&D tend to use debt than firms with zero R&D (Philippe et al., 2004, 284). Casson et al. (2008) point out that more innovative firms significantly relied on external financing. They use debt “as it involves giving up less control rights than new equity” (Casson et al., 2008, 220).

3. METHODOLOGY

We tested the quality of financial-structural position and assess of sustainable financing of organizations that doing innovation activities. The research is based on the financial structure analysis of 68 innovation organizations in Serbia selected from the Register of Innovation Activities. The analysed group of entities includes 43 organizations classified as development and production centers, 18 research and development centers and seven innovation centers. The list of registered innovative organizations in 2019 contained 127 organizations, but 59 organizations are excluded from the analysis. Fifty-seven organizations were removed from the Register of Innovation Activities in the period before starting our research, one organization is in the bankruptcy process, and the financial statements are not publicly available for one organization. Three analysed organizations were removed from the Register in 2020, but two new registered in the same year.

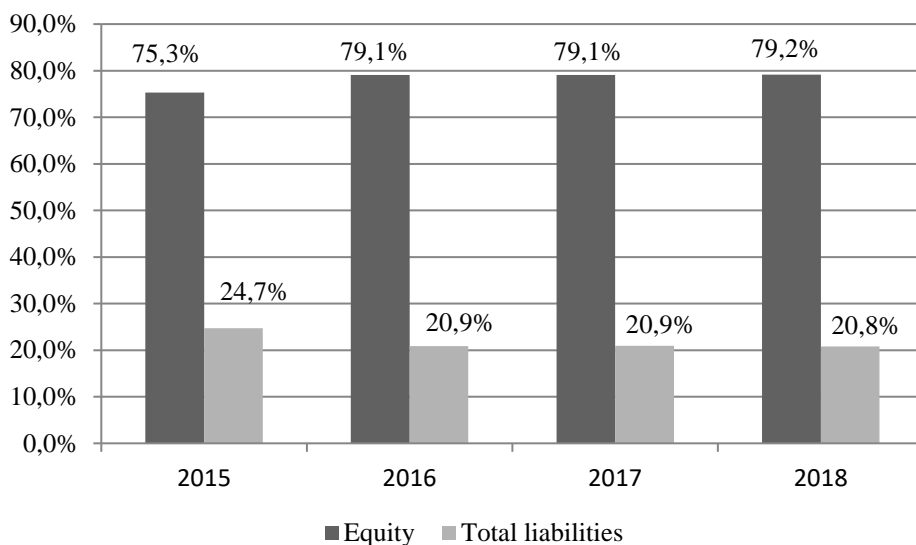
The data sources are individual financial statements of innovative organizations publicly available in the Register of Financial Statements of the Business Registers Agency of the Republic of Serbia (SBRA). The financial statements are transparent sources of information on the state of assets, equity and liabilities, the net results and other comprehensive income, cash flows and changes in equity. The financial statements are an important information resource for business decision-making and a basis for financial analysis (Vukelić et al., 2016, 266). We examine the financial structure of these organizations in the four years (2015-2018). The balance sheet is the basis for financial structure analysis of innovative entities on an aggregate and individual levels and assessing the risks to which the companies are exposed. By analysing of the debt-to-equity ratio, the authors got the information about the dominant finance source and assessed the quality of their capital structure. The income statements provide a good assumption to evaluate national innovation organizations' financial performance and earning capacities.

For evaluation, the authors performed the analysis of innovative organizations' financial structure on an aggregate level and by size. The entities are classified as micro, small, medium, or large-sized based on the average number of employees, operating income, and the average value of total assets on 31 December 2018. In the last analysed year, micro-entities are the most numerous in the total number of innovative organizations registered in the Register of Innovation Activities. About 53% of organizations (36 entities) are classified as micro and 30 innovative organizations as small. In the same period, one organization is classified as a medium and one as a large-size entity.

4. RESULTS AND DISCUSSION

The results of analysis based on aggregate data show that their own financing sources predominantly finance innovation organizations. Figure 1 shows the share of equity and liabilities in the total financing sources in the period 2015-2018. The proportion of equity in the total financing sources ranged from 75.3% in 2015 to 79.2% in 2018. A significantly higher share of equity than the debt indicates a good and stable aggregate financial-structural position. Due to equity's ability to absorb losses caused by unrealistic management estimates and bad investments, creditors expect a more dominant share of equity in the total funding sources (Marinković, 2019, 22).

Figure 1. The share of equity and liabilities in the aggregate balance sheet



Source: Authors' calculation based on SBRA data

Table 1 shows the detailed structure of innovative organizations' total liabilities and equity in 2015-2018. Own financing sources dominated in the analysed period. Also, the growth tendency was noticed in absolute amounts. Equity increased by 26% in 2018 compared to 2015. Liabilities recorded a smaller share in the aggregate balance sheet in the observed four-year period.

Table 1. Total liabilities and equity of innovative organizations (in 000 dinars)

Balance sheet position	2015	2016	2017	2018
Basic capital	4,212,001	4,320,249	4,413,895	4,430,558
Subscribed capital unpaid	206	206	18,095	206
Repurchased own shares	0	0	2,206	2,206
Reserves	870,881	914,081	961,595	999,866
Revaluation reserves	2,370,141	2,369,511	2,391,338	2,144,931
Unrealized gains				
Unrealized losses	3	2	2	2
Retained earnings	3,905,549	4,870,286	5,691,274	6,758,762
Loss	270,666	268,921	361,022	349,682
EQUITY	11,088,109	12,205,410	13,112,967	13,982,433
Long-term provisions and liabilities	153,769	244,746	956,395	1,022,459
Deferred tax liabilities	12,085	11,762	73,388	75,760
Short-term liabilities	3,472,451	2,966,135	2,443,878	2,579,531
Total liabilities	3,638,305	3,222,643	3,473,661	3,677,750
Total liabilities and equity	14,726,414	15,428,053	16,586,628	17,660,183

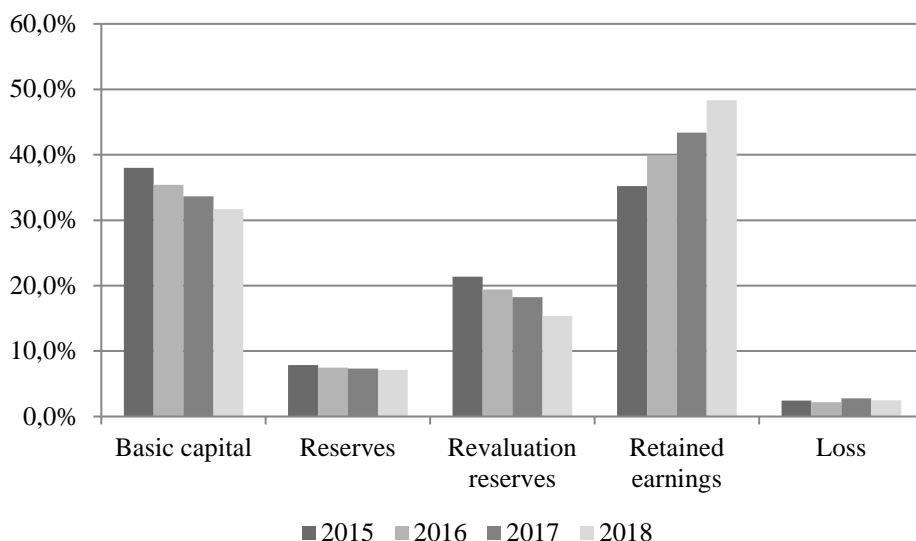
Source: Authors' calculation based on SBRA data

The retained earnings were the dominant balance sheet item in the capital structure. Its share in the equity ranged from 35.2% in 2015 to 48.3% in 2018. The proportion of basic capital in the equity structure increased from 31.7% in 2015 to 38% in 2018. Revaluation reserves recorded a more significant share and ranged from 15.3% in 2018 to 21.4% in 2015. The losses up to the amount of equity show the cumulative effects of bad business activities and represent a correction in the value of equity (Belopavlović, 2015, 321). The accumulated losses oscillate in the observed period and range from 2.2% to 2.8%. Other balance sheet items that represent the equity components had an extremely low share in the observed period and were not shown in the capital structure in Figure 2.

Net working capital has an important role in assessing the organization's ability to maintain long-term financial stability showing whether and to what extent long-term capital is sufficient to cover long-term assets. The direction of changes in the financial stability can be shown by the net working capital analysis and its determinants (Stevanović, 2015, 351). Net working capital is defined as the difference between current assets and short-term liabilities. It represents the part of current assets that is financed by long-term financing sources. It is expected that net working capital is positive to ensure good preconditions for liquidity. The analysis results based on aggregate data show that innovative organizations noticed a positive net working capital with a pronounced growth trend. Compared to the first year of

analysis, registered innovative entities achieved a net working capital growth by 74% in 2018.

Figure 2. The capital structure of innovative organizations in 2015-2018.

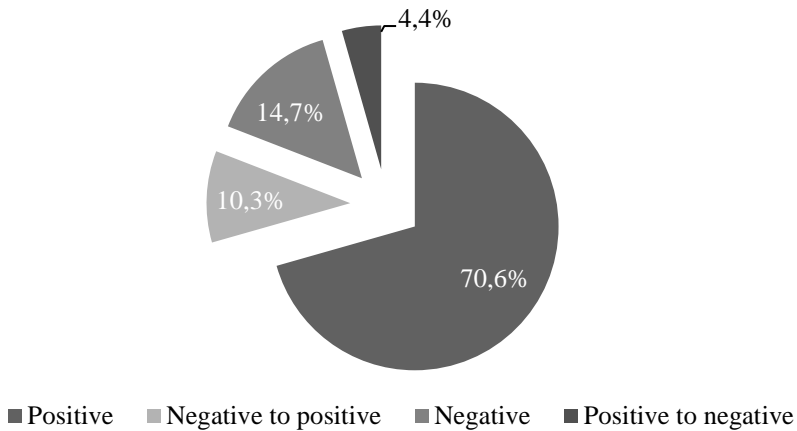


Source: Authors' calculation based on SBRA data

Figure 3 represents the share of innovative organizations with positive and negative net working capital, observing an average level in 2015-2018. The most innovative firms had higher current assets than short-term liabilities in the observed four years (48 organizations or 70.6%), while seven organizations or 10.3% moved from negative to positive net working capital. Two mentioned groups of organizations that encompass approximately 81% of analysed innovative organizations noticed the positive net working capital or movement from negative to positive that indicates financial stability.

The financial-structural position of ten innovative companies (10.7%) indicates the problem of illiquidity due to higher short-term liabilities in relation to current assets. Three innovative firms or 4.4% had positive net working capital in the first observed years, but they faced disturbing financial position and liquidity problems during the time.

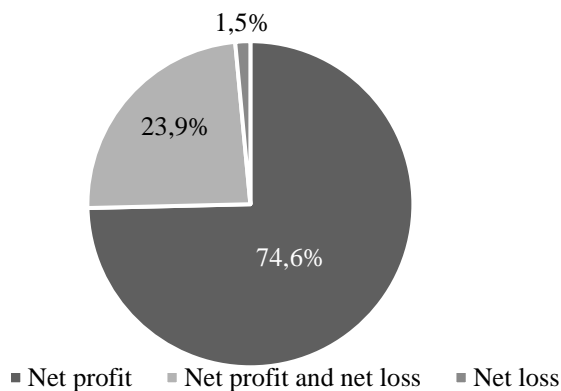
Figure 3. Net working capital of innovative organizations in 2015-2018.



Source: Authors' calculation based on SBRA data

The analysed innovative organizations predominantly operated with a net profit in 2015-2018 that is a good precondition for sustaining financial stability. Figure 4 shows net results of innovative organizations in the period 2015-2018. About 75% of organizations achieved a positive net financial result in all years of the observed period, while only one generated total expenditures higher than total revenues in all four years. Organizations operating with net profit and net loss, depending on the observed year, make up 24% of the total number of innovative organizations (4.5% have a net profit in three years; 10.4% have a net profit in two years; 9% have a net profit in just one year).

Figure 4. Net results of innovative organizations in 2015-2018.



Source: Authors' calculation based on SBRA data

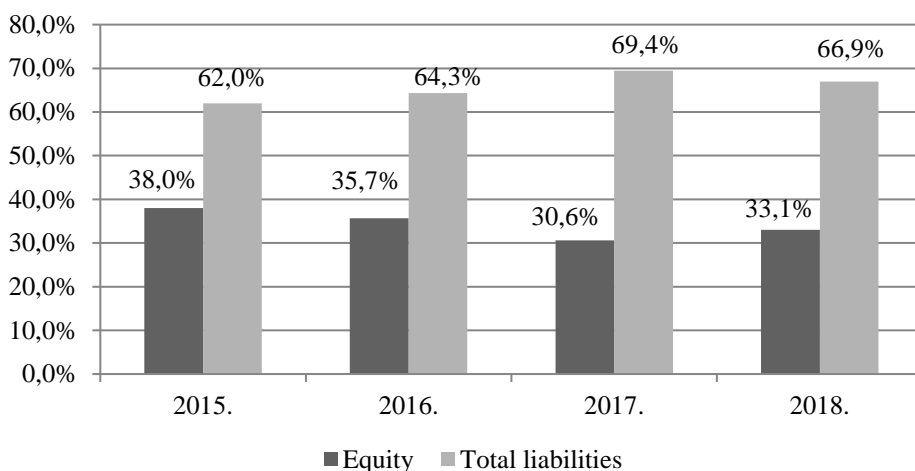
An enterprise that consistently generates losses is not capable of survival. Many of such enterprises distort the earning capacity image and the financial structure of the group that they belong to (Stevanović, 2015, 349). The analysis results confirmed only seven organizations (about 10%) operated with a loss above the amount of capital in some or all years of analysis. The share a loss above equity value in total balance sheet sum was low and ranged from 0.072% to 0.19%. The low proportion indicated an insignificant impact on the aggregate financial-structural position of innovative firms. All firms that operated with a loss above equity belong to the group of micro-entities.

Although aggregate data significantly show equity financing, it is extremely important to make conclusions carefully. Through an in-depth analysis by individual innovative organizations, the authors concluded that dominant equity financing is strongly influenced by several innovative organizations. The analysis by individual organizations shows that more than half of the analysed innovative firms significantly finance by debt.

Observing the organizations by size, the authors concluded that one medium and one large organization have an extremely favourable financial-structural position with a dominant share of equity in total funding sources (89.9% in 2015 to 92.4% in 2017). The organization classified as large, has a strong influence on innovative organizations' aggregate financial structure, which is confirmed by its share in the total equity (52.5%).

The equity and liabilities of micro-innovative organizations show a growing tendency over time in absolute amounts. Figure 5 shows the debt-equity ratio in 36 micro entities. In all analysed years, micro-innovative entities significantly financed their business from borrowed financial sources. The proportion of debt in total funding sources ranged from 62% to 69.4%. Although the number of micro entities dominates in analyzed groups, their share in the aggregate balance sheet is low (equity ranged from 1.2% to 1.5%, and liabilities ranged from 6% to 11.9%). Based on the above, the authors concluded that innovative micro organizations have a small influence on the aggregate financial structure.

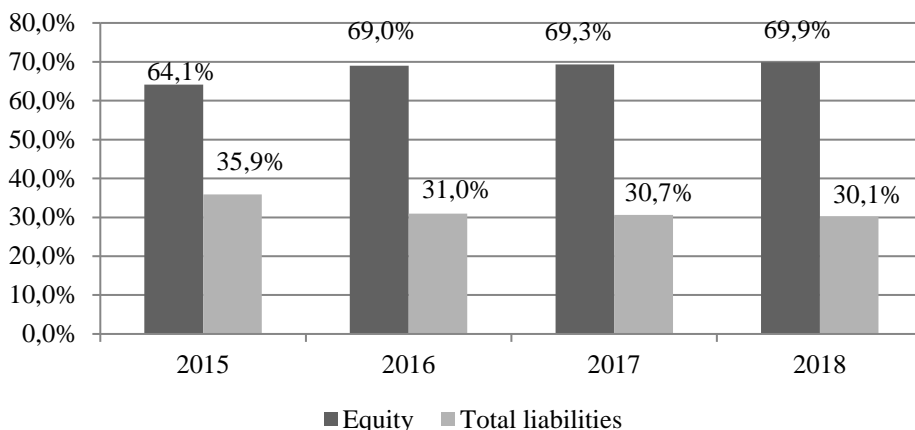
Figure 5. The share of equity and liabilities in micro innovative organizations



Source: Authors' calculation based on SBRA data

The results of the analysis of 30 organizations belonging to the group of small enterprises show significant reliance on their own financing sources in the whole observed period (Figure 6). The proportion of equity increased from 64.1% in the first year of analysis to 69.9% in 2018. This ratio is heavily influenced by several, but especially by one organization. Observed by individual organizations, most small firms have significant financing from their own sources. This conclusion coincides with the results of the analysis on an aggregate level.

Figure 6. The share of equity and liabilities in small innovative organizations



Source: Authors' calculation based on SBRA data

The short-term liabilities were dominant in the debt structure, with a tendency their decrease in favour of the long-term provisions and liabilities. The share of short-term liabilities in total liabilities amounted to 95.4% in the first year of analysis, while a decrease was recorded in 2018 (70.1%). The short-term liabilities were also reduced in absolute amounts. This debt amounted to 3,472 thousand dinars in 2015 and 2,579 thousand dinars in 2018, representing a decrease of 25.7%.

Table 2. Structure of short-term liabilities (in 000 dinars)

Structure of short-term liabilities	2015	2016	2017	2018
Short-term financial liabilities	329,641	166,128	194,071	315,083
Received advances, deposits and caution money	145,850	256,383	251,457	190,393
Liabilities from business operations	1,257,520	1,212,670	1,135,418	1,190,544
Other short-term liabilities	951,435	974,642	467,485	475,225
Liabilities for Value Added Tax	43,394	63,452	56,898	66,272
Liabilities for other taxes, contributions and other duties	66,121	50,207	18,514	58,072
Accruals and deferred income	678,490	242,653	320,035	283,942
Short-term liabilities	3,472,451	2,966,135	2,443,878	2,579,531

Source: Authors' calculation based on SBRA data

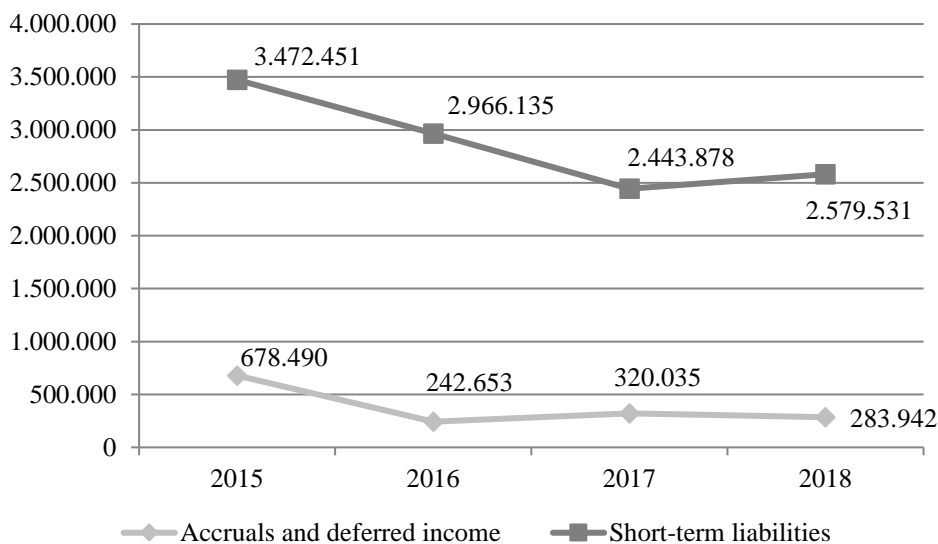
As Table 2 shows, liabilities from business operations and other short-term liabilities account for more than 50% of total short-term liabilities on an aggregate level. The same conclusion can be drawn if we look at the organizations by size. Liabilities based on project subsidies or government grants under contracts represent the accruals and deferred income that is a short-term liability.

According to the Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2016 – 2020: Research for Innovation, innovation activity is encouraged through budget support, cooperation with international financial organizations, funds from the Innovation Fund, and other funds. The Innovation Fund of the Republic of Serbia provides support for the development of innovations through the mini-grant program, matching grants program, collaborative grant scheme program, and innovation vouchers.

Innovative organization financing from state funds for stimulating innovation is treated as a short-term liability until the defined criteria are realized, and contract obligations fulfilled. State support received before the fulfilments of defined criteria are recognized as accrual and deferred income at fair value. Government grants that are not conditioned by the fulfilment of some obligations recognize as revenue in the

income statements. If government funds are conditioned by achieving specific results, revenue can be recognized if pre-defined criteria are realized. Figure 7 represents short-term liabilities and accrual and deferred income in the period 2015-2018.

Figure 7. Dynamics of short-term liabilities and accruals and deferred income in 2015-2018 (in 000 dinars)



Source: Authors' calculation based on SBRA data

Figure 7 shows the oscillations in the accruals and deferred income movement during the analysed period. Their decrease was evident in the last analysed year compared to the initial accounting period (decrease by 58.2%). The share of accruals and deferred income in the structure of total short-term liabilities ranged from 19.5% in 2015 to 11% in 2018.

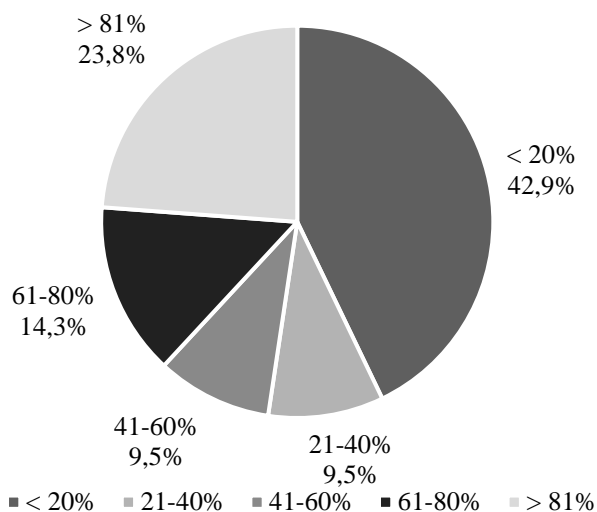
The analysis results by organizations observed by size show that the small entities had the largest share of accrual and deferred income in total short-term liabilities (the share ranged from 8.9% to 21.2%). These organizations also recorded the largest absolute amount of mentioned balance sheet items. The smallest participation is evident in medium and large innovative organizations (ranged from 0.5% to 2.6%). 60% of innovative organizations that report the accrual and deferred income refer to the small organizations (23 of 41 organizations).

Financing of registered innovation organizations by the Innovation Fund of Republic of Serbia, the other state funds, and international financial organizations' funds to

stimulate innovation is treated as income from premiums, subventions, donations or as accruals and deferred income until the defined contracts' criteria are realized. Revenues from premiums, subsidies, grants, donations, are the group of revenues that belong to operating revenues. This group includes income generated from the state budget, province, local governments, but also revenues from donations or grants from foreign governments, international organizations, private foundations, and similar sources (Official Gazette RS, 2020).

Most of the analysed innovative organizations (66% or 44 innovative organizations) report revenues from premiums, subsidies, grants, donations in the income statement whereby 31% of all analysed organizations (or 21 organizations) continuously generating these revenues in the period 2015-2018. The share of the revenue from premiums, subventions, and donations in total operating income in the above mentioned 31% of organizations is presented on an average level in figure 8.

Figure 8. The share of the revenue from premiums, subventions, and donations in total operating income in 31% organizations (on average in 2015-2018)



Source: Authors' calculation based on SBRA data

Revenues from premiums, subsidies, grants, donations are more than 40% of total operating revenues in about 48% of organizations that record these revenues in all analysed period. In 38% of these organizations, observed revenues are over 60% of their total operating revenues. About 30% of these organizations share the revenues from premiums, subsidies, grants, and donations lower than 20% total operating revenues.

About 34% of organizations generate these revenues in some of the observed years. The same number of analysed organizations (23 entities) do not make these revenues in 2015-2018, but some record accruals and deferred income. The funds received under a project grant agreement are recorded on this balance sheet item, but they will be recognized as revenue only after realizing defined criteria.

Considering the notes to the financial statements of individual organizations as a part of financial statements set, we remarked the structure of the revenues from premiums, subsidies, grants, donations. These revenues include financial resources from Innovation Fund programs, subventions from Development Fund of Serbia, support programs of the Development Agency of Serbia, projects of the Ministry of Education, Science and Technological Development, and the European Commission's projects, USAID and similarly.

5. CONCLUSION

The paper presents systematic research of organizations' financial structure quality included in the national Register of Innovation Organizations. The primary hypothesis that relates to the sources of funding is partially accepted. The analysis results based on aggregate data show that innovation organizations are predominantly financed by their own financing sources (75.3% in 2015; 79.2% in 2018). Through an in-depth analysis by organizations observed by size, the authors concluded that dominant equity financing is strongly influenced by several innovative organizations. One medium and one large organization have an extremely favourable financial-structural position with a predominant share of equity in total funding sources (89.9% in 2015 to 92.4% in 2017). The analysis results of 30 small organizations show significant reliance on their own financing sources (the proportion of equity increased from 64.1% in the first year of analysis to 69.9% in 2018). The micro-innovative entities significantly financed their business from borrowed financial sources. The proportion of debt in total funding sources ranged from 62% to 69.4%. The analysis by individual organizations shows that approximately half of the analysed innovative organizations notice a higher share of liabilities in the total financing sources. The short-term liabilities are dominant in liabilities structure, with a tendency their decrease. Financing of registered innovation organizations by the Innovation Fund of Republic of Serbia, the other state funds, and international financial organizations' funds to stimulate innovation is treated as short-term liabilities until the defined criteria are realized. The presented results contribute to considering different possibilities of financing innovation organizations. The paper's special contribution is that the analysis is focused on the

options of financing innovation organizations from various sources to support innovation.

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ASSESSMENT OF THE INNOVATION CAPACITY OF BUSINESS ENTITIES IN THE REPUBLIC OF SERBIA

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Abstract: *The paper aims to assess the innovation capacity of business entities in the Republic of Serbia by conducting desk and field research. Desk research involves an analysis of relevant literature, statistics, and data on different actors of the innovation system of RS. Field research is conducted using a survey on a sample of 10 large companies and 30 SMEs. Additionally, a good practice example technique is used to gain insight into the business model and practice of a company that successfully innovates. To assess the innovation capacity, the differences between large and SMEs are analysed in terms of a strategic approach to innovation development, degree of familiarity with the concept of innovation, type of innovative activities and perception of innovation environment and the importance and quality of activity of individual participants in the innovation system. The research confirms that large companies have a more pronounced strategic approach to the innovation development and are more familiar with the innovation concept. When it comes to performance, large companies consider the academia and science to be the most successful, and SMEs consider the ICT companies as most successful. Concerning the importance, large companies attach equal and greatest importance to science and academia, large companies, start-up companies and ICT companies. On the contrary, SMEs believe that the Ministry in charge of innovation is the most important actor in the innovation system. The research results indicate that SMEs innovate differently from large companies. Considering that the national innovation system is still insufficiently developed, and that there are numerous obstacles, the Serbian business entities have solid innovation capacity.*

Keywords: *Innovation, capacity, large enterprises, small and medium-sized enterprises, Serbia*

1. INTRODUCTION

Constant innovation activities that lead to a new product or process is the way firms should differentiate themselves from others to achieve sustainable growth (Jung &

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Kwak, 2018). Generating and applying new knowledge through innovation is a basic source of economic growth. Innovation is the process of transforming an idea/innovation into good/service that consumers/customers are willing to purchase (Saguy, 2011, pp. 1876). A distinction is made between radical and incremental innovations. Radical innovation refers to the fundamental changes in the activities of a firm, or an industry, and represents clear departures from the existing practices (Demircioglu et al., 2019). Incremental innovation can be conceptualized as requiring minimal, if any, departures from the existing templates of organizing and production (Ahmad & Erçek, 2019). Innovation is a prerequisite for achieving smart and sustainable development in a modern business environment characterized by dynamism and uncertainty. Innovative companies are the leading bearers of economic growth and generators of new jobs. Activities based on knowledge and new technologies are rapidly gaining in importance while connecting different actors in the innovation system. The links between business entities and public institutions facilitate the implementation of existing and the development of new innovations thus improving the competitiveness of enterprises and economies. The generation, application and commercialization of knowledge encourage the development of high-tech products and services that affects the growth of productivity and competitiveness of exports and production.

Knowledge that underlies the development of new business ventures, production systems, products and services, represents the intellectual capital that underdeveloped and developing countries lack mostly due to its high value. This stems from the fact that knowledge-based economies are characterized by dynamic development of information and communication technologies (ICT), scientific and technological progress. Knowledge is a means, and not an end in itself. It is a basic precondition for the development of innovation. According to the current Serbian legislation, innovation is a successful market application of an invention, i.e., a concept, method and/or idea to produce a new product/service or process.

Innovation capacity has often been equated with the formal research and development (R&D) activities of enterprises and innovation output with new products (Kirner et al., 2009). Innovation capacity is the resource inputs and intermediate transformative assets that enable a firm to engage in activities needed for innovation (O'Connor, Roos & Vickers-Willis, 2007, pp. 537). Szeto (2000) emphasizes that improving the innovation capacity of firms is dependent upon various factors, among which the continuous supply of innovation resources and the accumulation of innovation knowledge are crucial.

Given the importance of innovation for economic growth and competitiveness, the paper aims to assess the innovation capacity of business entities in the Republic of Serbia. To realize the research objective, the following hypotheses were tested:

- H1: Large companies have a more pronounced strategic approach in the process of innovation development and are more familiar with the concept of innovation;
- H2: SMEs and large companies generally perceive the innovation environment, and the importance and quality of work of individual actors in the innovation system differently; and
- H3: SMEs innovate differently from large companies.

The hypotheses are developed based on the literature review. The results of desk and field research are used to test the hypotheses. Also, a good practice (case study) technique was applied to present the model to solve the specific problems, develop and improve the innovation capacity of business entities.

Descriptive statistics are used to process and describe the main features of primary and secondary data obtained during the research. The objectification of the research results is performed by qualitative and quantitative analysis of primary data. The results are then placed in the context of the results obtained from secondary research sources. The innovation capacity of business entities in the Republic of Serbia is assessed by applying the comparative analysis of primary and secondary data.

2. LITERATURE REVIEW

To define the concept of innovation, the research begun with the review of the current national legislation. Pursuant to the Law on Innovation Activity of the Republic of Serbia (Official Gazette RS, No. 110/2005, 18/2010 and 55/2013), innovation represents the successful market application of invention, i.e., the application of a new or significantly improved product and/or service, process, marketing method or new organizational method in business. Accordingly, the basic types of innovation are:

- product innovation, as the application of a new or significantly improved product, which is new to the observed legal entity (does not have to be new to the market), and is not a change of aesthetic nature or exclusively sale of innovated products produced and developed by another legal entity,
- process innovation, as the application of a new or significantly improved method of production or delivery (including significant changes in technique, equipment, or software, but not exclusively organizational and

managerial changes) that is new or improved for the observed legal entity, regardless of who developed it,

- organizational innovation, as the application of new or significant changes in the structure or methods of management, with the intention to improve the use of knowledge, quality of products or services, or increase the efficiency of business flows, and
- marketing innovation, as the application of a new marketing method, including significant changes in product design, packaging, marketing and product promotion and product billing.

Innovation usually starts with creating a new idea, and idea generation is considered as a significant factor for firm innovation capacity (Tajvidi & Karami, 2015). Innovation capacity has been defined as continually improving the capabilities and resources of firms for discovering opportunities to engage in new product development (Szeto, 2000). Kirner et al. (2009) noted that innovation capacity refers to R&D activities of enterprises and innovation output in terms of new products.

Innovation is mainly associated with large enterprises. However, the importance of small enterprises is not in question. The real question is whether there is a difference in the innovation capacity of business entities of different sizes? Many studies have addressed this question providing different conclusions. SMEs face specific obstacles when engaging in R&D and innovation, many of which can be traced back to market failures (OECD, 2019). Hirsch-Kreinsen (2008) points out that in small enterprises innovations are not necessarily result of formal R&D, but rather results of daily business development, customer collaboration or optimization of processes. In large companies, innovative activities even without success can be used to acquire new knowledge and skills, while in SMEs they can be fatal and cause large losses and business closures. In relation to large enterprises, one of the advantages of SMEs is reflected in less bureaucracy and a greater degree of flexibility and ability to react to market and technological changes (Đuričin & Beraha, 2016).

Despite the importance of R&D investment, it cannot be achieved in most companies, except for a few large ones, due to the lack of funds (Jung & Kwak, 2018). The ability to mobilize funds in favour of innovation is on the side of large firms (Pavolna, 2019). Limited access to finance is perhaps one of the most significant limiting factors for SMEs when introducing new technologies into business processes. It is difficult for SMEs to secure external funding support (Lv et al., 2018). Compared with large firms, SMEs are more difficult to obtain loans from banks (Tronnberg & Hemlin, 2014; Zhang et al., 2016). However, the lack of resources in SMEs to engage in looking outward is said to be a barrier to open innovation, but at the same time this shortage is cited as a motive for looking beyond organisational

boundaries for technological knowledge (Spithoven et al., 2012). The results of the research conducted by De Martino & Magnotti (2018) indicate that the role of the qualified staff is crucial, even more important than R&D investment, and moreover confirm the importance of collaboration in the case of small size of the firm given the lack of internal expertise and the limited resources to carry out in-house R&D activities. Karantininis et al. (2010) also addresses the issue of collaboration by exploring the form of relationships among firms (vertical integration, contractual arrangements and market power) in the innovation process pointing out that innovation is influenced by a firm's organization, stage in the chain and export orientation.

As the position of large companies and SMEs in the innovation system differs, a diverse approach is necessary to foster innovation development. While large companies are generally characterized by a strategic approach to innovation development, in SMEs innovation is not necessarily the result of formal R&D (Forsman, 2011). In SMEs innovation is often a result of everyday business operation. This primarily refers to the daily needs for the development of cooperation with customers and process optimization (Hirsch-Kreinsen, 2008). Since in small firms the development activities are integrated in daily business efforts it is very difficult to differentiate the daily business development from innovation (Forsman, 2008). Research shows that only one third of small businesses have a formal plan for innovation development and slightly less than half of them reserve funds in the form of a special budget for innovation (Jong & Marsili, 2006). Most SMEs do not have any formal written innovation plan, and less than half of those enterprises set a budget for innovation in the firm (Marsili & Salter, 2006). Also, innovation in small enterprises is a result of investigation, learning, assessment, and adaptation of technologies (Santamaria et al. 2009). This could result in difficulties in distinguishing innovation development from other business activities, especially in small enterprises in which the development work is integrated into their daily business (Forsman, 2011; Forsman, 2008).

Because of the specificity of innovation development, SMEs usually need to outsource certain types of services and resources. Forsman (2011) points out that in many SMEs accumulation of knowledge which is a precondition for the development of innovative ideas is only possible by outsourcing from the external environment (Forsman, 2011). Also, the innovation capacity can be increased through networking (Caniels & Romijn, 2003). The benefits of networking are reflected in the possibilities for knowledge improvement, access to new markets, lower production costs, lower R&D costs, etc. (Karaev et al., 2007).

The empirical results of the study conducted by Kutlača et al. (2020) reveal a strong interdependence among the R&D expenditures and economic performance at the national level in Serbia, and thus emphasized the importance of continuously encouraging investments in research and innovation. In terms of the innovation performance and the level of development of the national innovation system, Serbia lags behind the EU-28 average. Given that a national innovation system refers to a set of organizations, institutions and their relationships directed towards generation, diffusion and application of scientific and technological knowledge in a country (Marjanovic et al., 2019, pp. 94), there seems to be a strong direct correlation between this system's quality and the innovation performance of business entities. This emphasizes the need to take action to improve opportunities and conditions for innovative activities. According to the latest available data provided by the Statistical Office of the Republic of Serbia, the average investment in R&D in Serbia is less than 1% of GDP.

3. DATA AND METHODOLOGY

Desk and field research methods are applied to realize the research objective (Đuričin & Beraha, 2018; Wonglimpiyarat, 2011). Additionally, a good practice technique is used (Đuričin, 2019; Beraha & Đuričin, 2016). Desk research involves the collection and analysis of relevant aggregate data. Desk research includes the analysis of the following data:

- relevant national regulations: Law on Innovation Activity ("Official Gazette of the Republic of Serbia", No. 110/05, 18/10 and 55/13).
- data on national innovation policy measures and programs and the size of funds for financing innovative activities.
- academic and professional literature, statistical data, and information on the participants of the innovation system of the Republic of Serbia and
- geographical representation of participants in the national innovation system and their scope of activities.

The research sample and questionnaires are defined based on the results of the desk research. Field research is conducted through the survey (Tuan et al., 2016). The questionnaires are designed in accordance with the European methodology: "Recommended practices for the Online CIS" - European Commission - Eurostat - Directorate G: Global Business Statistics, 2014. The questionnaires are structured and adapted to the research objective, i.e., respecting the role that business entities have in the national innovation system.

In most cases, the survey is conducted indirectly, i.e., by forwarding the questionnaire to the e-mail addresses of business entities. Each e-mail is personalized and contains information about the purpose and objective of the research. In a small number of cases, the questionnaires are administered in person. The sampling of representatives of large enterprises and the SME sector is conducted considering the desk research results. To assess the innovation capacity, the questionnaire is sent to the addresses of large companies which, according to the results of the research of the Business Registers Agency (APR), belong to the group of 100 most successful companies in the Republic of Serbia. The survey was realized in the period March-June 2018. In the case of SMEs, the survey is conducted on a random sample, considering data on their predominant activity. The innovation capacity of business entities is assessed on a sample of 10 large companies and 30 SMEs.

The example of good practice is selected from the SME sector. It is an enterprise that has been proven to record good results and can serve as a model to solve certain problems and improve the innovation capacity of business entities. It is a successful experience, which has been tested and confirmed and has the potential to increase positive innovation results in practice in case of its mass adoption and implementation.

The research is conducted using two basic data sets. Secondary data refer to data that already exist as such but is used for the first time to achieve the research objective, and they are collected from internal and external sources. Specific data on participants in the national innovation system are collected from internal sources, while general data on the research subject contained in national and international official and publicly available documents, publications, professional literature, reports, etc. are collected from external sources (Đuričin, 2018). Primary data are obtained by field research through a survey on a sample of 40 business entities.

All data (primary and secondary) obtained during the research are processed using descriptive statistical analysis. Qualitative and quantitative analysis is performed for primary data, and the obtained results are objectified. These results are then placed in the context of the results obtained from secondary research sources. To assess the innovation capacity of economic entities in the Republic of Serbia, the comparative analysis of both primary and secondary data is conducted.

4. RESULTS AND DISCUSSION

The results of the research are presented according to the structure of the survey questionnaire and divided into three groups. The first group of results refers to general information on the surveyed business entities. The second group of results

consists of data on the innovative environment in which business entities operate. The third group of results includes data on specific innovative activities and their results.

According to the size, micro, small and medium sized enterprises account for 32.3%, 41.9% and 25.8% of the total number of SMEs in the research sample, respectively. According to the ownership structure, domestic private ownership accounts for 87.1%, foreign private ownership and combined domestic and foreign private ownership account for 3.2% each, while the ownership of the Republic of Serbia accounts for 6.5% of the total number of SMEs in the sample. According to the ownership structure of large enterprises in the sample, domestic private ownership accounts for 66.7%, and combined foreign ownership and ownership of the Republic of Serbia account for 33.3% each.

The enterprises in the sample are mostly export-oriented. 66.7% of large companies sell their products and services on both national and international markets, while 33.3% sell on the local and national markets. The largest share of SMEs, i.e., 32.3% simultaneously sell their products and services on the domestic and international markets. Only 6.5% of SMEs sell their products and services on the national and local markets, 19.4% sell only on the local market, while 12.9% sell exclusively on the national and 12.9% exclusively on the international markets. 16.1% of SMEs sell their products and services on the local, national, and international markets at the same time (Table 1).

The largest percentage of surveyed enterprises are not members of any business association or network. 33.3% of large companies and 17.6% of SMEs are members of some business association or network. Exclusive membership in clusters and international associations is recorded by 8.8% of surveyed SMEs each. Also, 8.8% of SMEs is member of both cluster and business association or network. Cluster members are embedded within a network of relationships within a specific industry, and they are involved in both cooperation and competition (Michailova & Chetty, 2011).

Table 1. General sample data

General data	SME	Large enterprises
Sample structure	<ul style="list-style-type: none"> ✓ 32.3% micro enterprises ✓ 41.9% small-sized enterprises ✓ 25.8% medium-sized enterprises 	
Ownership structure	<ul style="list-style-type: none"> ✓ 87.1% domestic private ownership ✓ 3.2% foreign private ownership ✓ 6.5% ownership of the Republic of Serbia ✓ 3.2% combined domestic and foreign private ownership 	<ul style="list-style-type: none"> ✓ 66.7% domestic private ownership ✓ 33.3% combined foreign ownership and ownership of the Republic of Serbia
Market share	<ul style="list-style-type: none"> ✓ 19.4% local market ✓ 12.9% national market ✓ 12.9% international market ✓ 6.5% local and national markets ✓ 32.3% national and international markets ✓ 16.1% local, national and international markets 	<ul style="list-style-type: none"> ✓ 33.3% local and national markets ✓ 66.7% national and international markets
Cluster/Business association/network/organization membership	<ul style="list-style-type: none"> ✓ 8.8% cluster membership ✓ 8.8% cluster and business network or association membership ✓ 17.6% business network or association membership ✓ 8.8% international organization membership ✓ 55.9% no registered membership 	<ul style="list-style-type: none"> ✓ 33.3% business network or association membership ✓ 66.7% no registered membership

Source: Field research results

Considering the dynamism of the modern business environment, innovation needs to be used strategically by firms to gain competitive advantage, achieve superior performance, and compete effectively on global and local markets (Keupp et al., 2012). The research results show that most surveyed Serbian enterprises have a systematic approach to innovation development. More specifically, all large

enterprises and 67.7% of SMEs have innovation development goals defined in their strategic documents and/or business plans. Dogan (2017) points out that successful companies are characterized by a holistic and systematic approach to innovation by developing a fully integrated innovation strategy with its mission and objectives and by making organizational culture and organizational systems compatible with the strategy. The question remains to what extent the defined strategic and business plans are implemented in practice by the Serbian enterprises.

Given that innovation often has different interpretations, the survey intended to answer the question on how familiar the Serbian enterprises are with the concept of innovation. The results show that 66.7% and 33.3% of large companies and 46.7% and 30% of SMEs are generally and completely familiar with the concept of innovation, respectively. Partially familiar and unfamiliar are 16.7% of SMEs each, while mostly unfamiliar and completely unfamiliar are 3.3% of SMEs each.

The presented research results related to the innovation development goals and familiarity with the concept of innovation confirm the first hypothesis:

- H1: Large companies have a more pronounced strategic approach in the process of innovation development and are more familiar with the concept of innovation.

Within the discussion on the innovation capacity, it is necessary to look at the degree to which individual enterprises use the benefits of the innovation system of Serbia. Concerning the familiarity with the current national regulations on innovative activities, 66.7% of large companies is generally familiar and 33.3% is generally unfamiliar with the national regulations. Only 6.5% of SMEs is completely familiar with the national regulations, while generally familiar and partially familiar are 29% of SMEs each, 22.6% are completely unfamiliar and 12.9% are generally unfamiliar. As regards the services of organizations providing infrastructural support to innovation activity, majority of large companies (66.7%) are only partially familiar, while 33.3% are generally unfamiliar. Only 9.7% of SMEs are completely familiar with the available supporting services, while generally familiar and partially familiar are 22.6% of SMEs each. Slightly less than one third of SMEs are not familiar at all with the role that these organizations play in the national innovation system, and around 16% of SMEs are generally unfamiliar. Many large companies and SMEs stated that when doing business, they cooperate with a higher education institution and/or scientific research institution. Such cooperation is recorded by as far as 66.7% of large companies and 58.1% of SMEs. Regarding the terms, measures, and support programs of the government in the field of innovative activity, per third of the surveyed large companies are generally unfamiliar, partially familiar, and

generally familiar. As for SMEs, 29%, 22.6% and 9.7 are partially, generally, and completely familiar with the government support, respectively (Table 2).

Table 2. Key factors for assessment of opportunities and conditions for innovative activities and innovation development in the Republic of Serbia (ranking on a scale from 1 to 10)

Offered answers	SME	Large enterprises
Macroeconomic environment	5.6	8.3
Lack and inadequacy of financial resources	7.7	6.7
Inadequate support of the government and governmental institutions	6.5	6.3
Insufficient familiarity with the relevant regulations	6.0	4.3
Lack of relevant regulations and procedures	4.4	4.3
Inadequate promotion of actors in the innovation system	4.8	4.3
Insufficient number of promising innovative business ideas	4.2	2.0
Inefficient system of scientific knowledge and new technology transfer	5.8	8.7
Administrative barriers	6.6	6.7
Incompetence of employees	5.0	7.3

Source: Field research results

The survey questionnaire also addressed the assessment of the opportunities and conditions for innovative activities and innovation development. All large companies and over half of SMEs rated these opportunity and conditions as solid, while they are rated as good and very bad by 6.7% and 10% of SMEs, respectively. SMEs stated the lack and inadequacy of financial resources as the key factor for such assessment, while large enterprises emphasized the inefficient system of knowledge and technology transfer. Both large companies and SMEs perceive the insufficient number of promising innovative business ideas as the least important factor for their assessment. The difficulty in securing financial resources is often exacerbated for unknown and unproven prerevenue micro-ventures, as these are less attractive to potential investors (Chan & Parhankangas, 2016; Sohl, 2003). As a nation's economy becomes more knowledge-intensive, an increasing number of players – in the private sector, public sector, and academia – are involved in the production and diffusion of innovation, and the effectiveness in gathering and utilizing knowledge from these institutions becomes an essential determinant of a country's competitiveness (Seidl & Pinheiro, 2018). Consequently, science, technology and innovation financing also grew in complexity and scope, incorporating new concepts to leverage innovative performance, recognizing regional, national, and international

interactivity and cooperation among actors, as well as the economic importance of knowledge and knowledge flows, and such mechanisms include (Ibid.):

- formal measures such as tax policies and government subsidies,
- long-term funding commitments by government and industry organizations,
- government budget allocation to universities, research institutes, libraries, and other organizations involved in learning and innovation,
- funding programs managed by international and regional organizations,
- target funding managed by specialized institutions, such as Science and Technology Councils and Foundations, and
- single-project funding via Project Finance.

The presented mechanism clearly gives importance to the efficiently established system of scientific knowledge and new technology transfer, i.e., cooperation between science and business. The need for technology commercialization in developed countries has resulted in the adoption of special laws that, within the university, have led to the establishment of technology transfer offices. In this way, universities are enabled to fully manage the intellectual property resulting from research. As a result, the commercialization of new technologies has accelerated, which has had a positive impact on economic development and entrepreneurial activity (Siegel et al., 2004).

Although the lack of financial resources is usually considered as one of the main obstacles to innovative activities, the research shows insufficient awareness of enterprises about the available opportunities. As far as 66.7% of large enterprises are generally not familiar with the available sources of financing for innovative activity of enterprises, while 29% and 25.8% of SMEs are generally familiar and partially familiar, respectively. Only 9.7% of SMEs are completely familiar with the available financing sources, and around 16% are completely unfamiliar.

Another aspect of the research is to assess the quality and importance of activity performed by various actors in the innovation system (Table 3). According to large companies, activities performed by science and academia, i.e., institutes, faculties, universities, and centres of exceptional value are of the highest quality. Regarding the importance of activity, large companies attach equal and greatest importance to science and academia, large enterprises, start-up companies, and ICT companies. According to SMEs, the highest quality of activity is performed by start-ups, while the ministry in charge of innovation stands out as the most important actor in the innovation system.

Table 3. Assessment of quality and importance of activity of each actor in the innovation system? (1 to 5 scale)

Actors in the innovation system	Quality		Importance	
	Large enterprises	SMEs	Large enterprises	SMEs
Government departments	3.7	2.8	4.7	4.0
Ministry in charge of innovation	3.7	3.0	4.7	4.3
Science and academia (Research Institutes, Faculties, Universities, Centres of Excellence)	4.7	3.4	5.0	4.1
Actors for promotion and enhancement of innovation	3.5	3.1	3.5	4.2
Organizations providing infrastructural support to innovation activity	3.5	3.1	4.5	4.0
Organizations performing innovation activity	3.0	3.1	4.0	3.6
Large companies (domestic and foreign)	4.0	3.5	5.0	4.0
SME sector	3.5	3.3	4.5	3.8
Start-up companies	4.0	3.6	5.0	3.8
ICT companies	4.0	3.7	5.0	3.8

Source: Field research results

The structure of answers to questions about the perception of the innovative environment, the importance and quality of activity of individual actors in the innovation system generally differs between large companies and SMEs. The analysis of the research results shows that SMEs give more specific and large companies more general answers to questions which, from the aspect of gradation offered on the Likert scale, makes them very different in terms of perception of the innovation environment, importance, and quality of work of individual actors in innovation system. Accordingly, the authors conclude that the above research results confirm the second hypothesis:

- H2: SMEs and large companies generally perceive the innovation environment, the importance and quality of work of individual actors in the innovation system differently.

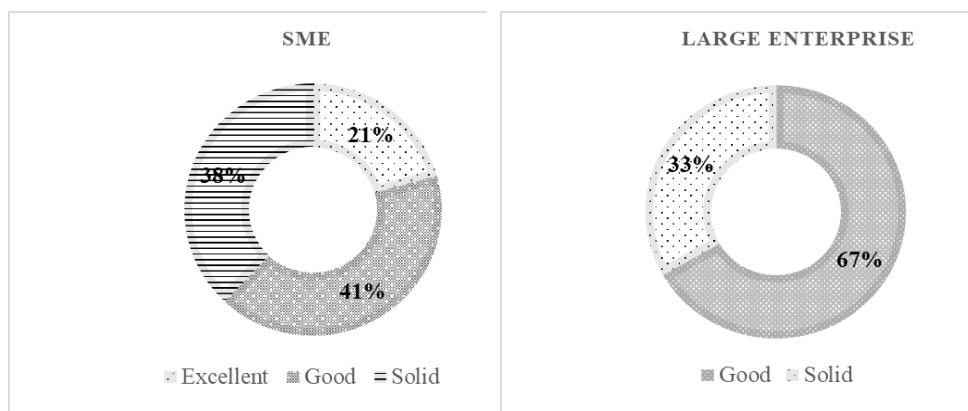
The next analysed aspect is the type of innovative activity performed by large companies and SMEs. In the organizational structure of all large enterprises there are separate units for R&D. Also, they implement innovative activities through the procurement of machinery, equipment and software, as well as through investments in design and marketing development, etc. 66.7% of large companies outsource R&D activities from other companies, institutions, and organizations. On the other hand, 38.7% of SMEs have separate organisational units for R&D. 29% of SMEs realize their innovative activity by outsourcing R&D from other companies, institutions and organizations, 54.8% through the procurement of machinery,

equipment and software, 25.8% by investing in design and marketing development, etc., while 9.7% of SMEs do not realize innovative activities at all. Innovative activities that did not result in innovation due to failure and/or suspension were not recorded in large companies. 66.7% of large enterprises recorded ongoing innovative activities which are expected to result in innovation, while in 33.3% of enterprises, innovative activities have resulted in innovation. Innovative activities did not result in innovation due to failure and/or suspension in 12.9% of SMEs. 41.9% of SMEs recorded ongoing innovative activities, and in 38.7% they have resulted in innovation. 6.5% of SMEs did not know whether innovative activities that did not result in innovation were recorded. The research conducted by Minović, Lazarević Moravčević & Beraha (2016) showed that SMEs in Serbia are actively engaged in the innovative activity, and while small enterprises are mainly focused on product innovation, medium-sized enterprises are focused on process innovation, i.e., on the improvement of technological procedures to reduce costs, and that there is a compatibility between the innovative activities and the competitive advantage strategy of medium-sized enterprises.

Innovative activities in all large companies result in process innovations. Innovative activities result in organizational innovation in 66.7% of companies, while they result in product/service innovation and marketing innovation in 33.3% of enterprises each. In 70% of surveyed SMEs, the result of innovative activities is product/service innovation, in 40% it is process innovation, in 26.7% it is organizational innovation and in 20% it is marketing innovation. Innovations in a form of new product, process or service are an important factor in providing competitive advantage for SMEs (Oksanen & Rilla, 2009). Most studies on SME innovativeness conclude that small firms can keep up with larger firms in the field of innovation and show no difference in the quality and significance of the innovations produced (Hilke, 2010). The question is not whether large companies are more innovative than SMEs. Of more importance is the conclusion that SMEs innovate differently from large companies (Hilke, 2010). The research results confirm the above assertions since all large companies have developed innovations that are new for their company, but not for the market in which they operate. On the contrary, 56.7% of innovations developed by SMEs are new for them, but not for the market, while 43.35% of innovations are new to the market and were developed before the competition. 66.7% of large companies and 43.35% of SMEs independently developed innovations. 33.3% of large companies and 13.3% of SMEs developed innovations in cooperation with other enterprises. Also, 23.3% of SMEs modified innovations initiated by other companies or organizations. The above research results confirm the third hypothesis:

- H3: SMEs innovate differently from large companies.

Figure 1. Innovation applications in existing product solutions



Source: Field research results

Enterprises in Serbia face numerous challenges and limitations when innovating. However, there are examples of good practice which can serve as a model to solve specific problems, develop and improve the innovation capacity of business entities. The number one high tech companies in Serbia which is also among the top 10 world companies in the field of night vision technology was selected for the analysis. It is the Harder Digital Sova company from Nis, which bases its innovative activity on the most modern optoelectronic technologies for viewing at night and in low visibility conditions. This company's success is based on the following factors:

- a good assessment of the availability of a critical mass of resources (people, equipment, space) to enter the privatization process,
- technology development concept implemented,
- stable market provided by a foreign partner,
- significant and continuous investment of a foreign partner (so far approximately 20 million Euros),
- investment in infrastructure as an important prerequisite (6,500 m², 800 m² of "clean" rooms),
- modern organizational model providing rational use of all available resources,
- extension of the program to civilian applications,
- focus on development projects (Horizon 2020, Innovation Fund, etc.),
- focus on human resources management as the most important factor, etc.

The company's most valuable experience is the process of human resources development in the field of high technology. Aware of the fact that state-of-the-art technology requires a new level of standards in all areas of operation, a special focus is on the development of high-tech staff who will be the bearer of technology and new programs and applications development. The company is maximally oriented towards staff rejuvenation and connection with older experienced workers. Accordingly, workshops that encourage team spirit, support team cohesion, and improve employee engagement are continuously organized. This ensures that the basic personal characteristics and potentials of individuals are recognized at an early stage. A key aspect is the improvement of theoretical knowledge in the field of optoelectronic technology, as it is insufficiently studied at universities. Consequently, a long-term learning process is required. Along with the obligatory mentoring work with every young engineer, there is an increasing collaboration with faculties. Lectures by professors are organized, which has positive effects on the theoretical level of knowledge of employees. Also, foreign experts in certain fields were engaged several times, which had very positive results. Emphasis is on the development of analytical skills and process analysis. These are conducted on a weekly basis, using a database that covers the entire technological production chain. Given the multidisciplinary of technology, this provides an opportunity to improve knowledge in other fields, as well. Engagement in innovative projects is also very important as it allows employees to gain practical experience. Raising the level of skills in nanotechnologies has been finalized by establishing the nano laboratory with the most modern equipment. With the latest CNC machining line and additive technology (3D printing), exceptional conditions are created to apply new technologies. Developing software technologies has been the company's priority from the very beginning. Open Erp software has been developed for complete production monitoring and planning, and material bookkeeping. The emphasis has been on developing software projects for algorithms for image processing and "cleaning" in low visibility conditions, where a major technological breakthrough is expected in the following period.

The illustrated example testifies to a successful experience in the innovative activity. The applied business model and practice of this company have been confirmed to have the potential to improve the results of innovative activities if adopted and implemented by similar companies in Serbia.

5. CONCLUSION

The obtained results confirm the research assumptions. All hypotheses are accepted based on which conclusions are drawn. The research confirms that large companies in the Republic of Serbia have a more pronounced strategic approach to the

innovation development and are more familiar with the innovation concept. The research results show that all large companies and 67.7% of SMEs have innovation development goals defined in their strategic documents and/or business plans. 66.7% and 46.7% of large companies and SMEs are generally familiar with the innovation concept, respectively.

Also, the research results lead to the conclusion that there is a difference in the way the innovation environment, the importance and quality of activity of individual actors in the innovation system is perceived by large companies and SMEs in Serbia. The terms and conditions for innovative activity and innovation development are rated as solid by all large companies. Regarding SMEs, they are rated as solid, good, bad, and very bad by 56.7%, 6.7%, 26.7%, and 10%, respectively. The representatives of large companies consider science and academia to perform their activities best. Also, regarding the importance of different actors in the innovation system, they attach equal and greatest importance to science and academia, large companies, start-up companies and ICT companies. On the contrary, SMEs believe that ICT companies are the best performing, while the Ministry in charge of innovation is the most important actor in the innovation system.

The research has confirmed that SMEs innovate differently from large companies. The innovative activity of large companies results in process innovation. In 66.7% of large companies, it results in organizational innovation, and in per 33.3% in product/service innovation and marketing innovation. The innovative activity results in product/service innovation, process innovation, organizational innovation, and marketing innovation in 70%, 40%, 26.7%, and 20% of SMEs, respectively.

The results of the research show that business entities in the Republic of Serbia have the potential to realize innovative activities and develop innovations. Considering that the national innovation system is still insufficiently developed, and that there are numerous obstacles in doing business, the business entities have solid innovation capacity. Also, the results provide the starting point for future research with an aim to analyse the possibilities to improve and develop innovation capacity. In addition to the results obtained by desk and field research, the presented example of good practise contains valuable data for future research directions.

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