O ČASOPISU

Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/ Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business, stalna je znanstvena publikacija Fakulteta. Izlazi od 1971. godine. U razdoblju od 1988. do 1993. izlazi u kontinuitetu jednom godišnje, a od 1993. u dva broja godišnje (proljeće i jesen). Koncepcija časopisa jest orijentacija na objavljivanje tekstova iz ekonomske teorije i ekonomske politike. Primarno je usmjeren na objavljivanje tekstova znanstvenog sadržaja, a samo iznimno i kvalitetnih stručnih radova. Drugi dio sadrži prikaze i ocjene knjiga, pregled nekih važnijih najnovijih izdanja znanstvenih djela u području ekonomskih i njima srodnih znanosti, te obavijesti o međunarodnim konferencijama, javnim pozivima i drugim važnim informacijama. Koncepciju, ciljeve i strategiju časopisa usmjerava Međunarodni savjetodavni odbor. Urednički odbor svojom politikom uređivanja časopisa provodi utvrđene odrednice Međunarodnog savjetodavnog odbora. Časopis je referiran u JEL-u (*Journal of Economic Literature*)/EconLit (*American Economic Association's Electronic Database*), Pittsburgh, Pennsylvania, USA od 1993. godine, a od 2007. i u bazama IBSS (*International Bibliography of the Social Sciences*), ProQuest, Cambridge, UK i DOAJ (*Directory of Open Access Journals*), Lund University, Sweden. Od lipnja 2008. referira se u bazi CAB Abstracts, UK, a od 31. srpnja 2008. godine do 31. prosinca 2018. godine i u bazama SSCI (*Social Sciences Citation Index*), *Social Scisearch* i JCR (*Journal Citation Reports/Social Sciences Edition*), Thomson Reuters, Philadelphia, USA. Thomson Reuters baze referiraju članke objavljene u svesku 1/2007. Časopisa i nadalje, a baza Proquest – ABI/INFORM, Ann Arbor, Michigan, USA referira Časopis od sveska 1/2006. Baza SCOPUS, Elsevier, B.V., Amsterdam, The Netherlands referira sve radove objavljene od 2008. godine. Časopis referira i EBSCO, Ipswich, MA, USA u svojim bazama EconLit with Full Text i SocINDEX u Abstracts&Indexing s referencama kao i baza ERIH PLUS od 2016. godine. Od 1. siječnja 2019. Časopis se referira u ESCI – Emerging Sources Citation Index (Clarivate Analytics).

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The Journal is open for cooperation with scientists from Croatia and abroad all year round. Your contribution to economic theory and practice is welcomed.

A special section in the Journal is reserved for Letters to the Editor. Readers and authors are invited to give their comments and suggestions. The most interesting letters, comments, and discussions will be published.

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In order to maintain the highest level of publishing ethical standards the Editorial Board of the Journal follows the recommendations of the COPE Code of Conduct for Journal Editors (https://publicationethics.org/).

CONTENTS – SADRŽAJ

Editor's note

Dear authors, reviewers, readers and colleagues,

Despite another year of various social, economic, demographic, and other uncertainties caused mainly by the pandemic, we are closing out this year, still firmly on the track to maintain and raise the scientific quality of the Journal and expand its impact. The most significant change in this issue is our decision to encourage the submission of theoretical papers to bridge the lack of thorough and quality research related to the discussion of fundamental economic ideas, novel ideas and concepts, new research dilemmas and phenomena, and relationships within inter-, and trans-disciplinary research. We strongly believe the new submission will inspire new research methods and further upgrade the current quality of empirical research. Therefore, we have modified the methodology and content to enable the submission of such papers.

We are also proud that several young and successful researchers have joined our editorial team. Constantly changing, seeking excellence, and encouraging active scholars to deliver high-quality publications, we have created a stimulating atmosphere to attract new authors and readers. We would also like to invite interested researchers to join our team primarily based on their willingness to help us and their scientific merits.

In June 2021, our fourth conference Digitomics – Economics of digital transformation was successfully held in a hybrid mode. The central theme of the conference was "Economics and Business of the post COVID19 World". We were privileged to have as our guest the well-known Professor Brad DeLong from the University of California, U.C. Berkeley, Berkeley, California, USA, who gave a talk on "From Commodity Economics to Attention Economics" in which he presented his novel research on very current economic phenomena. We held our traditional panel discussions on smart cities and the Unger Foundation transdisciplinary panel. In total, more than 50 speakers presented their research. We are already looking forward to our next conference, which will be held in Opatija, Croatia, June 23-25, 2022. All information on how to participate and collaborate can be found on the conference website – www.edt-conference.com. Next year, under the working theme "Dealing with Uncertainty", we will address not only current uncertainties related to epidemiological developments, but also the short- and long-term impact of social and economic measures and tools that governments have taken to prevent the occurrence of negative effects of the pandemic. As always, the best papers will compete for publication in our journal.

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Although we are sure that we will face many uncertainties in the coming year, we hope that the results will be positive, both globally and in our individual business and personal affairs. Therefore, as always, we invite you to join us in our efforts to live better and more productive lives. We wish our readers, authors, reviewers, and supporters all the best in 2022!

Sincerely,

Professor Saša Drezgić
Editor-in-Chief

ARTICLES – ČLANCI

Long-run asymmetric association between FDI and productivity in Turkey[*]

Yüksel Okşak[1], Cüneyt Koyuncu[2]

Abstract

Incoming foreign direct investments (FDI) may enhance the productivity level of the host country by bringing new advanced technologies. On the other hand, the nexus of FDI and productivity, rather than being linear, might be nonlinear because the effect of increases and decreases in FDI on productivity may not be symmetric. In this sense, this study investigates the asymmetric relationship between FDI and productivity in Turkey by using two different productivity indicators (i.e., PROD1 and PROD2) and employing a Nonlinear ARDL approach. Our hypothesis claims there is an asymmetric association between FDI and productivity in the long run in Turkey. Nonlinear cointegration test findings indicate that selected variables are cointegrated. Hence, they move together in the long run. Our study uses aggregated data at the macro level to analyze the long-term asymmetric relationship between foreign direct investment and labor productivity in Turkey using the NARDL estimation technique. Concerning the estimation results, a long-run nonlinear relationship between incoming FDI and labor productivity was detected, and this finding remained valid across two models constructed by using two distinct labor productivity indicators. As a whole, our results are consistent with the ones found in the literature. Besides, for the first time in the literature, this study addresses the long-run asymmetric nexus between FDI and labor productivity by using macro-level data specific to Turkey and makes various policy recommendations.

Key words: *productivity, FDI, working hours, investment, GDPPC, NARDL*

JEL classification: *C22, E22, F21, J24*

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254
Yüksel Okşak,Cüneyt Koyuncu • Long-run asymmetric association between FDI...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 253-277

1. Introduction

There are studies emphasizing that foreign direct investment (FDI) contributes to growth and productivity in different ways. Foreign direct investments and foreign trade are efficient tools for accumulating capital and creating employment. Studies reveal that multinational companies are more efficient and contribute much more to the global value chain than national companies. More advanced technologies transferred via multinationals can lead to the spread of R&D and know-how in the local economy. Incoming FDI can increase the efficiency level of the host country by introducing new advanced technologies that are more effective and efficient than the previous ones in the country.

FDIs contribute critically to developing countries' ability to transfer information and technology. FDI provides the home country with cheap labor and energy while it provides the host country with an accelerating effect on development and economic growth. Thus, it contributes to the development of the total investment amount and hence the economic activity of the host country. FDI has the role of the leading determinant of foreign capital inflows. (Carp, 2013). When we examine the studies dealing with the relationship between FDI and labor, it is possible to say that they focus on country, wage level, employment, labor market flexibility, and sectoral studies. Hence, at the aggregate level, FDI contributes to economic growth in North Africa, in turn generating additional revenues for governments and populations in the region through fiscal policies and jobs creation (Soumare, 2015). For example, Rong et al. (2020) observe a positive employment impact of FDI, with labor market flexibility playing an important positive regulatory role. Another empirical study (Hübler and Keller, 2010) does not confirm the hypothesis that total FDI inflows reduce the energy intensity of developing countries. On the contrary, external development assistance reveals that it is related to energy efficiency gain. Empirical results found by Zhang (2005) pinpoint the fact that Hong Kong-Taiwan direct investments are mainly motivated by cheap labor costs.

The underlying fact is that FDI is an investment type that promises much more stability than capital market investments since FDI is such an investment with limited mobility. In this context, attracting FDI to the country is one of the main targets of developing countries (Nistor, 2015; Flora, 2017). There is an opinion that the FDI surge will increase the internal growth of the economies of developing countries. The competition between FDI companies and domestic companies, as believed, will create research and development, technological infrastructure, competitiveness, efficiency and institutional capacity increases (Osano and Koine, 2016; Eller et al., 2006). That is why, studies on the impact of FDI increases on the productivity levels of host countries are gaining importance.

When we look at empirical studies on the FDI, it is possible to say that there are three different elements related to the spillover and direction of FDI. These aspects

can roughly be introduced as intra-industry links, intra-industry back and forth links, and vertical cross-industry links. There is evidence that the know-how that FDI has, regardless of its direction, will have a diffusion effect in the host economy and increase overall productivity (Kim et al., 2015; Saggi, 2002). FDI can promote international experience, gains, and an increase in efficiency in industries and the overall productivity in the host country. In this context, a country's economy must attract FDI to facilitate the transfer of information and new technology. According to Ngoc et al. (2009), the technology-dimensional spillover effect of FDI is divided into two in the literature as (i) intra-industry/horizontal spillovers and (ii) inter-industry/vertical spillovers. It draws attention that intra-industry/horizontal spreads, being divided into three main branches, are as follows: (1) demonstration effects, (2) competition effects, and (3) labor mobility effects. According to the study; Demonstration effects express the effect of learning by imitation and watching. Competition effects The indirect effect of FDI on the productivity and innovation of the host country through intensified competition is also a form of spillover effect. Labor mobility effects occur when workers and managers working in foreign subsidiaries are trained with advanced technical and managerial skills move to other domestic companies or open their businesses. Study (ii) indicates that cross-industry/vertical spillovers occur as an interaction between foreign and domestic firms that are not in the same industry.

In the theoretical literature, the prevailing opinion is that foreign direct investments trigger growth in host countries via improving efficiency and productivity (Dritsaki et al., 2004, Borensztein et al., 1998; Makki and Somwaru, 2004). However, empirical studies have not been able to prove this consensus. The evidence in the studies shows that FDI has a positive effect on the productivity of the host countries or companies in question. However, empirical studies differ in the direction and shape of the said positive effect. On the other hand, the impact of increases and decreases in FDI on productivity may not be symmetrical. According to Anwar and Sun (2014: 23), where they examine the nature of FDI-related productivity spillovers in the Chinese manufacturing industry, the size of spillovers depends on firm age, capital density and ownership structure. They found that the size of productivity spillovers depends on firm size and product quality.

Unlike the theoretical definitiveness of FDI spillovers, many empirical studies examining productivity spillovers fail to find conclusive evidence. Most studies for developing and transitional economies either fail to find significant positive effects or even uncover evidence of negative intra-industry effects (i.e., horizontal effects). FDI often harms local firms by increasing competitive pressure and taking market share away from firms in the host economy. Fortunately, evidence of positive vertical effects in developing economies seems to be more effective in empirical studies than in previous literature, which generally finds that local suppliers to foreign buyers are the prime beneficiaries of FDI inflows. To sum up,

Yüksel Okşak,Cüneyt Koyuncu • Long-run asymmetric association between FDI...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 253-277
256

the wisdom derived from the previously-conducted studies tells us that asymmetric FDI spillovers have positive vertical effects but negative horizontal ones (Jeon et al., 2013). In other words, FDI can promote international experience, gains, and increasing efficiency in industries and the overall productivity in the host country. In this context, a country's economy must attract FDI to facilitate the transfer of information and new technology.

In the light of the findings of existing studies on the subject analyzing the nexus of FDI and productivity in the literature, the main hypothesis of this study asserts that incoming FDI and labor productivity are positively correlated in a non-linear manner in the long term in Turkey from 1987 to 2018. This study identifies a long-run nonlinear relationship between FDI and labor productivity. In this context, it contributes to further scientific research and the literature, especially by addressing the long-term asymmetric relationship between FDI and labor productivity and using macro-level data specific to Turkey for the first time in the literature

The remaining part of the study consists of five sections. Section 2 obtains a brief literature review on the issue. We explain the theoretical background of the methodology employed to conduct our analyses in Section 3. The data utilized in the research are described and clarified along with tabulated estimation results in Section 4. Section 5 provides a detailed discussion of the empirical findings, and the last part concludes.

2. Literature Review

FDI plays a vital role in the economic development of countries with capital, advanced technology and knowledge gap. These countries compete fiercely to bring more FDI to their countries. The basic expectations of these countries are the increase in welfare. However, the fact is that an increase in welfare arises from an increase in productivity. The literature displays a wide range in terms of both productivity and FDI.

Regarding productivity, in their study utilizing panel data set covering 1989-2008 and 19 transition economies, three labor productivity indicators, and six privatization indicators, Yilmaz and Yalçınkaya Koyuncu (2018) point out that privatization increases productivity in transition economies. In their analysis using the cross-section data of 111 countries and Ordinary Least Square (OLS) estimation technique for different samples of 1997-2006 period, Yidirim et al. (2009) reveal that labor productivity decreases as the air temperature rises in a country. The study by Koyuncu Yalcinkaya et al. (2016) displays that labor productivity will increase with female labor force participation. Using annual observations from 162 countries, Koyuncu Yalcinkaya et al. (2017) found a positive relationship between

internet penetration and productivity. The relationship between corruption and labor productivity is also examined by Koyuncu Yalçınkaya and Ünver (2018).

Regarding FDI, Koyuncu et al. (2016) empirically analyzed the impact of IQ level on FDI using a cross-section data of 184 countries and two different FDI indicators. They point out that countries with higher IQ levels experience higher FDI entry. Tax incentives also contribute to the increase of FDIs. The corporate tax incentive is a policy used by many countries to attract FDIbecause FDI can increase efficiency and economic growth in host countries. Deng et al. (2012) display that removing tax incentives prevents productivity and spillovers of FDI and undermines foreign presence, vital for FDI productivity and spread. The relationship between judicial independence and the FDI, analyzed by Koyuncu Yalcinkaya (2011) and another study by Ito (2005), emphasizes that attracting FDI will also contribute to urban and spatial development.. The estimation results of the Koyuncu Yalcinkaya and Ünver's (2019) study show that infrastructure has a positive statistically significant impact on FDI inflows.

In this study, we empirically investigate whether there exists a non-linear long-term relationship between FDI and productivity for the period of 1987-2018 in Turkey. Therefore, it is essential to draw attention to the studies in the literature especially examining the relationship between FDI and productivity.

The research of the relationship between FDIs and productivity has been widely and in-depth conducted for transition economies (Elmawazini et al., 2018), EU countries (Derado and Horvatin, 2019; Vassilis and Jacob, 2010), Central and Eastern European countries (Bijsterbosch and Kolasa, 2010), Gulf Cooperation Organization Member countries (Elmawazini, 2014), Sub-Sharan Africa countries (Asongu et al., 2020), and developing countries (Herzer and Donaubauer, 2018). Koyuncu and Çınar (2009) covered the period 1980-2005 in Turkey for 26 observations with the help of co-integration analysis. Previously, they had investigated the long-term relationship between productivity and trade openness and then tested the relationship between productivity and foreign direct investment in the same way. Accordingly, the end of the 20 year-period of trade openness explains 38.7% of workforce productivity, while foreign direct investments explain 19.3% of workforce productivity. The relationship between FDI and productivity is also examined based on effects: the effect of FDI on labor productivity (Pripoaie, 2017; Karentina, 2019), on firm-level productivity (Chen et al., 2019; Rashmi, 2004; Vinish, 2002; Fukunari and Kozo, 2006), on industry efficiency (Wang, 2012; Kim, 2015; Khalifah et al., 2020), and the productivity of sub-sectors (Lin et al., 2020; Sheereen et al., 2015; Jin et al., 2017; Souare, 2013).

Economic growth is a result of the interaction of labor, capital, and technology. In this context, FDI contributes not only with its funds but also intangible assets (technology and technical information) contribute to the increase in productivity of

the host country (Derado and Horvatin, 2019). Derado and Horvatin (2019) point out that innovative FDIs have much stronger positive effects in technologically less developed economies. Eric and Malick (2010), which draws attention to a different dimension of productivity growth, emphasize that the contributions of FDIs from various countries may differ significantly due to the sophisticated differences in technology/knowledge, managerial practices, motives, and strategic approaches in host countries. Wang (2010) supports this view in his study in which he argues that FDI brings not only new investments that increase national income but also secondary spillovers that lead to an increase in productivity in the host economy. Wang (2010) argues that in the world, the majority of FDI mainly originates from multinational enterprises in developed countries, and multinationals devote a significant amount of resources to research and development (R&D).

Fillat and Woerz (2011) tested the relationship between FDI and productivity growth for 35 countries covering the period of 1987-2002. They take into account the heterogeneity of host countries and their industries. They concluded that the most important is a positive relationship between FDI and productivity for some industries and host countries if FDI has a high investment or export orientation.

Bijsterbosch and Kolasa (2010) display the impact of FDI entry on the productivity convergence in Central and Eastern Europe with four different results. First, it has a strong convergence effect on productivity at both the country and industry levels. Secondly, FDI entry plays a crucial role in calculating productivity increases. Third, the impact of FDI on productivity is critically dependent on the absorption capacity of the host countries and their industries. Fourth, there is significant heterogeneity between countries, industries, and time for some key findings. Demir and Duan (2018) investigated the effects of bilateral FDI flows on host country productivity growth and productivity convergence dynamics. Using bilateral FDI flows' data from 108 hosts and 240 home countries over 1990–2012, they found no significant effect of bilateral FDI flows on either host country productivity growth or on the productivity gap between the host and the frontier country. These findings are not sensitive to the direction of FDI flows, which are South-South, South-North, North-South, or North-North. However, they found some evidence of a positive effect of FDI flows on human capital growth only in the South-South direction. They also failed to find any productivity growth or convergence effect at the sectoral level, including agricultural, industrial, or services sectors.

Demena and Van Bergeijk (2017) reviewed the heterogeneity of productivity spillovers caused by FDI in 31 developing countries through a more comprehensive data set. Having analyzed 1450 spillover estimates of 69 empirical studies published in 1986–2013, they came across the inconsistencies in the reported spillover findings affected by publication bias, the data, estimation techniques, and empirical specification. Their findings show that reported FDI spillover estimates are affected by publication bias. Their results emphasize that spillovers and their sign largely

depend systematically on specification characteristics of the primary studies and publication bias. They pinpoint the fact that future research should cover more developing countries. Not only should they investigate whether spillovers occur but also how spillovers emerge.

There are many studies that analyze the effect of FDI at the firm level. Singh (2017) reviewed the literature and investigated the relationship between FDI and the productivity of firms for the period between 1974 and 2013. When it comes to family businesses, it is revealed that there is no improvement in productivity due to their risky approach and limited strategic aggressiveness. It is also observed that labor productivity does not change when unskilled labor is employed. Kimura and Kiyota (2006) focused on FDI and firm productivity using panel data for Japanese firms. They find that the most productive and moderately efficient companies are exporting and searching for FDI while the least productive companies are focused only on the domestic market. In addition, firms that maintain their presence in foreign markets through FDI demonstrate that they show the highest productivity growth, thus contributing to the improvement of national productivity. Evaluating firms according to the upper, middle, and lower efficiency category, Girma et al. (2005) point out that the firms with the highest efficiency find it profitable to cover the costs associated with FDI, while the less efficient firms can only serve the domestic market. They demonstrate that the productivity distribution of multinational firms involving FDI is dominant in the direction of exporter firms.

Firms' decisions regarding FDI also affect the relationship between FDI and productivity. Therefore, it will be useful to examine the studies in this direction in the literature. Jordaan (2005), who provided statistical evidence on FDI-related externalities in the Mexican manufacturing industries for 1993, reveals that the magnitude of the technological differences between FDI and Mexican firms is in a positive relationship with externalities, which is not effective on incentives and adverse competition for investments that facilitate externality. Damijan et al. (2007) test three empirical hypotheses that relate the decision for outward FDI to total factor productivity by using a data set of Slovenian manufacturing firms active in the period 1994–2002 that contains information on outward FDI and exports to different markets. The evidence supports the hypothesis that more productive firms are more likely to invest in a foreign affiliate. Second, the hypothesis that less productive firms can be encouraged to invest in low-income countries is rejected by the data. However, the main contribution of the study to the literature is the existence of a positive relationship between the number of foreign affiliates of a firm and the total factor productivity. Tomiura (2007), which deals with a firm-level dataset covering all manufacturing industries in Japan, concluded that foreign outsourcers and exporters tend to be less productive than the firms active in FDI but more productive than domestic firms even when firm size, factor intensity, and/or industry are controlled for. Vahter (2011) investigated different channels

through which FDI affects domestic firms and whether FDI affects knowledge sourcing activities, innovation, and productivity growth of domestic firms by employing firm-level panel data from Estonia's manufacturing sector. He found no evidence of an impact of FDI entry on the short-term productivity growth of local incumbents. However, he found a positive relationship between the entry of FDI and the direct measures of spillovers. He argues that FDI inflow to a sector is closely related to more knowledge flows to domestic firms and an increase in their innovation activities.

Barbosa and Eiriz (2009) examined whether foreign firms generate productivity spillovers by using firm-level data over the 1994–1999 period in the Portuguese manufacturing industry. Their results suggest that foreign firms in the same industry, being the observed firms (horizontal spillovers), and linkages between foreign firms and their local suppliers or customers (vertical spillovers) do not impact significantly the productivity of firms. However, they failed to detect differences in productivity spillovers associated with firm-specific characteristics. Fauzel et al. (2015) investigated whether FDI in the manufacturing sector enhances the productivity sector in Mauritius. Their results indicate that FDIs in the manufacturing industry contributes to both total factor productivity and labor productivity in the long run. When the short-term results of the study are analyzed, it is revealed that FDI in the manufacturing sector continues to affect efficiency, but the effect is minimal. Their results also confirm the presence of bi-causality and feedback effects in the FDI-Productivity relationship.

Teixeira and Shu (2012) focused on the relationship between FDI, productivity, and economic growth in China. Based on a set of large and innovative firms (national and foreign capital) located in China, they concluded that the direct impact of foreign capital on the level of human capital in firms is negative suggesting that FDI has a positive influence on their human capital. They also concluded that FDI has a positive impact on general human capital (i.e. formal education) by means of investment in R&D. They argue that these results suggest that it is necessary to implement a selective policy to attract FDI for China to benefit from FDI by taking into account more technologically advanced, R&D-based projects. In their studies analyzing the development of long and short-term labor productivity for the Chinese provinces between 1978 and 2010, Mitze and Özyurt (2014) present that FDI has a direct impact on labor productivity in addition to internal factors such as investment intensity and infrastructure utilization. However, Driffield and Love (2007), who empirically examined the effects of FDIs on the UK's domestic productivity, state that inward FDIs, which are motivated by technology suppliers, do not cause productivity increases. Similarly, Zhang (2002) states that FDIs have certain effects on labor productivity, but this effect is not very strong and important. Therefore, according to Zhang, the contribution of FDIs to China's technological progress through technology transfer is still not fully noticed.

3. Methodology

ARDL model proposed by Pesaran et al. (2001) is one of the most preferred methods in the literature for cointegration analysis since, unlike the conventional cointegration methods, it allows regressors for being I(0), I(1), or mixed. In our case, the ARDL model can be depicted as below:

$$\Delta PROD_t = \mu + \delta_1 PROD_{t-1} + \delta_2 \text{FDIINW}_{t-1} + \delta_3 \text{INVEST}_{t-1} + \delta_4 \text{HOUR}_{t-1} +$$

$$+ \delta_5 \text{GDPPC}_{t-1} + \sum_{i=1}^{p-1} \beta_i \Delta PROD_{t-i} + \sum_{i=0}^{q-1} \alpha_i \Delta \text{FDIINW}_{t-i} + \sum_{i=0}^{s-1} \phi_i \Delta INVEST_{t-i} + \qquad (1)$$

$$+ \sum_{i=0}^{r-1} \theta_i \Delta HOUR_{t-i} + \sum_{i=0}^{w-1} \gamma_i \Delta GDPPC_{t-i} + \varepsilon_t$$

where the notations of δ_1, δ_2, δ_3, δ_4, δ_5 terms represent long-run coefficients; β_i, α_i, ϕ_i, θ_i, γ_i terms represent short-term coefficients; Δ is first degree difference operator; μ is constant term , and ε_t is white noise error term.

The ARDL model represented in Equation (1) allows for investigating both the short-run and the long-run relationship between productivity and FDI as long as this relationship is linear (i.e., symmetric). On the other hand, when the association between productivity and FDI is nonlinear (i.e., asymmetric) then a model misspecification error will be committed. In order to avoid this potential model misspecification error, a model taking into account asymmetric association between productivity and FDI is required.

Shin et al. (2014) proposed a non-linear NARDL (i.e., NARDL) model accounting for asymmetric relationship between PROD and FDIINW variables. In NARDL approach, FDIINW variable is decomposed into its positive and negative partial sums as follows:

$$\text{FDIINW}_t^+ = \sum_{j=1}^{t} \Delta \text{FDIINW}_t^+ = \sum_{j=1}^{t} \max(\Delta \text{FDIINW}_j, 0) \quad and$$

$$\text{FDIINW}_t^- = \sum_{j=1}^{t} \Delta \text{FDIINW}_t^- = \sum_{j=1}^{t} \min(\Delta \text{FDIINW}_j, 0)$$

$$(2)$$

The NARDL representation of our model taking short-run and long-run asymmetries into consideration can be shown as follows:

$$\Delta PROD_t = \mu + \delta_1 PROD_{t-1} + \delta_2^+ \text{FDIINW}_{t-1}^+ + \delta_2^- \text{FDIINW}_{t-1}^- + \delta_3 INVEST_{t-1} +$$

$$+ \delta_4 HOUR_{t-1} + \delta_5 GDPPC_{t-1} + \sum_{i=1}^{p-1} \beta_i \Delta PROD_{t-i} + \sum_{i=0}^{q-1} (\alpha_i^+ \Delta \text{FDIINW}_{t-i}^+ + \qquad (3)$$

$$\alpha_i^- \Delta \text{FDIINW}_{t-i}^-) + \sum_{i=0}^{s-1} \phi_i \Delta INVEST_{t-i} + \sum_{i=0}^{r-1} \theta_i \Delta HOUR_{t-i} + \sum_{i=0}^{w-1} \gamma_i \Delta GDPPC_{t-i} + \varepsilon_t$$

Presence of a long-run asymmetry between productivity and FDI can be checked by testing the null hypothesis of H_0: $\delta_2^+ = \delta_2^-$. Accepting H_0 hypothesis will result in a symmetric long-run association between productivity and FDI while rejecting H_0 hypothesis will lead to an asymmetric long-run relationship between productivity and FDI. According to the bound test approach of Pesaran et al. (2001), our null hypothesis for the cointegration test is given by H_0: $\delta_1 = \delta_2^+ = \delta_2^- = \delta_3 = \delta_4 = \delta_5 = 0$. If the computed F-statistic value exceeds the upper bound value (i.e., I_1) then we conclude that there is a cointegrating relationship among variables, in other words, the relevant variables move together in the long run. F-statistic value falling below the lower bound value (i.e., I_0) implies no cointegration, whereas F-statistic value remaining between two bound values leaves us indecisive.

4. Empirical data and results

In this study, by performing the Nonlinear Auto-Regressive Distributed Lag (NARDL) analysis for two different productivity indicators for the 1987-2018 period, we empirically investigated whether there is a non-linear long-term relationship between FDI and productivity in Turkey. The period limitation stems from the unavailability of data for years before 1987 for one of the control variables utilized in the analyses.

Incoming FDI may make a positive contribution to productivity of the host country by bringing new advanced technologies, which are more effective and productive relative to previous technologies. However, the nexus of FDI and productivity, rather than being linear, might be non-linear because the impact of increases and decreases in FDI on productivity may not be symmetric. Therefore, we hypothesize that an asymmetric association between FDI and productivity exists in the long run in Turkey.

Two distinct proxies for productivity are employed, namely PROD1 and PROD2. PROD1 is gross value added in terms of per person employed. It is computed as the ratio of gross value added at basic prices (constant 2010 US$) to persons employed. The data for gross value added and persons employed are gathered from WDI and The Conference Board Total Economy Database respectively. PROD2 is labor productivity per person employed in 2017 US$ and obtained from The Conference Board Total Economy Database. FDIINW is per capita inward FDI and imputed by dividing inward FDI (US dollars at current prices) with population. FDI data are from UNCTADSTAT while data for the population are collected from WDI.

Besides the FDIINW variable, we employed three control variables (i.e., HOUR, GDPPC, and INVEST) relevant to productivity. The HOUR stands for annual hours worked per worker provided by The Conference Board Total Economy Database. Increasing working hours may lead to rises in productivity, especially for developing economies like Turkey, and hence we expect to have a positive coefficient for the

HOUR variable. GDPPC is GDP per capita in terms of constant 2010 US$ and gathered from WDI. GDP per capita reflects the purchasing power and welfare level of individuals in an economy. Therefore, increases in GDP per capita will enhance the working motivation of workers, and eventually, productivity level will rise. A positive coefficient for the GDPPC variable is anticipated. INVEST is gross fixed capital formation in terms of constant 2010 US$ and represents investments in the economy. The production capacity of an economy goes up as long as the investment level increases in that economy. We expect a positive coefficient for INVEST variable. All variables are in logarithmic forms so that coefficients reflect the elasticities.

Since both ARDL and NARDL approaches do not allow integration order of I (2) or beyond, we firstly performed Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root tests to figure out integration level of the variables. As indicated by Tables 1 and 2, all variables are stationary at a 1% significance level, and thus, they meet the requirement of the ARDL and the NARDL approaches. Therefore, we are able to conduct long-run asymmetry analyses via NARDL model.

Table 1: PP Test for Constant&Linear Trend Model (H_0: non-stationary)

	Level		First Difference		Integration
	Stat.	Prob.	Stat.	Prob.	
INVEST	-2.8171	0.2021	-6.1687	0.0001	I(1)
HOUR	-1.1626	0.9014	-4.7318	0.0033	I(1)
GDPPC	-1.0237	0.9263	-6.4850	0.0000	I(1)
FDIINW	-2.3223	0.4107	-5.7703	0.0002	I(1)
PROD1	3.3973	0.0695	-8.0164	0.0000	I(1)
PROD2	-3.4972	0.0567	-8.1383	0.0000	I(1)

Source: Author's research

Table 2: ADF Test for Constant&Linear Trend Model (H_0: non-stationary)

	Level		First Difference		Integration
	Stat.	Prob.	Stat.	Prob.	
INVEST	-2.8171	0.2021	-6.0135	0.0001	I(1)
HOUR	-1.7738	0.6937	-4.7460	0.0032	I(1)
GDPPC	-1.0378	0.9240	-5.6779	0.0003	I(1)
FDIINW	-2.2441	0.4506	-5.6422	0.0003	I(1)
PROD1	-3.3789	0.0722	-7.3822	0.0000	I(1)
PROD2	-3.4738	0.0595	-7.4741	0.0000	I(1)

Source: Author's research

Secondly Schwarz information criteria (SIC) is used to choose the optimal lag lengths and the NARDL(1, 0, 0, 0, 1, 0) model is selected out of 486 models evaluated. Bound test results for nonlinear cointegration for the models where PROD1 and PROD2 are dependent variables are displayed in Table 3 and 4 respectively. As seen from Table 3, calculated F-statistics is higher than upper-bound critical values at all significance levels but 1% significance level for PROD1 model; hence this finding implies that there is a nonlinear cointegrating relationship among relevant variables. In other words, the selected variables move together in the long term.

Table 3: Nonlinear Cointegration Test Results for PROD1 Model

F-statistic: 4.4625	CriticalValues	
Sig. Level	I_0	I_1
10%	2.49	3.38
5%	2.81	3.76
2.50%	3.11	4.13
1%	3.5	4.63

Source: Author's research

As displayed in Table 4, calculated F-statistics is higher than upper-bound critical values at all significance levels for PROD2 model; thus this result hints that selected variables have a co-movement in the long run.

Table 4: Nonlinear Cointegration Test Results for PROD2 Model

F-statistic: 5.7611	CriticalValues	
Sig. Level	I_0	I_1
10%	2.49	3.38
5%	2.81	3.76
2.50%	3.11	4.13
1%	3.5	4.63

Source: Author's research

We thirdly implement Wald test to find out if there exists a long-run asymmetry for PROD1 and PROD2 models by testing the null hypothesis of H_0: $\delta_2^+ = \delta_2^-$. As seen from Table 5 reporting long-term asymmetry test findings, there is a long-run asymmetry for both PROD1 and PROD2 models at 1% significance level. This finding confirms the validity of NARDL model relative to ARDL model.

Table 5: Long-run Asymmetry Test Results

PROD1		PROD2	
F-statistic	P-value	F-statistic	P-value
18.3065	0.0003	15.1581	0.0007

Source: Author's research

As indicated by the findings given in Model Diagnostic Tests section, residuals of PROD1 model have a normal distribution and the model does not suffer from autocorrelation or heteroscedasticity problem.

Table 6: NARDL Estimation Results for PROD1 Model

Short-run Coefficients		
	Coefficient	P-value
$\Delta FDIINW_{+(t)}$	0.0169	0.0787
$\Delta FDIINW_{-(t)}$	-0.0480	0.002
$\Delta INVEST_{(t)}$	0.0567	0.4243
$\Delta HOUR_{(t)}$	0.9810	0.0117
$\Delta GDPPC_{(t)}$	0.7780	0.0018
Constant	-7.9693	0.0001
$ECM_{(t-1)}$	-0.6903	0.0001
Long-run Coefficients		
	Coefficient	P-value
$FDIINW^+$	0.0165	0.0669
$FDIINW^-$	-0.0559	0.0162
INVEST	0.0709	0.4356
HOUR	2.5828	0.0001
GDPPC	0.8537	0.0078
Trend	-0.0143	0.0337
Model Diagnostic Tests		
	test-statistic	*P-value*
ARCH Heteroskedasticity Test	*0.2951*	*0.5911*
B-G Serial Correlation LM Test	*0.3768*	*0.6906*
Jarque-Bera test on normality	*1.3263*	*0.5152*

Source: Author's research

Yüksel Okşak, Cüneyt Koyuncu • Long-run asymmetric association between FDI...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 253-277

266

Moreover, as can be seen from Figure 1 displaying the CUSUM of the squares test result, since the movement lies within the 5% significance lines, it suggests that parameters are stable in the PROD1 model.

Figure 1: CUSUM-Square Parameter Stability Test for PROD1 Model
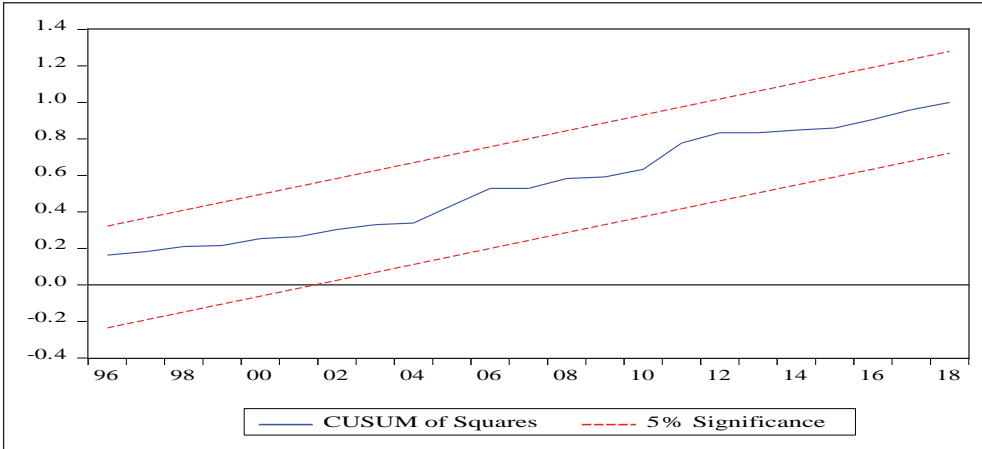
Source: Author's research

Model Diagnostic Tests findings also indicate that residuals of PROD2 model are distributed normally and the model does not have autocorrelation or heteroscedasticity problem.

Figure 2: CUSUM-Square Parameter Stability Test for PROD2 Model
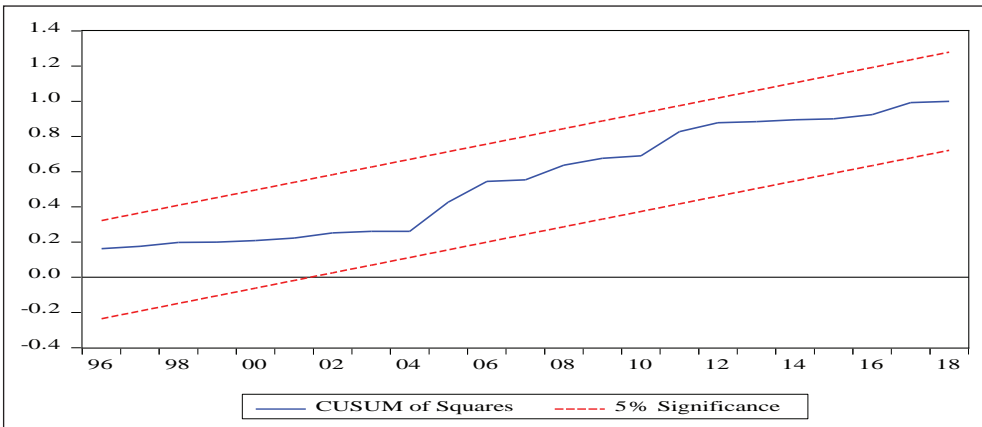
Source: Author's research

Table 7: NARDL Estimation Results for PROD2 Model

Short-run Coefficients		
	Coefficient	P-value
$\Delta FDIINW_{+(t)}$	0.0186	0.0549
$\Delta FDIINW_{-(t)}$	-0.0414	0.006
$\Delta INVEST_{(t)}$	0.1306	0.0795
$\Delta HOUR_{(t)}$	0.9636	0.0142
$\Delta GDPPC_{(t)}$	0.5423	0.0263
Constant	-12.3353	0.0001
$ECM_{(t-1)}$	-0.9106	0.0001
Long-run Coefficients		
	Coefficient	P-value
$FDIINW^+$	0.0201	0.0135
$FDIINW^-$	-0.0402	0.0458
INVEST	0.1204	0.1495
HOUR	2.1053	0.0002
GDPPC	0.6287	0.0258
Trend	-0.0097	0.0961
Model Diagnostic Tests		
	test-statistic	*P-value*
ARCH Heteroskedasticity Test	*0.4111*	*0.5265*
B-G Serial Correlation LM Test	*1.1501*	*0.3357*
Jarque-Bera test on normality	*0.1333*	*0.9355*

Source: Author's research

CUSUM of squares test result in Figure 2 implies parameters of PROD2 model are stable since the movement stays inside the 5% significance lines.

5. Results and discussion

Lastly, long-term estimation results are shown in Tables 6 and 7. Table 6 displays the findings for the model where PROD1 (i.e., gross value added in terms of per person employed) is a dependent variable. Error correction term (ECM) takes the anticipated negative sign and is highly statistically significant. The coefficient of ECM reflects how strongly the dependent variable responds to a deviation from the equilibrium relationship stemming from a shock in one period, or it is nothing more than how fast such an equilibrium distortion is recovered. The ECM coefficient indicates that any deviation from the long-run equilibrium will be eliminated

within a period shorter than two years. In addition, the ECM coefficient with a higher value than -1 in the PROD1 model hints stability of the PROD1 model. The positive and negative long-run asymmetric coefficient estimations, given by FDIINW+ and FDIINW- are statistically significant at least at a 10% significance level. According to the estimation findings, in the long run in Turkey, when the incoming per capita FDI increases by 1% gross value added in terms of per person employed goes up by 0.0165% whereas when the incoming per capita FDI goes down by 1% gross value added in terms of per person employed drops by 0.0559%. Long-term coefficients of HOUR and GDPPC variables possess the expected signs and are highly significant. An increase of 1% in working hours causes a 2.5828% enhancement in gross value added in terms of per person employed while a rise of 1% in per capita GDP makes a 0.8537% contribution to gross value added in terms of per person employed in the long run in Turkey.

Table 7 reports the estimation results for the model where PROD2 (i.e., labor productivity per person employed) is a dependent variable. Error correction term (ECM) of the model gets the expected negative sign and is highly significant. The ECM coefficient points out that any deviation from the long-run equilibrium will be eliminated in less than one year. Meanwhile, the ECM coefficient with a value higher than -1 in the PROD2 model hints at the stability of the PROD2 model. Positive and negative long-run asymmetric coefficient estimations, given by FDIINW+ and FDIINW- are statistically significant at least at a 5% significance level. As can be deducted from estimated long-run coefficients of FDIINW+ and FDIINW- variables, when the incoming per capita FDI goes up by 1%, labor productivity per person employed rises by 0.0201% while, when the incoming per capita FDI goes down by 1%, labor productivity per person employed falls by 0.0402% in Turkey. Long-run coefficients of HOUR and GDPPC variables take the anticipated signs and are statistically significant at least at a 5% significance level. If working hours go up by 1%, then labor productivity per person-employed rises by 2.1053%; on the other hand, an increase of 1% in per capita GDP leads to a rise of 0.6287% in labor productivity per person employed in the long run in Turkey.

In addition to the studies emphasizing that there is no significant relationship between FDI and labor productivity, there are also studies showing a negative relationship. Some studies suggest that FDI is not only an investment but is also creating employment and brings along the much-needed technological advances, or has a crowding-out effect. Therefore, such studies emphasize the positive relationship between FDI and Labor productivity and try to explain the source of this relationship with the spillover effect. The results of this paper obtained in the study also support this situation. As mentioned earlier, it is emphasized that there is a positive relationship between FDI and labor productivity in a non-linear manner in the long term in Turkey. An increase in working hours causes an enhancement in gross value added in terms of per person employed while a rise in per capita

GDP makes a contribution to gross value added in terms of per person employed in the long run in Turkey. If working hours go up then labor productivity per person-employed rises; on the other hand, an increase in per capita GDP leads to a rise in labor productivity per person employed in the long run in Turkey.

Our hypothesis claims the existing asymmetric association between FDI and productivity in the long run in Turkey. Nonlinear cointegration test findings indicate that selected variables are cointegrated, moving together in the long run. The obtained results contribute to bridging a significant gap by bringing a different perspective to the relevant literature. Our study uses aggregated data at a macro level to analyze the long-term asymmetric relationship between foreign direct investment and labor productivity in Turkey using the NARDL estimation technique.

6. Conclusion

This study explores both short-run and the long-run asymmetric association between incoming FDI and labor productivity in Turkey. Following this purpose, the nonlinear autoregressive distributed lag (NARDL) model is employed and estimated. Concerning the estimation results, a long-run nonlinear relationship between incoming FDI and labor productivity was detected and this finding remained valid across two models constructed by using two distinct labor productivity indicators. Therefore estimation results acknowledge the validity of our main hypothesis. Short-run coefficients of the FDI variable are significant and take the expected signs in both models. Moreover per capita GDP and working hours, in parallel to prior expectations, positively affect labor productivity in both short-run and long-run whereas investment does not have a significant impact on labor productivity. In other words, an increase in GDP per capita leads to a rise in labor productivity by enhancing the working motivation of laborers, and an increase in working hours induces a rise in labor productivity by increasing output per labor in both the short-run and long run in Turkey. As a whole, our results are consistent with the ones found in the literature. Besides, for the first time in the literature, this study addresses the long-run asymmetric nexus between FDI and labor productivity by using macro-level data specific to Turkey. The results of this study contain several policy implications. To improve and maintain long-run sustainable labor productivity, the Turkish government should implement practice policies and legislative regulations necessary for promoting inward FDI. Encouraging inward FDI not only enhances labor productivity but also boosts up economic growth through the transmission mechanism. The Turkish government also should support and adopt policies augmenting per capita GDP, which is a rough indicator of an individual's welfare level. The impact of inward FDI on labor productivity in Turkey should be further studied in future researches by implementing the

Yüksel Okşak, Cüneyt Koyuncu • Long-run asymmetric association between FDI...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 253-277

270

same analysis for the manufacturing sector, industrial sector, agricultural sector, and sector of services. In addition to that different data set in terms of variable combination or estimation techniques can be employed to see how the results vary.

References

Anwar, S., Sun, S. (2014) "Heterogeneity and curvilinearity of FDI-related productivity spillovers in China's manufacturing sector", *Economic Modelling*, Vol. 41, pp. 23–32, https://doi.org/10.1016/j.econmod.2014.03.021.

Asongu, S. A., Nnanna, J., Acha-Anyi, P. N. (2020) "On the simultaneous openness hypothesis: FDI, trade and TFP dynamics in Sub-Saharan Africa", *Journal of Economic Structures: The Official Journal of the Pan-Pacific Association of Input-Output Studies (PAPAIOS),* Vol. 9, No. 1, https://doi.org/10.1186/s40008-020-0189-4.

Barbosa, N., Eiriz, V. (2009) "Linking corporate productivity to foreign direct investment: An empirical assessment", *International Business Review*, Vol. 18, No. 1, pp. 1–13, https://doi.org/10.1016/j.ibusrev.2008.10.003.

Bijsterbosch, M., Kolasa, M. (2010) "FDI and productivity convergence in Central and Eastern Europe: an industry-level investigation", *Review of World Economics / Weltwirtschaftliches Archiv,* Vol. 145, No. 4, pp. 689–712, https://doi.org/10.1007/s10290-009-0036-z.

Borensztein, E., De Gregorio, J., & Lee, J. W. (1998) How does foreign direct investment affect economic growth?. Journal of international Economics, 45(1), 115–135, https://doi.org/10.1016/S0022-1996(97)00033-0.

Carp, L. (2013) "Anaysis of the relationship between fdi and economic growth–literature review study", *The USV Annals of Economics and Public Administration*, Vol. 12, No. 15, pp. 154–160, http://www.annals.seap.usv.ro/index.php/annals/article/view/467/460.

Chen Ting Gui, L. G., Yabe, M. (2019) "Impact of outward FDI on firms' productivity over the food industry: evidence from China", *China Agricultural Economic Review*, Vol. 11, No. 4, pp. 655–671, https://doi.org/10.1108/CAER-12-2017-0246.

Damijan, J. P., Polanec, S., Prašnikar, J. (2007) "Outward FDI and Productivity: Micro-evidence from Slovenia", *World Economy*, Vol. 30, pp. 135–155, doi: 10.1111/j.1467-9701.2007.00876.x.

Demir, F., Duan. Y. (2018) "Bilateral FDI Flows, Productivity Growth, and Convergence: The North vs. The South", *World Development,* Vol. 101, pp. 235–249, https://doi.org/10.1016/j.worlddev.2017.08.006.

Deng, Z., Falvey, R., Blake, A. (2012) "Trading market access for technology? Tax incentives, foreign direct investment and productivity spillovers in China",

Journal of Policy Modeling, Vol. 34, No. 5, pp. 675–690, https://doi.org/10.1016/j.jpolmod.2012.01.003.

Derado, D., Horvatin, D. (2019) "Does Fdi Mode of Entry Have an Impact on the Host Country's Labor Productivity? An Analysis of the Eu Countries", *Ekonomski Vjesnik*, Vol. 32, No. 2, pp. 405–423, https://www.proquest.com/scholarly-journals/does-fdi-mode-entry-have-impact-on-host-countrys/docview/2335125988/se-2?accountid=17219.

Demena, B.A., van Bergeijk, P.A.G. (2017) "A META-ANALYSIS OF FDI AND PRODUCTIVITY SPILLOVERS IN DEVELOPING COUNTRIES", *Journal of Economic Surveys*, Vol. 31, pp. 546–571, doi: 10.1111/joes.12146.

Driffield, N., Love, J. H. (2007) "Linking FDI motivation and host economy productivity effects: conceptual and empirical analysis", *Journal of international business studies*, Vol. 38, No. 3, pp. 460–473, https://doi.org/10.1057/palgrave.jibs.8400268.

Dritsaki, M., Dritsaki, C., Adamopoulos, A. (2004) "A causal relationship between trade, foreign direct investment and economic growth for Greece", *American Journal of applied sciences*, Vol. 1, No. 3, pp. 230–235, https://core.ac.uk/download/pdf/25903151.pdf.

Elmawazini, K. (2014) "FDI Spillovers, Efficiency Change and Host Country Labor Productivity: Evidence from GCC Countries", *Atlantic Economic Journal*, Vol. 42, No. 4, https://doi.org/10.1007/s11293-014-9428-0.

Elmawazini, K. et al. (2018) "Tripartite decomposition of labor productivity growth, FDI and human development: evidence from transition economies", *Economic Change and Restructuring: Empirical and Policy Research on the Transitional and Emerging Economies*, Vol. 51, No. 2, https://doi.org/10.1007/s10644-016-9197-7.

Eller, M., Haiss, P., Steiner, K. (2006) "Foreign direct investment in the financial sector and economic growth in Central and Eastern Europe: The crucial role of the efficiency channel", *Emerging Markets review*, Vol. 7, No. 4, pp. 300–319, https://doi.org/10.1016/j.ememar.2006.09.001.

Erdogan, A. (2011) "Foreign direct investment and productivity spillovers: evidence from Turkey", *Journal of Applied Finance & Banking*, Vol. 1, No. 4, https://ssrn.com/abstract=2369151.

Eric C.Y. Ng, Souare, M. (2010) "Inward FDI and Productivity Performance in Canadian Industries: Does the Country of Origin Matter?", *Transnational Corporations Review*, Vol. 2, No. 3, pp. 72–90, doi: 10.1080/19186444.2010.11658251.

Fatima, S. T. (2016) "Productivity spillovers from foreign direct investment: evidence from Turkish micro-level data", *The Journal of International Trade & Economic Development*, Vol. 25, No. 3, pp. 291–324, https://doi.org/10.1080/09638199.2015.1050057.

Yüksel Okşak, Cüneyt Koyuncu • Long-run asymmetric association between FDI...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 253-277

272

Fauzel, S., Seetanah, B., Sannasee, R. V. (2015) "Productivity Spillovers of FDI in the Manufacturing Sector of Mauritius. Evidence from a Dynamic Framework", *Journal of Developing Areas*, Vol. 49, No. 2, pp. 295–316, https://doi.org/10.1353/jda.2015.0026

Fillat, C., Woerz, J. (2011) "Good or bad? The influence of FDI on productivity growth. An industry-level analysis", *The Journal of International Trade & Economic Development*, Vol. 20, No. 3, pp. 293–328, doi: 10.1080/09638190903003010.

Flora, P., Agrawal, G. (2017) "FDI and economic growth nexus for the largest FDI recipients in Asian emerging economies: a panel co-integration analysis", In *International Business Strategy* (pp. 261–275). Palgrave Macmillan, London. https://doi.org/10.1057/978-1-137-54468-1_12.

Fukunari, K., Kozo, K. (2006) "Exports, FDI, and Productivity: Dynamic Evidence from Japanese Firms", *Review of World Economics / Weltwirtschaftliches Archiv*, Vol. 142, No. 4, https://doi.org/10.1007/s10290-006-0089-1.

Girma, S., Kneller, R., Pisu, M. (2005) "Exports versus FDI: An Empirical Test", *Rev. World Econ.,* Vol. 141, pp. 193–218, https://doi.org/10.1007/s10290-005-0025-9.

Herzer, D., Donaubauer, J. (2018) "The long-run effect of foreign direct investment on total factor productivity in developing countries: a panel cointegration analysis", *Empirical Economics: Journal of the Institute for Advanced Studies*, Vol. 54, No. 2, https://doi.org/10.1007/s00181-016-1206-1.

Hübler, M., Keller, A. (2010) "Energy savings via FDI? Empirical evidence from developing countries", *Environment and Development economics*, Vol. 15, No. 1, pp. 59–80, https://www.jstor.org/stable/44379001.

Ito, Y. (2015) "Is starting FDI more productive than staying at home? Manufacturing and service sectors in Japan", *Journal of International Trade & Economic Development*, Vol. 24, No. 1, pp. 105–131, https://doi.org/10.1080/09638199.2013.877064.

Jeon, Y., Park, B. I., Ghauri, P. N. (2013) "Foreign direct investment spillover effects in China: Are they different across industries with different technological levels?", *China Economic Review*, Vol. 26, pp. 105–117. https://doi.org/10.1016/j.chieco.2013.05.001.

Jin S. et al. (2017) "Benefit or damage? The productivity effects of FDI in the Chinese food industry", *Food Policy*, Vol. 68, pp. 1–9, https://doi.org/10.1016/j.foodpol.2016.12.005.

Jordaan, J. A. (2005) "Determinants of FDI-induced externalities: New empirical evidence for Mexican manufacturing industries", *World Development*, Vol. 33, No. 12, pp. 2103–2118, https://doi.org/10.1016/j.worlddev.2005.07.007.

Karentina, R. (2019) "The spillover effects of foreign direct investment on labor productivity", *Economic Journal of Emerging Markets*, Vol. 1, No. 32, https://doi.org/10.20885/ejem.vol11.iss1.art4.

Khalifah, N. A., Salleh, S. M., Adam, R. (2020) "FDI productivity spillovers and the technology gap in Malaysia's electrical and electronic industries", *Asıan-Pacıfıc Economıc Lıterature*, Vol. 29, No. 1, pp, 142–160, https://doi.org/10.1111/apel.12094.

Kim, H. H., Lee, H., Lee, J. (2015) "Technology diffusion and host–country productivity in South-South FDI flows", *Japan and the world Economy*, Vol. 33, pp. 1–10, https://doi.org/10.1016/j.japwor.2014.11.001.

Kim, M. (2015) "Productivity spillovers from FDI and the role of domestic firm's absorptive capacity in South Korean manufacturing industries", *Empirical Economics: Journal of the Institute for Advanced Studies*, Vol. 48, No. 2, https://doi.org/10.1007/s00181-014-0804-z.

Kimura, F., Kiyota, K. (2006) "Exports, FDI, and Productivity: Dynamic Evidence from Japanese Firms", *Rev. World Econ.,* Vol. 142, pp. 695–719, https://doi.org/10.1007/s10290-006-0089-1.

Koyuncu, C., Çınar, İ., T. (2009) "Ticari Dışa Açıklık Ve Doğrudan Yabancı Sermaye Yatırımlarının İşgücü Verimliliğine Etkisi: 1980 – 2005 Türkiye Uygulaması", *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, Vol. 23, No. 1, pp. 309–326, https://dergipark.org.tr/en/pub/atauniiibd/issue/2695/35498.

Koyuncu, C. et al. (2016) "Is IQ Level of a Country Important to Attract More FDI?: Cross-country Evidence", *The Empirical Economics Letters*, Vol. 15, No. 12, pp. 1179–1188.

Koyuncu Yalcinkaya, J. (2011) "Yargı Bağımsızlığı, Mülkiyet Hakkı ve Yolsuzluğun Yabancı Sermaye Girişleri Üzerindeki Etkisi", *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, Vol. 29, Retrieved from https://dergipark.org.tr/en/pub/dpusbe/issue/4771/65658.

Koyuncu Yalcikaya, J., et al. (2016) "The Relationship Between Female Labor Force Participation and Labor Productivity: Panel Data Analysis". Eskişehir Osmangazi Üniversitesi İİBF Dergisi, Vol. 11, No. 2, pp. 237–249. https://www.researchgate.net/profile/Mustafa-Unver/publication/309348316_The_Relationship_Between_Female_Labor_Force_Participation_and_Labor_Productivity_Panel_Data_Analysis/links/580c872c08ae2cb3a5da7266/The-Relationship-Between-Female-Labor-Force-Participation-and-Labor-Productivity-Panel-Data-Analysis.pdf.

Koyuncu Yalcinkaya, J., Ünver, M. (2018) "Does Corruption Deteriorate Labor Productivity? Panel Evidence" in Studies on Balkan and Near Eastern Social Sciences, Vol. 2, Edited by Rasim Yilmaz and Günther Löschnigg, pp. 159–169, Berlin: PETER LANG, ISBN 978-3-631-74727-8.

Koyuncu Yalcinkaya, J., Ünver, M. (2019) "Revisiting the Nexus of Infrastructure and FDI: The Case of Transition Economies", *Balkan and Near Eastern Journal of Social Sciences*, Vol. 3, No. 4, pp. 150–156, https://www.researchgate.net/profile/Mustafa-Unver/publication/322037262_Revisiting_the_Nexus_of_

274

Yüksel Okşak,Cüneyt Koyuncu • Long-run asymmetric association between FDI...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 253-277

Infrastructure_and_FDI_The_Case_of_Transition_Economies/ links/5a3f8523458515f6b0463d1d/Revisiting-the-Nexus-of-Infrastructure-and-FDI-The-Case-of-Transition-Economies.pdf.

Koyuncu Yalcikaya, J. et al. (2017) "Internet Penetration and Productivity: A Panel Study". Anadolu Üniversitesi Sosyal Bilimler Dergisi, Vol. 17, No. 1, pp. 59–66, https://dergipark.org.tr/en/pub/ausbd/article/415638.

Lin, B. et al. (2020) "The impact of foreign direct investment on the productivity of the Chinese forest products industry", *Forest Policy and Economics*, Vol. 111, https://doi.org/10.1016/j.forpol.2019.102035.

Makki, S. S., Somwaru, A. (2004) "Impact of foreign direct investment and trade on economic growth: Evidence from developing countries", *American journal of agricultural economics*, Vol. 86, No. 3, pp. 795–801, http://www.jstor.org/stable/3697825.

Mitze, T., Özyurt, S. (2014) "The Spatial Dimension of Trade- and FDI-driven Productivity Growth in Chinese Provinces: A Global Cointegration Approach", *Growth & Change*, Vol. 45, No. 2, pp. 263–291, https://doi.org/10.1111/grow.12042.

Ngoc Anh, N., et al. (2009) "Foreign direct investment in Vietnam: is there any evidence of technological spillover effects; research report", https://idl-bnc-idrc.dspacedirect.org/handle/10625/39598.

Nguyen, A. N., Nguyen, T. (2008) "Foreign direct investment in Vietnam: Is there any evidence of technological spillover effects", Available at SSRN 1117202, http://dx.doi.org/10.2139/ssrn.1117202.

Nistor, P. (2015) "FDI implications on BRICS economy growth", *Procedia Economics and Finance,* Vol. 32, pp. 981–985, https://doi.org/10.1016/S2212-5671(15)01557-9.

Osano, H. M., Koine, P. W. (2016) "Role of foreign direct investment on technology transfer and economic growth in Kenya: a case of the energy sector", *Journal of Innovation and Entrepreneurship*, Vol. 5, No. 1, pp. 1–25, https://doi.org/10.1186/s13731-016-0059-3.

Pesaran, M. H., Shin, Y., Smith, R. J. (2001) "Bounds testing approaches to the analysis of level relationships", *Journal of Applied Econometrics*, Vol. 16, No. 3, pp. 289–326, doi: 10.1002/jae.616.

Pripoaie, R. (2017) "Statistical Analysis of the Evolution FDI Comparative with Growth Rate of Labour Productivity per Employed Person and Growth Rate of GDP per Capita", *Acta Universitatis Danubius: Oeconomica*, Vol. 6, https://www.ceeol.com/search/article-detail?id=730619.

Rashmi, B. (2004) "Impact of Japanese and US FDI on Productivity Growth: A Firm-Level Analysis", *Economic and Political Weekly*, Vol. 39, No. 5, https://www.jstor.org/stable/4414579.

Rong, S. et al. (2020) "FDI, labor market flexibility and employment in China", *China Economic Review*, Vol. 61, https://doi.org/10.1016/j.chieco.2020.101449.

Saggi, K. (2002) "Trade, foreign direct investment, and international technology transfer: A survey", *The World Bank Research Observer*, Vol. 17, No. 2, pp. 191–235, https://doi.org/10.1093/wbro/17.2.191.

Sheereen F., Seetanah, B., Sannasee, R. V. (2015) "Productivity Spillovers of Fdi in the Manufacturing Sector of Mauritius. Evidence from a Dynamic Framework", *The Journal of Developing Areas*, Vol. 49, No. 2, https://www.jstor.org/stable/24241308.

Shin Y., Yu B., Greenwood-Nimmo M. (2014) "Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework" In: Sickles R., Horrace W. (eds.) Festschrift in Honor of Peter Schmidt. Springer, New York, NY, pp. 281–314, doi: 10.1007/978-1-4899-8008-3_9.

Singh, A. P. (2017) "Does FDI Promote Productivity? A Deep Dive", *Indian Journal of Industrial Relations*, Vol. 52, No. 3, pp. 443–455, https://www.jstor.org/stable/26536408.

Souare, M. (2013) "Productivity growth, trade and FDI nexus: evidence from the Canadian manufacturing sector", *The Journal of Technology Transfer*, Vol. 38, No. 5, https://doi.org/10.1007/s10961-012-9259-6.

Soumaré, I. (2015) "Does FDI improve economic development in North African countries?", *Applied Economics*, Vol. 47, No. 51, pp. 5510–5533, https://doi.org/10.1080/00036846.2015.1051655.

Teixeira, A. C., Shu, L. (2012) "The level of human capital in innovative firms located in China. Is foreign capital relevant?", *Journal of the Asia Pacific Economy*, Vol. 17, No. 2, pp. 343–360, https://doi.org/10.1080/13547860.2012.668095.

Tomiura, E. (2007) "Foreign outsourcing, exporting, and FDI: A productivity comparison at the firm level", *Journal of International Economics*, Vol. 72, No. 1, pp. 113–127, https://doi.org/10.1016/j.jinteco.2006.11.003.

Wang, Y. (2010) "FDI and productivity growth: the role of inter-industry linkages", *Canadian Journal of Economics/Revue canadienne d'économique,* Vol. 43, pp. 1243–1272, doi:10.1111/j.1540-5982.2010.01613.x.

Wang, Y. (2012) "Openness and Productivity: The Role of Imports, FDI and International Telecommunications", *Latin American Journal of Economics*, Vol. 49, No. 1, http://dx.doi.org/10.4067/S0719-04332012000100005.

Vahter, P. (2011) "Does FDI Spur Productivity, Knowledge Sourcing and Innovation by Incumbent Firms? Evidence from Manufacturing Industry in Estonia", *The World Economy*, Vol. 34, pp. 1308–1326, doi:10.1111/j.1467-9701.2011.01379.x.

Vassilis, M., Jacob, A. J. (2010) "Does FDI promote regional development? Evidence from local and regional productivity spillovers in Greece", *Eastern*

Journal of European Studies, Vol. 2, https://www.ceeol.com/search/article-detail?id=519350.

Vinish K. (2002) "Liberalisation, FDI, and Productivity Spillovers: An Analysis of Indian Manufacturing Firms", *Oxford Economic Papers*, Vol. 54, No. 4, https://doi.org/10.1093/oep/54.4.688.

Yildirim, K., Koyuncu, C., Koyuncu, J. (2009) "Does temperature affect labor productivity: Cross-country evidence", *Applied Econometrics and International Development*, Vol. 9, No. 1, pp. 29–39, https://www.researchgate.net/profile/Cuneyt-Koyuncu/publication/227410116_Does_Temperature_Affect_Labor_Productivity_Cross-Country_Evidence/links/0a85e53467d19369e8000000/Does-Temperature-Affect-Labor-Productivity-Cross-Country-Evidence.pdf.

Yılmaz, R, Yalçınkaya Koyuncu, J. (2018) "The Impact of Privatization on Labor Productivity in Transition Economies and the Turkic Republics", *Bilig*, Vol. 85, pp. 257–281, Retrieved from https://dergipark.org.tr/en/pub/bilig/issue/36704/518765.

Zhang, Z. (2002) "Productivity and economic growth: an empirical assessment of the contribution of FDI to the Chinese economy", *Journal of Economic Development*, Vol. 27, No. 2, pp. 81–94, https://www.researchgate.net/profile/Zhaoyong-Zhang/publication/227450303_Productivity_and_economic_growth_an_empirical_assessment_of_the_contribution_of_FDI_to_the_Chinese_economy/links/00b4951f328c0d4b4a000000/Productivity-and-economic-growth-an-empirical-assessment-of-the-contribution-of-FDI-to-the-Chinese-economy.pdf.

Zhang, K. H. (2005) "Why does so much FDI from Hong Kong and Taiwan go to Mainland China?", *China Economic Review*, Vol. 16, No. 3, pp. 293–307, https://doi.org/10.1016/j.chieco.2005.02.004.

Dugoročna asimetrična povezanost između izravnih stranih ulaganja i produktivnosti u Turskoj

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Sažetak

Izravna strana ulaganja (FDI) mogu povećati razinu produktivnosti zemlje domaćina uvođenjem novih naprednih tehnologija. S druge strane, veza između izravnih stranih ulaganja i produktivnosti, umjesto da je linearna, može biti nelinearna zbog toga što je moguće da učinak povećanja i smanjenja izravnih stranih ulaganja na produktivnost nije simetričan. U tom smislu, ova studija istražuje asimetrični odnos između izravnih stranih ulaganja i produktivnosti u Turskoj a koriste se dva različita pokazatelja produktivnosti (tj. PROD1 i PROD2) i primjenjuje nelinearni ARDL pristup. Naša hipoteza tvrdi da je dugoročno u Turskoj prisutna asimetrična povezanost između izravnih stranih ulaganja i produktivnosti. Nalazi testa nelinearne kointegracije pokazuju da su odabrane varijable kointegrirane i stoga se dugoročno kreću zajedno. Naša studija koristi prikupljene podatke na makro razini kako bi se analizirao dugoročni asimetrični odnos između izravnih stranih ulaganja i produktivnosti rada u Turskoj uz primjenu NARDL tehnike procjene. Što se tiče rezultata procjene, utvrđena je dugoročna nelinearna veza između ulaznih izravnih stranih ulaganja i produktivnosti rada, a ovaj je nalaz ostao valjan u dva modela konstruirana korištenjem dva različita pokazatelja produktivnosti rada. U cjelini, naši su rezultati u skladu s onima koji se nalaze u literaturi. Osim toga, po prvi put u literaturi, ova se studija bavi dugoročnim asimetričnim vezama između izravnih stranih ulaganja i produktivnosti rada korištenjem podataka na makro razini specifičnim za Tursku te daje različite političke preporuke.

Ključne riječi: *produktivnost, FDI (izravna strana ulaganja), radno vrijeme, investicije, GDPPC, NARDL*

JEL klasifikacija: *C22, E22, F21, J24*

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Urban employment in post-transition economies: skill mismatch in the local labor market[*]

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Abstract

The paper explores the mismatch between the skills and qualifications required by the labour market and those acquired through education and on-the-job learning. The skill mismatch in transition economies tends to be even more pronounced as the labour markets in these countries are characterized by structural unemployment, affecting both older workers with obsolete skills and the young ones. Employers face poor incentives for investing in workforce skill development, due to the inadequate investment climate and volatile business environment. Transition countries face increasing outward mobility of an educated workforce, loss of human capital, and shortage of workforce in the fields such as ICT, medicine, science and research. The research is based on empirical data generated in a survey on ICT and manufacturing enterprises in the City of Niš, Serbia. The research methodology combines workers' self-assessment method for the skill gap measurement and the competence approach combined with the statistical methods. The findings indicate the presence of a qualification mismatch, in the form of the over-qualification as a dominant irregularity in the analysed labour market. The results of the study are expected to contribute to creating a network of policy instrumentaria that tend to be effective on a sub-national level in addressing the mismatch.

Key words: *education, labour market, skill mismatch, unemployment*

JEL classification: *J24, C10, R23*

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1. Introduction

The labour market mismatch is a common phenomenon in market economies, generated by a number of causes – economic shocks, imperfect information, technology advancements. However, its appearance is most often assigned to the imperfect ability of education systems to respond to the increasing demands for new skills in the conditions of rapid technological and organizational development. The skill mismatch, commonly described as a situation where an employee's skills exceed or lag behind those required by the job, is an inexhaustible research subject across a wide range of fields, as well as a topic of critical concern for policymakers. Despite the extensive literature on the subject, many aspects and the key concepts of the skills mismatch are still quite ambiguous and fragmentary. The body of evidence on skill mismatch is vast, covering various types of mismatches, although not always providing firm conclusions and efficient policy responses aimed at reducing social and economic costs of skills waste.

The research in this paper aimed to contribute to the literature on the labour market inefficiencies in post-transition economies provide analysis of data on skill mismatch collected at the sub-national level in the Republic of Serbia and discusses the results obtained through a comparative analysis of the existence of skills mismatches in other post-transition economies. Unlike developed countries, where the key source of the increasing skill gaps can be related to the globalisation process and technological innovation, the transition economies have faced far more intense labour market changes caused by the overall transformation and the structural changes of the economic systems. As human capital appears to be a crucial resource that underpins the economic growth in these countries, the issue of enhancing work skills and improving the skill base is imposed as a task of critical importance. The analysis of the mismatch is a complex task, given its multidimensional nature and the multiple levels it is performed at. This research is designed as an attempt to address the gap in data and research evidence on a skill mismatch within a single city framework in a post-transition economy. Based on the up-to-date survey data on skills and qualifications of employees, as well as job requirements in a local economic environment, the paper tests the assumption of an existing mismatch in a local labour market. The main objective of the paper is to determine the extent of the existing skill and qualification mismatches in the companies with the largest share of employment in the local economy that has been experiencing a significant increase of employee numbers in recent years. In addition, the research is aimed to explore the importance of various sets of business skills from the perspective of the employee. Therefore, the research presented in the paper will test the following hypothesis: an existing mismatch in a local labour market in post-transition economy records significantly higher values in the number of overqualified workers than the developed labour markets of the European Union.

The paper is structured as follows: after introductory notes, a literature review on defining and measuring skill mismatch will be presented. In the next section, proposed methodology and data sources used in the paper will be described, followed by the presentation and discussion of main results. Finally, some concluding remarks will be offered.

2. Literature review

The concept of skill refers to the ability of an individual to perform tasks required by a particular job. It is a multidimensional concept, including educational attainment, qualifications, and specific competencies (Gambin et al., 2016). Skills are individual characteristics augmented through different types of investment that can generate productive value. Several distinct types of skills can be distinguished such as firm-specific, non-transferable and generic skills that can be transferred across occupations (Becker, 1962). This distinction is especially important from the aspect of education and training, and more particularly, the funding of these activities. Firm-specific skills can be valuable only in the firm where an individual works, unlike general skills, transferable to other firms (Stevens, 1994). Human capital productivity depends not only on the higher education system, but on its mutual reinforcement with life-long skill development, work experience, and other intangible categories such as motivation and work ethic (Mbonigaba and Wilfred, 2019).

The neoclassical model of human capital implies that any investment in enhancing individual skills should be rewarded by the increased wage. This way, the wages would reflect the demand for skills, and in a perfect labour market, the market forces would lead to the equilibrium level of skills, as skill shortages in particular areas would push up wages and attract more individuals to develop skills in these areas. However, as the labour markets are not perfect, they respond slowly to signals about the supply and demand of skills, which leads to sub-optimal human capital allocation and skills supply (Willson and Hogarth, 2003). According to the neoclassical theory, an imbalance between the labour supply and demand is a transitory phenomenon that can be resolved by upward or downward wage flexibility. When the employees' skills are insufficient compared to the job requirements, the underemployed workers used at the existing wages cannot meet the job requirements.. Therefore, "the skills mismatch represents a departure from traditional wage differentials across skill groups" (Handel, 2003).

The labour market mismatch is not an unusual phenomenon in market economies (McGuinness, 2006). It is defined as the situation of imbalance where the level or type of skills available does not correspond to labour market needs (CEDEFOP, 2018). The mismatch between the available skills and skills required by the job

can appear in terms of over-skilling, under-skilling, over-qualification, under-qualification, skill gaps, and skill shortages (European Commission, 2015). There is conclusive empirical evidence that the mismatch affects labour productivity through inefficient resource allocation (McGowan and Andrews, 2015), but also reduces the labour market efficiency by raising frictional and structural unemployment (Petrolongo and Pissarides, 2001).

Numerous and various factors cause the imbalance between the demand and the supply of qualifications and skills.. These causes can be either demand-side or supply-side issues. It can be induced by temporary factors, such as economic shocks, imperfect information, or technological and organizational improvements. Others can be assigned to the information asymmetry – due to the lack of information about the opportunities at the labour market, actors are prone to making sub-optimal choices. Technological and organizational improvements may cause skill obsolescence if the employees cannot adapt to the changes (Robst, 1995). Several causes of skill mismatch are closely related to insufficient training. There are certain barriers to the investment in training – capital or credit constraints, or the reluctance of employers to invest in employee training (Winterbotham et al., 2014). Sometimes the training systems are not designed in a way to easily adapt to the changes in skill demand and cannot respond to the changes in the labour market. Intergenerational or geographical mobility can also cause frictions in the labour market. There are indications that the expansion in higher education that results in the increased average formal schooling level of employees positively affects the education-job matches on the regional labour market. In other words, an increase in companies' workforce average schooling level decreases the probability that companies report mismatch (Cabus and Somers, 2018). Similarly, the recent research on the education mismatch in local labour markets indicates that the circumstances in these markets have significant effects on enrolment rates in higher education institutions and should be considered by the education policies in preventing the mismatch (Ortiz et al., 2020).

The *horizontal mismatch* exists when the qualification an employee has in a field of study does not match the qualification required by the job. If the qualification of an employee is above or below the required skill level, a *vertical mismatch* occurs. In recent years, the most pronounced problems concerning the discrepancy between the education systems and labour market requirements appear to be overeducation and over skilling (Sloane and Mavromaras, 2020). One of the methods for measuring the mismatch is the comparison of the share of unemployed people with a certain level of educational attainment to the share of employed people with the same education level (Gatelli and Johansen, 2012). Although it is relatively easy to measure the qualification mismatch, it does not reflect entirely the imbalance between the available and required skills – skills gained beyond formal education, the quality of different education and training systems, as well as skill development

on the job and life-long learning (Green and McIntosh, 2007). The vertical mismatch is present in all economies where the creation of new jobs causes the demand for new skills in comparison to those required by the jobs that no longer exist. This is especially the case with transition economies, taking into account a number of jobs destroyed in the process of economic restructuring (Sondergaard and Murthi, 2012).

The labour markets in transition countries are characterized by chronic unemployment that affects both older workers with obsolete skills and the young ones, as indicated by particularly high youth unemployment rates (Kolev and Saget, 2005). In the conditions of rapid technological development, old skills required in disappearing industries become redundant (Commander and Kollo, 2008). In addition, the poor investment climate and volatile business environment create poor incentives for the employers in transition countries for investing in the skill development of the employees. The number of transition countries with poor economic performance faces increasing outward mobility of educated workforce (the so-called *brain-drain)* causing a significant skill mismatch within certain occupations (Hars and Simons, 2016). One of the reasons for the persistent skill mismatch in the transition economies is the inability of education systems in these countries to adapt to the new requirements of the labour market, accompanied by low public investments in education, that has also contributed to reducing the available stock of human capital (Sondergaard and Murthi, 2012). Dual training and promotion of work-based life-long learning is one of the generally accepted approaches to improving the match between workforce skills and labour market demands (Šćepanović and Martín Artiles, 2020), but insufficiently developed in the post-transition countries.

An indicator of skill shortages or surpluses that is often used in economic research relates to the measurement of wage differentiation or the wage growth that can indicate the existence of the skill mismatch in the long run. However, in the short run, one of the regularly used mismatch measures is obtained through the employee surveys, where the employees report, based on their self-assessment, whether they are sufficiently skilled for their current jobs or whether they can use their existing skills on the job (Elias and Purcell, 2004). The qualification mismatch is measured based on the opinions of workers about the match between their job and the level of acquired education (Dorn and Sousa-Poza, 2005). The skill mismatch is determined by comparing the self-assessed skill levels of the employees and the levels required for the job. This method covers measuring a wide range of skills, but it often cannot identify the specific skills deficits.

The rationale for this method of measuring the mismatch is the assumption that the employees themselves are able to assess the extent to which they possess the skills necessary to undertake their jobs, or the skills and qualifications needed to get/perform the job. There are two issues regarding the reliability of data collected

this way. First, the employees tend to often overstate the availability of their skills, causing an upward bias of the skill surplus estimate, or the downward bias of the skill gap (Mason and Wilson, 2003). This way, over-skilling appears much more often compared to under-skilling (Alen and Van der Velden, 2001). Second, such data may indicate employees' transition in the labour market, from the initial low-paid job to the job in line with their qualifications, instead of measuring the real mismatch. Also, the context of the questions or the impact of some exogenous factors can affect the reliability of the responses.

3. Research methodology

Methodologies of skill mismatch measurement typically refer to the quantification of particular professional characteristics, educational level, qualifications, and specific competencies (literacy, numeracy, foreign languages, IT skills, etc.) required for the job, compared to the skills of the individuals employed or interested for the job. Thus, the measure of skill mismatch is the degree to which employees possess skills or education/qualifications at levels that are sufficient, insufficient, or poorly connected to their current job requirements (Quintini, 2011; Ramos et al., 2012).

Occupational skills encompass various dimensions which are difficult to measure in practice. The attempts for developing efficient models for measuring the skill mismatch have led to a significant number of papers in the contemporary literature addressing this problem, as well as to the development of measurement methodologies by various international institutions. The basic categorization of skills, according to the European Commission measurement methodology, includes basic skills, transversal skills, and vocational skills (CEDEFOP, 2018). Similarly, the methodology used by UNESCO includes almost the same groups of skills – foundation skills, transferable skills, and technical and vocational skills associated with specific occupations (UNESCO, 2012). A slightly more detailed approach is provided by the ILO, which classifies all relevant skills into four groups – foundation skills or basic skills, professional or personal skills, transferable skills or core work skills, and technical and vocational skills (Brewer, 2013). USAID methodology of determining the skills mismatch includes sets of skills such as soft skills, academic skills, and technical skills (Lipman et al., 2015). The skill mismatch assessment models used by the OECD and the World Bank have such an approach that basic skills and cognitive skills are analysed within the same group. OECD model encompasses basic foundational i.e. cognitive skills, social and emotional skills, and vocational skills (OECD, 2012; OECD, 2014; OECD, 2015), while the model used in World Bank research includes cognitive skills, behavioural skills, and technical skills.

Figure 1: Model flowchart
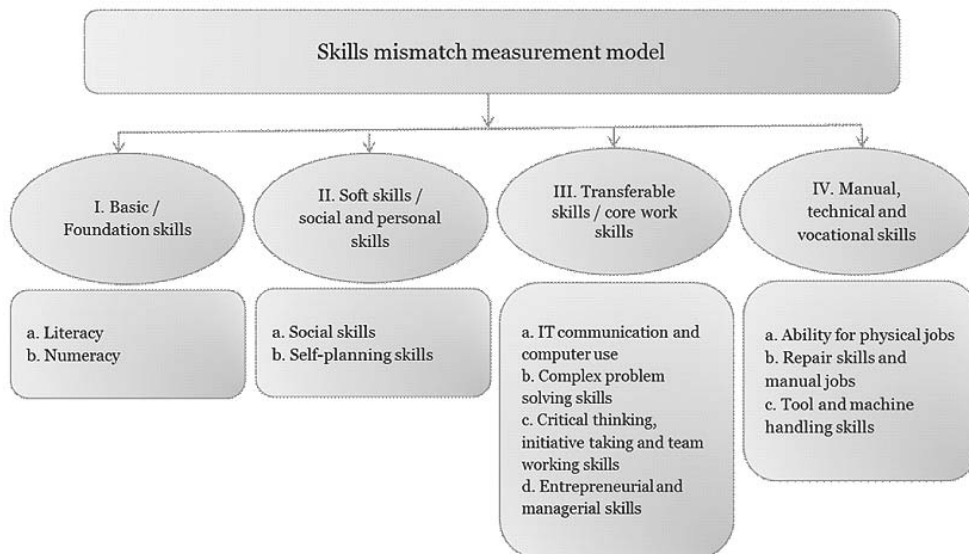
Source: Authors' preview

The model developed for measuring skill mismatch in this research combines approaches used by European Commission (CEDEFOP, 2018) and International Labour Office (Brewer, 2013) and include four different groups of skills (Figure 1):

i. Basic or foundation skills which include literacy and numeracy;

ii. Soft skills or social and personal skills that include social skills and self-planning skills;

iii. Transferable skills or core work skills that comprise IT communication and computer use, complex problem-solving skills i.e. analytical skills, critical thinking, initiative taking and team working skills, entrepreneurial and managerial skills;

iv. Manual, technical and vocational skills that encompass ability for physical jobs, repair skills and manual jobs and tool and machine handling skills.

4. Empirical data and analysis

This research focuses on enterprises from different industries (food production and processing, recycling, electrical industry, machine industry, defence industry and high-tech equipment) operating in the City of Niš, Serbia. The empirical research

and data collection is conducted within the research project of the Serbian Academy of Sciences and Arts (SASA) in 2019 (March 22 – December 22, 2019). The sample includes privately owned, small and medium-sized enterprises, employing a total number of 2,309 workers. These are the companies that have been experiencing the upward trend in the number of employees in recent years and as such have constant requirements for jobs with specific knowledge and skills. According to Agency for Business Registers (2019) data, in the previous three years, surveyed companies from food processing industry have shown a slight increase in the number of employees (3%), companies belonging to machine industry have increased their number of employees for 16.88%, while enterprises belonging to the high-technologies and electrical industries show a growth in the number of employees of 197%. For the same period, asset growth in food processing enterprises was 20.27%, high-technologies and electrical industries 33.03%, machine industry 27.29%, and recycling industry recorded asset growth of 7.69%.

One of the characteristics of the post-transition period in the Serbian economy is the pronounced process of de-industrialization with low rates of industrial production and decreasing number of employees (Savić, 2014). Therefore, the aim of this research is to explore the skill mismatch in one segment of the local labour market, comparing the available skills with requirements of the industrial companies that report increasing performance indicators and continuous growth in the number of employees.

Aiming at gathering relevant data to identify skill mismatches defined by the model presented in the previous section, an empirical survey has been conducted. The survey methodology is founded on contemporary research that utilises worker self-assessment as a methodological approach to collecting data on horizontal and vertical mismatches. Programme for the International Assessment of Adult Competencies (PIAAC) and Survey of Adult Skills, as a key element of OECD empirical approach to measuring skill mismatch, explore the skill gaps based on employees' self-assessment, especially the ability to deploy and develop skills required for the job at performance satisfactory level (Pellizzari and Fichen, 2013; Pouliakas and Russo, 2015). Workers Self-Assessment (WA) and Competence Approach for assessment of overeducation are often used for collecting data regarding skill shortages and skill gaps (Gambin et al., 2018; ILO, 2017; ILO, 2018a; ILO, 2018b).

The survey conducted for the purpose of this paper draws upon the methodology used in the Skills and Employment Survey, conducted by the University of Cardiff (Felstead et al., 2012). The data were collected as part of continuous research activities of the Serbian Academy of Sciences and Arts – Branch in Niš. The survey questionnaire consists of one hundred and fifty questions covering all four skill groups listed in the model. Each skill group was assessed through a series of questions, which provided information on the importance of those skills

for performing a particular job, the skills required to perform a particular job at a satisfactory level, as well as the skills that the interviewed employee owns. Empirical data collection was conducted through a questionnaire or a guided questionnaire, depending on the educational structures of the respondents and the type of jobs.

The sample includes slightly less than 10% of the total number of employees in the surveyed companies, i.e., 214 workers employed in the food processing industry, electrical and mechanical engineering industry, high-technologies industries, and recycling. Formed on the principles of random sampling, it covers all educational profiles of employees and job types. Male respondents make 57.5% of the sample, while 42.1% are female (Table 1).

Table 1: Structure of the sample

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender					
Valid	No answer	1	0.5	0.5	0.5
	Male	123	57.5	57.5	57.9
	Female	90	42.1	42.1	100.0
	Total	214	100.0	100.0	
Professional Qualifications					
Valid	No qualifications	1	0.5	0.5	0.5
	General qualifications (primary and lower secondary education)	17	7.9	7.9	8.4
	Professional qualifications (upper secondary, vocational secondary)	86	40.2	40.2	48.6
	Academic qualifications	85	39.7	39.7	88.3
	Vocational qualifications (vocational studies)	10	4.7	4.7	93.0
	Refuse to answer	15	7.0	7.0	100.0
	Total	214	100.0	100.0	

Source: Authors' calculation

Most respondents have professional (40.2%) or academic qualifications (39.7%), where professional qualification encompasses upper secondary and vocational secondary education, while academic qualifications refer to higher education (Table 1). The average age of the respondents in the sample is 40.9 years (minimum 22, maximum 67 years, std. deviation 10.499).

The results cover two specific research outcomes: (1) identifying skills of the highest importance for performing the job at a satisfactory performance level, and (2) identifying vertical skill mismatch – the existence of over-qualification or under-qualification of employees.

The first part of the results is presented in Table 2 and indicates that the most important skills regarding employment in observed industrial companies are transferable skills or core work skills (average assessment 3.9814). The crucial skills within the group are critical thinking, initiative-taking, and team working skills, followed by complex problem-solving skills (Table 2). Even though it is industrial production, manual, technical, and vocational skills are perceived as the least important for successful job performance. This can be explained by the information that these are high-technology intensive industries, where physical labour is not intensively utilized. It is interesting to note that IT communication and computer use are rated at the level of importance of basic skills, i.e. below the level of importance of the core work skills.

Table 2: Importance of skills for the job: Workers self-assessment in scale 1 to 5

	N	Minimum	Maximum	Mean	Std. Deviation
Basic/Foundation skills	165	1	5	3.1747	0.84765
a. Literacy	165	1	5	3.1697	0.9264
b. Numeracy	214	1	5	3.0234	1.17529
Soft skills/Social and personal skills	214	1.64	5	3.5822	0.73105
a. Social skills	214	1.56	5	3.5452	0.76178
b. Self-planning skills	214	1	5	3.6192	0.86287
Transferable skills/Core work skills	186	1.67	5	3.9814	0.71618
a. IT communication and computer use	210	1	5	3.51	1.381
b. Complex problem-solving skills	214	1.67	5	3.7329	0.78434
c. Critical thinking, initiative taking and team working skills	194	1.67	5	3.9835	0.89397
d. Entrepreneurial and managerial skills	95	1	5	3.6695	1.04241
Manual, technical and vocational skills	214	1	5	2.7301	1.13931
a. Ability for physical jobs	214	1	5	2.25	1.223
b. Repair skills and manual jobs	214	1	5	3.07	1.492
c. Tool and machine handling skills	214	1	5	3.12	1.49

Source: Authors' calculation

Assessment of skill mismatch was provided by determining the difference in the levels of qualifications, required to perform a particular job, and the qualifications held by the employee performing the job. At the sample level, there is a clear over-qualification of employees (Table 3), where the average assessment of qualification required for the job (3.23, on a scale of 1 to 5) is lower than employee's qualification (3.63, on a scale of 1 to 5).

Table 3: Mismatch assessment – Means

	N	Mean	Std. Deviation	Minimum	Maximum
Qualification required for the job	186	3.23	1.073	1	5
Employee's qualification	186	3.63	0.979	1	5

Source: Authors' calculation

The results in Table 4 show that a qualification mismatch concerns 39.8 percent of respondents, of whom 28.5 percent are over-qualified, while 11.3 percent are under-qualified.The results referring to over-qualification are comparable to other non-EU post-transition economies such as Ukraine and Armenia, where the incidence of over-education among urban working-age population is 29.1 percent (Kupets, 2015b). North Macedonia compares favourably with the share of over-qualified employees at 20.7 percent (Kupets, 2015b). A significant share of over-qualified or over-educated workers in workforce in post-transition economies can be explained by the fact that the high levels of formal education in these countries do not necessarily translate into high levels of up-to-date productive skills (Kupets, 2015a).

Table 4: Mismatch assessment – Ranks

		N	Mean Rank	Sum of Ranks
Employee's qualification – Qualification required for the job	Negative Ranks	21[a]	30,79	646,50
	Positive Ranks	53[b]	40,16	2128,50
	Ties	112[c]		
	Total	186		

a. Employee's qualification < Qualification required for the job;
b. Employee's qualification > Qualification required for the job;
c. Employee's qualification = Qualification required for the job

Source: Authors' calculation

290

Jelena J. Stanković, Marija Džunić, Srđan Marinković • Urban employment...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 279-297

5. Results and discussion

Compared to the developed economies, results of qualification mismatch presented in this paper differ significantly. The share of over-qualified employees in the European Union is 14.7% and under-qualified 18.7%, while in OECD countries these percentages are 16.8% for over-qualification and 18.9% for under-qualification (OECD.Stat, 2016). According to the data on the qualification mismatch in post-transition economies that are EU members, it can be concluded that the results of this research related to under-qualification of workers are comparable to under-qualification percentages in those countries (Figure 2). However, in terms of over-qualification, the results obtained in this study clearly indicate a significantly higher percentage of workers with a higher level of qualifications than the one required for the job they are performing.

Figure 2: Comparative preview: Share of overqualified and underqualified urban workforce in post-transitional EU countries and Serbia
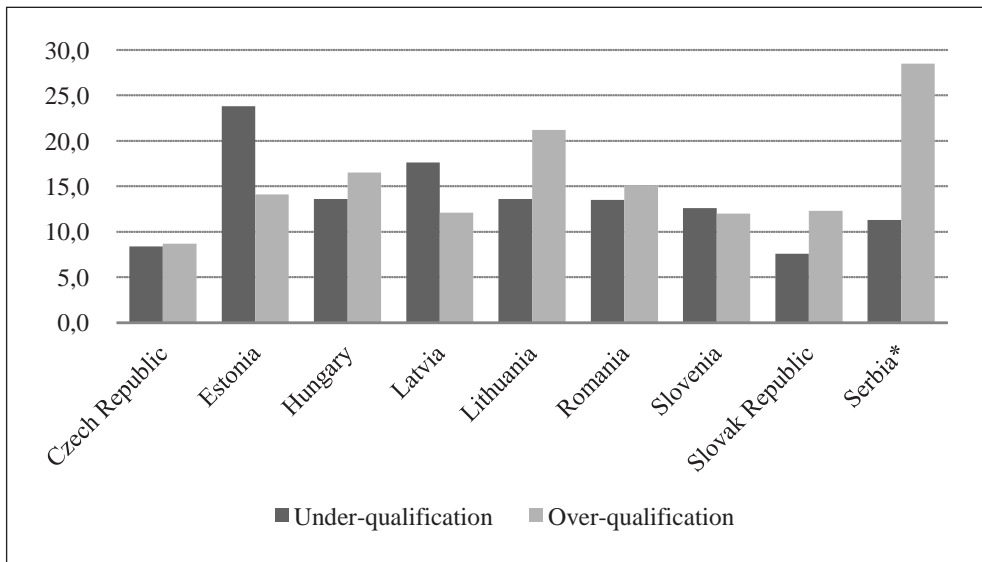
Data generated in this research, at sub-national level

Source: OECD.Stat, 2016

Comparable findings for non-EU post-transition countries are presented by Kupets (2015a, 2015b). A similar conclusion is provided by Bartlett (2013), based on the evidence for the emerging market economies, implying that the highest rate of skill mismatch is among highly educated university graduates, especially male graduates.

Government structures in the Republic of Serbia often use educational attainment data as one of the country's key competitive advantages for attracting foreign direct investment and accelerating innovation. However, the quantitative indicators related to the share of highly educated should be treated with certain reserve especially at the sub-national level, taking into account the result of the analysis where the percentage of over-education among research groups indicates dispersion informal educational level from real knowledge and skills that can be materialized in the labour market.

6. Conclusion

Findings in the research indicate that the most important category of skills in the observed industries are transferable skills or core work skills (average importance in workers self-assessment is 3.9814 on a scale of 1 to 5). As a dominant irregularity at the local labour market, the existence of qualification mismatch is determined, with the prevailing over-qualification, i.e. over-education (28.5 percent of the surveyed employees had a higher level of qualifications than the one required for the job). The causes of pronounced over-education in the labour market can be viewed from two perspectives. The first relates to unattractive job offers, including the unwillingness or inability of employers to offer competitive wages, unsatisfied job quality, or low work conditions, while the second can be regarded as a lack of training and life-long education of the employees.

The scientific contribution of the research in this paper is twofold. In theoretical terms, a model for assessing skill mismatch has been developed based on contemporary models used by relevant international institutions, but also adapted to the specificities of the labour market of post-transition economies. The empirical contribution relates to data collection indicating the level of skill mismatch at the local labour market in one of the largest cities in the Republic of Serbia. This type of research is rare for labour markets in post-transition countries and creating an empirical basis that enables comparison to developed economies (i.e. methodologically is aligned with research conducted in developed economies) is a step forward in this field of research.

The research and conclusions of this paper are limited to the urban labour market of the City of Nis and do not include the services sector. Further research will be focused on a spatially larger sample, but also a wider coverage of economic sectors.

Acknowledgments

References

Allen, J., Van der Velden, R. (2001) "Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search", *Oxford Economic Papers*, Vol. 53, No. 3, pp. 434–452. https://doi.org/10.1093/oep/53.3.434.

Agency for Business Registers of Republic of Serbia (2019) *Financial Statements Database*. Available at: https://pretraga3.apr.gov.rs/pretragaObveznikaFI [Accessed: May 9, 2021].

Bartlett, W. (2013) "Skill Mismatch, Education Systems, and Labour Markets in EU Neighbourhood Policy Countries", WP5/20 search working paper. Available at: http://www.ub.edu/searchproject/wp-content/uploads/2013/09/WP05.20.pdf [Accessed: May 9, 2021].

Becker, G. S. (1962) "Investment in Human Capital: A Theoretical Analysis", *Journal of Political Economy,* Vol. 70, No. 5, pp. 9–49. https://doi.org/10.1086/258724.

Brewer, L. (2013) *Enhancing youth employability: What? Why? and How? Guide to core work skills*, Geneva: ILO.

Cabus, S., Somers, M. (2018) "Mismatch between education and the labour market in the Netherlands: is it a reality or a myth? The employers' perspective", *Studies in Higher Education,* Vol. 43, No. 11, pp. 1854–1867. https://doi.org/10.1080/03075079.2017.1284195.

Cedefop (2018) *Insights into skill shortages and skill mismatch*: *learning from Cedefop's European skills and jobs survey*, Luxembourg: Publications Office Cedefop reference series, No 106. https://doi.org/10.2801/645011.

Commander, S., Kollo, J. (2008) "The changing demand for skills - Evidence from the transition", *Economics of Transition*, Vol. 16, No. 2, pp. 199–221. https://doi.org/10.1111/j.1468-0351.2008.00303.x.

Dorn, D., Sousa-Poza, A. (2005) „The Determinants of Early Retirement in Switzerland", *Swiss Journal of Economics and Statistics,* Vol. 141, No. 2, pp. 247–283. https://doi.org/10.5167/uzh-99445.

European Commision (2015) *Employment, Social Affairs & Inclusion: Measuring skills mismatch*, Analytical Web Note 7/2015. https://doi.org/10.2767/620480.

Elias, P., Purcell K. (2004) "Is Mass Higher Education Working? Evidence from the Labour Market Experiences of Recent Graduates", *National Institute Economic Review*, No. 90, pp. 60–74. https://doi.org/10.1177/002795010419000107.

Felstead, A. et al. (2012) *Skills and Employment Survey (SES)*, project funded by UK Commission for Employment and Skills (UKCES) and Economic and Social Research Council (ESRC), United Kingdom. Available at: https://esrc.ukri.org/research/our-research/skills-and-employment-survey-ses/ [Accessed: December 23, 2021].

Gambin, L. et al. (2016) *Research to understand the extent, nature and impact of skills mismatches in the economy*, London: Department for Business, Innovation and Skills (Research paper number 265) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/522980/BIS-16-260-research-skills-mismatches-in-the-economy-May-2016.pdf [Accessed: May 9, 2021].

Gatelli, D., Johansen, J. (2012) Measuring mismatch in ETF partner countries, *mimeo*, Turin: European Training Foundation. Available at: https://esrc.ukri.org/research/our-research/skills-and-employment-survey-ses/ [Accessed: May 9, 2021].

Green, F., McIntosh, S. (2007) "Is There a Genuine Underutilisation of Skills Amongst the Overqualified?" *Applied Economics,* Vol. 39, pp. 427–439. https://doi.org/10.1080/00036840500427700.

Handel, M. J. (2003) "Skills Mismatch in the Labour Market" *Annual Review of Sociology,* No. 29, pp. 135–165. https://doi.org/10.1146/annurev.soc.29.010202.100030.

Hars, A., D. Simon (2016) "Why do doctors leave – and what would make them stay? On the characteristics of the migration of medical doctors from Hungary" *Külgazdaság,* Vol. 60, No. 5–6, pp. 3–26.

International Labour Office (2017) *World Employment and Social Outlook: Trends 2017*. Geneva: ILO. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_541211.pdf [Accessed: May 9, 2021].

International Labour Office (2018a) *Measurement of qualifications and skills mismatches of persons in employment*, ICLS/20/2018/Room document 15, 20th International Conference of Labour Statisticians Geneva. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/meetingdocument/wcms_636052.pdf [Accessed: May 9, 2021].

International Labour Office (2018b) *World Employment and Social Outlook: Trends 2018*. Geneva: ILO. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_615594.pdf [Accessed: May 9, 2021].

Kolev, A., Saget, C. (2005) "Understanding youth labour market disadvantage: Evidence from south-east Europe", *International Labour Review*, Vol. 144, No. 2, pp. 161–175. https://doi.org/10.1111/j.1564-913x.2005.tb00564.x.

Kupets, O. (2015a) *Skill mismatch and overeducation in transition economies*, IZA World of Labor. Available at: https://wol.iza.org/articles/skill-mismatch-and-overeducation-in-transition-economies/long [Accessed: May 9, 2021].

Kupets, O. (2015b) *Education in Transition and Job Mismatch: Evidence from the Skills Survey in Non-EU Transition Economies*. Kyoto Institute of Economic Research Discussion Paper No. 915. Available at: http://www.kier.kyoto-u.ac.jp/DP/DP915.pdf [Accessed: May 9, 2021].

Lippman, L. et al. (2015) *Key Soft Skills that Foster Youth Workforce Success: Toward a Consensus across Fields*. Washington: Child Trends. Available at: https://www.childtrends.org/wp-content/uploads/2015/06/2015-24AWFCSoftSkillsExecSum.pdf [Accessed: May 9, 2021].

Mason, G., Wilson, R. A. (2003) *Employers Skill Survey New Analyses and Lessons Learned*. Nottingham: Department for Education and Skills. Available at: https://warwick.ac.uk/fac/soc/ier/publications/2003/mason_and_wilson_2003.pdf [Accessed: December 23, 2021].

Mbonigaba, J., Wilfred, A.G. (2019) "Productivity effects of human capital: an empirical investigation of health and higher education in South Africa", *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/ Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business*, Vol. 37, No. 1, pp. 277–301. https://doi.org/10.18045/zbefri.2019.1.277.

McGowan, M.A., Andrews, D. (2015) Labor market mismatch and labor productivity. *OECD Economics Department Working Papers No. 1209*, Paris: OECD Publishing. Available at: https://www.oecd.org/economy/growth/Labour-Market-Mismatch-and-Labour-Productivity-Evidence-from-PIAAC-Data.pdf [Accessed: December 23, 2021].

McGuiness, S. (2006) "Overeducation in the Labor Market" *Journal of Economic Surveys,* Vol. 20, No. 3, pp. 387–418. https://doi.org/10.1111/j.0950-0804.2006.00284.x.

OECD (2012) *Better Skills, Better Jobs, Better Lives: A Strategic Approach to Skills Policies*, Paris: OECD Publishing, https://doi.org/10.1787/9789264177338-en.

OECD (2014) *Skills Beyond School: Synthesis Report,* OECD Reviews of Vocational Education and Training, Paris: OECD Publishing. https://doi.org/10.1787/9789264214682-en.

OECD (2015) *Skills for Social Progress: The Power of Social and Emotional Skills*, OECD Skills Studies, Paris: OECD Publishing, https://doi.org/10.1787/9789264226159-en.

OECD.Stat (2016) *Mismatch Datbase*. Available at: https://stats.oecd.org/Index.aspx? DataSetCode=MISMATCH [Accessed: May 9, 2021].

Ortiz, E. A. et al. (2020) Local Labor Markets and Higher Education Mismatch, IDB working paper series No IDB–WP–01115. Available at: https://publications.iadb.org/publications/english/document/Local-Labor-Markets-and-Higher-Education-Mismatch-What-is-The-Role-of-Public-and-Private-Institutions.pdf [Accessed: December 23, 2021].

Petrolongo, B., Pissarides, C. (2001) "Looking into the black box: a survey of the matching function", *Journal of Economic Literature*, Vol. 39, pp. 390–431. https://doi.org/10.1257/jel.39.2.390.

Pellizzari, M., Fichen, A. (2013) *A New Measure of Skills Mismatch: Theory and Evidence from the Survey of Adult Skills (PIAAC)*, OECD Social, Employment and Migration Working Papers, No. 153, Paris: OECD Publishing, http://dx.doi.org/10.1787/5k3tpt04lcnt-en.

Pouliakas, K., Russo G. (2015) *Heterogeneity of Skill Needs and Job Complexity: Evidence from the OECD PIAAC Survey*, IZA Discussion Paper 9392. Available at: http://ftp.iza.org/dp9392.pdf [Accessed: May 9, 2021].

Quintini, G. (2011) *Over-Qualified or Under-Skilled: A Review of Existing Literature*, OECD Social, Employment and Migration Working Paper 121. Available at: https://www.oecd-ilibrary.org/social-issues-migration-health/over-qualified-or-under-skilled_5kg58j9d7b6d-en [Accessed: May 9, 2021].

Ramos, R., Surinach, J., Artís, M. (2012) "Regional Economic Growth and Human Capital: The Role of Over-Education", *Regional Studies*, Vol. 46, No. 10, pp. 1389–1400. https://doi.org/10.1080/00343404.2012.675140.

Robst, J. (1995) "Career Mobility, Job Match, and Overeducation", *Eastern Economic Journal*, Vol. 2, pp. 539–550.

Savić, Lj. (2014) "New Industrialization in Serbia – Reality or Delusion", *Management: Journal for Theory and Practice Management*, Vol. 70, pp. 59–64. https://doi.org/10.7595/management.fon.2014.0005.

Sloane, P. J., Mavromaras, K. (2020) Overeducation, skill mismatches, and labor market outcomes for college graduates. IZA Institute of Labor Economics. Available at: https://wol.iza.org/articles/overeducation-skill-mismatches-and-labor-market-outcomes-for-college-graduates/long [Accessed: June 27, 2021].

Solutions for Youth Employment (2015) *Toward Solutions for Youth Employment*. A 2015 Baseline Report. World Bank: Washington. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_413826.pdf [Accessed: May 9, 2021].

Šćepanović V., Martín Artiles, A. (2020) "Dual training in Europe: a policy fad or a policy turn?", *Transfer: European Review of Labour and Research,* Vol. 26, No. 1, pp. 15–26. https://doi.org/10.1177/1024258919898317.

Sondergaard, L., Murthi, M. (2012) *Skills, Not Just Diplomas: Managing Education for Results in Eastern Europe and Central Asia*, Washington: The World Bank. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/2368

/652050REPLACEM061562B09780821380963.pdf?sequence=1&isAllowed=y [Accessed: December 23, 2021].

Stevens, M. (1994) "Labor Contracts and Efficiency In On-The-Job Training", *The Economic Journal*, Vol. 104, pp. 408–419. https://doi.org/10.2307/2234760.

UNESCO (2012) *EFA Global Monitoring Report 2012. Youth and Skills: Putting Education to Work*. Paris: UNESCO. Available at: https://en.unesco.org/gem-report/report/2012/youth-and-skills-putting-education-work [Accessed: May 9, 2021].

Wilson, R. A., Hogarth, T. (2003) *Low Skill Trajectories: a review of the evidence and additional analysis*. London: Department for Trade and Industry.

Winterbotham, M., D. et al. (2014) *The UK Commission's Employer Skills Survey 2013: UK Results*, UK Commission for Employment and Skills. Available at:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/327492/evidence-report-81-ukces-employer-skills-survey-13-full-report-final.pdf [Accessed: December 23, 2021].

World Bank (2017) *World Development Report 2018: Learning to Realize Education's Promise*. World Bank: Washington, DC. Available at: https://openknowledge.worldbank.org/handle/10986/28340 [Accessed: May 9, 2021].

Urbano zapošljavanje u post-tranzicijskim gospodarstvima: neusklađenost vještina na lokalnom tržištu rada

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Sažetak

Ovaj rad istražuje neusklađenost između vještina i kvalifikacija koje zahtijeva tržište rada i onih koje se stječu obrazovanjem i učenjem na radnom mjestu. Neusklađenost vještina u tranzicijskim gospodarstvima ima tendenciju da bude još izraženija budući da tržišta rada u tim zemljama karakterizira strukturna nezaposlenost, koja istovremeno pogađa i starije radnike sa zastarjelim vještinama i mlade. Poslodavci se suočavaju s lošim poticajima za ulaganje u razvoj vještina radne snage zbog neodgovarajuće investicijske klime i nestabilnog poslovnog okruženja. Zemlje u tranziciji suočavaju se sa sve većom vanjskom mobilnošću obrazovane radne snage, gubitkom ljudskog kapitala i nedostatkom radne snage u područjima kao što su ICT, medicina, znanost i istraživanje. Istraživanje se temelji na empirijskim podacima prikupljenim u anketi o ICT-u i proizvodnim poduzećima u gradu Nišu u Srbiji. Metodologija istraživanja kombinira metodu samoprocjene radnika za mjerenje jaza u vještinama i pristup temeljen na kompetencijama u kombinaciji sa statističkim metodama. Nalazi ukazuju na prisutnost kvalifikacijske neusklađenosti, u vidu prekvalificiranosti za posao kao dominantne nepravilnosti na analiziranom tržištu rada. Očekuje se da će rezultati studije doprinijeti stvaranju mreže političkih instrumenata koji imaju tendenciju da budu učinkoviti na podnacionalnoj razini u rješavanju neusklađenosti.

Ključne riječi: *obrazovanje, tržište rada, neusklađenost vještina, nezaposlenost*

JEL klasifikacija: *J24, C10, R23*

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Practical application of the CCB model in Czechia

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Abstract

This research aimed to present a new bankruptcy prediction model and apply this original prediction method in practice. The Come Clean Bankruptcy (or CCB) model uses relevant financial indicators and ratios to detect the signs of impending financial distress in time so that the management can take appropriate measures to avoid it. The model was applied to the data reported by 199 entities operating in the textile/clothing industry in the Czech Republic. Analyzing data reported for the previous seven years enabled us to predict which companies are more likely to end in a difficult financial situation. Afterward, comparing these predictions with the actual development of those companies in 2013-2020 serves to verify the efficacy and usability of the model to corporate reality. The research has shown that companies that went bankrupt in the analyzed period represented only a fraction of the data set (roughly 4.5%). Despite the small number of financial failures occurring during the analyzed period, the CCB model could detect impending bankruptcy in one-third of the cases.

Key words: Bankruptcy model, predicting risks, financial distress, Czech Republic

JEL classification: M41

1. Introduction

Nowadays, there is a wide range of available organizational and financial measures for *saving* companies that found themselves in financial distress, each corresponding to the specific circumstances in the company and the causes of the financial distress. Though the efficacy of those measures is ever increasing, there is little doubt that it is much more advantageous, both in terms of time and financial costs, to *prevent* the bankruptcy in the first place, rather than to solve it once it occurs.

That is why financial analysis and its models - the main tools used for the early detection of a crisis – have been given much attention in scientific research over the last 50 years. The number of models and bankruptcy-detecting strategies is ever-increasing and the current tendency is to focus on testing the validity of those strategies/models with an empirical approach, which is the case of this paper, too. The quality of existing financial analysis systems is determined directly by their complexity. Although the elementary methods of processing the data do not have the necessary explanatory power, their application is frequent. Complex systems allow for a more detailed depiction of the situation in the company, yet they tend to be confusing for the users of financial analyses. The results pinpoint the problem that financial analysis users can understand less than three-quarters of such an analysis. Unlike many other creditworthy/bankruptcy models, this model provides a clear explanation of the obtained results.

Virtually all financial analyses require the use of data reported in financial statements. However, accounting data alone only reflects the past and not the prospects for the future. In other words, it defines the current values of strongly variable quantities (Kovanicova, 1999). These shortcomings can be eliminated by comparing the data with each other, expanding its explanatory power. That is why financial ratios are the fundamental methodological tool for financial analysis. Prediction models are often based on recommended values of indicators, which are nevertheless too broad. The CCB model, on the other hand, compares the individual ratios of a selected company with values of 198 competing entities operating in the same sector of the economy, which increases the explanatory power of data and accuracy of the analysis.

This paper deals with the hypothesis that the data of companies falling within the same industry should provide more accurate results when compared to the data of companies operating in various sectors. Even a single company sector hit by a major crisis affects the entire set of companies. Therefore, the data provided should not include outliers that make them suitable and reliable material for any financial analysis, including bankruptcy prediction. The paper opens up with an overview of relevant literature that has brought new perspectives on the issue of bankruptcy prediction models. The following chapters depict the methodological basis of the research, presenting the financial indicators and ratios used so that the reader can understand their role in the assessment of the financial health of companies. The paper aims at testing the validity of the selected bankruptcy prediction model dealt with in chapters 4 and 5 with the actual application of the model on the data sample and the explanation of provided results. The paper concludes with a discussion on the applicability of the model for practical use and further research.

2. Literature review

The first prediction models which appeared during the 1920s were rather simple in their structure. They usually included only one indicator to be analyzed, such as the FitzPatrik (FitzPatrik, 1932) or Smith and Winakor (1935) models. Since then, the domain of prediction models saw tremendous development. The number of examined ratios progressively increased throughout the following decades and along with it, the number of prediction models too. Bellovary et al. (2007) indicate that from 1968 till 2007, more than 165 models have been introduced in scientific publications. Recent prediction models and analyses are increasingly complex in their structure and methodology.

Mantziaris (2015) discussed the suitability of Edward Altman's prediction model, which appeared for the first time in 1968 and became universally accepted, for current times. More precisely, he applied the multi discriminant analysis (MDA) model on a set of 40 companies operating in Greece, out of which 50% went bankrupt due to the financial crisis of 2008. Mantziaris (2015) argues that the model is not suitable for times of great economic uncertainty and disturbances. Furthermore, it does not take into account new trends in corporate management, such as the use of higher debt to run a business. Therefore, the author concludes that Altman's model needs to be modified to stay relevant in the domain of financial predictions.

López-Gutiérrez et al. (2015) conducted an extensive empirical analysis focused on the possible effects of financial distress on investment activities in companies. The data obtained for 4029 companies operating in Germany, Canada, Spain, France, Italy, the UK, and the USA between 1996 and 2006 for this study has shown that financial distress is not the only factor influencing the investment. The propensity to underinvest additionally depends on the investment opportunities available to the company. López-Gutiéerrez et al. (2015) have used extensive data set for their research, yet the author of this paper thinks that reducing the number of companies and focusing on specific markets (such as Europe or the US) would maybe provide more solid results.

A similar study to the one presented herein in terms of number of analyzed companies was conducted in Lithuania. Šlefondorfas (2016) has proposed a new bankruptcy prediction model and applied it on the data of 145 companies (72 already bankrupt and 72 still operating). The author thinks that the best way to predict future development is to create a model that is specifically designed for a particular country, as the model in question was able to correctly classify 89% of the analyzed companies.

Standard Logistic and Bayesian modeling was used in the Shrivastava et al. (2018) study to predict distressed firms in the Indian corporate sector. The analysis is based on a sample of 628 companies over the 10-year time within the period 2006-2015.

302
Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

According to the results, Bayesian methodology seems to perform consistently better in terms of predictive capabilities.

Klepac and Hampel (2017) predicted financial distress of agriculture companies operating in the European Union based on Logistic regression, the Support vector machines method with the RBF ANOVA kernel, the Decision Trees and the Adaptive Boosting based on the decision trees to acquire the best results. The authors' goal was to discover whether it is possible to predict financial distress 1-3 years ahead with solid accuracy. The chosen methodology performed well for one-year ahead predictions. However, for a long-spanned period before bankruptcy, the models are not efficient enough to predict bankruptcy.Recent models are increasingly based on linear and logistic regressions, survival analysis, linear and quadratic programming, multivariate adaptive regression splines, and multiple-criteria programming. Neural networks and their predictive capabilities have been studied in greater detail by Cleofas-Sánchez et al. (2016). Their work compared several different neural models (MLP, RBF, BN and VP) with the hybrid associative memory with translation (HACT). The results of their analysis (concerning over nine real-life financial databases) have shown that the HACT neural network predicts the default cases better than the remainder of the methods analyzed. Lee and Choi (2013) created a back-propagation neural network in order to carry out a multi-industry investigation of Korean companies.

The CCB Model, similarly to the models used in some of the research presented above, use relevant financial indicators to determine whether a company is or is not endangered by bankruptcy in the foreseeable future. The choice of indicators was based on data of companies that went bankrupt in the past as well as on generally accepted theoretical assumptions concerning the sustainable development of companies. These indicators reflect above all the trends in cash flows, optimal capital structure, and the company's liquidity, as it has been shown that these areas, including (under)investment, as shown in López-Gutiéerrez (2015), reveal essential information about the financial health of a company. The author of this paper agrees with the conclusion of Šlefondorfas (2016) that using data from companies operating in the same country is beneficial to the overall validity of the prediction as it increases its accuracy. The CCB model works in addition with companies that operate in the same market/industry, to obtain even more reliable results.

3. Methodology

Predicting bankruptcy with the use of the CCB Model consists of several steps (see Table 1). The selection of financial indicators and ratios, briefly mentioned above, represents the first and the crucial step in the whole process of an accurate prediction, then used for several other analysis methods, such as the Du Pont chart

and determination of the break-even point, to obtain an idea about the optimal indebtedness of a company.

Steps n. 4, 5 and 6 consist of actual assessment of the values obtained for each company and comparing them with other entities operating in the same industry (in this case the textile industry).

Table 1: The CCB model methodology

Step in the CCB model		Reason	Goal
1	Financial ratios	Comparing companies according to absolute values is misleading.	Organizing input data in order to set up the Du Pont chart.
2	Du Pont chart	Global incorporation of examined variables.	Building financial leverage.
3	Monitoring of the break-even point and financial leverage	The value of the company is affected by financial leverage.	Defining the optimal indebtedness.
		Considering company's performance	Company's risks.
4	Incorporation of competing entities	Intercompany comparison.	External environment of the company.
5	Global analysis	Analysis of non-economic variables.	Company as a whole.
6	Bankruptcy intervals and decisions	Assigning the probability of bankruptcy over time.	Deciding on bankruptcy.

Source: Author's research

As mentioned above, the selection of proper ratios appears to be crucial for any bankruptcy prediction model. The following paragraphs therefore explain in detail what those indicators are and why they were chosen.

When a company borrows funds, it is expected to pay regular installments. Debt provides the basis for financial leverage since shareholders obtain the remaining amount once the creditors are paid off. Regarding the amount of debt, the extent of financial leverage seems to be a necessary monitoring variable.

There are many ways to look at financial leverage. In the CCB model, the value of liabilities is added to the ratio of long-term debt to total capital, because long-term liability agreements (lease) oblige the company to pay a series of fixed payments. The debt ratio can thus be defined as (1.1):

$$\frac{Long-term\ Debt + Lease\ Value}{Long-term\ Debt + Company\ value + Capital} \tag{1.1}$$

304
Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

It should be noted that this ratio uses book values, not market values. The market value of a business determines whether the creditors will get their money back. Using the market value of the debt, therefore, seems more appropriate.

The above-defined debt ratio considers only long-term debt obligations. The current ratio defined as the difference between total liabilities and equity (debt capital) to total liabilities is not used by the CCB model. EBIT and depreciation-to-interest coverage ratio represent another measure of financial leverage.

Earnings to interests' ratio is defined by the relationship (1.2):

$$\frac{EBIT + Assets}{Interest} \tag{1.2}$$

Regular interest payments are an obstacle that a company has to deal with in time to avoid bankruptcy. The ratio constructed this way provides information on when the interest payments will no longer be covered by earnings. This value does not include fixed liabilities (regular repayments of existing debt, long-term lease payments).

If the volume of company loans increases, or if creditors provide their funds, the total coverage of the debt by assets is not absolutely decisive. This issue becomes serious in case the capital was provided to the company for a shorter time horizon. The CCB model is, however, a prediction model with standard five-year analysis.

The creditor/analyst must assess whether the company will have enough cash to repay the debt, despite the shorter time horizon. The focus should therefore be on liquid assets which have more reliable values. The weight of the liquidity ratio is insignificant in the model, as liquidity ratios are highly volatile. The ratio of net working capital to total assets is considered as the gross ratio of potential cash (1.3).

$$\frac{Current\ Assets - (Outstanding\ Debt + Payables + Other\ Liabilities)}{Total\ Assets} \tag{1.3}$$

The introduction of the current ratio (current assets to liabilities) that serves the same purpose, could be criticized. When a company borrows a large number of funds from a creditor and invests it in marketable securities, the net working capital does not change, but the current ratio does. For this reason, short-term investments/debts are not used to calculate the current ratio. Sales of selected assets can also be included in the process of monitoring financial distress.

The liquidity of assets also plays an important role. Cash, marketable securities, and outstanding receivables are a priority. The numerator of the ratio can be the net of receivables.

For bankruptcy purposes, the version without receivables seems like a more suitable option (1.4):

$$\frac{Cash + Marketable\ Securities}{Current\ Liabilities} \qquad (1.4)$$

In the CCB model, the relationship (1.4) is again increased by receivables so that the numerator of the current quick ratio is not changed. The denominator contains current expenses. The ratio (1.4) transforms to an interval measure that uses the average daily operating expenses in the denominator.

$$\frac{Cash + Marketable\ Securities + Receivables}{Daily\ Operating\ Costs} \qquad (1.5)$$

It follows from the nature of the relationship (1.3) that the analysis requires longer time span than just one calendar year. The denominator represents an average. The interval rate provides information on the number of days during which the amount of liquid assets will be sufficient, even if no other cash is available to the company.

The CCB model measures company's performance with the return on total assets. Income is defined as earnings before interest, but after tax. If only operating performance is to be measured, we need to add interest tax shields to the taxes. This allows to obtain taxes that the company would pay if it was fully funded by shares. Using the tax rate of 20%, the return on total assets will be determined by the relationship (1.6):

$$\frac{EBIT - (Tax + Shield)}{Average\ Total\ Assets} \qquad (1.6)$$

The analyzed company has a return on total assets of 7.3%, while its EBIT in the amount of CZK 1,190k is adjusted for a/ taxes in the amount of CZK 399k and b/ interest tax shields. These shields are obtained by multiplication of the tax rate and net interest (that is $0.20 \times 151k$ CZK). Rising assets in the denominator put pressure on lower returns. This measurement finds its application precisely in the framework of intercompany comparison of entities that may have a significantly different debt ratio.

All companies should achieve a higher return on assets, but their capabilities are limited by competition. If the expected return on assets is fixed by competition, the company must opt for a compromise between a/ the ratio of sales to assets and b/ the profit margin. The actual procedure will vary by industry. In the textile industry, the low ratio of sales to assets is offset by a higher margin, i.e. revenues relative to sales.

Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323
306

Based on the results of the market efficiency tests, described in the previous chapters, we can assign market value ratios to the analyzed ratios of the CCB model. Even though the payout ratio does not fit into this group, it is the only ratio characterizing the external dividend environment. Equation (1.7) provides information on how much of the earnings are paid out in the form of dividends. In the event of a stronger decline in corporate income, there is no reduction in dividends. However, if the income is variable, the company's management sets a low payout ratio. When the income drops unexpectedly, the payout ratio tends to temporarily increase.

Similarly, if management predicts a higher income in the future, it may pay higher dividends. Incomes not paid in dividends are again reactivated in business operations.

$$\frac{Dividents}{Earnings\ per\ Share} \tag{1.7}$$

$$1 - \frac{Dividents}{Earnings\ per\ Share} \tag{1.8}$$

Multiplication of the relationship (1.8) by the return on capital allows to find out how fast the shareholders' investment is growing due to the activation of earnings. The following applies to the analyzed company (1.9):

$$\frac{Debt - Dividents}{Earnings\ per\ Share} \times \frac{Earnings\ per\ Share}{Capital} \tag{1.9}$$

The CCB model compares this value with yields from previous years. The way in which dividends (dividend policy) are determined has been sufficiently described and confirmed in the past (Lintner, 1956). Lintner's model explains dividend payments as follows. The dividends in the following year di_1 is equal to the constant share of earnings per share Es (1.10):

I. di_1 = *target dividend* = *target ratio* $\times$ *Es* (1.11)

The dividend change will be equal to (1.12):

$di_1 - di_0$ = *changed target* = *target ratio* $\times$ *Es* $-$ *di_0* (1.12)

Companies rely on shareholders preferring a steady rise in dividends. Therefore, even in conditions that seem to guarantee an increase in dividends, companies take a partial step towards their target payment. Dividend changes correspond to the model (1.13):

$$di_1 - di_0 = pace\ of\ adaptation \times target\ change =$$
$$= pace\ of\ adaptation \times (target\ ratio \times Es - di_0)$$ (1.13)

The more conservative the company is in terms of the capital structure, a/ the slower it moves towards the goal, and b/ the lower the pace of adaptation is going to be. The CCB model shows that dividends depend in part on a/ current results and b/ dividends in the previous year.

These depend on the dividends in the year prior. Therefore, dividends can be recorded as a weighted average of current/past earnings. When current earnings are growing, yet less than in the previous year, The probability of the increase in the amount of dividends is the greatest.

Another monitored group within the CCB model is the a/ market value ratios or b/ ratios combining the accounting / market aspect.

$$\frac{Share\ Price}{Earnings\ per\ Share}$$ (1.14)

The price to earnings ratio (1.14), or P/E, is a common evaluation benchmark used by investors. If the assumption of a steady growth of dividends is met, the current share price is as follows (1.15):

$$\frac{di_1}{r_i - g}$$ (1.15)

In this relationship, di_1 stands for the expected dividend in the next year, r is the return that investors demand for similar investments, and g is the expected rate of dividend growth. The P/E ratio can be identified by dividing by expected earnings per share. A high P/E ratio means that:

1) investors expect significant dividend growth or,

2) the stock is not particularly risky, meaning that investors are ready for lower return, or

3) the company expects a significant average growth, therefore it pays out a large share of earnings.

The last fundamental characteristic observed within the CCB model is the relationship between the share price and its book value (1.16):

$$\frac{Share\ Price}{Share\ Book\ Value}$$ (1.16)

308

Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

This figure provides an external perspective on the bankruptcy prediction purposes, the overall property structure of the company is assessed. Revalued assets / liabilities seem to be an optimal choice within the CCB model.

The last characteristic (1.16) can be substituted/supplemented with Tobin's q. The starting point is the market value of the company's debt/equity to the market reproduction costs of replacing the company's assets. This ratio is similar to the market/book value ratio, except that the numerator q includes all debt + equity of the company, not just net equity. Similarly, the denominator covers all assets and not just net capital. These assets are reported in replacement costs, not acquisition costs. The effect of inflation could also be considered here.

The ratios analyzed above describe, yet do not explain, whether/how the debt, which is crucial for the prediction of financial distress, affects the company's earnings. Indebtedness increases the expected flow of earnings per share, but not the share price. This is because the expected flow of earnings is precisely offset by a change in the rate at which earnings are capitalized.

The expected return on assets of the company r_a is equal to the expected operating income divided by the total market value of securities:

$$\frac{Expected\ Operating\ Income}{Market\ Value\ of\ all\ Secturities} \tag{1.17}$$

In perfect capital markets, companies do not decide on borrowing funds based on the operating income or the total market value of its securities. Therefore, the expected return on assets r_a of the company is not affected by the decision to borrow funds. In the case of the analyzed company, it can be assumed that the investor controls the entire debt of the company, including shares. The investor has a natural right to operating income. Therefore, the expected return on the portfolio = r_a. Expected return on portfolio = weighted average of expected returns for individual holders. The expected return on the portfolio composed of all the company's securities is equal to the following structure. Expected return on assets = the sum of the debt ratio multiplied with expected return on debt (r_D) and the equity ratio multiplied with the expected return on capital (r_E). Relationship (1.18) can be noted as follows:

$$rA = \left(\frac{Debt}{Debt + Equity} \times rD\right) + \left(\frac{Equity}{Debt + Equity}\right) * rE \tag{1.18}$$

The equation can be adjusted to get the relationship for r_E- the expected return on equity of the indebted company. Expected return on capital = expected return on assets + debt-to-capital ratio multiplied with the difference between expected return on assets + expected return on debt. Relationship (1.18) is modified as follows (1.19):

$$rE = rA + \frac{Debt}{Equity}(rA - rD) \tag{1.19}$$

The expected rate of return on the debt of an indebted company is directly proportional to the debt-to-equity ratio (D/E), expressed in market values. The growth depends on the difference between r_A, the expected return on the company's portfolio of all securities, and r_D, the expected return on debt:

$$r_E = r_A \tag{1.20}$$

4. Empirical data and analysis

The financial indicators and subsequently financial ratios were obtained for a total of 199 companies. For the sake of brevity, the Table 2 as well as Tables 3 and 4 in the following chapter include only a sample of 31 companies so that the reader could get an idea of how exactly the data were processed.

Table 2: Analyzed entities

Number	Company	Registration n°
1.	2P SERVIS s.r.o	280 49 390
2.	5. AVENUE EXCLUSIVE s.r.o	284 34 501
3.	Actual spinning a.s	287 11 891
4.	Adient Strakonice s.r.o	280 85 272
5.	ALIJAN s.r.o	269 16 258
6.	ALLIGARD s.r.o	252 00 933
7.	ALONSO & co., s.r.o	264 04 991
8.	ALTREVA spol. s.r.o	607 07 879
9.	AMANN s.r.o	472 83 416
10.	ANE KONSULT spol. s r.o	648 25 477
...		
90.	KONTEST s.r.o	277 15 019
91.	KONYA - M s.r.o.	263 77 675
92.	KORDÁRNA Plus a.s	277 58 711
93.	Koutný spol. s r.o	607 50 197
94.	Kümpers Textil s.r.o.	632 17 961
95.	KUS PRÁCE s.r.o	283 40 361
96.	KVD CZ s.r.o	260 72 351
97.	L & L STUDIO PRAHA s.r.o	276 58 821
98.	LASY, s.r.o	262 43 814

310

Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

Number	Company	Registration n°
99.	LEATHER TRADE s.r.o	288 90 001
100.	LEKA Grünau a.s	255 81 856
...		
190.	VŘÍDLO, výrobní družstvo	000 28 860
191.	VŠEZEP s.r.o	008 70 838
192.	VÚB a.s	455 34 420
193.	Výrobní družstvo VKUS Frýdek-Místek	000 31 330
194.	VÝVOJ, oděvní družstvo v Třešti	000 30 732
195.	W & P company s.r.o	263 84 701
196.	WLADITA Ltd, s.r.o	261 38 336
197.	X tašky s.r.o.	270 83 446
198.	YATE spol. s r.o	432 26 990
199.	ZITA studio s.r.o	279 86 365

Source: Business Register maintained by the Czech Statistical Office

A total of 14 financial variables (Table 3) is obtained for each company and then processed in several steps. First, the variables are used to define financial ratios (Table 4). Then the original value x_{ij} is transformed to standardized variable u_{ij}, in the case of an indicator with the character +1 (2.1) and in the case of an indicator with the character -1 (2.2):

$$u_{ij} = \frac{x_{ij} - x_{pj}}{s_{xj}} \tag{2.1}$$

$$u_{ij} = \frac{x_{pj} - x_{ij}}{s_{xj}} \tag{2.2}$$

where the value of x_{ij} is the value of the j-th indicator in the i-th company, x_{pj} is the arithmetic mean calculated from the values of the j-th indicator and s_{xj} is the standard deviation obtained from the values of the j-th indicator.

Then an arithmetic mean (2.3) and standard deviation (2.4) of the standardized values are calculated:

$$d_{np} = \frac{\sum_{j=1}^{m} u_{ij} \cdot p_j}{\sum_{j=1}^{m} p_j}, \, i = 1, 2, \dots, n \tag{2.3}$$

$$s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(x_i - \bar{x})^2} \qquad\qquad (2.4)$$

Finally, the companies are ranked according to the arithmetic mean by the likelihood of bankruptcy, where the lower the mean value, the higher the probability of bankruptcy.

As mentioned in the previous chapters, the CCB model was applied to a set of 199 existing companies operating in the same domain of economy (textile industry) and in the same geographical area (the Czech Republic). The reason for this is obvious, as comparing companies operating in various industries and/or countries would result in misleading predictions.

In accordance with the methodology, the first step of analysis consisted of obtaining financial statements reported by companies and compiling selected financial indicators or variables. Data from current financial statements could not be used as it would require a certain waiting period in order to verify the prediction accuracy of the model. For this reason, the model works with the year 2013 as the starting point for prediction and a seven-year time span for predicting the onset of bankruptcy. For the sake of brevity, the data in Table 3 represent only one out of 7 years that were used for the prediction.

The variables in Table 3 then served as the basis for financial ratios (see Table 4) that are essential for the prediction. These include short-term receivables turnover rate, short-term payables turnover rate, other payables, immediate liquidity, quick ratio, current liquidity, return on investments, return on equity, return on operating capital, debt ratio, net working capital, financial coverage of debt capital, interest coverage and coverage of fixed assets with long-term capital. The reasoning behind the choice of these particular indicators was already discussed in the previous sections of this article.

The next step consisted of determining the arithmetic mean of the indicators (x_{pj}) and standardized variable (S_{xj}) for each of the analyzed ratios using the formulas (2.3) and (2.4). Standardized variables were defined for the monitored indicator and monitored entity. The sum column represents the simple sum of the standardized values. The average of the standardized values is obtained by dividing the sum by the number of monitored variables. The use of differentiated weights would lead to a distortion of the final ranking, as the selection of the monitored ratios was made while taking into account the goal of detecting impending bankruptcy. The calculation, therefore, considers unit weights that do not distort the final ranking.

Companies were finally arranged in Table 5 with those with the best prospects (lowest probability of bankruptcy) at the top of the table to those with the worst

312
Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

prospects (high probability of bankruptcy) at the bottom. The average value of CCB indicator ranges between 12.15 and -0.61. Companies were divided into three groups defined by two threshold values – lower 9% and 22%. The 15 companies thus represent entities that are at high risk of bankruptcy and the 34 companies is considered approaching bankruptcy. We can therefore conclude that the situation of a total of 49 textile/clothing companies from the reference package is considered problematic. The remainder of companies falls within the category for which bankruptcy cannot be predicted at the moment.

The final step lies in the comparison of prediction provided by the CCB Model and the actual development of analyzed companies during the years 2013-2020. Table 6 contains 9 companies that went bankrupt or became insolvent as well as information whether the CCB Model was able to anticipate that state.

Table 6: Actual development of companies

Company Serial No.	Company Name	Bankruptcy	Date	Predicted
16.	ATRON, s.r.o	YES	Nov. 1, 2019	No
33.	BRULEKO s.r.o	YES	Jan. 1, 2019	No
47.	DIVERSO KV s.r.o.	INSOLVENCY	Jan 16, 2017	No
49.	Durocas Czech s. r. o.	YES	Nov. 5, 2019	Yes
91.	KONYA – M s.r.o.	YES	Nov 9, 2018	No
139.	PRVNÍ CHRÁNĚNÁ DÍLNA s.r.o	INSOLVENCY	Jan. 23, 2020	Yes
144.	RESCUE s.r.o	YES	Nov. 21, 2019	No
185.	VIGA BEST s.r.o.	YES	Apr. 27, 2019	No
152.	Schwinn Tschechien s.r.o	LIQUIDATION	Apr. 1, 2020	Yes

Source: Business Register maintained by the Czech Statistical Office

The Table 6 contains information about the companies which, due to various factors and variables affecting the market, eventually declared bankruptcy, insolvency or liquidation. All failed companies were limited-liability companies, and the issues of bankruptcy, insolvency, and liquidation occurred between 2017 and 2020. The last column of the table is essential for assessing the model accuracy as it reveals whether the failure was predictable or unpredictable by the CCB model. Three of the failed companies, namely Durocas Czech s.r.o., PRVNÍ CHRÁNĚNÁ DÍLNA s.r.o, and Schwinn Tschechien s.r.o. were evaluated as approaching or being at high risk of bankruptcy. The rest of the companies belong to those companies for which bankruptcy is unpredictable. (yet not completely ruled out either).

5. Results and discussion

The CCB model used financial indicators from the last 7 years in order to calculate financial ratios relevant for bankruptcy prediction. These ratios were then used to determine the main CCB indicator (ranging from -0,61 to 12,15) where the following rule is applied – the lower the indicator, the higher the probability of financial distress. As shown in Table 5, a total of 49 companies was thus marked as approaching bankruptcy or being at high risk of bankruptcy. Three out of nine companies that actually went bankrupt during the analyzed period can be found in this group. In order to objectively assess the efficiency and accuracy of the CCB model, we first need to discuss what the ambitions of the model are.

The CCB model is primarily an auxiliary tool for management. It provides reasonably accurate estimates of a company's current situation and its evolution shortly. However, its outputs are not visible in binary terms. In other words, even if, a company according to the results obtained via the CCB model, is not threatened by bankruptcy, it should not suppose that there is absolutely no risk of getting into financial problems. Likewise, a company that finds itself in the lower end of Table 5 should not immediately opt for drastic measures to avoid bankruptcy. The company should rather obtain the information through the CCB model, primarily because the CCB model can help the company lead a more complex and in-depth analysis of its financial situation. Therefore, the model has mainly preventive functions and needs to be used as such. One of the greatest advantages of the model is the simplicity of its use. Despite the extensive data set, both in terms of the number of companies and the number of financial statements used as a base for the prediction, it remains easy to navigate, and the outputs are very straightforward so that there is no room for misinterpretations. One could argue that more advanced prediction methods, such as machine learning predictions, outperform the CCB model in terms of accuracy. There is no doubt that AI has seen increasing progress in recent years, and the accuracy of AI-based predictions is ever-increasing, too. These analyses, however, require a state-of-the-art software program and such data sets that will provide good results. Also, even though not a minor factor, it requires a person or a team who understands the complexity of machine learning, or else this service needs outsourcing.

All the above leads to higher costs of performing such an analysis. For small businesses, careful of every additional expense, advanced prediction methods, therefore, may be unattainable. That is where the CCB model could be perhaps most useful; in small businesses that want to obtain a reasonably accurate estimate of the company's situation without incurring excess costs.

314
Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

6. Conclusions

Even though financial distress or bankruptcy may have a slightly different definition depending on the legislation applicable in a particular country or state, it has always been perceived as a situation that should be avoided. Prevention of bankruptcy is always more convenient and less expensive than resolving the bankruptcy that has already occurred. Due to the current pandemic resulting in uncertainty in the markets, we expect the interception of the potential risk of financial distress will move even higher in the list of management priorities.

The presented CCB model is an analysis instrument specifically designed for this purpose. The research has the main objective to detect the impending bankruptcy signs and has primarily been based on the selected indicators of the company's financial health. It includes sustainable development, optimal capital structure, and liquidity. Ensuring the applicability of the model in practice was one of the key objectives of the research. Its explanatory power was tested on the data of 199 companies operating in the textile/clothing industry in the Czech Republic. All the data necessary for the prediction were from standard financial statements. The comparison of predicted development and actual evolution of tested entities has shown that the CCB model was able to predict bankruptcy/insolvency proceedings in one-third of the cases, even though the number of companies that found themselves in this situation was rather small, considering the extent of the referential package (only 9 out of 199).

The CCB model leaves enough room for future research. The first and most obvious way of developing the model would be to apply it to a set of companies operating in a different sector and compare its accuracy to the analysis accuracy herein. Secondly, researchers could put focus on modifying the financial ratios used for the analysis by either adding new ratios to the mix or reducing the number of ratios. The results could then again be compared with the results of the current CCB model. According to the research hypothesis, as described in the introduction, the CCB model should provide quite reliable results, mainly because it uses data from companies operating in the same sector as well as the same country. Since failed companies represented a mere fraction of the referential package, the author believes that the accuracy of the prediction provided by the model has met the expectations. In addition, any assessment of the results must involve the crucial role of the model, which is *the preventive* role. Had the model been used in time by the companies that were eventually evaluated as "approaching the bankruptcy". In three cases the management might have taken necessary steps to deter the bankruptcy. That is quite a high number because the model in question does not require the use of complex software or algorithms, nor is it demanding in terms of financial costs, which is an important factor, especially for small to medium-sized companies.

The research results lead us to conclude that the described model represents a suitable and reliable tool for detecting financial distress in companies. Bankruptcy or insolvency is a legal situation arising under specifically-defined conditions that may differ by country. Therefore, the CCB model should be perceived merely as an auxiliary tool for the management, and the company's outputs should prompt a further analysis or expert opinion of its circumstances.

References

Bellovary, J. L., Giacomino, D. E., Akers, M. D. (2007) "A review of bankruptcy prediction studies: 1930 to present", *Journal of Financial education*, Vol. 33, pp. 1–42.

Cleofas-Sánchez, L., García, V., Marqués, A., Salvador Sánchez, J. (2016) "Financial distress prediction using the hybrid associative memory with translation", *Applied Soft Computing Journal,* Vol. 44, pp. 144–152, doi: 10.1016/j.asoc.2016.04.005.

FitzPatrick, P. J. (1932) "A Comparison of the Ratios of Successful Industrial Enterprises With Those of Failed Companies. The Certified Public Accountant Beaver 1968", *Journal of Accounting Research,* (In three issues: October, 1932, pp. 598–605; November, 1932, pp. 656–662; December, 1932, pp. 727–731).

Kovanicova, D. (1999) *Finanční účetnictví,* Prague: Polygon.

Klepac, V., Hampel, D. (2017) "Predicting financial distress of agriculture companies in the EU", *Agricultural Economics,* Vol. 63, pp. 347–355, doi: 10.17221/374/2015-agricecon.

Lee, S. and Choi, W.S. (2013) "A multi-industry bankruptcy prediction model using back-propagation neural network and multivariate discriminant analysis", *Expert Systems with Applications,* Vol. 40, No. 8, pp. 2941–2946, doi: 10.1016/j.eswa.2012.12.009.

Lintner, J. (1956) "Distribution of Incomes of Corporations among Dividends, Retained Earnings, and Taxes", *American Economic Review*, Vol. 46, pp. 97–113.

López-Gutiérrez, C., Sanfilippo-Azofra, S., Torre-Olmo, B. (2015) "Investment decisions of companies in financial distress", *BRQ Business Research Quarterly,* Vol. 18, pp. 174–187, doi: 10.1016/j.brq.2014.09.001.

Mantziaris, S.Z. (2015) *Bankruptcy Prediction Models: An Empirical Analysis of Altman's Z-Score Model in Forty Greek Companies in the Period of Economic Recession.* Dissertation, School of Business Administration, Department of Accounting and Finance, University of Macedonia.

Shrivastava, A., Kuldeep, K., Nitin, K. (2018) "Business distress prediction using a Bayesian logistic model for Indian firms", *Risks,* Vol. 6. doi: 10.3390/risks6040113.

316

Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

Smith, R., Winakor, A. (1935) "Changes in Financial Structure of Unsuccessful Industrial Corporations", *Bureau of Business Research,* Bulletin No. 51. University of Illinois Press.

Šlefendorfas, G. (2016) "Bankruptcy prediction model for private limited companies of Lithuania", *Ekonomika,* Vol. 95, pp. 134-152, doi: 10.15388/ekon.2016.1.9910.

Praktična primjena CCB modela u Češkoj

Vitezslav Halek[1]

Sažetak

Cilj ovog istraživanja bio je predstaviti novi model predviđanja stečaja i potom ovu originalnu metodu predviđanja primijeniti u praksi. Model Come Clean Bankruptcy (ili CCB) koristi relevantne financijske pokazatelje i omjere kako bi na vrijeme utvrdio znakove nadolazećih financijskih problema tako da ih uprava može izbjeći poduzimanjem odgovarajućih mjera. Model je korišten na podacima za 199 subjekata koji posluju u tekstilnoj/odjevnoj industriji u Češkoj. Analizom tih podataka za sedam prethodnih godina moguće je predvidjeti za koje je tvrtke vjerojatnije da upadnu u tešku financijsku situaciju. Ta se predviđanja zatim uspoređuju sa stvarnim razvojem tih tvrtki u razdoblju 2013. – 2020. godine kako bi se provjerila učinkovitost i upotrebljivost modela u korporativnoj stvarnosti. Istraživanje je pokazalo da su poduzeća koja su u analiziranom razdoblju stvarno otišla u stečaj predstavljala samo djelić skupa podataka (otprilike 4,5 %). Unatoč malom broju financijskih pogrešaka koje su se dogodile tijekom analiziranog razdoblja, model CCB-a je u trećini slučajeva uspio detektirati nadolazeći stečaj.

Ključne riječi: *Model stečaja, predviđanje rizika, financijski problemi, Češka Republika*

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Appendices

Table 3: Selected Financial Variables

Ref. No.	Company	Short-Term Receivables Turnover	Short-Term Payables Turnover	Other Payables	Immediate Liquidity	Quick Ratio	Current Liquidity	Return On Investments	Return On Equity	Return On Operating Capital	Debt Ratio	Net Working Capital	Financial Coverage Of Debt Capital	Interest Coverage	Fixed Assets Coverage With Long-Term Capital
1.	2P SERVIS s.r.o	0,0000	0,0000	0,6656	0,5216	1,1786	1,3604	0,8851	0,8851	0,1387	0,6656	0,2399	2,2492	0,0000	0,2814
2.	5. AVENUE EXCLUSIVE s.r.o	x	x	0,7019	0,5317	0,5357	1,4246	-0,8692	0,0000	x	0,7019	0,2981	-2,7097	0,0000	0,0000
3.	Actual spinning a.s	0,0000	53,9461	0,1683	0,0000	0,0093	0,0093	-0,2061	-0,2070	-0,1553	0,3067	-0,1511	-1,7557	0,0000	1,1786
4.	Adient Strakonice s.r.o	104,5218	111,4530	0,6384	0,1414	1,1574	2,1041	-0,0868	-0,3465	-0,1447	0,7924	0,1975	-11,1146	-0,2653	0,7437
5.	ALIJAN s.r.o	102,2878	106,2731	0,5467	0,3830	1,2021	1,8085	0,1893	0,6964	0,1439	0,8133	0,2553	6,2564	0,0000	0,5971
...															
90.	KONTEST s.r.o	0,0000	0,0000	0,8975	0,0995	0,9254	0,9640	0,5631	0,4656	0,0151	0,8975	-0,0322	14,7710	0,0000	1,0560
91.	KONYA - M s.r.o.	4,1216	41,3491	0,5044	0,1223	0,3938	2,2026	0,1077	0,2068	0,0126	0,8282	0,5389	13,9336	0,1738	0,0236
92.	KORDÁRNA Plus a.s	x	x	0,0073	1,4000	136,1333	136,1333	0,0266	0,0232	x	0,0073	0,9927	0,2778	0,0000	0,0000
93.	Koutný spol. s r.o	34,3594	20,2779	0,0417	3,0234	4,2321	7,5752	0,1233	0,0757	0,0646	0,1158	0,7612	1,0616	0,0000	0,1084
94.	Kümpers Textil s.r.o.	15,1742	25,1299	0,5871	0,0551	0,4942	0,6440	0,0831	0,1027	0,0277	0,6616	-0,0468	9,1622	0,5191	1,0230
95.	KUS PRÁCE s.r.o	x	x	0,0000	x	x	x	0,0000	0,0000	x	0,0000	1,0000	x	x	0,0000
...															
190.	VŘÍDLO, výrobní družstvo	35,6543	12,1675	0,0413	2,2848	4,0795	7,8470	-0,0223	-0,0223	-0,0216	0,0736	0,5041	-3,5658	0,0000	0,4500
191.	VŠEZEP s.r.o	53,4709	69,9363	0,5382	0,1504	1,0684	2,6063	0,0453	0,0629	0,0393	0,6478	0,2347	16,7312	0,4016	0,7211
192.	VÚB a.s	57,7528	10,0242	0,2753	1,4449	2,1170	2,5624	0,0808	0,0719	0,0653	0,2968	0,3329	4,6689	0,0229	0,6048
193.	Výrobní družstvo VKUS Frýdek-Místek	24,5168	18,4869	0,2272	0,3166	1,2447	2,4590	0,2133	0,2314	0,0529	0,3691	0,3515	2,2791	0,0983	0,5373
194.	VÝVOJ, oděvní družstvo v Třešti	30,7162	64,8016	0,1248	0,9657	1,5001	2,2161	0,1407	0,1208	0,0615	0,3537	0,3847	3,6760	0,0000	0,4395
195.	W & P company s.r.o	0,0000	0,0000	0,9744	0,0343	0,1175	0,9318	0,0860	0,7823	0,0084	0,9744	-0,0357	23,7872	0,4596	0,7702

Source: Author's calculation

318

Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

Table 4: Financial Ratios with Standardized Variable and Arithmetic Mean

Company Serial N°	Debt Ratio	Earnings Multiplied By Interests	Working Capital To Total Assets	Quick Ratio Net Of Receivables	Operating Cost	Interest Tax Shields	Return On Capital	Price-Earning Ratio	Expected Return On Debt	(Q) Value	Indebted Company	Sum Total	Average	Rank
X_{δj}	1,67	295,51	-0,05	0,92	19,12	0,16	0,09	11,72	0,21	2,27	3,04	×	×	×
S_{δj}	9,42	1681,02	3,14	6,15	224,43	1	1	44,98	1,05	3,85	46,99	×	×	×
1.	-0,16	-0,02	0,26	0,33	-0,06	0,07	0,1	-0,14	0,05	-0,25	-0,06	0,12	0,01	57.
2.	3,79	-0,17	0,76	-0,14	-0,08	2,11	2,15	0,88	-0,12	0,91	2,2	12,29	1,12	7.
3.	-0,11	0	0	-0,15	-0,07	0	0	0	0	-0,41	-0,06	-0,8	-0,07	122.
4.	-0,09	0	0,05	-0,13	-0,06	-0,1	2,05	0	-0,15	-0,29	2,26	3,12	0,28	16.
5.	-0,09	-0,18	0,05	-0,13	-0,07	-0,14	-0,26	1,53	-0,44	-0,26	-0,05	-0,04	0	60.
...														
95.	0,11	3,21	0,15	-0,14	-0,07	0,01	-0,05	-0,24	-0,06	-0,37	-0,04	2,51	0,23	19.
94.	-0,1	-0,17	-0,15	-0,15	-0,08	-0,05	-0,08	0,37	-0,1	-0,33	-0,06	-0,9	-0,08	142.
93.	-0,17	3,19	0,27	0,56	-0,06	0,07	0,05	-0,09	-0,01	-0,28	-0,06	3,47	0,32	14.
92.	-0,14	-0,16	0,11	-0,14	0,07	0,03	0,02	-0,09	-0,05	-0,22	-0,06	-0,63	-0,06	109.
91.	-0,07	-0,15	0,09	-0,14	-0,08	-0,09	-0,13	-0,11	1,16	-0,1	0,02	0,4	0,04	50.
90.	-0,12	-0,12	0,13	-0,05	-0,07	-0,09	-0,06	-0,08	-0,07	-0,27	0	-0,8	-0,07	122.
...														
190.	-0,17	-0,11	0,2	0,47	-0,06	-0,11	-0,08	0,11	-0,19	-0,36	-0,06	-0,36	-0,03	77.
191.	-0,11	-0,17	-0,13	-0,14	-0,07	-0,04	-0,07	0,63	-0,08	-0,5	0	-0,68	-0,06	109.
192.	-0,15	-0,13	0,09	-0,03	-0,06	-0,04	-0,04	0,13	-0,12	-0,41	-0,06	-0,82	-0,07	122.
193.	-0,08	-0,15	-0,25	-0,12	-0,08	-0,1	-0,17	0,76	-0,13	0,19	-0,05	-0,18	-0,02	68.
194.	-0,15	-0,1	0,13	0,05	-0,07	0	0	0,02	-0,06	-0,25	-0,06	-0,49	-0,04	89.
195.	-0,08	-0,17	-0,33	-0,14	-0,08	-0,13	-0,08	-0,2	-0,98	-0,27	-0,06	-2,52	-0,23	198.

Source: Author's calculation

Table 5: Ranking of Companies based on Probability of Bankruptcy

	Rank	Average Value (According to Table 4)	Analyzed Company (Reference n.)
Bankruptcy cannot be Predicted	1.	12,15	74.
	2.	8,84	76.
	3.	2,89	140.
	4.	2,28	83.
	5.	2,03	134.
	6.	1,97	132.
	7.	1,12	2.
	8.	0,84	164.
	9.	0,54	165.
	10.	0,43	31.
	11.	0,40	156.
	12.	0,39	119.
	13.	0,37	154.
	14.	0,32	93.
	15.	0,31	163.
	16.	0,28	4.
	17.	0,25	145.
	18.	0,24	11.
	19.	0,23	95.
	19.	0,23	110.
	19.	0,23	118.
	22.	0,22	54.
	22.	0,22	182.
	22.	0,22	184.
	25.	0,20	63.
	26.	0,19	131.
	27.	0,18	42.
	27.	0,18	117.
	29.	0,15	39.
	29.	0,15	116.
	31.	0,14	16.
	31.	0,14	127.
	33.	0,13	10.
	34.	0,12	44.
	34.	0,12	169.
	36.	0,10	7.
	37.	0,08	12.
	37.	0,08	59.
	37.	0,08	112.
	40.	0,07	15.
	40.	0,07	33.
	40.	0,07	89.
	40.	0,07	121.

	Rank	Average Value (According to Table 4)	Analyzed Company (Reference n.)
	44.	0,06	73.
	44.	0,06	137.
	44.	0,06	176.
	47.	0,05	32.
	47.	0,05	43.
	47.	0,05	114.
	50.	0,04	8.
	50.	0,04	91.
	52.	0,03	65.
	52.	0,03	120.
	52.	0,03	166.
	55.	0,02	85.
	55.	0,02	153.
	57.	0,01	1.
	57.	0,01	109.
	57.	0,01	146.
	60.	0,00	5.
	60.	0,00	48.
	60.	0,00	68.
	60.	0,00	148.
	60.	0,00	179.
Bankruptcy cannot be Predicted	65.	-0,01	107.
	65.	-0,01	144.
	65.	-0,01	172.
	68.	-0,02	14.
	68.	-0,02	34.
	68.	-0,02	47.
	68.	-0,02	53.
	68.	-0,02	64.
	68.	-0,02	71.
	68.	-0,02	150.
	68.	-0,02	173.
	68.	-0,02	193.
	77.	-0,03	45.
	77.	-0,03	56.
	77.	-0,03	72.
	77.	-0,03	75.
	77.	-0,03	96.
	77.	-0,03	100.
	77.	-0,03	111.
	77.	-0,03	122.
	77.	-0,03	126.
	77.	-0,03	138.
	77.	-0,03	185.
	77.	-0,03	190.

	Rank	Average Value (According to Table 4)	Analyzed Company (Reference n.)
	89.	-0,04	18.
	89.	-0,04	40.
	89.	-0,04	55.
	89.	-0,04	161.
	93.	-0,05	6.
	93.	-0,05	17.
	93.	-0,05	28.
	93.	-0,05	36.
	93.	-0,05	46.
	93.	-0,05	50.
	93.	-0,05	66.
	93.	-0,05	102.
	93.	-0,05	123.
	93.	-0,05	125.
	93.	-0,05	128.
	93.	-0,05	155.
	93.	-0,05	162.
	93.	-0,05	171.
	93.	-0,05	194.
	93.	-0,05	200.
	109.	-0,06	9.
	109.	-0,06	30.
	109.	-0,06	35.
Bankruptcy cannot be Predicted	109.	-0,06	62.
	109.	-0,06	87.
	109.	-0,06	92.
	109.	-0,06	103.
	109.	-0,06	143.
	109.	-0,06	147.
	109.	-0,06	149.
	109.	-0,06	157.
	109.	-0,06	175.
	109.	-0,06	191.
	122.	-0,07	3.
	122.	-0,07	22.
	122.	-0,07	29.
	122.	-0,07	51.
	122.	-0,07	58.
	122.	-0,07	79.
	122.	-0,07	81.
	122.	-0,07	82.
	122.	-0,07	84.
	122.	-0,07	90.
	122.	-0,07	104.
	122.	-0,07	113.

322

Vitezslav Halek • Practical application of the CCB model in Czechia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 299-323

	Rank	Average Value (According to Table 4)	Analyzed Company (Reference n.)
Bankruptcy cannot be Predicted	122.	-0,07	136.
	122.	-0,07	151.
	122.	-0,07	186.
	122.	-0,07	189.
	122.	-0,07	192.
	122.	-0,07	197.
	122.	-0,07	198.
	122.	-0,07	199.
	142.	-0,08	13.
	142.	-0,08	19.
	142.	-0,08	38.
	142.	-0,08	69.
	142.	-0,08	80.
	142.	-0,08	94.
	142.	-0,08	124.
	142.	-0,08	159.
	142.	-0,08	181.
Approaching Bankruptcy	151.	-0,09	20.
	151.	-0,09	26.
	151.	-0,09	37.
	151.	-0,09	52.
	151.	-0,09	88.
	151.	-0,09	98.
	151.	-0,09	115.
	151.	-0,09	130.
	151.	-0,09	135.
	151.	-0,09	152.
	151.	-0,09	174.
	151.	-0,09	188.
	163.	-0,10	57.
	163.	-0,10	77.
	163.	-0,10	86.
	163.	-0,10	196.
	167.	-0,11	60.
	167.	-0,11	78.
	167.	-0,11	97.
	167.	-0,11	129.
	167.	-0,11	133.
	167.	-0,11	168.
	167.	-0,11	170.
	174.	-0,12	21.
	174.	-0,12	25.
	174.	-0,12	49.
	174.	-0,12	67.
	174.	-0,12	105.

	Rank	Average Value (According to Table 4)	Analyzed Company (Reference n.)
Approaching Bankruptcy	174.	-0,12	180.
	174.	-0,12	183.
	181.	-0,13	23.
	181.	-0,13	24.
	181.	-0,13	27.
	181.	-0,13	106.
High Risk of Bankruptcy	186.	-0,14	41.
	186.	-0,14	61.
	186.	-0,14	108.
	186.	-0,14	142.
	186.	-0,14	158.
	186.	-0,14	167.
	186.	-0,14	177.
	186.	-0,14	187.
	194.	-0,16	178.
	195.	-0,17	139.
	196.	-0,18	160.
	197.	-0,19	99.
	198.	-0,20	70.
	199.	-0,23	195.
	200.	-0,61	101.

Source: Author's research

Amila Pilav-Velić et al. • Emergency remote learning acceptance among higher...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 325-347
325

Emergency remote learning acceptance among higher education students during COVID-19 pandemic

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Abstract

The current study investigates how attitudes towards digital transformation and personal innovativeness affect the acceptance of emergency remote learning in the COVID-19 pandemic environment. The pandemic has affected all aspects of societies across the globe, including higher education that was also a significant push-up factor for the digital transformation of higher education. Thus, the main aim of this paper is to investigate the factors affecting emergency remote learning acceptance among the higher education students in Bosnia and Herzegovina (BiH). The results presented in this paper gained from a study carried out among higher education students in BiH cover the period of April – July 2020 via the open-source platform. The study focused on the students' attitude towards a digital transformation is a significant factor in accepting emergency remote learning. Also, the personal

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innovativeness score has proven to be a crucial factor for adopting this new learning setting, i.e., more innovative students have a greater emergency remote learning acceptance than students with a lower personal innovativeness score. Hence, this study pinpoints the necessity of changing the attitudes towards technology applications in education. It would increase the usage of remote learning services and provide students with knowledge and skills for the new labour market.

Key words: *personal innovativeness, remote learning, digital transformation, students, COVID-19*

JEL classification: *I21, I23, O33, O36*

1. Introduction

A smart society is a society in which digital technology encourages the strengthening of three broad areas: (i) well-being and living standards of citizens; (ii) economic strength and prospects; (iii) efficiency of institutions/organizations/ companies operating within a society (Chakravorti et al., 2017). The role of digital technology in a smart society is not a final goal, but a means to achieve other higher goals of society. Therefore, accepting and using digital technology is a prerequisite for social growth and development in all segments of society. In other words, whether we are enthusiastic or indifferent to technology, we cannot deny that it is part of our daily lives and that we desperately need it (McCarthy and Wright, 2004). However, as Bouee (2015) pointed out, "success in the digital age does not lie in the efficiency of technology, but in the dexterity and adaptability of the people who use it". In other words, employees in the organization/company must learn how to use and adopt technology to increase company productivity (Venkatesh et al., 2003).

Before the pandemic, higher education institutions around the globe started with the implementation of different learning models: distance learning, online learning, blended learning, mobile learning, etc. However, the emergence of the COVID-19 pandemic has made universities completely switch to remote learning. All of these forms of learning are dependent on technological equipment, and hence, the provision of equipment was a big challenge for institutions, faculty, and learners (Adedoyin and Soykan, 2020). It was a stress test for the higher education system, lecturers, tutors, and students involved (Handel et al., 2020). Authors Hodges et al. (2020), Milman (2020), Rapanta et al. (2020) argue, remote teaching caused by the pandemic can only be understood as "an emergency remote teaching." Thus, in this research paper, we employ the concept of "an emergency remote learning" as students had neither choice to decide nor the time to prepare for this new environment. Hodges et al. (2020) indicate that emergency remote-teaching emerges as a response to a crisis and is a temporary shift of instructional delivery that involves the complete application of the remote models of instruction. "While this is a strong stress test for education systems, this is also an opportunity to develop alternative education opportunities" (OECD, 2020: 1). Today's generations

of students across the globe require skills and competencies that will enable them to acquire existing and create new knowledge and technologies to meet future needs. As OECD (2021: 7) puts it: "our schools today are our economies tomorrow". A paradigm shift has occurred in university education (Garcia-Morales et al., 2021) and online education is here to stay (Adedoyin and Soykan, 2020).

The question that guided this study is how digital transformation, personal innovativeness, and specific personality traits affect the acceptance of emergency remote learning in higher education institutions. Dimensions examined in this study are (1) Students' innovativeness as defined by Zhou and George (2001) with a special focus on domain-specific innovativeness, i.e., Openness of access to digital transformation as in Agarwal and Prasad (1998), (2) Students' attitudes towards digital transformation as measured by Lu et al. (2005) and (3) Personality traits – Big Five Personality Traits test (Conscientiousness, Openness, Agreeableness, Extraversion, and Neuroticism) which will provide an additional basis for understanding students' attitudes and behaviour when using digital technology in their learning experience set in this changing global environment (Rammstedt and John, 2007). Taking into account all of the above, this study has the following specific research objectives:

RO1. To determine the statistically significant difference between the propensity towards remote learning and selected factors.

RO2. To explain the factors that influence *the likelihood of* the propensity towards remote learning.

With a growing body of research on the impact of an individual's socio-demographic characteristics on his/her digital abilities and attitude towards digital transformation, few have focused exclusively on examining these characteristics in the category of students at higher education level, i.e., universities, and none in the context of emergency remote learning caused by COVID-19 pandemic. This statement especially refers to Bosnia and Herzegovina (BiH), where scientific research in the field of digitalization is at a very low level compared to European and global contemporary research in the same scientific field. Empirically speaking, this research paper addresses the category of higher education students in BiH at two cycles, i.e., first cycle (undergraduate – bachelor level), second cycle (graduate – master level), their innovativeness, and digital transformation in the emergency remote learning caused by the COVID-19 pandemic. Results show, among other things, a significant association between remote learning, digital transformation, and personal innovativeness, but also different digital transformation scores, among different groups of respondents. Thus, we also provide important practical implications for future research.

The rest of the paper is structured as follows. Section 2 reviews previous studies by investigating digital transformation, personal innovativeness, and personality traits

in the learning environment and explains our hypothesis development. In Section 3, we describe our methodological framework. In Section 4, we discuss the empirical data and the analysis. Section 5 discusses the key findings of this. Lastly, Section 6 provides concluding remarks with policy implications, limitations of the research and recommendations for the future studies in the field.

2. Literature review

Students' acceptance of remote learning various due to several factors. These factors are divided for this research paper into main categories: personal innovativeness, personal traits and digital transformation.

2.1. Personal innovativeness and domain-specific personal innovativeness

Contemporary literature that deals with the conceptualization of personal innovativeness describe personal innovativeness as a key determinant in the innovation adoption process. Agarwal and Prasad (1998) made a significant contribution by introducing personal innovation as a separate dimension that deepens the understanding of how an individual's attitude toward digital technology is formed. People with pronounced personal innovation are more likely to not only embrace digital technology but also to act as leaders and motivators within their society and encourage others to start using and embracing innovation (Rogers, 1995). Moreover, a person is considered innovative if he/she is willing to accept innovation at an early stage or soon after its appearance in society (Rogers and Shoemaker, 1971a; Rogers 1995). However, domain-specific innovativeness was found to predict innovative user behaviour more accurately (Leavitt and Walton, 1975). First launched by Goldsmith and Hofacker (1991) and later applied in different industries such as fashion (Goldsmith et al., 2005) and information technology (Agarwal and Prasad, 1998; Agarwal and Karahanna, 2000).

Domain-specific conceptualization of Personal Innovativeness in Information Technology (PIIT), defined by Agarwal and Prasad (1998), deals with innovative individuals as early adopters of innovations. These individuals have more positive perceptions and beliefs about innovation, particularly in the scope of new technology. Defined by Lu et al. (2005) PIIT symbolizes risk-taking propensity, characteristic just for particular individuals. Also, personal innovativeness implies risk-taking propensity, and these individuals can cope with high levels of uncertainty (Bruner and Kumar, 2005; Hwang, 2014). Other characteristics of innovative individuals also include knowledge self-efficacy (Lin and Hwang, 2014); self-confidence in performing new tasks (Kegerreis et al., 1970); computer self-efficacy (Thatcher and Perrewe, 2002); openness towards mobile learning (Joo et al., 2014) and early technology adopters (Rogers and Shoemaker, 1971b;

Rogers, 2003). Undergraduate students have stronger preferences for online courses than graduate students. Also, married students reported lower levels of anxiety/frustration with online courses (Keller and Karau, 2013). When it comes to students, personal innovativeness in the domain of information technology represents a significant factor in explaining the students' perception of the technology and their intent to use the technology in the learning process (Fagan et al., 2012). Based on the above-discussed arguments, the following hypothesis is proposed:

> *H1*: Personal innovativeness may be considered as an antecedent of the propensity towards emergency remote learning.

2.2. Digital transformation and remote learning: attittudes and acceptance

The characteristics of the technology whose adoption is being examined significantly affect the attitude of individuals toward technology. Such and similar findings have motivated the development of different models for examining the acceptability of technologies. Some of them include Theory of Reasoned Action – TRA (Hale et al., 2002); Technology Acceptance Model – TAM (Chuttur, 2009); Theory of Planned Behavior – TPB (Ajzen, 1991); Model of Adoption of Technology in Households – MATH (Fillion and Le Dinh, 2008); Motivational Model – MM (Samaradiwakar and Gunawardena, 2014). The Unified Theory of Acceptance and Use of Technology (UTAUT) holds four key constructs, namely: (i) performance expectancy, (ii) effort expectancy, (iii) social influence, and (iv) facilitating conditions. However, UTAUT2 has added three additional constructs: hedonic motivations, price value, and habit (Venkatesh et al., 2012). This model shows that acceptance depends on four basic variables: 1. Expected results; 2. Expected use effort; 3. Social impact; and 4. Facilitating conditions in access to technology. These four variables affect IT acceptance, and they change according to the four basic factors: 1. Gender of the individual; 2. Age of the individual; 3. Individual experience; and 4. Will (willingness) to use (Venkatesh et al., 2003).

Vekantesh (2000) found a positive correlation between the level of education and the expected results of the use of technology, stating that more educated people recognize the greater usefulness of innovation. In addition, England and Stewart (2007) state that the introduction of new technology (product/innovation) plays a key role in creating a positive perception of the use of technology, i.e., that the characteristics of the technology whose acceptance is examined are a very important determinant in decision making for future technology users (Tolba and Mourad, 2011). Similarly, Rogers (1962; 2003) states that the adoption of innovation highly depends on the perception of the characteristics of the innovation and the adopter's situation. In fact, the perceived usefulness and ease of use are considered important factors for technology acceptance (Rodrigues-Ardura and Meseguer-Artola, 2016). Regarding the usage, technology that is easy to use is more likely to be perceived

as useful (Fagan et al., 2012). Also, the technology acceptance model shows that an individual's perception of the ease of use and usefulness significantly influence the individual's intention to use information technology applications (Davis, 1989). Thus, it can be derived that technology that is easy to use is more likely to be perceived as useful (Fagan et al., 2012).

Digital competence is understood as the student's ability to access and use technology to consume and evaluate the information for further production and communication with different digital tools and media (He and Zhu, 2017). Its close relationship with students' ICT self-efficacy with a focus on the user's perception of its capabilities to use ICT to achieve intended outcomes is shown in Venatesh et al. (2003). Furthermore, previous studies (Hatlevik and Christophersen, 2013; Park, 2009; Park et al., 2012) show a significant influence of computer self-efficacy on students' adoption of digital tools and applications for learning. Open access to online education (as a form of remote learning) allows students to develop a learning system that is more skill-oriented (Harvey and Slaughter, 2007). Technology is not a supplemental teaching tool but an essential one to successful performance outcomes (Ertmer and Ottenbreit-Leftwich, 2010), and we add to that a positive attitude towards digital transformation as a precondition for acceptance of remote learning. Based on these assumptions, we hypothesize the following:

H2: Propensity towards digital transformation may be considered as an antecedent of the propensity towards emergency remote learning.

2.3. The effects of personality

Personality researchers have expressed high levels of consensus on the value of the Big Five dimensions (Openness, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability) in the process of studying (Keller and Karau, 2013). For a long time, it has been used as a predictor of performance and preferences in different educational environments (Poropat, 2009). Personality has been analysed in the context of students' academic performance in different disciplines (Borg and Shapiro, 1996; Chowdhury and Amin, 2006). The common conclusion of these studies has been that personality affects academic performance and that the importance of different dimensions differs among these studies, i.e., disciplines.

The existence of the influence of the five personality dimensions on digital literacy and the individual's attitude towards digital transformation has already been dealt with in several previous studies. The relationship between personality traits and attitudes towards the acceptance of innovation in terms of two dimensions, perceived usefulness and perceived ease of use, is expressed and strong (Ozbek et al., 2014; Khan et al., 2011). Namely, the researchers found that while comfort positively affects perceived usefulness, neuroticism has a negative relationship to the stated dimension. Furthermore, openness to experience and conscientiousness positively affect

perceived utility and perceived ease of use of technology (Ozbek et al., 2014; Khan et al., 2011). The specific relationship between personality and academic performance in the context of online and distance learning has been analyzed by a significant number of authors. Most of them have found this relationship as strong while the significance of some personality dimensions varies from one author to another. These results can be found in Butler and Pinto-Zipp (2005); Kanuka and Nocente (2003); Lee and Lee (2006); Rovai (2003); Schniederjans and Kim (2005); Downing and Chim (2004), Keller and Karau (2013) and others.

Building on these arguments, we propose the following hypothesis:

> *H3*: Personality traits may be considered as an antecedent of the propensity towards remote learning.

3. Methodology

The authors used the following probit model as a primary methodological approach:

> $e = \beta_0 + \beta_1$ *Propensity towards digital transformation* +
> $+ \beta_2$ *Personal innovativeness* $+ \beta_{3-7}$ *Personality traits* +
> $+ \beta_{8-10}$ *Demographic Characteristics*

Estimation of the model was made by using STATA version 14. Prior to estimating the probit model, we will use the chi-square test of independence to examine the association of the propensity towards digital transformation, personal innovativeness, personality traits, and demographic characteristics with the propensity towards emergency remote learning. The null (H0) and alternative hypothesis (H1) of the chi-square test of independence are expressed as follows:

> H_0: Propensity towards emergency remote learning is independent of propensity towards digital transformation/personal innovativeness/ personality traits/demographic characteristics

> H_1: Propensity towards emergency remote learning is not independent of propensity towards digital transformation/personal innovativeness/ personality traits/demographic characteristics

The test statistic for the chi-square test of independence (χ^2) is calculated by using following formula:

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i},$$
(1)

where O_i stands for observed values and E_i for expeced values.

Furthermore, in order to measure the strength of the linear relationship between quantitative variables (emergency remote learning, digital transformation, personal innovativeness) and to compute their association we will use correlation analysis. The correlation coefficient (*r*) is calculated by using the following formula:

$$r = \frac{cov_{xy}}{\sigma_x \sigma_y} \,,$$

(2)

where cov_{xy} stands for covariance between two variables, and $\sigma_x \sigma_{y_i}$ for the product of their standard deviations. The null hypothesis is that the population *correlation coefficient* is not significantly different from zero. Finally, we'll compare the means of two groups using the independent samples t test to see if there's statistical evidence that the associated population means are significantly different. The null hypothesis is that the difference between the two population means is equal to 0.

4. Empirical data and analysis

4.1. Data source and sample

Using the purposive sampling technique, data collection was carried out among students from BiH, during the summer semester of 2020, from April to July 2020, yielding a sample of 273 valid responses. Table 1 contains an overview of the basic characteristics of the sample.

Table 1: Overview of basic characteristics of the sample

Characteristic		Frequency	Per cent
Gender	Male	68	26.4
	Female	190	73.6
	Total	273	100.0
Study cycle	The first cycle	188	68.9
	The second cycle	85	31.1
	Total	273	100.0
Age	≤ 21	90	33.0
	21+	183	67.0
	Total	273	100.0

Source: Authors' work

The data collection instrument is a structured questionnaire with closed questions, divided into several sections. The first section addresses Internet usage and digital literacy, while the second section addresses personal innovativeness followed by emergency remote learning dimension and demographic and other relevant data.

4.2. Instrument validity

The scores for each subscale were calculated as the total score for the items representing each dimension. However, before that, we assessed whether the subscales had satisfactory reliability (Table 2).

Table 2: Scale statistics

Measure	N	Number of items[6]	Mdn	Standard deviation	Cronbach's Alpha
Emergency remote learning	273	9	34.00	7.67	0.928
Digital transformation	273	4	13.00	3.22	0.801
Personal innovativeness	273	5	19.00	3.68	0.826

Source: Authors' work

Cronbach's Alpha is a measure of reliability that ranges from 0 to 1, with values of 0.60 to 0.70 deemed the lower limit of acceptability (Hair et al., 2014). Having that in mind, it may be concluded that all scales had an acceptable level of reliability. Furthermore, the scores for each subscale were calculated as a total score for the items representing each dimension, i.e., emergency remote learning, digital transformation, and personal innovativeness.

4.3. Variables

Overview and description of variables are presented in Table 3.

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[6] Emergency remote learning was operationalized by the following items that refer to the: online teaching system; learning platform; satisfaction and experience with online learning system; teaching contents. Digital transformation was operationalized by the items that refer to: new information technology; experimenting with new information technologies Personal innovativeness was operationalized by some of the following items: new and practical ideas for improvement; new technologies, processes, techniques and/or product ideas; risk-taking and others. In all cases 5 point Likert scale was used ranging from absolute dis*agreement to absolute agreement.*

334
Amila Pilav-Velić et al. • Emergency remote learning acceptance among higher...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 325-347

Table 3: Variables

Variables	Type of variable	Description	Categories
Propensity toward emergency remote learning	Categorical	Dependant variable based on the median value of remote learning score. If the emergency remote learning score was above median (*Mdn* > 34), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 34).	D = 1 if the respondent has above-average positive attitude towards emergency remote learning, 0 otherwise
Propensity toward digital transformation	Categorical	Independent variable based on the median value of digital transformation score. If the score was above median (*Mdn* > 13), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 13).	D = 1 if the respondent has above-average positive attitude towards digital transformation, 0 otherwise
Personal innovativeness	Categorical	Independent variable created based on the median value of personal innovativeness score. If the score was above median (*Mdn* > 19), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 19).	D = 1 if the respondent has above-average personal innovativeness score, 0 otherwise
Openness	Categorical	Derived from the question in the survey related to openness as a personality trait. Independant variable based on the median value of openness score. If the score was above median (*Mdn* > 2), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 2).	D = 1 if the respondent has above-average openness score, 0 otherwise
Conscientiousness	Categorical	Derived from the question in the survey related to conscientiousness as a personality trait. Independant variable based on the median value of conscientiousness score. If the score was above median (*Mdn* > 4), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 4).	D = 1 if the respondent has above-average conscientiousness score, 0 otherwise

Variables	Type of variable	Description	Categories
Extraversion	Categorical	Derived from the question in the survey related to extraversion as a personality trait. Independant variable based on the median value of extraversion score. If the score was above median (*Mdn* > 4), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 4).	D = 1 if the respondent has above-average extraversion score, 0 otherwise
Agreeableness	Categorical	Derived from the question in the survey related to the agreeableness as a personality trait. Independant variable has based on the median value of agreeableness score. If the score was above median (*Mdn* > 1), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 1).	D = 1 if the respondent has above-average agreeableness score, 0 otherwise
Neuroticism	Categorical	Derived from the question in the survey related to neuroticism as a personality trait. Independant variable based on the median value of neuroticism score. If the score was above median (*Mdn* > 2), the value of dummy variable was 1, and 0 if the score was equal and below median (*Mdn* ≤ 2).	D = 1 if the respondent has above-average neuroticism score, 0 otherwise
Age	Categorical	Derived from the question in the survey related to age.	1 – ≤ 21 years 2 – 21+ years
Gender	Categorical	Derived from the question in the survey related to gender.	D = 1 if the respondent is female, 0 otherwise
The study cycle	Categorical	Derived from the question in the survey related to the study cycle.	1 – the first study cycle 2 – the second study cycle

Source: Authors' work

336

Amila Pilav-Velić et al. • Emergency remote learning acceptance among higher...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 325-347

4.4. Empirical analysis

Within this chapter, the authors will present the results of the empirical research. In the first step of the analysis, we examined the association between selected variables. Results of the Pearson correlation indicated that there was a significant, positive association between the propensity toward emergency remote learning and digital transformation (r = .180, p = 0.003); propensity toward emergency remote learning and personal innovativeness (r = .182, p = 0.003), and between digital transformation score and personal innovativeness score, (r = .537, p = 0.000).

In the next step of the analysis, the personal innovativeness and digital transformation scores of two groups of respondents with a different propensity toward emergency remote learning were compared. On average, the group with the above-average propensity towards emergency remote learning (*M* = 19.46, *SD* = 3.54) had a higher personal innovativeness score compared to the other group (*M* = 17.78, *SD* = 3.21). This difference was statistically significant t (228.57) = -4.712, p = 0.000). When it comes to digital transformation, on average, the group with the above-average propensity towards emergency remote learning (*M* = 14.08, *SD* = 3.26) had a higher score compared to the other group (*M* = 12.76, *SD* = 3.03). This difference was statistically significant (t (259) = -4.563, p = 0.000).

Furthermore, the personal innovativeness and emergency remote learning scores of two groups of respondents with a different propensity toward digital transformation were compared. On average, the group with the above-average propensity towards digital transformation (*M* = 20.05, *SD* = 3.01) had a higher personal innovativeness score compared to the other group (*M* = 16.93, *SD* = 3.58). This difference was statistically significant t (271) = -3.215, p = .000). When it comes to emergency remote learning, on average, the group with the above-average propensity towards digital transformation (*M* = 35.77, *SD* = 7.30) had a higher score compared to the other group (*M* = 31.98, *SD* = 7.58). This difference was statistically significant (t (259) = -3.783, p = 0.000).

Finally, a chi-square test of independence was performed to examine the difference between propensity towards remote learning and propensity towards digital transformation and socio-demographic variables, i.e., age, gender and study cycle. We found a statistically significant difference between the propensity towards emergency remote learning and age, χ^2 (1, $N = 261$) = 16.707, $p < 0.01$ and the propensity towards emergency remote learning and study cycle, χ^2 (1, $N = 261$) = 9.998, $p < 0.05$.

When it comes to the propensity towards digital transformation, results of a chi-square test of independence are pointing to a statistically significant difference between this type of propensity and study cycle, χ^2 (1, $N = 273$) = 11.949, $p < 0.001$.

To evaluate the impact of the selected independent variables on the *likelihood of propensity towards emergency remote learning, the probit model* was used. The

goodness-of-fit was evaluated using the following measures: Pearson chi-square statistics, Hosmer and Lemeshow goodness-of-fit test, classification tables and pseudo R^2. The results of the Pearson chi-square statistics verified the whole model (with all predictors included) as statistically significant (p = 0.000). This model as a whole matches substantially better than a model without predictors. The Hosmer and Lemeshow goodness-of-fit test (p = 0.5172) also verified this. According to the classification tables, model correctly classifies 70.45% of cases. Table 4 displays the results of the estimated model with marginal effects included.

Table 4: The estimated model with marginal effects

Independent variables	B	S.E	p.	MEMs	*S.E.*	*p*	*AMEs*	*S.E.*	*p*
Digital transformation	0.593	0.185	0.001	0.228	0.069	0.001	0.207	0.065	0.001
Personal innovativeness	0.442	0.188	0.019	0.172	0.073	0.022	0.153	0.067	0.022
Personality Traits									
Openness	0.078	0.177	0.660	0.030	0.069	0.660	0.026	0.058	0.660
Conscientiousness	0.393	0.231	0.089	0.155	0.091	0.088	0.134	0.079	0.092
Extraversion	-0.046	0.210	0.826	-0.018	0.081	0.825	-0.015	0.069	0.825
Agreeableness	0.103	0.183	0.573	0.040	0.071	0.573	0.339	0.059	0.571
Neuroticism	-0.072	0.186	0.700	-0.028	0.072	0.700	-0.024	0.062	0.701
Age									
21+	0.571	0.214	0.008	0.214	0.076	0.005	0.193	0.071	0.006
Gender									
Female	-0.003	0.200	0.990	-0.001	0.078	0.990	-0.001	0.066	0.990
Study cycle									
The second cycle	0.214	0.211	0.310	0.084	0.083	0.312	0.073	0.073	0.321
_cons	-1.242	0.311	0.000	-	-	-	-	-	-

Note: MEMs – Marginal effect at the mean; AMEs – Average marginal effects

Source: Authors' work

As it can be seen from the previous table, the following variables prove to be statistically significant: digital transformation (p < 0.01), personal innovativeness (p < 0.05), and age (p < 0.01).

Out of these three statistically significant factors, attitude towards digital transformation is the strongest predictor of the *propensity toward emergency remote learning*. Speaking of it, the predicted likelihood of a propensity toward emergency remote learning is 22.80% greater for those respondents who have an above-average positive attitude towards digital transformation compared to those who do not. The expected change is statistically significant (p < 0.05).

338

Amila Pilav-Velić et al. • Emergency remote learning acceptance among higher...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 325-347

When it comes to personal innovativeness, the predicted likelihood of propensity toward emergency remote learning is 22.80% greater for those respondents whose personal innovativeness score is above average. The expected change is statistically significant ($p < 0.05$). Finally, when it comes to age, the predicted likelihood of propensity toward emergency remote learning is 21.40% greater for respondents who are over 21 years old comparing to younger ones. The expected change is statistically significant ($p < 0.05$).

5. Results and discussion

This research study reveals that the attitude towards digital transformation is the strongest predictor of the propensity toward emergency remote learning. These findings are following the findings of Lai et al. (2012) who have shown that the attitude to technology usage has a significant effect on university students' learning with technology. This trait is considered to be an important factor in researching the adoption of technology in mobile, online and e-learning processes (Celik and Yesilyurt, 2013; Lai et al., 2012). Dabbagh and Kitsantas (2012) agree that a positive attitude towards technology is needed for successful participation in the learning process. He and Zu (2017) found that attitude mediates the impact of personal innovativeness and digital competencies (or digital literacy) on students' behaviour in digital informal learning. None of the tested personality traits is statistically significant in the propensity toward remote learning model. Previous studies in this area are also inconsistent as discussed in the literature review.

Personal innovativeness may be considered as an antecedent of the propensity towards emergency remote learning according to the results of this research study. These findings are following the findings of He and Zu (2017) who identified students' personal innovativeness and digital competences as important factors and found their direct effects on digital informal learning among Chinese university students. Personal innovativeness was also measured by using Liu et al. (2010) three-item scale with adjustments to fit the local context. In line with this, Cheng (2014), Liu et al. (2010), while analysing digital informal learning, found a significant effect of personal innovativeness on this form of learning. In this area of research, many studies have analysed the attitude towards technology and found a significant effect on the university level students learning with technology (Lai et al., 2012).

Previous studies also analysed students' personal traits and found influence of personal innovativeness on mobile media for informal learning in higher education specifically (Cheng, 2014; Liu et al., 2010), while Joo et al. (2014) found a significant influence on user satisfaction and future intentions to continue mobile learning. Furthermore, Raaij and Schepers (2008) found that personal innovativeness reduces anxiety that surrounds computer usage and includes an open

attitude to change and thus resulting in a higher tendency for technology usage in a virtual environment. Meyers et al. (2013) and Ungerer (2016), when analysing the same effect, came to the conclusion that digital competence and personal innovativeness may directly influence digital informal learning and also indirectly impact students' informal digital learning through attitude.

This study shows that there is no statistically significant difference between men and women in their propensity towards emergency remote learning. Two possible explanations for this could be that (a) students have been "forced" to emergency remote learning due to the COVID-19 pandemic and (b) the digital gap between male and female university students is narrowing. Our findings in this aspect are consistent with previous studies by Gabriel et al. (2012) and He and Zhu (2017) that found no differences between male and female university students regarding the time they spent on daily computer use and digital informal learning study. Furthermore, Markauskaite (2006) and Hatlevik and Christopherson (2013) found no differences between male and female digital competences. Finally, the Big five personality test was used for the purpose of studying personality effects on emergency remote learning. This study found no significant effects of personality traits on the propensity towards emergency remote learning. Kanuka and Nocente (2003) concluded that students' strong attraction to flexibility and convenience of online learning caused them to be satisfied regardless of their specific personality traits. Similarly, in line with the convenience of online learning environment, Downing and Chim (2004) highlight that individuals who are regarded as introverts in a class environment, become extroverts in an online setting. This could be a possible explanation for the lack of personality traits in our study in emergency remote learning setting. Consistent with these findings, university students whose personal innovativeness score is higher are more likely to accept new learning environment(s). Technology is not a supplemental teaching tool but rather an essential one when it comes to successful performance outcomes, i.e., student learning (Ertmer and Ottenbreit-Leftwich, 2010). This has never been more true than today. Thus, technology is essential in absorption of existing knowledge to create new knowledge and technologies. Digital competencies not only show students' ability to use technology in accessing and consuming information but they also show how students use technology to process, acquire and evaluate gathered information (Hatlevik and Christophersen, 2013).

6. Conclusions

The present study analysed the effect of digital transformation, personal innovativeness and personal traits on emergency remote learning. It can be concluded that digital transformation, personal innovativeness and the age of university-level students are significant factors when analysing *propensity towards emergency remote learning. This implies that students with positive attitudes towards digital*

transformation, and highly innovative students have a higher propensity towards emergency remote learning at the university level. Our study provides a significant contribution in analysing the effect of personal on emergency remote learning acceptance at the university level. This fills the existing gap in the literature investigating the effect of factors such as attitude towards digital transformation, personal traits and personal innovativeness on the acceptance of emergency remote learning caused by the COVID-19 pandemic at high education level.

This study also has limitations. Firstly, the study is limited by its sample since it focuses only on university level students in the emergency remote learning environment. A possible limitation of this study is the sample type, i.e., convenience sample that limits the generalization of the findings since the research focuses on university students in BiH. Also, the study is based on the self-reporting questionnaire. Thus, one should be cautious about generalization of findings in this study. The COVID-19 pandemic has changed learning methods at all education levels (primary and secondary),. Therefore,future studies need to address these levels as well. Future research on the digital transformation of education due to the COVID-19 pandemic should also include other aspects of social and academic life. Possible differences of prior levels of digitalization among the surveyed higher education institutions should be taken into account via qualitative analysis through semi-structured interviews.. Future studies should focus on specific student categories such as students with disabilities and investigate their acceptance of emergency remote learning for this group and other vulnerable or potentially excluded groups. This would provide a valuable insight for a better design of specific studies and/or courses. Investigation of students' academic performance and career prospects prior to and after the pandemic is of a significant interest for researchers and educators today. Finally, considering the concept of emergency remote learning, future research should focus more on the teachers' side of emergency remote learning and the factors that have affected their adoption of new and existing learning tools to fit the state of education emergency and "pass" the stress test.

The findings in this study importantly call for change in the attitude towards digital transformation and continuous work on improving students' personal innovativeness for increasing emergency remote learning acceptance. Promoting a positive attitude towards new technologies by focusing on their benefits, satisfaction and making them user-friendly will increase the acceptance of remote learning. Universities should continuously assess the satisfaction and usage of technology in remote learning to get the necessary and invaluable feedback for future evidence: grounded decision-making by all stakeholders involved in the education system and would also provide them with the tools for future stress tests that might occur. Increasing the usage of remote learning services and maximization of their benefits are imperatives since these are providing students with knowledge and skills for the new labour market.

References

Adedoyin, B.O., Soykan, E. (2020) "Covid-19 pandemic and online learning: the challenges and opportunities", *Interactive Learning Environments*, https://doi.org/10.1080/10494820.2020.1813180.

Agarwal, R., Karahanna, E. (2000) "Time Flies When You're Having Fun: Cognitive Absorption and Beliefs About Information Technology Usage", *MIS Quarterly,* Vol. 24, No. 4, pp. 665–694, https://doi.org/10.2307/3250951.

Agarwal, R., Prasad, J. (1998) "A conceptual and operational definition of personal innovativeness in the domain of information technology", *Information systems research*, Vol. 9, No. 2, pp. 204–215, https://doi.org/10.1287/isre.9.2.204.

Ajzen, I. (1991) "The Theory of Planned Behavior", *Organizational Behavior and Human Decision Processes,* Vol. 50, No. 2, pp. 179–211, https://doi.org/10.1016/0749-5978(91)90020-T.

Borg, M. O., and Shapiro, S. L. (1996) "Personality type and student performance in principles of economics", *Journal of Economic Education*, Vol. 27, No. 1, pp. 3–25, https://doi.org/10.1080/00220485.1996.10844890.

Bouee, C. E. (2015) "Digital Transformation Doesn't Have to Leave Employees Behind", *Harvard Business Review*, Available at: https://hbr.org/2015/09/digital-transformation-doesnt-have-to-leave-employees-behind [Accessed September 28, 2021].

Bruner I.I., G. C., Kumar, A. (2005) "Explaining consumer acceptance of handheld Internet devices", *Journal of business research*, Vol. 58, No. 5, pp. 553–558, https://doi.org/10.1016/j.jbusres.2003.08.002.

Butler, T.J., Pinto-Zipp, G. (2005) "Students' learning styles and their preferences for online instructional methods", *Journal of Educational Technology Systems*, Vol. 34, No. 2, pp.199–221, https://doi.org/10.2190/8UD2-BHFU-4PXV-7ALW.

Celik, V., Yesilyurt, E. (2013) "Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer supported education", *Computers & Education,* Vol. 60, No. 1, pp. 148–158, https://doi.org/10.1016/j.compedu.2012.06.008.

Chakravorti, B., Chaturvedi, R.S., Troein, C. (2017) "Building Smart Societies – A Blueprint for Action. How the World's Most Digitally Advanced Governments Offer a Strategic Choice Framework on Technology for Policymakers", *The Fletcher School, Tufts University*, Available at: https://sites.tufts.edu/digitalplanet/files/2020/06/Building-Smart-Societies.pdf [Accessed September 28, 2021].

Cheng, Y.M. (2014) "Exploring the intention to use mobile learning: the moderating role of personal innovativeness", *Journal of Systems and Information Technology,* Vol. 16, No. 1, pp. 40–61, https://doi.org/10.1108/jsit-05-2013-0012.

342

Amila Pilav-Velić et al. • Emergency remote learning acceptance among higher...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 325-347

Chowdhury, M. S., Amin, M. N. (2006) "Personality and students' academic achievement: interactive effects of conscientiousness and agreeableness on students' performance in principles of economics", *Social Behaviour and Personality*, Vol. 34, No. 4, pp. 381–388, https://doi.org/10.2224/sbp.2006.34.4.381.

Chuttur M.Y. (2009) "Overview of the Technology Acceptance Model: Origins, Developments and Future Directions", *Indiana University, USA . Sprouts: Working Papers on Information Systems*, SSN 1535-6078, Vol. 9, No. 37, Available at: https://expertiseweek3.files.wordpress.com/2014/04/chuttur-2009-tamreview3.pdf [Accessed September 28, 2021].

Dabbagh, N., Kitsantas, A. (2012) "Personal learning environments, social media, and self-regulated learning: a natural formula for connecting formal and informal learning", *The Internet and Higher Education,* Vol. 15, No. 1, pp. 3–8, https://doi.org/10.1016/j.iheduc.2011.06.002.

Davis, F. D. (1989) "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS quarterly,* Vol. 13, No 3, pp. 319–340, https://doi.org/10.2307/249008.

Downing, K., Chim, T.M. (2004) "Reflectors as online extraverts?", *Educational Studies*, Vol. 30, No. 3, pp. 265–276. https://doi.org/10.1080/0305569042000224215.

England, I., Stewart, D. (2007) "Executive Management and IT Innovation in Health: Identifying the barriers to adoption", *Health Informatics Journal,* Vol. 13, No. 2, pp. 75–87, https://doi.org/10.1177/1460458207076462.

Ertmer, A.P., Ottenbreit-Leftwich, A.T. (2010) "Teacher Technology Change", *Journal of Research on Technology in Education,* Vol. 42, No. 3, pp. 255–284, https://doi.org/10.1080/15391523.2010.10782551.

Fagan, M., Kilmon, C., Pandey, V. (2012) "Exploring the adoption of a virtual reality simulation: The role of perceived ease of use, perceived usefulness and personal innovativeness", *Campus-Wide Information Systems*, Vol. 29, No. 2, pp. 117–127, https://doi.org/10.1108/10650741211212368.

Fillon, G., Dinh, Le T. (2008) "An Extended model of adoption of technology in households: A model test on people using a mobile phone", *Management Review: An International Journal,* Vol. 3, No. 1, pp. 58–91. Available at: https://higherlogicdownload.s3.amazonaws.com/INFORMS/a19154ba-c5e4-4a42-af42-0c6b23c694b8/UploadedImages/MRIJ3(1)2008(4).pdf [Accessed December 16, 2021].

Garcia-Morales, J.V., Garrido-Moreno, A., Martin-Rojas, R. (2021) "The Transformation of Higher Education After the COVID Disruption: Emerging Challenges in an Online Learning Scenario", *Frontiers in Psychology, Mini Review*, https://doi.org/10.3389/fpsyg.2021.616059.

Goldsmith, R. E., Hofacker, C. F. (1991) "Measuring consumer innovativeness", *Journal of the academy of marketing science,* Vol. 19, pp. 209–221, https://doi.org/10.1007/BF02726497.

Goldsmith, R. E. et al. (2005) "Price sensitivity and innovativeness for fashion among Korean consumers", *Journal of Social Psychology,* Vol. 145, No. 5, pp. 501–508, https://doi.org/10.3200/SOCP.145.5.501-508.

Hair, J. F. et al. (2014) *Multivariate Data Analysis*, Harlow-Essex: Pearson Education Limited.

Hale, J., Householder, B., Greene, K. (2002) "The theory of reasoned action", pp. 259–286, Available at: http://eclipse.rutgers.edu/wp-content/uploads/sites/51/2014/pdf/TRA%20bk%20ch-02.pdf [Accessed September 28, 2021].

Handel, M. et al. (2020) "Digital readiness and its effects on higher education students' socio-emotional perceptions in the context of the COVID-19 pandemic", *Journal of Research on Technology in Education*, https://doi.org/10.1080/15391523.2020.1846147.

Harvey, M., Slaughter, T. (2007) "Evaluation of an access route to higher education through a work-based assessment strategy", *Assessment and Evaluation in Higher Education,* Vol. 32, No. 1, pp. 35–43, https://doi.org/10.1080/02602930600886572.

Hatlevik, O. E., Christophersen, K.A. (2013) "Digital competence at the beginning of upper secondary school: identifying factors explaining digital inclusion", *Computers & Education,* Vol. 63, pp. 240–247, https://doi.org/10.1016/j.compedu.2012.11.015.

He, T., Zhu, C. (2017) "Digital informal learning among Chinese university students: the effects of digital competences and personal factors", *International Journal of Educational Technology in Higher Education,* Vol. 14, No. 44, https://doi.org/10.1186/s41239-017-0082-x.

Hodges, C. et al. (2020) "The difference between emergency remote teaching and online learning", *Educause Review*, March 27, 2020, Available at: https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning [Accessed December 16, 2021].

Hwang, Y. (2014) "User experience and personal innovativeness: An empirical study on the Enterprise Resource Planning systems", *Computers in Human Behavior*, Vol. 34, pp. 227–234, https://doi.org/10.1016/j.chb.2014.02.002.

Joo, Y.., Lee, H.W., Ham, Y. (2014) "Integrating user interface and personal innovativeness into the TAM for mobile learning and Cyber University", *Journal of Computing in Higher Education*, Vol.26, No. 2, pp. 143–158, https://doi.org/10.1007/s12528-014-9081-2.

Kanuka, H., Nocente, N. (2003) "Exploring the effects of personality type on perceived satisfaction with web-base learning in continuing professional development", *Distance Education*, Vol. 24, No. 2, pp. 228–245, https://doi.org/10.1080/0158791032000127491.

Kegerreis, R. J., Engel, J. F., Blackwell, R. D. (1970) "Innovativeness and diffusiveness: a marketing view of the characteristics of early adopters". In D. Kollat, R. Blackwell, & J. Engels, ed., *Research in consumer behaviour*, New York: Holt, Rinehold, and Winston.

Keller, H., Karau, J.S. (2013) "The importance of personality in students' perceptions of the online learning experience", *Computers in Human Behavior,* Vol. 29, No. 6, pp. 2494–2500, https://doi.org/10.1016/j.chb.2013.06.007.

Khan, M., Iahad, N., Miskon, S. (2011) "Exploring the Influence of Big Five Personality Traits towards Computer Based Learning (CBL) Adoption", *Journal of Information Systems Research and Innovation,* Vol. 8, pp. 1–8. Available at: https://seminar.utmspace.edu.my/jisri/download/Special%20Issue-Dec2014/Exploring%20the%20Influence.pdf [Accessed December 16, 2021].

Lai, C., Wang, Q., Lei, J. (2012) "What factors predict undergraduate students' use of technology for learning? A case from Hong Kong", *Computers & Education,* Vol. 59, No. 2, pp. 569–579, https://doi.org/10.1016/j.compedu.2012.03.006.

Leavitt, C., Walton. J. (1975) "Development of a scale for innovativeness". In Schlinger, M.J. ed., *NA-Advances in Consumer Research*, Vol. 2, pp. 545–554, Available at: http://www.acrwebsite.org/search/view-conference-proceedings.aspx?Id=5781[Accessed September 28, 2021].

Lee, J.M., Lee, Y. (2006) "Personality types and learners' interaction in web-based threaded discussion", *Quarterly Review of Distance Education*, Vol. 7, No. 1, pp. 83–94. Available at: https://eric.ed.gov/?id=EJ875026 [Accessed December 16, 2021].

Lin, H., Hwang, Y. (2014) "Do feelings matter? The effects of intrinsic benefits on individuals' commitment toward knowledge systems", *Computers in Human Behavior,* Vol. 30, No. 1, pp. 191–198, https://doi.org/10.1016/j.chb.2013.07.056.

Liu, Y., Li, H., Carlsson, C. (2010) "Factors driving the adoption of m-learning: An empirical study", *Computers & Education,* Vol. 55, No. 3, pp. 1211–1219, https://doi.org/10.1016/j.compedu.2010.05.018.

Lu, J., Yao, J. E., Yu, C. S. (2005) "Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology", *The Journal of Strategic Information Systems*, Vol. 14, No. 3, pp. 245–268, https://doi.org/10.1016/j.jsis.2005.07.003.

Markauskaite, L. (2006) "Exploring differences in trainee teachers' ICT literacy: does gender matter", *Australian Journal of Educational Technology,* Vol.22, No. 1, pp. 445–455. Available at: https://www.ascilite.org/conferences/brisbane05/blogs/proceedings/51_Markauskaite.pdf [Accessed December 16, 2021].

McCarthy, J., Wright, P. (2004) "Technology as Experience", *Interactions,* Vol. 11, No. 5, pp. 42–43, https://doi.org/10.1145/1015530.1015549.

Meyers, E. M., Erickson, I., Small, R. V. (2013) "Digital literacy and informal learning environments: an introduction. Learning", *Media and Technology,* Vol. 38, No. 4, pp. 355–367, https://doi.org/10.1080/17439884.2013.783597.

Milman, N. B. (2020) "This is emergency remote teaching, not just online teaching", *Education Week,* Available at: https://www.edweek.org/leadership/

opinion-this-is-emergency-remote-teaching-not-just-online-teaching/2020/03 [Accessed: September 28, 2021].

OECD (2020) *"Education responses to covid-19: Embracing digital learning and online collaboration"*, OECD, Available at: https://read.oecd-ilibrary.org/view/?ref=120_120544-8ksud7oaj2&title=Education_responses_to_Covid-19_Embracing_digital_learning_and_online_collaboration [Accessed September 28, 2021].

OECD (2021) "*The State of School Education. One Year into the Covid Pandemic*", OECD Publishing, Paris. Available at: https://doi.org/10.1787/201dde84-en [Accessed: September 28, 2021].

Ozbek, V. et al. (2014) ̎The Impact of Personality on Technology Acceptance: A Study on Smart Phone Users", *Procedia – Social and Behavioral Sciences,* Vol. 150, No. 15, pp. 541–551. https://doi.org/10.1016/j.sbspro.2014.09.073.

Park, S. Y. (2009) "An analysis of the technology accept ance model in understanding university students' behavioral intention to use e-learning", *Educational Technology & Society,* Vol. 12, pp. 150–162, https://doi.org/10.1111/j.1467-8535.2011.01229.x.

Park, S. Y., Nam, M.W., Cha, S.B. (2012) "University students' behavioral intention to use mobile learning: evaluating the technology acceptance model", *British Journal of Educational Technology,* Vol. 43, No.4, pp. 592–605, https://doi.org/10.1111/j.1467-8535.2011.01229.x.

Poropat, A.E. (2009) "A meta-analysis of the five-factor model of personality and academic performance", *Psychological Bulletin*, Vol. 135, No. 2, pp. 322–338, https://doi.org/10.1037/a0014996

Raaij, van, E. M., Schepers, J. J. L. (2008) "The acceptance and use of a virtual learning environment in China", *Computers and Education*, Vol. 50, No. 3, pp. 838–852, https://doi.org/10.1016/j.compedu.2006.09.001.

Rammstedt, B., John, O. P. (2007) ̎Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German", *Journal of Research in Personality,* Vol. 41, pp. 203–212, https://doi.org/10.1016/j.jrp.2006.02.001.

Rapanta, C. et al. (2020) "Online university teaching during and after the covid-19 crisis: Refocusing teacher presence and learning activity", *Postdigital Science and Education*, Vol. 2*,* pp. 1–23, https://doi.org/10.1007/s42438-020-00155-y.

Rodrıguez-Ardura, I., Meseguer-Artola, A. (2016) "What leads people to keep on e-learning? An empirical analysis of users' experiences and their effects on continuance intention", *Interactive Learning Environments,* Vol. 24, No. 6, pp. 1030–1053, https://doi.org/10.1080/10494820.2014.926275.

Rogers, E. (1962) *Diffusion of Innovations*, 1st edition. New York, NY, Free Press.

Rogers, E. (1995) *Diffusion of Innovations*, 4th edition. New York, NY, Free Press.

Rogers, E. (2003) *Diffusion of Innovations*, 5th edition. New York, NY, Free Press.

Rogers, E.M., Shoemaker, F.F. (1971a) *Communication of Innovation: A Cross-Cultural Approach*, 2nd Edition. New York, NY, Free Press.

Rogers, E.M., Shoemaker, F. (1971b) *Diffusion of innovations*. 2nd Edition. New York, NY, Free Press.

Rovai, A.P. (2003) "The relationships of communicator style, personality-based learning style, and classroom community among online graduate students", *Internet and Higher Education*, Vol. 6, No. 4, pp. 347–363, https://doi.org/10.1016/j.iheduc.2003.07.004.

Samaradiwakara, G.D.M.N., Gunawardena, C. (2014) "Comparison of existing technology acceptance theories and models to suggest a well improved theory/model", *International Technical Science Journal,* Vol. 1, pp. 21–36. Available at: http://elpjournal.eu/wp-content/uploads/2016/03/itsj-spec-1-1-3.pdf [Accessed December 16, 2021].

Schniederjns, M.J., Kim, E.B. (2005) "Relationship of student undergraduate achievement and personality characteristics in a total web-based environment: an empirical study", *Decision Sciences Journal of Innovative Education*, Vol. 3, No. 2, pp. 205–221, https://doi.org/10.1111/j.1540-4609.2005.00067.x.

Thatcher, J. B., Perrewe, P. L. (2002) "An empirical examination of individual traits as antecedents to computer anxiety and computer self-efficacy", *MIS quarterly*, Vol. 26, No. 4, pp. 381–396, https://doi.org/10.2307/4132314.

Tolba, A. H., Mourad, M. (2011) "Individual and cultural factors affecting diffusion of innovation", *Journal of International Business & Cultural Studies,* Vol. 5, No.1, pp. 1–16. Available at: http://www.aabri.com/manuscripts/11806.pdf [Accessed December 16, 2021]

Ungerer, L. M. (2016) "Digital Curation as a Core competency in current learning and literacy: a higher education perspective", *The International Review of Research in Open and Distributed Learning,* Vol. 17, No. 5, https://doi.org/10.19173/irrodl.v17i5.2566.

Vekantesh, V. (2000) "A Theoretical Extenwsion of the Technology Acceptance Model: Four Longitudinal Field Studies", *Management Science,* Vol. 46, No. 2, pp. 186–204, https://doi.org/10.1287/mnsc.46.2.186.11926.

Venkatesh, V. et al. (2003) "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27, No. 3, pp. 425–478, https://doi.org/10.2307/30036540.

Venkatesh, V., Thong, L.Y., Xu, X. (2012) "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology", *MIS Quarterly,* Vol. 36, No. 1, pp. 157–178, https://doi.org/10.2307/41410412.

Zhou, J., George, J. M. (2001) "When job dissatisfaction leads to creativity: Encouraging the expression of voice", *Academy of Management Journal, Vol. 44*, No. 4, pp. 682–696. https://doi.org/10.5465/3069410.

Hitno prihvaćanje učenja na daljinu među studentima visokog obrazovanja tijekom pandemije COVID-19

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Sažetak

Trenutna studija istražuje kako stavovi prema digitalnoj transformaciji i osobnoj inovativnosti utječu na prihvaćanje hitnog učenja na daljinu u okruženju pandemije COVID-19. Pandemija je utjecala na sve aspekte društava diljem svijeta, uključujući visoko obrazovanje, a također je bila značajan poticajni čimbenik za digitalnu transformaciju visokog obrazovanja. Stoga je glavni cilj ovog rada istražiti čimbenike koji utječu na hitno prihvaćanje učenja na daljinu među studentima visokog obrazovanja u Bosni i Hercegovini (BiH). Rezultati prikazani u ovom radu izvedeni su iz istraživanja koje je provedeno među studentima visokog obrazovanja u BiH u razdoblju od travnja do srpnja 2020. godine putem otvorene web platforme. Studija je pokazala da je stav učenika prema digitalnoj transformaciji značajan čimbenik u prihvaćanju hitnog učenja na daljinu. Također, ocjena osobne inovativnosti pokazala se značajnim čimbenikom u prihvaćanju ove nove postavke učenja, tj. inovativniji učenici imaju veće prihvaćanje učenja na daljinu u hitnim slučajevima od učenika s nižim rezultatom osobne inovativnosti. Stoga ova studija ukazuje na potrebu promjene stavova prema korištenju tehnologije u obrazovanju. Time bi se povećala upotreba usluge učenja na daljinu te studentima pružila znanja i vještine za novo tržište rada.

Ključne riječi: *osobna inovativnost, učenje na daljinu, digitalna transformacija, studenti, COVID-19*

JEL klasifikacija: *I21, I23, O33, O36*

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Efficiency of banks in Croatia[*]

Dean Učkar[1], Danijel Petrović[2]

Abstract

Croatian banking sector amounts to the majority of its financial sector. Therefore, it is necessary that Croatian banks operate efficiently. In the past two decades, the Croatian banking sector went through a consolidation process that steadily decreased the number of banks and allocated the majority of assets and market share to a few large banks. A simple definition of efficiency is cost minimization and profit maximization. Therefore, a bank is efficient when it strives to minimize its costs while maximizing its profits. This paper aims to estimate efficiency of Croatian banks using the DEA methodology within the period 2014-2019. In addition, the performance indicators (return on assets, return on equity) calculated for the same period aim at comparing performance indicators to efficiency results. The results indicate that larger banks are generally more efficient in operating on the frontier. And, in comparison to performance indicators, they achieve higher levels of returns on assets and equity. Furthermore, some small banks tend to be efficient, while the benefits of being a medium bank are inconclusive since the results reveal that some medium banks have below average efficiency. Overall, average efficiency improved in the observed period, which means that the consolidation process of financial institutions creates large and efficient banks.

Key words: *banking efficiency, Data Envelopment Analysis, financial consolidation, Croatian banking sector*

JEL classification: *G21, C61, C67*

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1. Introduction

Financial institution performance plays a crucial role in the economic growth and development of a country. Therefore, banks being the most prominent financial institutions must operate efficiently. Being efficient has several benefits for banks since it implies that they maximize profits, minimize costs, offer competitive financial products, are less prone to liquidity problems, and are less affected by economic downturns. Traditionally, the efficiency estimated by using simple ratios of accounting data (such as performance indicators: return on assets – ROA and return on equity – ROE) is available from financial statements. However, it is possible to use complex methods in efficiency estimation such as econometric models (Stochastic Frontier Approach – SFA) and non-parametric linear programming models (Data Envelopment Analysis – DEA) that evaluate if a decision-making unit (DMU) is operating on the frontier. In other words, DEA provides information on the efficiency of DMU's as well as, if a DMU is not operating on the frontier, on how inefficient it is. Both approaches have their advantages and disadvantages (see Učkar and Petrović, 2021), mainly the sample size (stochastic requirement) and the requirement for a priori assumptions on the form of the production function for the former, and the lack of addressing noise – increased sensibility to incorrect data for the latter.

In this paper, the DEA methodology implemented to estimate bank efficiency in Croatia covers the period of 2014-2019. The DEA, a non-parametric method, which through the usage of multiple-input and output variables, enables the comparison of relative efficiency among banks to assess the distance of each DMU (decision-making unit) to the frontier. This method is particularly suitable for efficiency estimation of the Croatian banking market that is a too-small sample to implement in other economic models. Namely, after a decades-long financial consolidation process, only 20 banks operate on the Croatian banking market. After gaining independence in the early 1990s, the Croatian economy, being in transition to a market-based economy started with an increase of small, privately-owned, and foreign banks, but then, for the past two decades, there has been a consistent decline in the number of banks, as well as the increase of market share of several large banks, making the market more competitive for new players. Today, Croatian banking market is predominantly foreign owned where the two largest banks operate with nearly half of total assets, and the four largest banks control more than 70% of total assets (Croatian National Bank, 2021). Therefore, it is accurate to define the Croatian banking market as highly consolidated.

The main goal of this paper is to estimate the efficiency of Croatian banks and evaluate the efficiency of the largest banks by comparing the attained efficiency results and performance indicators levels (ROA and ROE). With the main goal in mind, we propose the following research hypothesis:

H1: Large banks are more efficient than small or medium banks.

Efficiency can be defined as an optimization problem of profit maximization and/or cost minimization. In other words, efficiency can be defined in simple terms as *given a set amount of inputs, firms focus to produce the maximal amount of output/s (profit maximization); given a set amount outputs, firms focus on employing as little as possible of inputs (cost minimization).* Certainly, this is a strictly narrow definition of efficiency and it definitely neglects other important roles of banks in society. This wider view of banking efficiency through the lenses of Environmental, Social, and Governance (ESG), as well as, banks' Corporate Social Responsibility (CSR) is beyond the scope of this paper. Although, there is some empirical evidence that the relationship between banks' corporate social performance and financial performance could be positive, however more research is needed to corroborate this theory (see Soana, 2011). There are several reasons why should managers, investors, and other stakeholders be concerned with the efficiency of financial institutions, in our case banks. Firstly, the basic definition of efficiency mentioned above is in line with the theory of the firm. The theory of the firm is a microeconomic theory that postulates that firms are decision-making entities that maximize profits. Although there is valued criticism on the assumptions of this theory, see Coase (1995), Branch (1973), Machlup (1967), Cyert and Hedrick (1972), and Demsetz (1988), it is noteworthy that the given definition of efficiency is in line with the postulates of the theory of the firm (profit maximization and cost minimization). For example, Demsetz (1988: 143–144) states that, in the model of the theory of the firm, the only task management seems to focus on, is the selection of profit-maximizing quantities of inputs and outputs. The author further states that Knight's analysis of the firm "as an institution for efficient risk-sharing is based on risk aversion and costly knowledge", is an important conclusion in the case of financial institutions. Cyert and Hedrick (1972) argue that the environment determines the sole objective of the firm, that is, profit maximization because any other behavior of the firm will lead to its extinction. Jensen and Meckling (1976: 306–307) argue that the literature of economics references to "the theory of the firm" is, in reality, a theory of markets in which firms are important actors. The firm is a "black box" operated to meet the relevant marginal conditions with respect to inputs and outputs, thereby maximizing profits, or more accurately, present value. Branch (1973: 26) states that the market slowly recognizes the superior performance of firms, and it is in general difficult to, with a high degree of conviction, determine the performance of firms using the information available (accounting data, financial statements, public announcements, media coverage). However, as good results continue, the market will tend to value such firms more highly, thereby rewarding the earlier stockholders with higher stock prices generating a higher return. Furthermore, Coase (1995) states that there are several reasons that will determine the size of the firm. According to the author, the firm will grow larger as long as the costs of the organization are decreasing with size, and as long as the costs rise slower with the increase in the number of transactions. It is necessary to take into account that technological change – inventions that tend to bring factors of production nearer

352

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

together (inputs), by lessening spatial distribution, tend to increase the size of the firm.

For the stakeholders and the bank management, achieving the highest profits possible certainly is one of their priorities. The majority of their compensation is tied to the bonuses awarded after certain performance objectives are achieved. On the other hand, there are benefits in focusing on cost efficiency since a decrease in cost (inputs) will directly translate to an increase in profits, while the rise in income will first be affected by the cost increases of increased production and taxes before translating to the increase in profits. The compensation structure is put in place by investors – shareholders whose main goal is attaining ever so increasing returns from the investment in the firm (through dividends and capital gains) to motivate the management to maximize profits and minimize costs. Therefore, a bank that efficiently employs given inputs in the provision of financial services to its clients creates more value for its management and shareholders. Furthermore, there is empirical evidence that more efficient banks are less prone to problems in times of crisis. Efficient banks are better at allocating their resources and are less prone to failures. Greater stability of a bank means that the jobs of its employees will be less impaired during market turmoil and the longevity of the firm will not be questioned. Furthermore, since there is evidence that efficient banks are less prone to problems during turmoil, government regulatory and supervisory institutions may allow an efficient bank with better management, more room for leverage (Altunbas et al., 2007). Because of financial consolidation, the majority of assets and deposits are concentrated into a few large financial institutions (often called "*too big to fail*" (TBTF) because their peril would greatly increase systemic risk, endanger the stability of the financial system, and greatly affect the real economy). As shown during the last financial crisis of 2007, these institutions have been closely interconnected. Therefore, regulatory and supervisory institutions focus on the performance of TBTF institutions to ensure the overall stability of the financial system and the economy. However, increased efficiency can also benefit physical (private) and business (public) clients since more efficient banks will on one hand, as discussed before, be more stable and less prone to liquidity problems. On the other hand, efficient banks will be more competitive, have a higher market share, and offer more affordable financial services and new products using innovative technologies. Consequently, more affordable financial products and services will stimulate new investments and consumption, therefore, in the end, stimulating the economy as a whole.

This paper is structured in sections as follows: Section 2 focuses on a literature review on efficiency estimation of financial institutions based on empirical research. Efficiency analysis of financial institutions belongs to a vast field of empirical research, but there have been just a few studies that focus on the efficiency of Croatian financial institutions (see Jermić and Vujčić (2002), Jurčević and Žaja (2013) and Peša et al. (2021)). Section 3 presents the DEA methodology and

models used in this paper. In this paper, two input-oriented models using different approaches (intermediation and operating approach) are implemented by using CCR and BCC models. Section 4 presents empirical data and describes the banking sector in Croatia and the effects of bank consolidation. Furthermore, this section provides profitability indicators (ROA and ROE) and efficiency results for the observed period. Section 5 discusses the attained efficiency results and compares them with similar studies. Section 6 concludes and addresses topics for future research.

2. Literature review

Efficiency estimation in banking is an important field of study. Numerous empirical studies examine bank efficiency. Berger and Humphrey (1997) conducted surveys of over 100 studies on financial institution efficiency. These surveys have been common in the past twenty years and helped consolidate the vast number of studies and empirical knowledge obtained through them. More recently, Kaffash and Marra (2017) used a citation network for the analysis and qualitative investigation of 620 most relevant papers from 1985 to 2016 that provide an overview of the most recent applications and methodological advancements of the DEA methodology in financial services. The results for the three observed areas (banking, insurance industry, and money market funds) suggest that no obvious methodological preferences exist.

Stability and efficiency of financial institutions, predominantly banks, have become increasingly important since the financial and economic crisis of 2007. According to Berger and Bouwman (2013), not only is the bank's survival a central item to strategic decisions made by bank managers (and other stakeholders, investors), but also to decisions made by regulators who are concerned about the stability of the banking system. Furthermore, they investigate how capital affects bank performance during financial crises. Their findings corroborate the theory that capital helps to enhance the survival probability to small banks at all times, to medium and large banks preliminary during banking crises. Radić et al. (2012) study the role of liquidity risk and capital risk exposure in investment banking efficiency estimation. The results highlight that investment banks with higher liquidity risk are penalized in the case of cost efficiency but have an advantage in generating profits, while higher capital levels appear to increase cost efficiency and reduce profit efficiency (Radić et al. 2012: 83).

Acharya et al. (2011) examine four primary failures that contributed to the financial crisis of 2007 (excessive risk-taking, the regulatory focus on individual risk, financial derivatives externalities – individual firm failures, and runs on unregulated banking sector). Authors propose reforms to address these failures, such as proper

354

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

pricing of government guarantees regarding risk, proper pricing of systemic risk (internalization of costs of negative externalities imposed by individual firm's actions), greater transparency of over-the-counter (OTC) market for derivatives, and the implementations of liquidity requirements for financial institutions. Given the current state of financial regulation, it is possible to say that these proposed reforms have been to a degree addressed and implemented.

Assaf et al. (2019) examine how bank efficiency during ordinary times affects survival, risk, and profitability during subsequent financial crises. The findings provide insight into cost-efficiency. During normal times, cost-efficiency seems to reduce bank failure probabilities and during a financial crisis, it decreases risk and enhances profitability. On the other hand, the authors state that profit efficiency has limited benefits. Furthermore, results propose that cost efficiency is the most adequate for measuring management quality, while there is a possibility that enhanced profit efficiency is a consequence of temporary high returns from risky investments. Assaf et al. (2019) argue that these findings may steer policyholders, regulators, supervisors, and managers to concentrate on cost efficiency during normal times to assure better financial crisis performance in the future.

Jurčević and Žaja (2013) investigate the efficiency of banks and insurance companies in the period of the financial crisis in Croatia. The results suggest that competition during normal periods, or periods of expansion (economic boom), may positively affect the efficiency of financial institutions. Efficiency decreases at the beginning of the crisis, but by implementing saving activities and expense cuts as early as possible to prevent further losses during the crisis, efficiency remarkably recovers in the next period. Benazić and Radin (2015) study the quantitative impact of main Croatian macroeconomic variables on non-performing placements and off-sheet liabilities of Croatian banks. The econometric analysis suggests that the real GDP is the main driver of the non-performing placements and off-balance sheet liabilities in Croatia in the observed period (March 1997 – September 2013), while an increase in prices, unemployment, interest rate, and the depreciation of national currency increase non-performing placements and off-balance sheet liabilities in Croatia. Therefore, the authors conclude that key macroeconomic variables examined in their study are a major factor in banking and financial crises. Authors stress that effective bank management, increased financial regulation, and prudence from regulatory and supervisory institutions needs to recognize and quantify these effects to effectively mitigate future crises.

This discussion highlights the evidence of the well-researched topic of the efficiency of banks. Papers that focus on M&A activities of financial institutions generally corroborate the hypothesis that these activities can positively affect efficiency and the notion that larger institutions tend to be more efficient. DeYoung et al. (2009) provide a review of over 150 studies on financial institutions' mergers and acquisitions. The results of this review prove that, in general, North American

and European bank mergers result in efficiency improvements. González-Torres et al. (2020) systemically review the research on sustainability in mergers and acquisitions. Liargovas and Repousis (2011) study the effects of M&A on the performance of the Greek banking sector. Unlike other studies, the results imply that Greek M&A activities did not create wealth for the shareholders of the combined entity. Finally, Huizinga et al. (2001) studied the efficiency effects of bank mergers in Europe over the period 1994-1998. Their findings were in line with previously mentioned studies in the sense of scale and cost efficiency gains from banks M&A activities.

The versatility of the DEA methodology is visible in its implementation in other sectors such as in medicine where is used to measure hospital efficiency and in public finance where is used in measuring the efficiency of local and regional self-government units. For example, Rabar and Grbin (2019) study the regional efficiency in Croatia using fiscal indicators. Their results show that the number of employees is the main source of inefficiency for local and regional self-government units. Furthermore, there are numerous empirical studies on the effect of M&A activities on the efficiency of firms in other sectors, such as the telecommunications industry or energy providers. Salleh et al. (2013) study the efficiency of M&A in Malaysian telecommunication companies. Results suggest that larger telecommunication companies are generally more efficient than smaller ones. Chin et al. (2004) research the impact of mergers and acquisitions on IT governance structures. It is concluded that multinational corporations with decentralized organizational structures might adopt a centralized IT structure to take the advantage of the economies of scale. On the other hand, Majumdar et al. (2007) find that mergers of telecommunications firms have a negative impact on their efficiency. Çelen (2013) analyses the effects of M&A activities on the Turkish electricity distribution market. Using the SFA method to measure the efficiency of electricity distribution organizations before and after mergers, the author concludes that the mergers between electricity distribution organizations increased the efficiency levels. The empirical evidence presented stresses the importance of financial institutions' efficiency. In the following section, we outline the methodology used in measuring the efficiency of banks in Croatia in the period from 2014 until 2019.

3. Methodology

There are several approaches to measuring the efficiency of financial institutions. Učkar and Petrović (2021) state that models in efficiency estimation is equally divided between parametric (econometric) models such as stochastic frontier approach (SFA) and non-parametric models such as data envelopment analysis (DEA). Both of these widely used methods have their advantages and disadvantages. Ferrier and Lovell (1990) measure cost efficiency in banking using an econometric stochastic frontier

356

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

approach and a non-parametric linear programming approach on the same sample to examine the similarities and differences of the results. It is concluded that the results from both approaches in most parts are similar in the impact of scale, and allocative efficiency. The approaches are limited in providing information on the existence of economics of diversification. The DEA methodology is used in this paper for several reasons. First, the DEA is a non-parametric linear programming model that not only can be viewed as a measure of efficiency but is as well, a balanced benchmarking method. Furthermore, there are several issues that are needed to be addressed prior to implementing this method in efficiency analysis, such as the purpose, the choice, and ratio of input-output variables, model orientation, and what data the model uses, as Cook et al. (2014) state. These problems were addressed prior to implementing the DEA methodology on Croatian banks. As stated in Cook et al. (2014) the number of input/output variables should not exceed half of the DMUs in the sample (a consensus in the empirical literature is that the number of DMU's in the sample should exceed the number of input/output variables at least three times). In this paper, input-oriented models are used, since given the size of the Croatian financial sector the output quantities are presumed fixed, and it is recognized that decision makes (banks) have more control over their inputs.

Thanassoulis (1999) states that the production and the intermediation approaches in measuring efficiency are not exclusive but complementary, as well that DEA studies in banking are predominantly based on the production approach at the branch level. Furthermore, the author states that one of the new areas where DEA can contribute to efficiency analysis is the *assessment of effectiveness in minimizing financial risk at the branch level* (Thanassoulis, 1999: 10–11). DEA methodology is applied in this paper, specifically CCR and BCC models proposed respectively by Charnes et al. (1978) and Banker et al. (1984). Defining the input and output variables greatly affects the results of efficiency estimation. This study uses two approaches similar to Jermić and Vujčić (2002) and implements the intermediation and the operating approach. The intermediation approach defines input and output variables regarding a bank's intermediary services that allocate funds from monetary sufficient to monetary deficient entities. On the other hand, the operating approach ties inputs and output variables to banks' operations. Both approaches implement four input and two output variables for each bank (DMU).

For the intermediation approach input variables are (denoted as x_{ij} for every input $i=1,…,4$ and $j=1,...,n$; $n=20$ denotes each of 20 commercial banks):

- Input 1 (x_{1j}) – fixed and intangible assets (defined as net value after amortization where intangible assets predominantly refer to banks investments in software)

- Input 2 (x_{2j}) – number of employees

- Input 3 (x_{3j}) – total deposits received

    – Input 4 (x_{4j}) – other liabilities (defined as the difference between total liabilities and deposits received)

The output variables for the intermediation approach are (denoted as y_{ij} for every input i=1,…,2 and j=1,...,n; n=20 denotes each of 20 commercial banks):

    – Output 1 (y_{1j}) – total loans (defined as the total amount of approved loans)

    – Output 2 (y_{2j}) – securities (defined as government and private securities)

For the operating approach input variables are (denoted as x_{ij} for every input i=1,…,4 and j=1,...,n; n=20 denotes each of 20 commercial banks):

    – Input 1 (x_{1j}) – interest cost

    – Input 2 (x_{2j}) – non-interest cost

    – Input 3 (x_{3j}) – labor related administrative costs (defined as gross wages and other employee costs)

    – Input 4 (x_{4j}) – other administrative costs (including amortization, advertising and representation)

The output variables for the intermediation approach are (denoted as y_{ij} for every input i=1,…,2 and j=1,...,n; n=20 denotes each of 20 commercial banks):

    – Output 1 (y_{1j}) – interest income

    – Output 2 (y_{2j}) – non-interest income (fees and commissions income)

The main advantages of the DEA methodology are its simplicity in implementation as well as that it does not require a formulation of a production function and the relationships (assumptions) between input and output variables. On the other hand, a different combination of input and output variables or applying different models will produce different efficiency results. However, the main disadvantage of the DEA method, which is a non-stochastic method, is not incorporating a random variable to address noise, and therefore, is particularly sensitive to inaccurate information. Furthermore, implementing DEA methodology to survey data can severely affect the quality of the efficiency results as the survey data tend to be, to a certain degree, inaccurate. It is necessary to address that the application of the DEA methodology is not aimed at the efficiency of one DMU (bank) but in general, the goal is to identify those DMUs that are below the "frontier", i.e., inefficient to some degree.

3.1. The CCR model

Charnes et al. (1978) proposed a model that assumes constant returns to scale (CRS) and produces results on total (global) technical efficiency. Efficiency in this model is obtained as the ratio of weighted outputs to weighted inputs for each DMU.

358

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

To estimate relative efficiency of a DMU it is necessary to solve the following fractional programming problem (for a more detailed look on DEA methodology see Cooper et al., 2007) in (1) to (4) to obtain values for the input "weights" (vi) where i = 1,…, m and the output "weights" (ur) where r = 1,…, s. The programing model takes a fractional form:

$$\max_{u,v} \theta\,(u, v) = \frac{u_1 y_{1j} + u_2 y_{2j} + \cdots + u_s y_{sj}}{v_1 x_{1j} + v_2 x_{2j} + \cdots + v_m x_{mj}} = \frac{\sum_{r=1}^{s} u_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \tag{1}$$

subject to

$$\frac{u_1 y_{1j} + \cdots + u_s y_{sj}}{v_1 x_{1j} + \cdots + v_m x_{mj}} = \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1, \text{ where } j = 1,\ldots, n \tag{2}$$

$$u_r \geq 0,\, r = 1,\ldots, s \tag{3}$$

$$v_i \geq 0,\, i = 1,\ldots, m \tag{4}$$

The fractional programming model from (1) to (4) has an infinite number of solutions. If some (u^*, v^*) is optimal, then for each positive scalar c, (cu^*, cv^*) is also optimal. Using the transformation in (5) it is possible to select a representative solution (u, v) for which we define the weighted sum of input variables equal to 1.

$$\sum_{i=1}^{m} v_i\, x_{i0} = 1 \tag{5}$$

The optimal solution from (5) simplifies the fractional programming problem from (1) to (4) into a linear programming problem for each DMU. The CCR model now can be written as:

$$\max_{u,v} z_0 = \mu_1 y_{1o} + \cdots + \mu_s y_{so} = \sum_{r=1}^{s} \mu_r y_{r0} \tag{6}$$

subject to

$$\sum_{r=1}^{s} \mu_r y_{rj} - \sum_{i=1}^{m} v_i\, x_{ij} \leq 0,\, j = 1,\ldots, n \tag{7}$$

$$\sum_{i=1}^{m} v_i \, x_{i0} = 1 \tag{8}$$

$$u_r \geq 0, \text{r} = 1,\ldots, \text{s} \tag{9}$$

$$v_i \geq 0, \text{i} = 1,\ldots, \text{m} \tag{10}$$

The dual of the linear programming problem (6) to (10) for each DMU can be written as:

$$\min_{\lambda} z_0 = \Theta_0 \tag{11}$$

subject to

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{r0}, r = 1, \ldots, s \tag{12}$$

$$\Theta_0 x_{i0} - \sum_{j=1}^{n} \lambda_j \, x_{ij} \geq 0, i = 1, \ldots, m \tag{13}$$

$$\lambda_j \geq 0, \text{j} = 1,\ldots, \text{n} \tag{14}$$

where θ_0 is a scalar and its value denotes the efficiency score for the i-th DMU, and λ_j is a Nx1vector of constants.

3.2. The BCC model

In retrospect to the CCR model which implies constant returns to scale Banker et al. (1984) develop a model that allows variable returns to scale (VRS) by adding a convexity condition for λ_j in the model (11) to (14). The convexity condition is achieved by setting the sum of components of the vector λ_j to one. This gives us the following model:

$$\min_{\lambda} z_0 = \Theta_0 \tag{15}$$

subject to

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{r0}, r = 1, \ldots, s \tag{16}$$

360

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

$$\Theta_0 x_{i0} - \sum_{j=1}^{n} \lambda_j x_{ij} \geq 0, i = 1, \dots, m \tag{17}$$

$$\sum_{j=1}^{n} \lambda_j = 1 \tag{18}$$

$$\lambda_j \geq 0, j = 1, \dots, n \tag{19}$$

The model (15) to (19) is now called the input oriented BCC model. Contrary to the CCR model, it provides information on pure technical efficiency since it allows for variable returns to scale (VRS). The following section deals with empirical data and analysis.

4. Empirical data and analysis

This section presents summary statistics of sample data and deals with the idiosyncrasies of the Croatian banking market. Furthermore, this section provides the results for the ROA and ROE financial indicators and efficiency results using the DEA methodology. Efficiency is estimated on a sample of 20 (currently operating) Croatian banks within the period 2014-2019. Therefore, this sample of 20 Croatian banks represents the whole Croatian banking market in the observed period. It provides evidence of the financial consolidation process that has taken part in Croatia for the past two decades. All the data in the observed period were acquired from the end-of-year financial statements of Croatian commercial banks, used for calculating the financial indicators and the input and output variables. More specifically, for the intermediation approach, we use banks' balance sheets information, and for the operating approach, we use banks' income statements information. Table 1 presents summary statistics for the input and output variables of the sample in the observed period from 2014 until 2019.

Table 1: Summary statistics of the sample variables (2014-2019)

	Min	Max	Average	Standard deviation	Coefficient of variation
Intermediation approach					
Fixed and intangible assets	13,503,708	1,438,271,497	261,048,719	360,074,867	1.3793
Number of employees	50	4,233	904	1,177	1.3026
Total deposits	391,017,661	96,913,294,854	15,004,595,704	22,893,227,308	1.5257
Liabilities	3,135,406	13,560,150,682	1,259,441,687	2,332,643,518	1.8521
Total loans	156,017,539	77,680,302,162	12,267,088,580	19,652,532,687	1.6021
Securities	398,500	11,931,344,900	2,514,186,470	3,186,046,368	1.2672
Operating approach					
Interest expenses	1,877,652	3,217,174,982	222,330,511	488,410,751	2.1968
Non-interest expenses	831,562	454,614,232	66,702,151	104,978,349	1.5738
Labor related administrative costs	6,570,045	886,786,766	173,597,830	243,269,583	1.4013
Other administrative costs	4,193,225	779,996,463	166,026,053	218,744,382	1.3175
Interest income	10,909,662	5,776,662,123	714,594,059	1,160,310,633	1.6237
Non-interest income	4,082,342	1,304,807,762	222,939,430	336,558,002	1.5096

Source: Author's calculations, using financial statements data, all values in HKR except "Number of employees"

4.1. Idiosyncrasies of the banking sector in Croatia

Banks have a prominent role in the Croatian financial system. Ever since gaining its independence in 1990, by adapting its planned economy to a market-based economy, a great number of commercial banks got established. However, in the past 30 years, the consolidation process of the banking sector has taken place, arguably since the early 1990s, as stated by Jermić and Vujčić (2002). In the period from 2011, the number of banks continuously decreased from 32 commercial banks, from which 17 were foreign, 13 were domestic and 2 were state-owned, to 20 banks in 2020, which 11 are foreign, 7 are domestic and 2 are state-owned (Croatian National Bank, 2021). Total assets of the Croatian banking system, in the period from 2011 until the third quarter of 2020 show incremental growth, totaling HRK 445,7 billion. As stated before, the Croatian banking system is predominantly foreign-owned, with more than 90% of total assets attributed to foreign-owned banks (Croatian National Bank, 2021). The current state of the banking market is a consequence of several acquisitions and mergers, as well as several bankruptcy proceedings in this short period. Banks that operate in the Croatian banking market

362

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

can be classified into large (total assets above HRK 40 billion), medium (total assets between HRK 40 and HRK 10 billion), and small (total assets below HRK 10 billion). Taking into account this classification, on the market operate 4 large, 4 medium-sized, and 12 small banks. Therefore, the consolidation process produces a high concentration of total assets in a few banks, which dominate the banking market, making it extremely competitive for new banks entering the market.

In Croatia, nearly half (48.1 % in Q3 2020) of all assets in the banking sector is attributed to the two largest banks (Zagrebačka Banka, Privredna Banka Zagreb), while more than 70% of total assets can be attributed to the four largest banks (Zagrebačka Banka, Privredna Banka Zagreb, Erste&Steiermärkische Banka, and OTP Banka) in Croatia (Croatian National Bank, 2021). Furthermore, in the period from 2009 until 2018 interest spread has remained somewhat stable, averaging around 2.5 percentage points (Figure 1), showing a substantial decline in 2018 (of 0.4 percentage points) after a period of marginal growth from 2013.

Figure 1: Interest spread in the period from 2009 until 2018
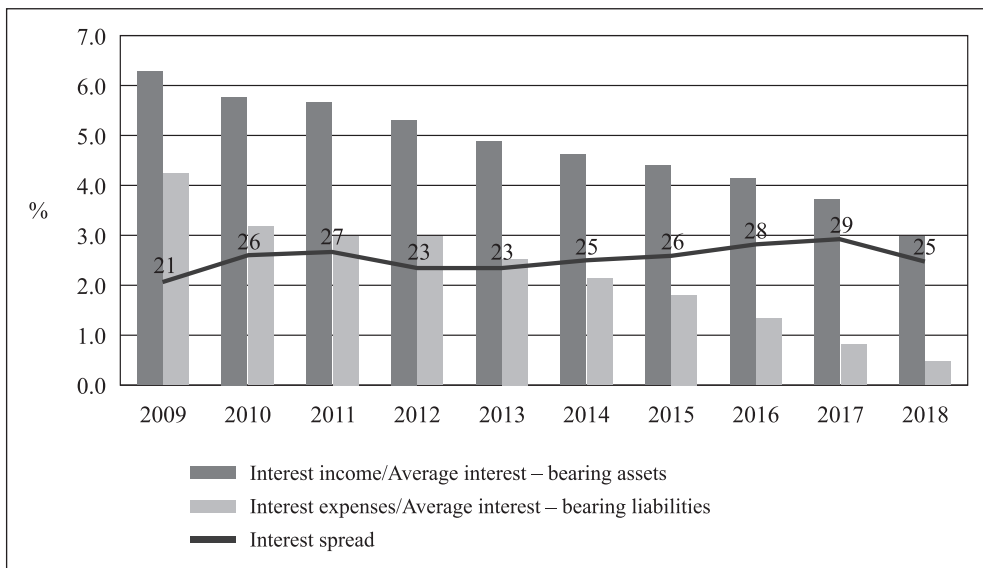
Source: Author's work using CNB data (2019) https://www.hnb.hr/en/analyses-and-publications/regular-publications/banks-bulletin (29.3.2021)

Even if interest spread is relatively stable, it is obvious that both ratios of interest income and interest expenses have steadily declined in the observed period, which follows from a steady decline of interest rates on the Croatian market. It is unclear if the consolidation process will continue in the future, but the question arises, are larger banks more or less efficient than medium and small banks. Findings from

Jermić and Vujčić (2002) show that the most efficient banks are either the smallest or the largest banks, while their results are unclear for medium banks. Financial indicators are often used in simple performance-efficiency estimation, notably performance indicators such as return on assets (ROA) and return on equity (ROE) are often considered as a measure of profitability for the banking system. Average performance indicators in the period from 2009 until 2018 are shown in Figure 2.

Figure 2: Bank return on average assets (ROAA) and return on average equity (ROAE) from 2009 until 2018

On average, ROAA is around 0.8%, while ROAE is around 4.3%. Both indicators are lower than it is theoretically required for banks to be considered efficient (see Jurčević and Žaja, 2013: 207), but in the last observed year, the indicators grew 2.6 percentage points and 0.4 percentage points respectively.

Return on assets and return on equity are presented in more detail in the following tables (Table 2 and Table 3) in the observed period from 2014 until 2019. Return on assets is calculated as a ratio of profit before taxes and average assets. The required data can be easily acquired from financial statements. Traditionally, ROA values of at least 1% percent or above are considered efficient, but investors would appreciate even higher levels of ROA, which would mean that bank management creates more profits from fewer assets implying higher profit efficiency (Jurčević and Žaja, 2013: 207). On the other hand, higher ROA values could mean that banks enter into

364

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

riskier investments that offer higher returns. From Table 2 it is visible that the four biggest banks by total assets (denoted by * in the table) in general provide higher ROA values, especially the two biggest banks Zagrebačka Banka and Privredna Banka Zagreb on average attain ROA values higher than 1% implying that bigger banks are more efficient.

Table 2: Return on assets (ROA) of Croatian banks from 2014 until 2019

Bank	2014	2015	2016	2017	2018	2019	Average	S.D.
Addiko bank	-0.45%	-9.13%	0.34%	0.72%	0.95%	0.88%	-1.11%	3.61%
Agram banka	-0.89%	0.22%	0.39%	0.60%	0.78%	1.05%	0.35%	0.62%
Banka Kovanica	-1.17%	0.92%	0.04%	0.45%	0.97%	1.22%	0.40%	0.80%
Croatia banka	0.17%	0.07%	0.09%	-1.11%	-0.92%	-1.17%	-0.48%	0.59%
Erste& Steiermarkische Bank*	0.44%	-2.08%	1.44%	1.43%	1.73%	1.47%	0.74%	1.33%
Hrvatska poštanska banka	-3.67%	0.72%	0.83%	0.06%	0.90%	0.42%	-0.12%	1.61%
Imex Banka	0.87%	-2.12%	-0.27%	-0.76%	-0.81%	0.20%	-0.48%	0.93%
Istarska kreditna banka Umag	0.50%	0.52%	0.84%	0.97%	0.84%	1.02%	0.78%	0.20%
J&T banka	-0.88%	-3.36%	-5.42%	-2.16%	0.07%	0.19%	-1.93%	1.99%
Karlovačka banka	0.32%	-0.78%	-0.29%	0.27%	0.73%	1.19%	0.24%	0.64%
KentBank	-0.93%	0.31%	0.47%	0.25%	0.33%	0.81%	0.21%	0.54%
OTP banka*	1.04%	-0.94%	0.96%	0.37%	0.69%	1.66%	0.63%	0.80%
Partner banka	0.11%	0.12%	0.74%	0.49%	0.77%	2.30%	0.76%	0.74%
Podravska banka	-0.57%	0.12%	1.11%	0.52%	0.43%	0.77%	0.39%	0.53%
Privredna banka Zagreb*	1.20%	0.30%	2.80%	2.27%	1.86%	2.52%	1.82%	0.85%
Raiffeisenbank Austria	1.16%	-0.99%	1.87%	1.51%	0.75%	1.31%	0.93%	0.93%
Samoborska banka	-0.16%	-1.62%	-1.97%	-1.49%	0.22%	0.72%	-0.72%	1.02%
Sberbank	0.40%	-2.46%	0.73%	-1.74%	0.90%	1.05%	-0.19%	1.38%
Slatinska banka	0.07%	-0.71%	-0.08%	0.08%	0.41%	0.26%	0.00%	0.36%
Zagrebačka banka*	1.44%	-0.64%	2.01%	0.97%	1.96%	1.58%	1.22%	0.90%

Source: Author's calculations using financial statements data; * denotes 4 largest banks by total assets

Similarly, return on equity is calculated as a profit ratio before taxes and average total bank equity. For a bank to be deemed efficient, it is necessary that its ROE values exceed at least 10%, while ROE levels above 15% demonstrate exceptional efficiency,

meaning that banks management produces higher profits while employing less total equity (Jurčević and Žaja, 2013: 207). From Table 3 it is obvious that the two largest banks on average achieve the highest ROE values, while this is not true for the third and fourth-largest banks. Higher returns on equity also have medium (Raiffeisenbank Austria) and small banks (Istarska kreditna banka Umag). It is necessary to note that ROE indicators in the observed period show higher volatility (standard deviation) than ROA indicators.

Table 3: Return on equity (ROE) of Croatian banks from 2014 until 2019

Bank	2014	2015	2016	2017	2018	2019	Average	S.D.
Addiko bank	-2.68%	-66.86%	3.08%	5.62%	6.54%	5.40%	-8.15%	26.43%
Agram banka	-14.25%	3.05%	4.61%	6.45%	7.67%	9.83%	2.89%	7.96%
Banka Kovanica	-13.44%	10.17%	0.39%	4.65%	9.92%	12.71%	4.07%	8.82%
Croatia banka	2.57%	1.18%	1.43%	-18.30%	-15.62%	-21.06%	-8.30%	10.16%
Erste& Steiermarkische Bank*	3.70%	-18.63%	12.91%	11.70%	13.72%	11.35%	5.79%	11.40%
Hrvatska poštanska banka	-75.43%	9.65%	8.24%	0.66%	9.48%	4.35%	-7.18%	30.69%
Imex Banka	11.24%	-28.00%	-3.66%	-10.43%	-11.49%	2.79%	-6.59%	12.33%
Istarska kreditna banka Umag	5.63%	5.93%	9.80%	11.06%	9.54%	11.38%	8.89%	2.29%
J&T banka	-9.63%	-33.60%	-50.53%	-20.03%	0.62%	1.55%	-18.60%	18.72%
Karlovačka banka	4.07%	-11.61%	-4.93%	4.31%	10.85%	16.67%	3.22%	9.38%
KentBank	-6.69%	2.15%	3.95%	2.38%	3.25%	7.98%	2.17%	4.41%
OTP banka*	9.45%	-8.64%	8.71%	1.91%	3.91%	11.77%	4.52%	6.77%
Partner banka	0.98%	1.10%	6.90%	4.76%	7.60%	20.73%	7.01%	6.64%
Podravska banka	-4.55%	0.92%	8.98%	4.03%	3.25%	5.86%	3.08%	4.21%
Privredna banka Zagreb*	7.07%	1.82%	16.41%	12.63%	10.57%	14.89%	10.56%	4.93%
Raiffeisenbank Austria	7.53%	-7.01%	13.78%	10.65%	5.48%	9.78%	6.70%	6.65%
Samoborska banka	-0.94%	-9.80%	-13.34%	-11.29%	1.77%	5.83%	-4.63%	7.20%
Sberbank	2.85%	-18.56%	5.52%	-13.11%	7.37%	9.35%	-1.10%	10.72%
Slatinska banka	0.54%	-6.23%	-0.70%	0.76%	3.98%	2.38%	0.12%	3.20%
Zagrebačka banka*	9.01%	-4.25%	13.60%	6.25%	13.14%	11.11%	8.15%	6.07%

Source: author's calculations using financial statements data; * denotes 4 largest banks by total assets

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

366

Returning to the question of the effect of consolidation on efficiency, Ferguson (2002) states that, in general, high levels of mergers and acquisitions of financial firms (M&A) occurred during the 1990s. Financial consolidation contributed to the creation of a significant number of large and thus complex financial institutions. Furthermore, Ferguson (2002) states that the most important forces encouraging financial consolidation are improvements in information technology, financial deregulation, globalization of financial and nonfinancial markets, and increased shareholder pressure for financial performance. However, even if the study determined that consolidation has the potential to improve operating efficiency, it concludes that efficiency gains are low.

Similarly, Berger et al. (2001) studied efficiency barriers on the cross-border consolidation of financial institutions within Europe, such as distance, cultural and language differences, currency, and regulatory and supervisory frameworks. Generally speaking, financial consolidation is more common domestically than internationally across European nations. Authors corroborate that there is substantial potential for efficiency gains from the financial institutions' consolidation. Urio and Tanna (2012), conduct a more focused study of the effects of consolidation on the efficiency of financial institutions in Europe. The review of empirical studies on consolidation of financial markets that began in the 1980s until the early 2000s demonstrates that most studies find evidence of efficiency improvements from mergers and acquisitions in varying degrees. A similar study is provided by Amel et al. (2004), their findings are in line with studies above, in the sense, that in general, the expectations of the impact of M&A on financial institutions (consolidation of the financial market), mainly banks, will to some degree positively affect efficiency. Furthermore, it corroborates the theory that in general, larger banks are on average more efficient, and that is one of the reasons to support the continuation of the consolidation process of financial markets in the future.

4.2. Efficiency results

In the past sections, the methodology used in this paper, as well as, the idiosyncrasies of the Croatian banking sector were established. Using the DEA methodology, this study investigates the efficiency of Croatian banks in the period from 2014 until 2019. The results are presented in the following tables. Table 4 presents efficiency results for the intermediation approach (input-oriented) CCR DEA model that assumes constant returns to scale (CRS). The input-oriented model is used to express the potential decrease (savings) of inputs in achieving technical efficiency (performing on the frontier). In a competitive market, management has more influence and greater possibility to influence the use of inputs (decrease in inputs = savings = cost minimization) in the banking process than affecting the increase of output (profit maximization), therefore the input orientation is chosen. Through the observed period, on average, the efficiency of Croatian banks improved

by two percentage points. The worst year was 2015, when only eight banks were efficient, while nine banks were less efficient than average. As predicted from past studies and microeconomic theory, seven banks that are by assets the largest banks in Croatia are continuously efficient for the observed period. In 2019, thirteen banks are on the frontier, four large, three medium-sized, and five small banks.

More closely, the largest banks (denoted by * in Table 4) are efficient throughout the observed period, as stated from previous research (Jermic and Vujčić, 2002), in general, small and large banks are efficient, while the benefits of being a medium bank are not entirely clear. Observing for volatility, in general, the efficiency of banks in the observed period is above or below 16 percentage points in 2015 (most volatile year).

Table 4: Efficiency of Croatian banks from 2014 until 2019 – Intermediation approach (CCR model)

Bank	2014	2015	2016	2017	2018	2019	Average
Addiko bank	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Agram banka	100.00%	64.74%	73.06%	100.00%	100.00%	100.00%	89.63%
Banka Kovanica	100.00%	86.70%	93.30%	89.29%	100.00%	100.00%	94.88%
Croatia banka	83.89%	66.67%	78.22%	86.92%	100.00%	92.22%	84.65%
Erste&Steiermarkische Bank*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Hrvatska poštanska banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Imex Banka	74.64%	62.78%	86.59%	92.22%	56.86%	90.95%	77.34%
Istarska kreditna banka Umag	100.00%	59.64%	80.70%	100.00%	100.00%	100.00%	90.06%
J&T banka	81.60%	63.36%	76.69%	94.07%	87.71%	90.20%	82.27%
Karlovačka banka	83.58%	60.06%	94.93%	92.84%	94.77%	97.56%	87.29%
KentBank	100.00%	100.00%	100.00%	100.00%	100.00%	89.24%	98.21%
OTP banka*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Partner banka	74.75%	71.72%	82.63%	100.00%	100.00%	100.00%	88.18%
Podravska banka	98.38%	61.87%	80.10%	100.00%	100.00%	100.00%	90.06%
Privredna banka Zagreb*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Raiffeisenbank Austria	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Samoborska banka	100.00%	91.73%	100.00%	68.20%	64.54%	64.62%	81.52%
Sberbank	88.34%	82.46%	94.18%	100.00%	100.00%	100.00%	94.16%
Slatinska banka	81.45%	71.60%	79.50%	76.91%	80.68%	85.89%	79.34%
Zagrebačka banka*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Average	93.33%	82.17%	91.00%	95.02%	94.23%	95.53%	91.88%
Standard Deviation	9.33%	16.67%	9.74%	8.61%	12.26%	8.40%	7.69%

Source: author's calculations using financial statements data; *denotes 4 largest banks by total assets

368
Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

Table 5 presents efficiency results for the intermediation approach (input-oriented) BCC DEA model that assumes variable returns to scale (VRS). In general, efficiency results are higher by the nature of the model, but the main findings are in line with the results from the CCR model (Table 4).

Table 5: Efficiency of Croatian banks from 2014 until 2019 – Intermediation approach (BCC model)

Bank	2014	2015	2016	2017	2018	2019	Average
Addiko bank	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Agram banka	100.00%	100.00%	73.26%	100.00%	100.00%	100.00%	95.54%
Banka Kovanica	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Croatia banka	90.19%	90.82%	78.39%	87.44%	100.00%	99.37%	91.04%
Erste&Steiermarkische Bank*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Hrvatska poštanska banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Imex Banka	77.73%	66.06%	88.72%	94.82%	58.75%	98.09%	80.70%
Istarska kreditna banka Umag	100.00%	99.84%	81.69%	100.00%	100.00%	100.00%	96.92%
J&T banka	100.00%	65.35%	80.70%	100.00%	100.00%	100.00%	91.01%
Karlovačka banka	87.62%	64.36%	97.20%	100.00%	100.00%	100.00%	91.53%
KentBank	100.00%	100.00%	100.00%	100.00%	100.00%	89.93%	98.32%
OTP banka*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Partner banka	74.97%	72.16%	85.23%	100.00%	100.00%	100.00%	88.73%
Podravska banka	100.00%	87.82%	100.00%	100.00%	100.00%	100.00%	97.97%
Privredna banka Zagreb*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Raiffeisenbank Austria	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Samoborska banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Sberbank	90.49%	89.11%	94.89%	100.00%	100.00%	100.00%	95.75%
Slatinska banka	84.04%	81.49%	84.71%	93.23%	98.27%	98.04%	89.96%
Zagrebačka banka*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Average	95.25%	90.85%	93.24%	98.77%	97.85%	99.27%	95.87%
Standard Deviation	7.96%	13.07%	8.91%	3.17%	8.98%	2.22%	7.38%

Source: author's calculations using financial statements data; *denotes 4 largest banks by total assets

The results show that larger banks are efficient in the observed period, and their overall efficiency improved by four percentage points. In general, these findings are in line with performance indicators ROA and ROE observed earlier (Tables 2 and 3) giving evidence that larger banks, in general, provide higher returns on assets and

equity. As stated before, the BCC model allows variable returns to scale and provides information on pure technical efficiency. Similar to the CCR model, average efficiency improves through the observed period while using the BCC model (Table 5).

In 2014, fourteen banks were on the frontier, while six had below-average efficiency. On the other hand, in 2019, sixteen banks were on the frontier, and the average efficiency in the last observed year was 99.27%. The overall average efficiency of banks in the observed period amounted to 95.87%. Regarding volatility, the standard deviation was lower when compared to the results from the CCR model, meaning that more banks are closer to the average efficiency of 99.27% in 2019.

Regarding economies of scale (the decrease of average cost per unit of output with the increase in the scale, quantity, or magnitude of output being produced) Cooper et al. (2007: 152-154) state that scale efficiency can be easily obtained by observing the difference between CRS and VRS technical efficiency scores for a particular bank. The difference in efficiency scores would then indicate the scale inefficiency of a bank. Therefore, is possible to calculate scale efficiency as the ratio of CRS efficiency and VRS efficiency. Observing the efficiency results from Table 4 (CCR model – CRS) and Table 5 (BCC model – VRS) for the intermediation approach it can be concluded that all four banks classified as large by assets are scale efficient.

Furthermore, in Tables 6 and 7, the results for the CCR and BCC models using the operating approach (input-oriented) are presented. Since the operating approach incorporates different inputs and outputs, the efficiency results differ from the intermediation approach.

However, some results coincide with the two approaches that can provide interesting conclusions on the efficiency of banks. Using the operating approach on the CCR model the average efficiency decreased from 90.33% in 2014 to 89.76% in 2019, while the average efficiency for the period is 89.26%, which is lower than the efficiency for the intermediation approach (Table 4, 91.88%).

In 2014, twelve banks were efficient, with an average efficiency of 90.33%, while seven banks were below average efficient. In 2019, eleven banks were efficient, with an average efficiency of 89.76%. The main takeaway from the intermediation approach is still present, i.e., the largest banks are, in general, efficient in the observed period, except for the OTP Banka that is inefficient in 2017 (67.34%) and 2018 (65.84%). OTP Banka today is by assets the fourth largest bank in Croatia, but attained its large bank status by the acquisition of Splitska Banka by the end of 2018. Therefore, the inefficiency in 2017 and 2018 could be attributed to the acquisition process. Efficiency score recuperated in 2019 as OTP Banka is on the frontier.

370

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

Table 6: Efficiency of Croatian banks from 2014 until 2019 – Operating approach (CCR model)

Bank	2014	2015	2016	2017	2018	2019	Average
Addiko bank	100.00%	100.00%	100.00%	100.00%	100.00%	70.30%	95.05%
Agram banka	100.00%	82.02%	96.20%	100.00%	100.00%	100.00%	96.37%
Banka Kovanica	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Croatia banka	73.25%	82.16%	84.51%	71.51%	61.68%	66.73%	73.31%
Erste&Steiermarkische Bank*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Hrvatska poštanska banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Imex Banka	100.00%	100.00%	100.00%	95.18%	82.59%	73.39%	91.86%
Istarska kreditna banka Umag	98.20%	85.52%	94.95%	97.21%	100.00%	100.00%	95.98%
J&T banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Karlovačka banka	57.54%	71.23%	71.99%	84.44%	85.29%	88.02%	76.42%
KentBank	79.17%	82.17%	78.66%	80.86%	84.03%	91.62%	82.75%
OTP banka*	100.00%	100.00%	100.00%	67.34%	65.84%	100.00%	88.86%
Partner banka	82.92%	79.18%	87.13%	87.06%	100.00%	100.00%	89.38%
Podravska banka	68.89%	67.86%	74..53%	62.67%	65.43%	73.07%	68.74%
Privredna banka Zagreb*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Raiffeisenbank Austria	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Samoborska banka	70.20%	77.51%	70.79%	65.08%	68.90%	65.03%	69.59%
Sberbank	100.00%	100.00%	60.25%	72.91%	73.74%	80.33%	81.21%
Slatinska banka	76.52%	72.07%	67.59%	72.98%	77.69%	86.71%	75.59%
Zagrebačka banka*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Average	90.33%	89.99%	89.33%	87.86%	88.26%	89.76%	89.26%
Standard Deviation	13.76%	11.71%	13.31%	13.81%	14.15%	12.89%	13.27%

Source: author's calculations, using financial statements data; *denotes 4 largest banks by total assets

As some studies have discovered, the effects of M&A are not instantaneous, and it is possible that the acquisition effect on efficiency has just taken place and its full benefits will be notable in the future. Similar conclusions can be derived from Table 7 that uses the operating approach on the BCC model. The efficiency results are higher in retrospect to the CCR operating approach since BCC allows variable returns to scale. In 2014, fourteen banks were on the frontier with 94.44% average efficiency while six banks were below average efficiency. Average efficiency slightly declined in the observed period, in 2019, twelve banks were efficient, and six were below average efficient. Overall average efficiency for the observed period was 93.30%. Additionally, the key take away from the BCC model using the

operating approach is the same one from the intermediation approach. The largest banks in Croatia are in general efficient for the observed period (except in the case of OTP Banka that has identical inefficiency in 2017 and slightly higher efficiency (66.01%) in 2018 in comparison to the CCR model). Similar conclusions can be attributed to medium banks in both models; two banks (of four) are overall efficient in the observed period. Furthermore, addressing scale efficiency for the operating approach, while observing the efficiency results from Table 6 (CCR model – CRS) and Table 7 (BCC model – VRS) it can be noted that large banks are in general scale efficient, except for OTP Banka in 2018 where its scale efficiency score is 99,74% supposedly due to the before mentioned acquisition.

Table 7: Efficiency of Croatian banks from 2014 until 2019 – Operating approach (BCC model)

Bank	2014	2015	2016	2017	2018	2019	Average
Addiko bank	100.00%	100.00%	100.00%	100.00%	100.00%	71.26%	95.21%
Agram banka	100.00%	88.57%	100.00%	100.00%	100.00%	100.00%	98.10%
Banka Kovanica	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Croatia banka	77.50%	84.67%	88.92%	74.17%	64.28%	75.54%	77.51%
Erste&Steiermarkische Bank*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Hrvatska poštanska banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Imex Banka	100.00%	100.00%	100.00%	100.00%	88.43%	88.93%	96.23%
Istarska kreditna banka Umag	100.00%	99.14%	100.00%	100.00%	100.00%	100.00%	99.86%
J&T banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Karlovačka banka	65.18%	81.84%	82.94%	92.04%	91.25%	97.19%	85.07%
KentBank	93.85%	89.38%	86.37%	81.40%	84.57%	91.98%	87.93%
OTP banka*	100.00%	100.00%	100.00%	67.34%	66.01%	100.00%	88.89%
Partner banka	91.58%	86.13%	100.00%	89.55%	100.00%	100.00%	94.54%
Podravska banka	72.79%	72.13%	80.66%	66.80%	72.20%	77.00%	73.60%
Privredna banka Zagreb*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Raiffeisenbank Austria	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Samoborska banka	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Sberbank	100.00%	100.00%	61.98%	73.76%	75.33%	83.81%	82.48%
Slatinska banka	87.88%	84.64%	84.32%	82.84%	85.75%	94.56%	86.67%
Zagrebačka banka*	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Average	94.44%	94.33%	94.26%	91.40%	91.39%	94.01%	93.30%
Standard Deviation	10.24%	8.28%	10.01%	11.95%	12.21%	9.28%	10.33%

Source: author's calculations using financial statements data; *denotes 4 largest banks by total assets

372
Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

5. Results and discussion

According to the results obtained in this study, the main conclusion is that the four largest banks have been fully efficient or achieved the above-average efficiency throughout the observed period, which is in line with the main hypothesis (H1) of this study. The results for medium and small banks are mixed. Jermić and Vujčić (2002) attain similar results nearly twenty years earlier. The results corroborate the theory that the consolidation process on the Croatian banking market positively affected banks' efficiency since our results show higher average efficiency than reported from Jermić and Vujčić (2002), and Jurčević and Žaja (2013). The 20 banks that operate in the Croatian banking market are, in general,efficient or close to full efficiency.

Irrelevant to the model, average efficiency in the observed period did improve, at the end of it, is close to or above 90%. It is still unclear if the consolidation process will continue, but following the findings from previous studies and efficiency results from this study, it is possible to conclude that the consolidation process of financial markets, in this case, banks, to some degree positively affects their efficiency. Therefore, it is possible to assume that inefficient banks will either fail or partake in future M&A with a larger bank, continuing the consolidation process of the Croatian financial market.

The attained results are also in line with a more recent study by Peša et al. (2021) that uses 15 different input and output combinations in the DEA input-oriented BCC model. The authors conclude that large banks in Croatia operate efficiently. Furthermore, Rhoades (1998) summarizes nine case studies on the efficiency effects of bank mergers that conclude with mixed results. Key findings of this study show that all summarized studies discovered significant cost-cutting objectives were achieved or surpassed fairly quickly. Four mergers showed clear efficiency gains relative to peers, and seven mergers exhibited an improvement in return on assets relative to peers. These results are in line with the attained results concerning the fourth largest bank in Croatia (OTP Banka) where its efficiency decreased during the acquisition process, but the bank regained full efficiency in the following year.

Empirical results from Al-Sharkas et al. (2008) indicate that mergers (i.e. financial consolidation) have improved the cost and profit efficiency of banks. Authors further elaborate that merged banks experience greater productivity growth compared to non-merged banks, as well as that mergers allow efficient banks to gain control of weaker banks – increasing input efficiency and taking advantage of opportunities created by improved technology. Similar results are visible on the Croatian market where M&A activities took place in the past three years, when small banks, faced with extinction, merged with medium and large banks. For example, the before mentioned acquisition of Splitska Banka by OTP Banka in 2018, the merger between Veneto and Privredna Banka Zagreb in 2018, and the

merger between Jadranska Banka and Hrvatska poštanska banka in 2019 (Peša et al., 2021: 222).

Additionally, Vander Vennet (1996) examined the performance effects of acquisitions and mergers between EC credit institutions in the period 1988-1993. The findings also corroborate the notion that M&A activities positively affect banks' performance in the case of cross-border acquisitions (the findings are not entirely positive for domestic acquisitions), which are common in the European banking industry. Some evidence on findings from Vander Vennet (1996) is also present in the Croatian banking market (series of cross-border acquisitions in the early 2000s). On the other hand, Sufian and Abdul Majid (2007) study the efficiency of financial institutions in Malaysia. The results suggest that efficiency is positively associated with bank capitalization and market share. As shown in this study, on the Croatian banking market, the largest banks that have the largest capitalization and market share are in general efficient. These results corroborate Sufian and Abdul Majid's (2007) findings.

Finally, Hughes et al. (1999) examine the net economic benefits from consolidation. Their findings provide evidence that consolidation offers, among other benefits, significant gains in bank financial performance. Furthermore, their results also corroborate the notion that larger banks achieve greater safety and improved efficiency, which is in line with the findings in this study. In general, the efficiency of the Croatian banking sector improved in the observed period, while large banks operate with full efficiency. Furthermore, the consolidation process on the Croatian banking market continued, and it is justified to assume that it will continue in the future.

6. Conclusions

The focus of this paper was the efficiency estimation of banks on the Croatian market. For this purpose, DEA methodology is employed on a sample of 20 operating banks within the period 2014- 2019. The attained results using the DEA methodology that are compared with financial indicators are in line with the main hypothesis (H1) in the sense that large banks are more efficient than small or medium banks in Croatia. Efficiency estimation of financial institutions is an important field of study whose empirical evidence was greatly expanded in the past decades. The Croatian banking market was formed in the early 1990s after adopting a capitalist economy. The banking market in the past two decades has shown clear signs of consolidation. Financial consolidation is a process that through mergers and acquisitions, as well as bank failures reduces the number of relevant market participants, while at the same time consolidating the majority of assets in a small number of large financial institutions. Several studies mentioned in this paper propose and corroborate the theory that large banks are more efficient. Our findings are in line with this theory

374

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

where, in general, the four largest banks on the Croatian banking market operate with an above-average efficiency of are on the frontier (fully efficient) in the observed period. In comparison to our efficiency results, performance indicators such as return on assets (ROA) and return on equity (ROE) are calculated since they represent a traditional measure of efficiency. Performance indicators are on average higher for the four largest banks in our sample, while being less volatile. Therefore, both efficiency estimated through a non-parametric method such as DEA and traditional performance indicators demonstrates that larger banks are in general more efficient. The results show that overall efficiency improved in the observed period according to the intermediation approach, while the operating approach showed a slight decline in average efficiency. Overall, regardless of the approach and the model, more than half of the observed banks operate efficiently, while average efficiency is near or above 90% regardless of the use of constant or variable returns to scale. Although this paper sheds some light on the efficiency of banks in Croatia, several questions remain unanswered that could be topics for future studies. Will the consolidation process continue on the Croatian banking market? Furthermore, is the combination of input and output variables used in this paper adequate for efficiency estimation of banks, or is there a more comprehensive combination? Additionally, keeping in mind the size of the sample (20 operating banks – DMU's), are there other methodologies suitable in efficiency estimation that would provide better insight into the state of efficiency of Croatian banks? Future studies could tackle the question of a wider definition of efficiency, incorporating more drivers for bank efficiency than just cost minimization and profit maximization, such as banks' role in society, in other words, their corporate social responsibility. Finally, how does the efficiency of Croatian banks compare to the efficiency of banks in the European Monetary Union (EMU)?

References

Acharya, V. V. et al. (2011) "Market failures and regulatory failures: Lessons from past and present financial crises", *ADBI Working Paper*, No. 264, pp. 1–37, http://hdl.handle.net/10419/53604.

Al-Sharkas, A. A., Hassan, M. K., Lawrence, S. (2008) "The impact of mergers and acquisitions on the efficiency of the US banking industry: further evidence", *Journal of Business Finance & Accounting*, Vol. 35, No. 1-2, pp. 50–70, https://doi.org/10.1111/j.1468-5957.2007.02059.x.

Altunbas, Y. et al. (2007) "Examining the relationships between capital, risk and efficiency in European banking", *European financial management*, Vol. 13, No. 1, pp. 49–70, https://doi.org/10.1111/j.1468-036X.2006.00285.x.

Amel, D. et al. (2004) "Consolidation and efficiency in the financial sector: A review of the international evidence", *Journal of Banking & Finance*, Vol. 28, No. 10, pp. 2493–2519, https://doi.org/10.1016/j.jbankfin.2003.10.013.

Assaf, A. G. et al. (2019) "Does efficiency help banks survive and thrive during financial crises?", *Journal of Banking & Finance*, Vol. 106, pp. 445–470, https://doi.org/10.1016/j.jbankfin.2019.07.013.

Banker, R. D., Charnes, A., Cooper, W. W. (1984) "Some models for estimating technical and scale inefficiencies in data envelopment analysis", *Management science*, Vol. 30, No. 9, pp. 1078–1092, http://dx.doi.org/10.1287/mnsc.30.9.1078.

Benazić, M., Radin, D. (2015) "Macroeconomic determinants of the non-performing placements and off-balance sheet liabilities of Croatian banks", *Organizacija,* Vol. 48, No. 2, pp. 75–87, https://doi.org/10.1515/orga-2015-0009.

Berger, A. N., Bouwman, C. H. (2013) "How does capital affect bank performance during financial crises?", *Journal of financial economics*, Vol. 109, No. 1, pp. 146–176, https://doi.org/10.1016/j.jfineco.2013.02.008.

Berger, A. N., Humphrey, D. B. (1997) "Efficiency of financial institutions: International survey and directions for future research", *European journal of operational research*, Vol. 98, No. 2, pp. 175–21, https://doi.org/10.1016/S0377-2217(96)00342-6.

Berger, A. N., De Young, R., Udell, G. F. (2001) "Efficiency barriers to the consolidation of the European financial services industry", *European Financial Management*, Vol. 7, No. 1, pp. 117–130, https://doi.org/10.1111/1468-036X.00147.

Branch, B. (1973) "Corporate objectives and market performance", *Financial Management*, Vol. 2, No. 2, pp. 24–29, https://www.jstor.org/stable/3665479.

Çelen, A. (2013) "The effect of merger and consolidation activities on the efficiency of electricity distribution regions in Turkey", *Energy policy*, Vol. 59, pp. 674–682, https://doi.org/10.1016/j.enpol.2013.04.024.

Charnes, A., Cooper, W. W., Rhodes, E. (1978) "Measuring the efficiency of decision making units", *European journal of operational research*, Vol. 2, No. 6, pp. 429–444, https://doi.org/10.1016/0377-2217(78)90138-8.

Chin, P. O., Brown, G. A., Hu, Q. (2004) "The impact of mergers & acquisitions on IT governance structures: A case study", *Journal of Global Information Management (JGIM)*, Vol. 12, No. 4, pp. 50–74, https://www.researchgate.net/publication/220500397_The_Impact_of_Mergers_Acquisitions_on_IT_Governance_Structures_A_Case_Study.

Coase, R. H. (1995) "The nature of the firm", In: *Estrin S., Marin A. (eds) Essential Readings in Economics,* Palgrave, London, pp. 37–54, https://doi.org/10.1007/978-1-349-24002-9_3.

Cook, W. D., Tone, K., Zhu, J. (2014) "Data envelopment analysis: Prior to choosing a model", *Omega,* Vol. 44, pp. 1–4, https://doi.org/10.1016/j.omega.2013.09.004.

Cooper, W. W., Seiford L. M., Tome K. (2007) *Data Envelopment Analysis, A Comprehensive Text with Models, Applications, References and DEA Solver Software.* Boston: Kluwer Academic Publishers. https://link.springer.com/book/10.1007/978-0-387-45283-8.

376

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379

Croatian National Bank (2019) *Banks Bulletin No. 32 September 2019*, Zagreb: CNB, available online: https://www.hnb.hr/en/analyses-and-publications/regular-publications/banks-bulletin [accessed: 29.3.2021].

Croatian National Bank (2021) official data from *Standard Presentation Format*, Zagreb: CNB, available online: https://www.hnb.hr/en/analyses-and-publications/regular-publications/spf [accessed: 29.3.2021].

Cyert, R. M., Hedrick, C. L. (1972) "Theory of the firm: Past, present, and future; an interpretation", *Journal of Economic Literature*, Vol: 10, No. 2, pp. 398–412, https://www.jstor.org/stable/2721463.

Demsetz, H. (1988) "The theory of the firm revisited", *Journal of Law, Economics, & Organization,* Vol. 4, No. 1, pp. 141–161, https://www.jstor.org/stable/765018.

DeYoung, R., Evanoff, D. D., Molyneux, P. (2009) "Mergers and acquisitions of financial institutions: A review of the post-2000 literature", *Journal of Financial services research*, Vol. 36, No. 2-3, pp. 87–110, https://doi.org/10.1007/s10693-009-0066-7.

Ferguson, R. W. (2002) "Understanding financial consolidation", *Economic Policy Review*, Vol. 8, No. 1, pp. 209–213, http://faculty.msmc.edu/hossain/grad_bank_and_money_policy/understanding%20financial%20consolidation_ferguson.pdf.

Ferrier, G. D., Lovell, C. K. (1990) "Measuring cost efficiency in banking: Econometric and linear programming evidence" *Journal of econometrics*, Vol. 46, No. 1-2, pp. 229–245, https://doi.org/10.1016/0304-4076(90)90057-Z.

González-Torres, T., et al. (2020) "A systematic review of research on sustainability in mergers and acquisitions", *Sustainability*, Vol. 12, No. 2, pp. 513–530, https://doi.org/10.3390/su12020513.

Hughes, J. P. et al. (1999) "The dollars and sense of bank consolidation", *Journal of banking & finance*, Vol. 23, No. 2-4, pp. 291–324, https://doi.org/10.1016/S0378-4266(98)00088-0.

Huizinga, H. P., Nelissen, J., Vander Vennet, R. (2001) "Efficiency Effects of Bank Mergers and Acquisitions", *Tinbergen Institute Discussion Paper Series*, No. TI 01-088/3, pp. 1–41, https://repub.eur.nl/pub/6843.

Jemric, I., Vujcic, B. (2002) "Efficiency of banks in Croatia: A DEA approach" *Comparative Economic Studies*, Vol. 44, No. 2, pp. 169–193, https://doi.org/10.1057/ces.2002.13.

Jensen, M. C., Meckling, W. H. (1976) "Theory of the firm: Managerial behavior, agency costs and ownership structure" *Journal of financial economics*, Vol. 3, No. 4, pp. 305–360, https://doi.org/10.1016/0304-405X(76)90026-X.

Jurčević, B., Žaja, M. M. (2013) "Banks and insurance companies efficiency indicators in the period of financial crisis: The case of the Republic of Croatia" *Economic research-Ekonomska istraživanja*, Vol. 26, No. 1, pp. 203–224, https://doi.org/10.1080/1331677X.2013.11517598.

Kaffash, S., Marra, M. (2017) "Data envelopment analysis in financial services: a citations network analysis of banks, insurance companies and money market funds", *Annals of Operations Research*, Vol. 253, No. 1, pp. 307–344, https://doi.org/10.1007/s10479-016-2294-1.

Liargovas, P., Repousis, S. (2011) "The impact of mergers and acquisitions on the performance of the Greek banking sector: An event study approach", *International Journal of Economics and Finance*, Vol. 3, No. 2, pp. 89–100, https://www.ccsenet.org/journal/index.php/ijef/article/view/7096.

Machlup, F. (1967) "Theories of the firm: Marginalist, behavioral, managerial", *The American economic review*, Vol. 57, No. 1, pp. 1–33, https://www.jstor.org/stable/1815603.

Majumdar, S. K., Moussawi, R., Yaylacicegi, U. (2007) "Quest for efficiency: Assessing the impact of mergers on performance in the US telecommunications industry", Available at: SSRN 1008601, http://dx.doi.org/10.2139/ssrn.1008601.

Peša A., Maté M., Prvonožec S. (2021) "Measuring bank efficiency: Croatian banking sector research" in: *Proceedings of the 10th International Scientific Symposium Region, Entrepreneurship, and Development*, June 2021, Osijek, pp. 218–233, available at: http://www.efos.unios.hr/red/wp-content/uploads/sites/20/2021/06/RED-2021-Proceedings.pdf [accessed 28.6.2021].

Rabar, D., Grbin, A. (2019) "Analysis of the regional efficiency in Croatia using fiscal indicators – a nonparametric approach (in Croatian, original title: Analiza regionalne efikasnosti u Hrvatskoj korištenjem fiskalnih pokazatelja – neparametarski pristup)", *Ekonomski pregled*, Vol. 70, No. 4, pp. 627–649, https://doi.org/10.32910/ep.70.4.3.

Radić, N., Fiordelisi, F., Girardone, C. (2012) "Efficiency and risk-taking in pre-crisis investment banks", *Journal of Financial Services Research*, Vol. 41, No. 1-2, pp. 81–101, https://doi.org/10.1007/s10693-011-0111-1.

Rhoades, S. A. (1998) "The efficiency effects of bank mergers: An overview of case studies of nine mergers", *Journal of Banking & Finance*, Vol. 22, No. 3, pp. 273–291, https://doi.org/10.1016/S0378-4266(97)00053-8.

Salleh, W. A. et al. (2013) "The efficiency of mergers and acquisitions in Malaysia based telecommunication companies", *Asian Social Science*, Vol. 9, No. 2, pp. 12–23, https://www.ccsenet.org/journal/index.php/ass/article/view/24349.

Soana, M. G. (2011) "The relationship between corporate social performance and corporate financial performance in the banking sector", *Journal of business ethics*, Vol 104, No. 1, pp. 133–148, https://doi.org/10.1007/s10551-011-0894-x.

Sufian, F., Abdul Majid, M. Z. (2007) "Consolidation and efficiency: Evidence from non-bank financial institutions in Malaysia", *University Library of Munich, Germany*, MPRA Paper No. 12128, pp. 1–30, https://mpra.ub.uni-muenchen.de/id/eprint/12128.

Thanassoulis, E. (1999) "Data envelopment analysis and its use in banking", *Interfaces*, Vol. 29, No. 3, pp. 1–13, https://www.jstor.org/stable/25062482.

Učkar, D., Petrović, D. (2021) "Financial Institutions Efficiency: Theory, Methods And Empirical Evidence" in the *64th International Scientific Conference on Economic and Social Development Proceedings of Economic and Social Development,* 22 January 2021, Online Conference, *Varazdin Development and Entrepreneurship Agency (VADEA)*, pp. 63–77, available at: https://zbw.eu/econis-archiv/bitstream/11159/5129/1/1747805807.pdf#page=69 [accessed 28.6.2021].

Urio, H. N., Tanna, S. (2012) "Consolidation and Performance in the European Banking Industry" in Meryem Duygun Fethi and Chrysovalantis Gaganis and Fotios Pasiouras and Constantin Zopounidis (Eds). *Financial Services: Efficiency and Risk Management*, pp. 1–40.

Vander Vennet, R. (1996) "The effect of mergers and acquisitions on the efficiency and profitability of EC credit institutions", *Journal of Banking & Finance*, Vol. 20, No. 9, pp. 1531–1558, https://doi.org/10.1016/S0378-4266(96)00014-3.

Dean Učkar, Danijel Petrović • Efficiency of banks in Croatia
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 349-379
379

Efikasnost banaka u Hrvatskoj

Dean Učkar[1], Danijel Petrović[2]

Sažetak

Hrvatski bankarski sektor sačinjava većinu financijskog sektora. Stoga je neophodno da hrvatske banke posluju učinkovito. U posljednja dva desetljeća, hrvatski je bankarski sektor prošao kroz proces konsolidacije koji je postupno smanjivao broj banka, te većinu imovine i tržišnog udjela alocirao na nekoliko velikih banaka. Efikasnost se u užem smislu može definirati kao minimiziranje troškova i maksimiziranje profita. Stoga je banka učinkovita kada nastoji minimizirati svoje troškove, a istovremeno maksimizirati svoje profite. Svrha ovog rada je procijeniti efikasnost hrvatskih banaka koristeći se DEA metodologijom u razdoblju od 2014. do 2019. godine. Dodatno, u istom razdoblju izračunavaju se pokazatelji uspješnosti (profitabilnost imovine, profitabilnost kapitala) s ciljem usporedbe pokazatelja uspješnosti i rezultata efikasnosti. Rezultati ukazuju da su velike banke uglavnom efikasne (posluju na efikasnoj granici), te u usporedbi s pokazateljima uspješnosti, postižu veće razine profitabilnosti imovine i profitabilnosti kapitala. Nadalje, nekoliko malih banaka imaju tendenciju biti efikasne, dok koristi banaka srednje veličine nisu jasne s obzirom da rezultati otkrivaju kako nekoliko srednjih banaka ostvaruje ispodprosječnu efikasnost. Sveukupno gledano, u promatranom razdoblju prosječna se efikasnost povećala, što navodi da proces konsolidacije financijskih institucija stvara velike i efikasne banke.

Ključne riječi: *efikasnost banaka, analiza omeđivanja podataka, financijska konsolidacija, hrvatski bankarski sektor*

JEL klasifikacija: *G21, C61, C67*

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Empowering leadership and human resources through stimulating innovative behaviors in higher education[*]

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Abstract

In the era of the Fourth Industrial Revolution, 4IR or Industry 4.0, since highly advanced technology largely replaced human works, many production activities of both goods and services were required to be innovative. The purposes of this study were to examine the role of energizing self-efficacy as a mediator of leadership empowering and innovative behavior to analyze the mediator's role of affective commitment between the two. A survey method was used by distributing online questionnaires to 617 lecturers in Indonesia. For researching the interrelation of empowering leadership, energizing self-efficacy, affective commitment, and innovative behavior via statistical examination of their interrelationship, we applied Stata 13 software to test the hypotheses. The results pinpointed the significant impact of empowering leadership on affective commitment, energizing self-efficacy, and innovative behavior. Energizing self-efficacy significantly influenced innovative behavior, but the impact vice versa is not significant. There was an indirect effect of empowering leadership on innovative behavior through energizing self-efficacy, but the affective commitment was not a mediator between

empowering leadership and innovative behavior. These findings indicated that lecturers could stimulate their innovative behaviors by increasing their self-efficacy through empowering leadership. Our research findings highlight the importance of enhancing innovative behavior, self-efficacy, and empowering leadership.

Key words: *affective commitment, empowering leadership, energizing self-efficacy, innovative behavior*

JEL classification: *C83, D23, I23, J24, M12, M54*

1. Introduction

The crucial role for stimulating lecturers' innovative behavior in the era of the Fourth Industrial Revolution, Industry 4.0, is taken by empowering leadership, energizing self-efficacy, and affective commitment. Nevertheless, the extent to which lecturers essentially perform more innovatively in response to higher job demands we argue here to be reliant upon the role of empowering leadership, energizing self-efficacy, and affective commitment obtained at work. The industrial revolution simply means a profound and radical change in the way humans produce goods and services that will affect the economic, social, and cultural system(Schwab, 2016). Starting with the industrial revolution 1.0, indicated by the discovery of a steam engine in the 18th century, we follow the way to the era of industrial revolution 4.0, called a digital revolution (Chudy et al., 2020). Of course, this change will affect the way of life, work, and how to relate to one another throughout the world. In order to make the organization able to survive in situations of uncertain business environment, dynamic and intense competition, innovation, and innovative behaviors are essential factors (Bani-Melhem et al., 2018; Hakimian et al., 2016; Akram et al., 2017).

The innovative behavior is very human-centric (Noopur and Dhar, 2019). Therefore, it is needed stimulation to arouse it. Previous researchers have proven that leaders play a major role in stimulating innovative behavior, including transformational leadership (Amankwaa et al., 2019), transformational-transactional leadership (Contreras et al., 2017), and relational leadership (Akram et al., 2017). However, previous studies that examined the relationship of leader behavior with innovative work behavior are still inconclusive and even, in some cases, are opposite (Contreras et al., 2017). The understanding of innovative behavior itself is still operationalized in variations; it often focuses on creativity in stimulating new ideas.

Along with the rapid changes in the 4.0 revolution era, not only organizations and employees are required to change, but the style of leadership, too. One of the concepts of a new leadership style that is different from the previous concept is empowering leadership (Rao Jada et al., 2019).

Empowering leadership is a leadership activity in sharing power and autonomy in making decisions to the followers (Zhu et al., 2019). This empowerment will increase employee self-efficacy due to the leadership's trust in their competence and encourage them to participate in decision-making. Self-efficacy can encourage employees to dare to innovate. Empowering leadership will also strengthen affective commitment in the form of emotional bonds manifested by inspiring, loving, and belonging to the organization. A strong affective commitment will encourage employees to innovate because they love their work and striving to advance their instances.

Recent reviews summarized that individual and context variables interact to influence innovative behaviors in organizations (Pons et al., 2016). Unfortunately, previous studies on the antecedents of innovative behavior mostly used respondents from various technology-related manufacturing industries (Özarallı, 2016). The innovative behavior of lecturers has not been widely studied to the best of the research team's knowledge. Meanwhile, in the era of revolution 4, universities must provide IT-based education. However, internet-based information technology is only a tool that will only help lecturers. The role of lecturers themselves cannot be replaced and they are required to innovate in giving lectures both offline and online. Lecturers as service providers in the higher education sector were also demanded to be innovative in the midst of intense competition between State, Private and Foreign Universities. Therefore, this research will focus on the innovative behavior of lecturers. The purpose of this study is to examine the role of energizing self-efficacy as a mediator between empowering leadership and innovative behavior and to examine the role of affective commitment as a mediator between empowering leadership and innovative behavior. By understanding the model that can stimulate the innovative behavior of lecturers, it is hoped that it can provide input for leaders to shape innovative behavior of lecturers in carrying out the teaching and learning process, conducting research, and quality community service. The body of the manuscript first begins by describing the theoretical background and hypotheses. Next, the literature review discusses the related studies. The method section provides details about the sample, data collection, and analysis. The manuscript next presents the empirical results to conclude with a discussion, limitations, and further research. Additionally, this study tested the following hypotheses:

H1: Empowering leadership is positive significantly related to innovative behavior

H2: Empowering leadership is positive significantly related to energizing self-efficacy

H3: Empowering leadership is positive significantly related to affective commitment

384

Shofia Amin et al. • Empowering leadership and human resources through stimulating...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 381-399

H4: Affective commitment is positive significantly related to innovative behavior

H5: Affective commitment acts as a mediator in the relationship between empowering leadership and innovative behavior

H6: Energizing self-efficacy is positive significantly related to innovative behavior

H7: Energizing self-efficacy acts as a mediator in the relationship between empowering leadership towards innovative behavior.

The remainder of this paper is organized as follows: Section 2 focuses on the literature review; Section 3 deals with the research methodology; Section 4 provides the empirical data and analysis; Section 5 provides the results and discussion, and Section 6 summarizes the conclusion.

2. Literarure review

2.1. Empowering leadership and innovative behavior

The term innovation is increasingly popular in the era of Industrial Revolution 4.0 that relies heavily on digital technology (Suendarti et al., 2020). The technology and business revolution facing enterprises has changed the nature of work to be more complex and requires intellectual employees to be able to adapt quickly, be proactive, and be innovative at work (Kurt, 2019). Employee empowerment is one of the strategies to deal with the situation of the technological and business revolution through providing flexibility for employees to make decisions, have authority and authority related to their field of work (Cheong et al., 2016). One of the ways to create employee empowerment is through empowering leadership.

Empowering leadership is a process to influence subordinates by dividing rules, supporting through motivation, and supporting in development to support their own experience from self-reliance, and working self-ability toward the whole organizational strategy (Subair and Oriogu, 2016) (Cheong et al., 2016) and Zhu et al. (2019) found that once individuals are empowered to take independent action, they are more likely to demonstrate innovative behavior. Refers to self-determination theory, it is said that the work environment influences the level of basic needs by providing necessary resources and motivation. Employees are expected to fulfill their needs for autonomy, competence, and relatedness in the context of empowering leadership because its key feature is the provision of autonomy and encouragement, which, in turn, might produce motivation (Kim, 2019). When employees satisfy their basic needs, they are likely to express positive

attitudes and results because they are motivated in an autonomous context. These employees tend to invest effort in relatively challenging activities that might help to improve the work situation (Atitumpong and Badir, 2018). Thus, empowering leadership is likely to increase employee innovative behavior by fulfilling employees' basic needs.

Leaders who implement behaviors that empower their subordinates aimed to develop their leadership skills and encourage followers to do things on their initiative will tend to develop creative behavior (Lee et al., 2018). Employees who work with empowering leaders might be relatively open to trying new methods or applying new ideas. The studies of Amalia and Handoyo (2018) and Chow (2017) support that employees who are empowered and feel the leadership's support for new ideas and solutions to the problems faced will have the motivation to innovate in their work.

2.2. Empowering leadership and self efficacy

As initially at the first time by Bandura (2012), human behavior is the result of intrapersonal influences, the behavior of the individuals involved, and the strength of the environment around them. The interaction of these three variables raises self-confidence in a person of his ability to successfully perform certain behaviors in certain situations and his expectations of the results of behavior which is called self-efficacy.

Individuals who have self-efficacy will have confidence in achieving success; they will manage their efforts and survive (persistence) when facing difficulties and stressful situations in achieving their goals. Thus, self-efficacy is a motivation that energizes employees to enthusiastically achieve goals (Salanova et al., 2011). The employee will have an opportunity to maximize their working ability using the best fit working methods. They will have more self-confidence in doing a task using their own ability

The study by Kim and Beehr (2017) found that there is a positive relationship between empowering leadership and self-efficacy. Empowering leadership will have an impact on increasing employee confidence to dare to try something new in the completion of their duties because employees are given the confidence to be creative in developing their potential. Self-efficacy is one aspect of self-knowledge which is the most influential in everyday human life because self-efficacy possesses the ability to influence the individual in determining what actions to take in order to achieve the set goal, and it includes estimates of the challenges (Rafiola et al., 2020). If someone has no confidence to deal with certain tasks or activities, then he will quickly switch to other tasks or activities avoiding a bigger effort needed to complete the task or activity.

2.3. Empowering leadership and affective commitment

As one of three components of organizational commitment introduced by Meyer and Allen (1991), affective commitment is an employee's emotional attachment to, identification with, and involvement in the organization. Employees with strong affective commitment will stay in their jobs because they want to, not because they need to (Cesário and Chambel, 2017). Affective commitment will create if they are appreciated, valued, and liked by their colleagues. Empowering leadership that gives trust and appreciation to employees will lead to affective commitment. This is in line with the concept of social exchange theory that says when employees receive advantageous treatment, they feel obligated to respond in kind and remunerate the organization (Mahmoud et al., 2021).

2.4. Self efficacy and affective commitment as mediator on the relationship between empowering leadership and innovative behavior.

Innovation can be interpreted as all individual actions that are directed at the interests of the organization in which the introduction and application of new ideas are beneficial (Harel et al., 2020). Innovative work behavior appears as a form of innovation at the individual level (Echebiri, 2020). As cited by Hakimian et al. (2016) there are two types of innovative behavior, namely technical and administrative behavior. Technical innovation refers to the introduction and/ or application of new technologies, products, and services, while administrative innovations refer to the introduction and/or application of new procedures and policies. Both technical and administrative innovations are not solely influenced by internal factors. Innovative behavior at work often arises when an employee faces challenges in his work, has broad authority in carrying out his duties and responsibilities. Organizations must also be aware that a climate that supports individual activities can encourage innovation.

Although affective commitment has persistently been established to be concerned with workplace behaviors, the relationship is complicated and depends on the context and the involvement of other variables (ST-Hilaire and de la Robertie, 2018). That's why many researchers are interested to study the antecedents of affective commitment and their results show that organizational and personal characteristics are the antecedents. One of the organizational characteristics is the behaviors of the leader (Cheong et al., 2018). Through empowered leadership, it will lead to self-efficacy and affective commitment which is a stimulus for innovative behavior.
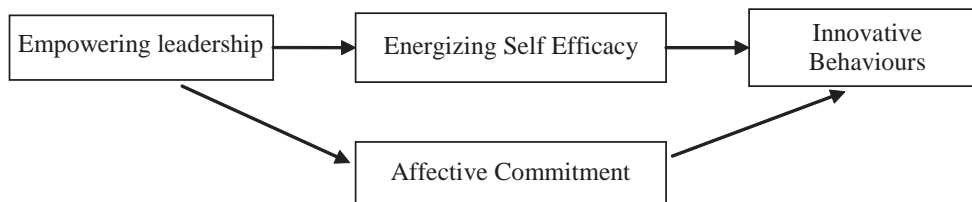
By having the opportunity to explore and implement solutions to problems in their work, employees have an affective commitment to their work. This is because they feel ownership of and responsibility for their work. If employees have the affective

commitment they will be more involved in organizational activities (Khaskheli et al., 2020). High involvement in organizational activities will spur new ideas, create models that can be applied and useful ideas useful or solutions to problems. Affective commitment will encourage innovative behavior because there is an emotional bond to stay remain and to advance the organization. Also, individuals who have self-efficacy will have confidence in achieving success; they will manage their efforts and persistence when facing difficult and stressful situations in achieving their goals. Thus, self-efficacy is a motivation that energizes employees to enthusiastically achieve goals (Bojovic and Jovanovic, 2020). By having high self-efficacy, employees will dare to take risks for innovative behavior.

This is reinforced by the social exchange theory which explains that good treatment from the organization/leader will also be rewarded well by employees. Sharing power, authority, and responsibility to subordinates in making decisions will be rewarded by employees with an increase in emotional bonds in the form of affective commitment that stimulates innovative behavior at work (Gkorezis, 2016). Empowering leadership will also strengthen employee self-efficacy because leaders give confidence in their abilities. As is known, innovative behavior is only owned by people who have competence and self-confidence.

Based on the previous literature review, a theoretical framework was compiled that inhibits the influence of empowering leadership, energizing self-efficacy, and affective commitment to innovative behavior as illustrated below:

Figure 1: Research framework

Source: Authors' research

388

Shofia Amin et al. • *Empowering leadership and human resources through stimulating...*

Zb. rad. Ekon. fak. Rij. • *2021* • *vol. 39* • *no. 2* • *381-399*

3. Research methodology

This study examined the role of empowering leadership, energizing self-efficacy, and affective commitment in stimulating lecturers' innovative behavior, testing the proposed hypotheses using a questionnaire prepared and elaborated by researchers based on a thorough literature review. The survey method used in this research helped develop a model to describe empowering leadership as a dependent variable, self-efficacy and affective commitment as a mediator, and innovative behavior as an independent variable. Then, we statistically examined the relationship between empowering leadership, energizing self-efficacy, affective commitment, and innovative behavior. The primary data were obtained directly by distributing questionnaires to selected respondents. Furthermore, to complement the primary data, the study also employed secondary data, collected from relevant agencies.

The research questionnaires of multiple-choice statements using 1 – 7 Likert scales were prepared. It ranged from strongly disagree (value of 1) to strongly agree (value of 7). Empowering leadership is defined as the process of influencing employees through the distribution of power, motivation, and development support that aims to encourage subordinates to work freely, be motivated and can work independently in achieving organizational goals and strategies. Measured by adapting the 17 measures of empowering leadership scales proposed by Konczak et al. (2000). Energizing self-efficacy reflects self-confidence to succeed in carrying out a job in certain situations with the expectation of certain results. Measured by adapting a scale from Borgogni et al. (2010). Affective commitment is an employee's emotional bond to the organization as indicated by a strong belief, accepting the goals and values of the organization, and striving to realize the organization's goals as the first priority and maintain its membership. Measured by 8 questions adapted from Meyer and Allen (1991). Innovative behavior means the individual's ability to change the way of working in the form of adopting new procedures, practices, and work techniques in completing work. Measured using 10 questions adapted from Zhang (2010).

4. Empirical data and results

The population of this research is lecturers from various universities in Indonesia who have worked as lecturers for at least three years. The sample's choice is to strengthen the validity and reliability of affective commitment and innovative behavior. To be more accurate, the samples were selected by having a minimum of three years of service as civil servants. Because the population size is not known with certainty, we carried out the sampling by convenience sampling method and determined a target sample size of 500 people who would spread

to various Indonesian universities using an online survey through the academic information system from Jambi University and the WhatsApp group of Indonesia Management Forum, Indonesian Research group, Publications of Management Lecturers and Alumni of postgraduate Airlangga University Surabaya for two months.

Then, for conducting the mediation test, it can be done without the precondition that the relation between the antecedent and the outcome should be significant. The mediation exists when the indirect effect is supported, regardless of the presence or absence of a direct effect (Aguinis et al., 2017). If the direct effect of the Independent Variable and the Dependent Variable is significant, there is a partial mediation. Conversely, if non-significant, there is a full mediation (Lachowicz et al., 2018).

Out of 735 questionnaires distributed online, we selected 617 as eligible for further processing. Following are the profiles of respondents in this study:

Table 1: Profil respondents

Variable		Observation	Number	Percentage
Gender	Female		295	52.19
	Male	617	322	47.81
Status	Civil Servant		379	61.43
	Non Civil Servant	617	238	38.57
Education Qualification	S3		171	27.71
	S2	617	446	72.29
Age	25-35		177	28.69
	36-46		178	28.85
	47-57	617	172	27.88
	> 57		90	14.58

Source: Authors' research

Table 1 shows that the majority of respondents are men with the status of Civil Servants, Masters level education (S2) and aged 36-46 years.

4.1. Validity and reliability

Before conducting data analysis, the first step is to conduct a confirmatory factor analysis to ensure the accuracy of the data (Goodness of Fit) by reducing some indicators that do not meet the requirements. The following table describes the loading factor for each variable.

Tabel 2: Preliminary Results of CFA Construct Validity Analysis (Aspect-Indicators)

Latent	Manifest	Loading Factor	P-Value
EL	EL1	0.60	0.00
	EL2	0.65	0.00
	EL3	0.60	0.00
	EL4	0.51	0.00
	EL5	0.36	0.00
	EL6	0.55	0.00
	EL7	0.59	0.00
	EL8	0.19	0.00
	EL9	0.48	0.00
	EL10	0.78	0.00
	EL11	0.80	0.00
	EL12	0.79	0.00
	EL13	0.75	0.00
	EL14	0.70	0.00
	EL15	0.71	0.00
	EL16	0.49	0.00
	EL17	0.73	0.00
AC	AC1	0.46	0.00
	AC2	0.16	0.00
	AC3	-0.13	0.00
	AC4	-0.21	0.00
	AC5	0.81	0.00
	AC6	0.82	0.00
	AC7	0.21	0.00
	AC8	0.66	0.00
ESE	ESE1	0.77	0.00
	ESE2	0.78	0.00
	ESE3	0.78	0.00
	ESE4	0.66	0.00
	ESE5	0.52	0.00
	ESE6	0.47	0.00
IB	IB1	0.72	0.00
	IB2	0.69	0.00
	IB3	0.77	0.00
	IB4	0.58	0.00
	IB5	0.76	0.00
	IB6	0.70	0.00
	IB7	0.50	0.00
	IB8	0.47	0.00

Source: Authors' research

Refers to the results of the first CFA, not all standardized loading factors for the variables of empowering leadership, energizing self-efficacy, and innovative behavior had loading factors above 0.5. For empowering leadership variables, indicators EL5, EL8, EL9, EL16 have a loading factor below 0.5. For AC variables, only the AC5, AC6, and AC8 indicators have a loading factor above 0.5. Meanwhile, the variables of energizing self-efficacy and innovative behavior are only the indicators ESE6 and IB 8 having a loading factor below 0.5. For the model to be fit and meet the requirements, all the indicators, not meeting the requirement, will be eliminated from the model.

Then the reliability test is measured using Construct Reliability (CR) and Average Variance Extracted (AVE) as presented in Table 3 below.

Table 3: Value of CR and AVE

No	Variable	CR	AVE
1	Empowering Leadership (EL)	0,91	0,46
2	Energizing Self Efficay (ESE)	0.81	0.60
3	Affective Commitment (AC)	0.83	0.51
4	Innovative Behavior (IB)	0.86	0.46

Source: Authors research

Based on the reliability construct calculation formula, the results obtained CR = 0.81-0.91 and VE = 0.46-0.6, which means that the variable has good reliability. As explained by Hair et al., (2010) that the construct has good reliability, if the value of Construct Reliability (CR) is $\geq$ 0.7 and the value of variance extracted (VE) is $\geq$ 0.40.

Furthermore, the value of goodness of fit is obtained as follows:

Table 4: Good of fit Criterion

No	Criterion	Value	Standard value	Information
1	Chi Square p	0.00	>0.05	No Fit
2	RMSEA	0.057	<0.08	Fit
3	SRMR	0.049	<0.05	Fit
4	TLI	0,91	>0.90	Fit
5	CFI	0,92	>0.90	Fit

Source: Authors' research

The results of the good of fit test show that the values of RMSEA, SRMR, TLI and CFI meet the required assessment standards. It can be concluded that the model built is in accordance with the sample data.

4.2. Hypothesis testing

The results of the hypothesis test are presented in Table 5 and Table 6.

Table 5: Direct effect

Dependent	Independent	Coeficient	P-Value	Information
IB $\leq$	EL	0.17	0.00	H1 accepted
ESE $\leq$	EL	0.44	0.00	H2 accepted
AC $\leq$	EL	0.28	0.00	H3 accepted
IB $\leq$	AC	0.04	0.33	H4 rejected
IB $\leq$	ESE	0.42	0.00	H5 accepted

Source: Authors' research

Based on the results illustrated in Table 5, it can be seen that empowering leadership variables have a positive significant effect on affective commitment, energizing self-efficacy, and innovative behavior. It means that the increased leadership that empowers subordinates directly will also increase affective commitment, self-efficacy, and innovative behavior.

Energizing self-efficacy has a positive effect on innovative behavior. On the other hand, affective commitment has a positive but not significant effect on innovative behavior. Increasing self-efficacy will directly increase innovative behavior, but increasing innovative behavior is not significantly influenced by increased affective commitment. All hypotheses are accepted, except for the fourth hypothesis that says *that* affective commitment is positive, significantly relating to rejected innovative behavior.

4.3. Indirect effect

Based on the results of data processing, it shows that the direct effect of empowering leadership on affective commitment is significantly positive, whereas, the direct effect of affective commitment on innovative behavior is insignificantly positive. It implies the effect of empowerment leadership increases affective commitment directly. However, although having affective commitment high, cannot increase innovative behavior both directly and indirectly.

Table 6: Indirect Effect

Variable	Coefficient	P-Value	Information
IB ≤ AC ≤ EL	0.01	0.33	Not significant
IB ≤ ESE ≤ EL	0.18	0.00	Significant

Source: Authors' research

Table 6 above shows that the value of the direct effect of empowering leadership on innovative behavior (0.17) is greater than the indirect effect through affective commitment (0.01). Hence, affective commitment does not act as a mediator between empowering leadership and innovative behavior. In other words, affective commitment as mediation between empowering leadership and innovative behavior was rejected.

The direct effect of empowering leadership on energizing self-efficacy is significantly positive. Also, the direct effect of emerging self-efficacy on innovative behavior is significantly positive. It implies, the effect of empowerment leadership increases energizing self-efficacy directly, and energizing self-efficacy increase innovative behavior directly.

The value of the direct effect of empowering leadership on innovative behavior (0.17) is less than that of the indirect effect through energizing self-efficacy (0.18). Hence, affective commitment acts as a fully mediating variable. To stimulate innovative behavior will be greater through increasing self-efficacy rather than through empowering leadership. In other words, energizing self-efficacy as mediation between empowering leadership and innovative behavior is accepted.

5. Results and discussion

There were five valuable findings of this study. First, the findings indicated that empowering leadership had a positive effect directly on innovative behavior. The current finding is in line with the results of previous studies and concluded that empowering leadership has a significantly positive and direct effect on innovative behavior (Gkorezis, 2016). It is because the lecturers have the freedom to manage their tasks. They also have the power to decide when and how to do their primary obligation.

Second, empowering leadership had a significant positive effect on energizing self-efficacy. It means that self-efficacy can be increased through the behavior of leaders who empower their subordinates. Empowering leadership means giving confidence to subordinates to complete their tasks autonomously, making decisions in completing tasks with their creativity. Thus empowering leadership also provides

Shofia Amin et al. • Empowering leadership and human resources through stimulating...
394
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 381-399

an opportunity for subordinates to develop their potential and increase competence. Someone will have self-efficacy if they have competence.

Third, empowering leadership had a significantly positive effect on affective commitment. Affective commitment is related to the emotion that encourages employees to remain loyal to the organization. Affective commitment is created because employees feel motivated to be allowed to develop their potential and gain trust. A pleasant behavior of the leader towards his/her employees will be rewarded by employees' positive attitudes in the form of affective commitment.

Fourth, energizing self-efficacy variable acted as a mediator on the relationship between empowering leadership and innovative behavior. Innovative behavior is influenced by courage to take risks and self-confidence. The courage to take risks will be owned by lecturers if they get good moral and material support from the leadership. Self-confidence will increase if they have the competence and are given the confidence and opportunity to actualize their competence. Empowering leadership has the characteristics of providing support and trust to its followers so that it can generate self-confidence and encourage innovative behavior.

Fifth, although empowering leadership had a significant direct effect on the affective commitment, the affective commitment did not have a significant direct effect on the innovative behavior. Meanwhile, energizing self-efficacy had a significant direct effect on innovative behavior. These findings indicated that affective commitment was unable to become a mediator between empowering leadership and innovative behavior. In particular, to enhance innovative behavior, it is preferred to increase self-efficacy through empowering leadership. The following are the managerial contributions of this study. Although empowering leadership improved self-efficacy and affective commitment, it stimulates innovative behavior more influenced by self-efficacy. This implied that leaders must stimulate the lecturers to enhance self-efficacy. Innovative behavior is only owned by people who have the competence and courage to take risks. People will have self-efficacy because they have competence. Then people will also dare to take risks because having self-efficacy will achieve success in their work. Through empowering leadership styles, it is hoped that lecturers' self-efficacy will continue to increase because they are given the trust and opportunity to always develop their own competencies.

6. Conclusion

Innovative behavior is more influenced by self-efficacy. To enhance innovative behavior, it is preferred to increase self-efficacy and empower leadership. This research presented a model for increasing innovative behavior through empowering leadership, energizing self-efficacy, and affective commitment. This study examined the role of empowering leadership, energizing self-efficacy, and affective

commitment in stimulating lecturers' innovative behavior. The results confirmed the main hypothesis that empowering leadership had a directly positive effect on innovative behavior. We also found that empowering leadership had a significantly positive effect on energizing self-efficacy. For the other hypothesis, it indicated that empowering leadership had a significantly positive effect on affective commitment while energizing self-efficacy variable acted as a mediator on the relationship between empowering leadership and innovative behavior. Our study also indicated that affective commitment was unable to become a mediator between empowering leadership and innovative behavior.

Implications for higher education policies and programs can be drawn from the findings of this study. For example, rector, dean, head of the department, and head of the study program may assign tasks and responsibilities for lecturers accompanied by the authority in decision making so that it is possible for lecturers to behave innovatively in the learning process through using various teaching methods, conducting various research, and innovative community service.

This study contributes to the literature on empowering leadership, energizing self-efficacy, and affective commitment in stimulating lecturers' innovative behavior. Principally, our study focused on how empowering leadership, energizing self-efficacy and affective commitment could stimulate innovative behaviors for lecturers in higher education institutions.

The main limitation of this research is related to a simultaneous cross-data collection method while attitude measurement needs observation through time-series data. Besides, the empirical data were gathered based on individual institutions while the discussion tends to be general; therefore further researchers are recommended to pursue research to see the findings based on time series data observation.

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References

Akram, T., Lei, S., Haider, M. J. (2017) "The impact of relational leadership on employee innovative work behavior in IT industry of China", *Arab Economic and Business Journal*, Vol. 11, No. 2, pp. 153–161. https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1016%2Fj.aebj.2016.06.001.

Amankwaa, A., Gyensare, M. A., Susomrith, P. (2019) "Transformational leadership with innovative behaviour: Examining multiple mediating paths with PLS-SEM", *Leadership and Organization Development Journal*, Vol. 40, No. 4, pp. 402–420. https://doi.org/10.1108/LODJ-10-2018-0358.

Atitumpong, A., Badir, Y. F. (2018) "Leader-member exchange, learning orientation and innovative work behavior", *Journal of Workplace Learning,* Vol. 30, No. 1, pp. 32–47. https://doi.org/10.1108/JWL-01-2017-0005.

Bandura, A. (2012) "On the Functional Properties of Perceived Self-Efficacy Revisited", *Journal of Management*, Vol. 38, No. 1, pp. 9–44. https://doi.org/10.1177/0149206311410606.

Bani-Melhem, S., Zeffane, R., Albaity, M. (2018) "Determinants of employees' innovative behavior", *International Journal of Contemporary Hospitality Management*, Vol. 30, No. 3, pp. 1601–1620. doi:10.1108/ijchm-02-2017-0079.

Bojovic, I., Jovanovic, S. S. (2020) "Transformational Leadership and Psychological Needs of Employees", *Technium:Social Science Journal*, Vol. 7. www.techniumscience.com.

Cesário, F., Chambel, M. J. (2017) "Linking Organizational Commitment and Work Engagement to Employee Performance", *Knowledge and Process Management*, Vol. 24, No. 2, pp. 152–158. https://doi.org/10.1002/kpm.1542.

Cheong, M. et al. (2016) "Two faces of empowering leadership: Enabling and burdening", *Leadership Quarterly*, Vol. 27, No. 4, pp. 602–616. https://doi.org/10.1016/j.leaqua.2016.01.006.

Cheong, M. et al. (2018) "A review of the e ff ectiveness of empowering leadership", *The Leadership Quarterly*, Vol. 30, No. 1, pp. 34–58. https://doi.org/10.1016/j.leaqua.2018.08.005.

Chow, I. H. S. (2017) "The mechanism underlying the empowering leadership-creativity relationship", *Leadership & Organization Development Journal,* Vol. 39, No. 2. https://doi.org/10.1108/LODJ-03-2016-0060.

Chudy, S. et al. (2020) "Contemplative insight as an opinion conflict and a search for meaning in the context of innovative elements of the revolution industry 4.0." In *Education and Information Technologies*. https://doi.org/10.1007/s10639-020-10279-0.

Contreras, F. et al. (2017) "Leadership and Employees' Innovative Work Behavior: Test of a Mediation and Moderation Model", *Asian Social Science*, Vol. 13, No. 9. https://doi.org/10.5539/ass.v13n9p9.

Gkorezis, P. (2016) "Principal empowering leadership and teacher innovative behavior: a moderated mediation model", *International Journal of Educational Management,* Vol. 30, No. 6. http://dx.doi.org/10.1108/IJEM-08-2015-0113%0ADownloaded.

Hakimian, F. et al. (2016) "Importance of commitment in encouraging employees' innovative behaviour", *Asia-Pacific Journal of Business Administration* Vol. 8,

No. 1. https://www.emerald.com/insight/content/doi/10.1108/APJBA-06-2015-0054/full/html.

Harel, R., Schwartz, D., Kaufmann, D. (2020) "Organizational culture processes for promoting innovation in small businesses", *EuroMed Journal of Business*,Vol. 16, No. 2. https://doi.org/10.1108/EMJB-03-2020-0027.

Kim, M., Beehr, T. A. (2017) "Self-Efficacy and Psychological Ownership Mediate the Effects of Empowering Leadership on Both Good and Bad Employee Behaviors# *Journal of Leadership and Organizational Studies*, Vol. 24, No. 4, pp. 466–478. https://doi.org/10.1177/1548051817702078.

Kurt, R. (2019) "Industry 4.0 in Terms of Industrial Relations and Its Impacts on Labour Life", *Procedia Computer Science*, Vol. 158, pp. 590–601. https://doi.org/10.1016/j.procs.2019.09.093.

Lachowicz, M. J., Preacher, K. J., Kelley, K. (2018) "A novel measure of effect size for mediation analysis", *Psychological Methods*, Vol. 23, No. 2, pp. 244–261. https://doi.org/10.1037/met0000165.

Lee, A., Willis, S., Tian, A. W. (2018) "Empowering Leadership: A Meta-Analytic Examination of Incremental Contribution, Mediation, and Moderation", *Journal of Organizational Behavior*, Vol. 39, No. 3, pp. 306–325. https://doi.org/10.1002/job.2220.

Mahmoud, S. et al. (2021) "The Mediating Role of Psychological Contract Fulfillment in the Relationship Between Organizational Support and Employee Performance" Psychology and Behavioral Sciences, Vol. 10, No. 1, pp. 25–38. https://doi.org/10.11648/j.pbs.20211001.14.

Noopur, N., Dhar, R. L. (2019) "Knowledge-based HRM practices as an antecedent to service innovative behavior: A multilevel study", *Benchmarking*, Vol. 27, No. 1, pp. 41–58. https://doi.org/10.1108/BIJ-10-2018-0329.

Özarallı, M. (2015) "Linking Empowering Leader to Creativity : The Moderating Role of ScienceDirect Linking empowering leader to creativity : the moderating role of psychological (felt) empowerment", *Procedia - Social and Behavioral Sciences,* Vol.181, pp. 366–376. https://doi.org/10.1016/j.sbspro.2015.04.899.

Pons, F. J., Ramos, J., Ramos, A. (2016) "Antecedent variables of innovation behaviors in organizations: Differences between men and women", *Revue Europeenne de Psychologie Appliquee*, Vol. 66, No. 3, pp. 117–126. https://doi.org/10.1016/j.erap.2016.04.004.

Rafiola, R. H. et al. (2020) "The effect of learning motivation, self-efficacy, and blended learning on students' achievement in the industrial revolution 4.0.", *International Journal of Emerging Technologies in Learning*, Vol. 15, No. 8, pp. 71–82. https://doi.org/10.3991/ijet.v15i08.12525.

Rao Jada, U., Mukhopadhyay, S., Titiyal, R. (2019) "Empowering leadership and innovative work behavior: a moderated mediation examination", *Journal of*

Knowledge Management, Vol. 23, No. 5, pp. 915–930. https://doi.org/10.1108/JKM-08-2018-0533.

Salanova, M. et al. (2011) "Linking transformational leadership to nurses' extra-role performance: The mediating role of self-efficacy and work engagement", *Journal of Advanced Nursing*, Vol. 67, No. 10, pp. 2256–2266. https://doi.org/10.1111/j.1365-2648.2011.05652.x.

Schwab, K. (2016) *The Fourth Industrial Revolution what it means and how to respond World Economic Forum*. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/.

ST-Hilaire, W. A., de la Robertie, C. (2018) "Correlates of affective commitment in organizational performance: Multi-level perspectives", *Australian Journal of Career Development*, Vol. 27, No. 1, pp. 3–8. https://doi.org/10.1177/1038416217744215.

Subair, R. E., Oriogu, C. D. (2016) "Still an issue The use of electronic books in university libraries in Nigeria", *American Journal of Social Sciences and Humanities*, Vol. 1, No. 2, pp. 67–72. https://www.academia.edu/30328134/STILL_AN_ISSUE_THE_USE_OF_ELECTRONIC_BOOKS_IN_UNIVERSITY_LIBRARIES_IN_NIGERIA.

Suendarti, M., Widodo, W., Hasbullah, H. (2020) "Demonstrating The Effect of Grit and Creativity on Innovative Behavior of Teacher ' s Natural Science: Mediating by Self -Efficacy", *Journal of Xian University of Architecture and Technology,* Vol. 12, No. 6, pp. 470–478.

Zhu, J., Yao, J., Zhang, L. (2019) "Linking empowering leadership to innovative behavior in professional learning communities: the role of psychological empowerment and team psychological safety", *Asia Pacific Education Review*, Vol. 20, No. 4, pp. 657–671. https://doi.org/10.1007/s12564-019-09584-2.

Shofia Amin et al. • Empowering leadership and human resources through stimulating...
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 381-399
399

Osnaživanje vodstva i ljudskih potencijala kroz poticanje inovativnog ponašanja u visokom obrazovanju

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Sažetak

U eri četvrte industrijske revolucije, 4IR ili industrije 4.0, budući da je visokonapredna tehnologija uvelike zamijenila ljudske radove, mnoge proizvodne aktivnosti i roba i usluga morale su biti inovativne. Svrha ove studije bila je ispitati ulogu poticanja samoefikasnosti kao posrednika osnaživanja vodstva i inovativnog ponašanja kako bi se analizirala posrednička uloga afektivne predanosti između njih dvoje. Korištena je anketna metoda distribucijom online upitnika za 617 predavača u Indoneziji. Za istraživanje međuodnosa osnaživanja vodstva, jačanja samoučinkovitosti, afektivne predanosti i inovativnog ponašanja putem statističkog ispitivanja njihove međusobne povezanosti, primijenili smo softver Stata 13 za testiranje hipoteza. Rezultati su ukazali na značajan utjecaj osnaživanja vodstva na afektivnu predanost, poticanje samoučinkovitosti i inovativno ponašanje. Energiziranje samoučinkovitosti značajno je utjecalo na inovativno ponašanje, ali utjecaj obrnuto nije značajan. Postojao je neizravan učinak osnaživanja vodstva na inovativno ponašanje kroz poticanje samoučinkovitosti, ali afektivna predanost nije bila posrednik između osnaživanja vodstva i inovativnog ponašanja. Ovi nalazi su pokazali da bi predavači mogli stimulirati svoje inovativno ponašanje povećanjem svoje samoučinkovitosti kroz osnaživanje vodstva. Naši rezultati istraživanja ističu važnost poboljšanja inovativnog ponašanja, samoučinkovitosti i osnaživanja vodstva.

Ključne riječi: *afektivna predanost, predavač, osnaživanje vodstva, poticanje samoučinkovitosti, inovativno ponašanje*

JEL klasifikacija: *C83, D23, I23, J24, M12, M54*

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Examining the factors of influence on avoiding personalized ads on Facebook[*]

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Abstract

Ad personalization is becoming the dominant promotional tactic, further enhanced by new technologies applications. Greater efficiency is the main goal of such an advertising approach, but it can cause the appearance of the so-called "privacy paradox" that can induce negative consumer reactions in terms of avoiding such ads. This paper investigates the factors influencing the avoidance of personalized ads communicated through the social network Facebook. Part of the research model deals with the impact of perceived personalization, perceived irritation, and perceived privacy concerns on skepticism towards advertising and advertising avoidance. Furthermore, the empirical research was conducted on data collected through the Facebook and WhatsApp mobile applications. Following the obtained results, there is no negative effect of perceived personalization to skepticism towards advertising while it exists toward advertising avoidance. Furthermore, a positive effect of perceived irritation to skepticism towards advertising does not exist, but positive effects to ad avoidance do. The direct positive effect of perceived privacy concerns to skepticism and ad avoidance was not found. Also, skepticism about personalized ads was found not to be positively associated with avoiding personalized ads. In addition to new insights, the results can help design and implement promotional campaigns through social media technologies.

***Key words:** Facebook personalized ads, skepticism toward advertising, advertising avoidance, new technologies*

***JEL classification:** M31, M37*

Damir Dobrinić, Iva Gregurec, Dunja Dobrinić • Examining the factors of influence...
402
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 401-428

1. Introduction

Everyday private and business activities are virtually unthinkable without an internet connection. New technologies that build on the Internet connection completely change the current ways of performing various processes and activities, including marketing activities. The current mass communication in which the so-called mass media (primarily TV) are used is increasingly being supplemented and combined with direct communication to each customer. The possibility of tracking digital traces, which people generate through using mobile devices or PC, and collecting and processing them, opens the door to precise targeting and high personalization of offers to individual customers. By monitoring customer behaviour, companies have the opportunity to create profiles that enable a very precise prediction of customer behaviour in the future. Chaffey and Smith (2017: 476) talk about profiling as a continuous activity on data collection, processing, and use in precision targeting. Within Internet communication, social networks occupy a dominant place.

The general definition of social networks conveyed by (Kingsnorth, 2019: 175) says that it is any "website or application that enables users to create and share content, or to participate in social networking." The most popular social network globally is still Facebook, with 2.7 billion users (Statista, 2020). With the appearance of the first ads on Facebook in 2005, the advantage of high targeting of the offer (ad) was noticed (Hanlon, 2019). The possibility of collecting high-quality data, which modern technologies additionally enable, opens the possibility of precise profiling and personalization of promotional communication. Chaffey and Chadwick (2019: 261) state how "recommendations based on profile information, behaviour or predictive analytics are known as personalization." The fact is that Facebook is one of the most popular social networks and that personalization is increasingly used as an advertising strategy; for this reason, Tran (2017) believes that the effect of personalized advertising on Facebook is worth exploring. The benefits of personalization for both advertisers and customers are clear; companies increase promotional productivity, and customers receive relevant advertising. Personalization is becoming a very effective tool to prevent ad avoidance and to make promotional campaigns more effective. In addition to the benefits that personalization provides, ads can be considered irritating and, as such, cause their avoidance at both the cognition and behaviour levels. New technologies (Big data, Artificial Intelligence, and the Internet of Things) enables the collection and analysis of large amounts of diverse data, which directly enters the area of privacy. It becomes very difficult for customers to control information that companies collect about them and how they use it. These perceived privacy concerns lead to ad avoidance. The effect of this concern on avoiding Facebook ads will be explored in this paper.

This research aims to determine the factors influencing the avoidance of personalized ads obtained through the social network Facebook. In pursuit of this aim, the authors propose the following research hypotheses:

> *H1: Privacy concern has a positive effect on scepticism about Facebook personalized ads.*

> *H2: Privacy concern has a positive effect on personalized Facebook ads avoidance.*

> *H3: The perception of personalized Facebook ads has a negative effect on scepticism about those ads.*

> *H4: The perception of personalized Facebook ads has a negative effect on avoiding those ads.*

> *H5: Ad irritability is positively related to scepticism towards personalized Facebook ads.*

> *H6: Ad irritability is positively related to avoiding personalized Facebook ads.*

> *H7: Scepticism towards personalized Facebook ads is positively related to avoiding those ads.*

Survey data were collected through a questionnaire available on the Facebook and WhatsApp mobile applications, 377 valid answers were collected. Furthermore, a multivariate statistical analysis technique (SEM) using IBM Statistic tools (SAS and AMOS) was used to test structural relationships.

The theoretical contribution of this paper is new knowledge about the attitudes and behaviour of customers regarding the acceptance of personalized ads on social networks. A literature review found only a few studies on the subject, which further motivated the authors of this research. In addition to new insights, the research results can help companies to plan marketing and sales campaigns through the social network Facebook. The paper consists of 4 units. Theory and research model development follows the introductory part. The third part presents the research methodology and research results. The fourth final section contains the discussion, contribution, and limitations of the research.

2. Literature review

Today's trends of connecting, communicating, and entertaining people are related to the usage of social networks. Such a role and importance of social networks utterly change the current marketing patterns of action towards individual customers. Marketing strategies are changing and directed towards establishing

and nurturing quality customer relationships based on their engagement with the company or brand. Unlike other communication channels that companies use, social networks are not under their control because users themselves decide when and how to communicate through social networks (Lacy et al., 2013). Realizing the importance of social networks for establishing high-quality long-term relationships, companies seek to establish control over this channel, and through honest and fair communication, turn customers into promoters of the company (Florea et al., 2018). New technologies facilitate this task by enabling the collection and analysis of large amounts of data used to shape marketing strategies. In this context, personalization based on established behaviors, desires, and expectations of customers also occurs. Personalization or mass customization as a marketing concept is not a novelty of today, so at the end of the twentieth century Pine (1993) defined it as "the production and distribution of customized goods and services on a mass basis." What is new is the full ability to implement this concept thanks to the applications of new technologies in business. As Goldsmith and Freiden (2004) state, personalization comes in a variety of forms. This paper will investigate customer behavior regarding the acceptance or non-acceptance of personalized ads they receive through the social network Facebook. Personalized ads have the task of focusing on what customers are interested in and what will provoke a certain reaction in them (Bleier and Eisenbeiss, 2015). Meeting this goal depends on the ability to collect and analyse large amounts of customer data and information (Bang and Wojdynski, 2016). The benefits of personalized ads are clear; however, customers may experience some discomfort related to their constant monitoring resulting in avoiding this type of ad. In addition to directly avoiding ads, it can also lead to less engagement in communicating with a brand or company (Tucker, 2014).

Figure 1: Conceptual model and research hypothesis

Source: Author's research
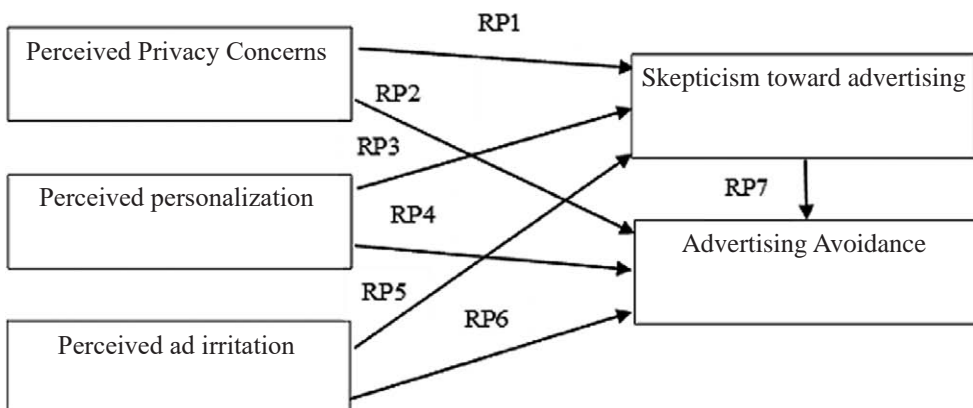
This paper investigates the factors that influence the avoidance of personalized ads on Facebook. Hadija et al. (2012) point out that even though the theoretical framework of ad avoidance is available in several research papers, social media advertising has not received enough research attention. The same was found by Tran (2017), who states that little attention has been paid to examining the effects of personalized ads on Facebook. In this regard, this research is being conducted in which the selected model is being tested on Facebook users in Croatia.

In order to clarify the influence of certain predictors on the behavior of recipients of personalized ads via Facebook, a research model applied and tested by Baek and Morimoto (2012) was basically used. Within the proposed research model, it will analyse the impact of perceived privacy concerns, perceived personalization, and perceived ad irritation on ad avoidance. Furthermore, in order to get a clearer view of this relationship, skepticism towards personalized Facebook ads is also analysed.

Figure 1 shows the conceptual model and research hypothesis.

2.1. Perceived privacy concerns (PPC)

In the Big data environment, privacy concern is taking on a whole new dimension. Any user interaction with the company through any channel can be recorded and analysed. Privacy concerns stem from the fact that users of the Internet and social networks are often not aware of their exposure and do not have enough knowledge about how they can and must protect themselves (Grmuša et al., 2019). Truyens and Eecke (2010) point out that social media users are not even aware of what information they expose through social media. According to Sheehan and Hoy (1999), concerns may elicit negative reactions to the ads received. Various studies have found that privacy concerns and compromised security (transmission of viruses and malware) are, in addition to irritation, the main reasons for avoiding ads. (Piorunkiewicz et al., 2019; PageFair, 2017; Li and Huang, 2016). Based on these findings, research hypotheses H1 and H2 were proposed.

> *H1: Privacy concern has a positive effect on skepticism about Facebook personalized ads.*

> *H2: Privacy concern has a positive effect on personalized Facebook ads avoidance.*

2.2. Perceived personalization (PPE)

According to Li (2016), personalization is defined as delivering individualized information to message recipients based on previously collected data about their preferences. Personalization is considered effective because it makes the message

personal (Maslowska et al., 2016), and a higher level of attention can be achieved by greater ad tailoring (Malheiros et al., 2012). Baek and Morimoto (2012) point out that well-personalized ads contain useful and relevant information, making advertising itself more valuable. In that context, it is important to emphasize that when users perceive ads as valuable and useful, they will avoid them to a lesser extent (Pasadeos, 1990). Various previous research confirms that personalization raises advertising effectiveness (Keyzer et al., 2015). According to Habeahan (2016), personalized ads reduce the level of user skepticism, that is, mistrust and ad avoidance. The subject of various studies on the effectiveness of advertising is also ad skepticism, which is considered through various aspects, from the truth of the advertisement to the motive of the advertiser (Obermiller and Spangenberg, 1998; Baek and Morimoto, 2012). Baek and Morimoto (2012) find that ad personalization strongly influences skepticism toward advertising and ad avoidance in the context of personalized advertising media (unsolicited commercial e-mail, postal direct mail, telemarketing, text messaging). In the context of Facebook ads, Tran (2017) also determine the impact of personalization on ad avoidance.

Based on the above findings, research hypotheses H3 and H4 were proposed.

> *H3: The perception of personalized Facebook ads has a negative effect on skepticism about those ads.*

> *H4: The perception of personalized Facebook ads has a negative effect on avoiding those ads.*

2.3. Perceived ad irritation (PAI)

Transferring research results by several authors Arora and Agarwal (2019) indicate that the effectiveness of ads decreases if ads are treated as irritating. According to HubSpot, (2020), too many ads, annoying or irrelevant ads, and intrusive ads are the top three ad-blocking motivations. Aaker and Bruzzone (1985) emphasize that irritation is an emotional response associated with dissatisfaction and impatience, while Li et al. (2002) state that irritation by advertising is seen as a feeling of discomfort that is less intense than feelings of insult and more intense than disagreement (Aaker and Bruzzone, 1985). Accordingly, Smith (2007) states that intrusive ads create a sense of irritation for the user and lead them to avoid them, while valuable ads, on the other hand, have a "calming" effect. On that track are the claims that the perception of ad irritation directly influences the formation of negative consumer attitudes about advertising itself (Rau et al., 2013; Aktan et al., 2016). Also, it is especially important to emphasize that according to Amyx and Lumpkin (2016), irritation directly affects consumer distrust, and they become less accessible and open to promotional communication, i.e., they try to avoid it.

Related to personalized advertising media, Baek and Morimoto (2012) establish a direct positive connection between PAI and personalized advertising skepticism and ad avoidance. Based on the analysis of previous research, research **hypotheses** H5 and H6 were proposed.

> H5: *Ad irritability is positively related to skepticism towards personalized Facebook ads.*

> H6: *Ad irritability is positively related to avoiding personalized Facebook ads.*

2.4. Skepticism toward advertising (STA)

Transferring research results by several authors Arora and Agarwal (2019) indicate that the effectiveness of ads decreases if ads are treated as irritating. According to HubSpot, (2020), too many ads, annoying or irrelevant ads, and intrusive ads are the top three ad-blocking motivations. Aaker and Bruzzone (1985) emphasize that irritation is an emotional response associated with dissatisfaction and impatience, while Li et al. (2002) state that irritation by advertising is seen as a feeling of discomfort that is less intense than feelings of insult and more intense than disagreement (Aaker and Bruzzone, 1985). Accordingly, Smith (2007) states that intrusive ads create a sense of irritation for the user and lead them to avoid them, while valuable ads, on the other hand, have a "calming" effect. On that track are the claims that the perception of ad irritation directly influences the formation of negative consumer attitudes about advertising itself (Rau et al., 2013; Aktan et al., 2016). Also, it is especially important to emphasize that according to Amyx and Lumpkin (2016), irritation directly affects consumer distrust, and they become less accessible and open to promotional communication, i.e., they try to avoid it. Related to personalized advertising media, Baek and Morimoto (2012) establish a direct positive connection between PAI and personalized advertising skepticism and ad avoidance. Based on the analysis of previous research, research **hypothesis** H5 and H6 were proposed.

> H5: *Ad irritability is positively related to skepticism towards personalized Facebook ads.*

> H6: *Ad irritability is positively related to avoiding personalized Facebook ads.*

2.5. Advertising avoidance (AAV)

The goal of each ad is to convey the message successfully. Avoiding this message signals a problem whose causes are various. Cho and Cheon (2004), investigating the causes of avoiding online ads, find that this problem cause: perceived goal

Damir Dobrinić, Iva Gregurec, Dunja Dobrinić • Examining the factors of influence...
408
Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 401-428

impediment, perceived ad clutter, and prior negative experiences. The importance of these factors as predictors of ad avoidance is also confirmed by Seyedghorban et al. (2016). In the context of social networks, Kelly et al. (2010), in addition to the predictors, determine some other as the relevance of the product, lack of credibility of the medium, and lack of trust of advertisers. Speck and Elliot (1997) define ad avoidance as: "all actions by media users that differentially reduce the exposure to ad content." According to them, this avoidance takes place on a cognitive, behavioral, and mechanical level. Accordingly, Cho and Cheon (2004) define three components of ad avoidance: cognition, affect, and behavior.

Cognitive refers to beliefs about an object, affection to the emotional experience of an ad, and behavior to a way of avoiding an ad. It is assumed that users who are skeptical of personalized ads on Facebook will also have a greater tendency to avoid them.

3. Methodology

The section includes a presentation of the measuring instrument and statistical methods used in the analysis of the results.

3.1. Research instrument

In the implementation of the empirical part of the research, a measuring instrument used by Baek and Morimoto (2012) and Tran (2017) was used. Following the research model, the impact of predictor variables on STA and AAV is measured; accordingly, the measuring instrument is divided into five parts with the corresponding number of questions. Respondents expressed their agreement with the proposed statements in the questionnaire on the Likert scale ranging from 1 to 5 (1 = complete disagreement, 5 = complete agreement). The original measurement instrument is attached to this paper appendix.

3.2. Statistical methods

This research implemented different statistical techniques. The correctness of the measuring instrument is determined by checking its validity and reliability. The validity of a measuring instrument represents "the degree to which a test measures what it claims, or purports, to be measuring" (Brown, 1996: 231). Validity was determined by measuring construct, content, convergent, and discriminant validity. Construct validity is ensured by using a verified construct in the literature. The proposed conceptual model consists of five constructs, three of which become predictor variables and two dependent variables.

Regarding content validity, variables are being measured by questions (items) that have been tested in the literature through several studies. Additional construct verification was performed through exploratory factor analysis (in terms of determining the dimensionality of the scale) using the IBM SPSS 23 software package. As part of construct validity, convergent and discriminant validity was also checked. Convergent validity tests the relationships within the variables and is measured by determining the external loadings factor (running a CFA), calculating average variance extracted (AVE), and composite (construct) reliability (CR). For checking discriminant validity (uniqueness of the construct) confirmatory factor analysis (IBM AMOS 26) was performed.

Cronbach's alpha coefficient analysed the measuring instrument's internal reliability, and it can take values between 0 and 1; the closer the coefficient is to the value 1, the more reliable the measurement scale. Since Cronbach's alpha tends to underestimate internal consistency reliability, composite reliability is often used to measure internal reliability (Hair et al., 2014).

Confirmatory factor analysis (CFA) under the structural equation modeling (SEM) was used for testing the match between the empirical and theoretical models. For the purpose of matching, fit indices were used: Chi-square index, the Goodness of Fit (GIF), Adjusted Goodness of fit (AGFI), Incremental fit index (IFI), Normed fit index (NFI), Comparative fit index (CFI), Root mean square error (RMSEA) and Standardized root mean square (SRMR) as an absolute measure of fit. The CFA was also used to check the research **hypothesis** by testing the relationships between variables in the structural model.

4. Empirical data and analysis

In this sector, the results of the empirical analysis are presented, which includes the presentation of data collection methods and sample structure, validity, and reliability of the measuring instrument, testing of the conceptual model, and testing of the proposed hypotheses.

4.1. Data collection and sample used

For the purposes of empirical research, a survey via Facebook and the WhatsApp mobile application was conducted. A survey was taking place in the period from May to July 2020, and 377 duly completed questionnaires were collected. According to gender, 124 (32.81%) respondents are male, and 253 (67.11%) are female. Between 18 and 23 years of age, there are 193 respondents (51.19%), between 24 and 40 years, 150 (39.79%) respondents and above 40 years, 34 (9.02%) respondents.

4.2. Validity analysis

Construct validity (the dimensionality of the scale) was performed through exploratory factor analysis (under the principal components model with varimax rotation) using the IBM SPSS 23 software package. To determine the suitability of the data for conducting the factor analysis, the Kaiser-Meyer-Olkin measure for all variables and the Bartlett-off test were performed. Both tests show satisfactory values (KMO = 0.931, p = 0.000 <0.05). Values less than 0.6 indicate that the data are not suitable for performing factor analysis (Yong and Pearce, 2013). Also, Bartlett's test of sphericity is greater than the chi-square's critical value, which indicates a significant difference in the variances.

Exploratory factor analysis was performed on 33 items in the measuring instrument. During the analysis, two items variable skepticism toward advertising, and one item variable perceived privacy concerns due to low factor loading was omitted from further analysis. The repeated analysis identified five factors with eigenvalues above 1 and factor loads above 0.5. The selected five factors explain 68.489% of the total variance.

Convergent validity tests the relationships within the variables and is measured by determining the external loadings factor (running a CFA), calculating average variance extracted (AVE), and composite (construct) reliability (CR). Outer loadings factors are greater than the cut-off value of 0.5, which indicates their reliability (Hulland, 1999), average variance extracted (AVE) is higher than 0.5 and composite reliability is higher than 0.6 (Bagozzi and Yi, 1988). To determine the internal consistency of variables, Cronbach's alpha coefficient was determined whose value should be higher than 0.7. Thus, all values obtained are above the limit (Table 1).

Table 1: Reliability and validity of the measuring instrument

Variables	Items	Cronbach's alpha	Outer factor loading	CR	AVE	Mean	SD
Perceived Privacy Concerns	PPC1	0.900	0.685	0.892	0.624	3.714	1.168
	PPC2		0.788			3.727	1.130
	PPC4		0.878			3.814	1.100
	PPC5		0.831			3.610	1.083
	PPC6		0.757			3.615	1.166
Perceived personalization	PPE1	0.901	0.708	0.899	0.641	2.639	0.990
	PPE2		0.812			2.637	0.966
	PPE3		0.853			2.515	1.039
	PPE4		0.811			2.196	1.061
	PPE5		0.813			2.516	1.087
Perceived ad irritation	PAI1	0.927	0.730	0.926	0.611	3.247	1.059
	PAI2		0.754			3.753	1.028
	PAI3		0.789			3.440	1.082
	PAI4		0.861			3.387	1.007
	PAI5		0.790			3.406	0.982
	PAI6		0.866			3.430	1.029
	PAI7		0.706			3.000	1.118
	PAI8		0.742			2.822	1.212
Skepticism toward advertising	STA1	0.9020	0.670	0.902	0.571	2.451	0.980
	STA4		0.742			3.032	1.048
	STA5		0.816			2.690	0.968
	STA6		0.682			2.448	0.993
	STA7		0.842			2.684	0.966
	STA8		0.801			2.538	0.991
	STA9		0.719			2.443	0.979
						2.769	1.014
Advertising Avoidance	AAV1	0.853	0.852	0.880	0.608	3,509	1.077
	AAV2		0.867			3,464	1.122
	AAV3		0.856			3,255	1.245
	AAV4		0.810			3,504	1.246
	AAV5		0.417			3,244	1.421

Source: Author's research

Running a confirmatory factor analysis (CFA) discriminate validity was also checked, and the uniqueness of each variable and their mutual difference was determined. (Table 2) The results show good discriminant validity; the second root of the mean-variance (AVE) for each variable is the highest value in the vertical and horizontal directions, while the correlation between the variables is less than 0.85, which is considered a good result (Altintas and Tuzunkan, 2017).

Table 2: Discriminant Validity

	PPC	PPE	PAI	STA	AAV
PPC	**0.790**				
PPE	-0.160	**0.800**			
PAI	0.496	-0.416	**0.782**		
STA	-0.248	0.668	-0.432	**0.755**	
AAV	0.378	-0.385	0.710	-0.344	**0.779**

PPC – Perceived Privacy Concerns; PPE – Perceived personalization; PAI – Perceived ad irritation; STA – Skepticism toward advertising; AAV – Advertising Avoidance; Bold numbers are Square Root of AVE.

Source: Author's research

4.3. Estimation of model fit

With the help of the statistical software package SPSS AMOS 26, confirmatory factor analysis was performed. The analysis sought to determine the matching of the research model with current data. Fit indices whose values are given in Table 3 were used to show the degree of matching.

Table 3: Fit indices

(Fit indices)	Research model	Recommended value	Source
Chi-square	688.360; 382, p < .0.001		
χ^2/df	1.802	< 5	Park & Kim (2014)
GFI	0.890	> 0.8	Halmi (2016, p. 175)
AGFI	0.866	> 0.8	Halmi (2016, p. 175)
IFI	0.960	> 0.9	Park & Kim (2014)
TLI	0.954	> 0.9	Kim & Han (2014)
NFI	0.915	> 0.9	Park & Kim (2014)
CFI	0.960	> 0.9	Hu & Bentler (1999)
RMSEA	0.046	0.03 – 0.08	Hair et al. (2014, p. 579)
SRMR	0.045	< 0.08	Hair et al. (2014, p. 579)

Source: Author's research

By comparing the actual values with the recommended values, it can be seen that all values are within the reference, which means that the tested model is good, i.e., that it has a good "fit model" (Table 3 and Figure 2). The correction of the measuring scale omits the statements PPC3, STA2, and STA3.

Figure 2: Path diagram*
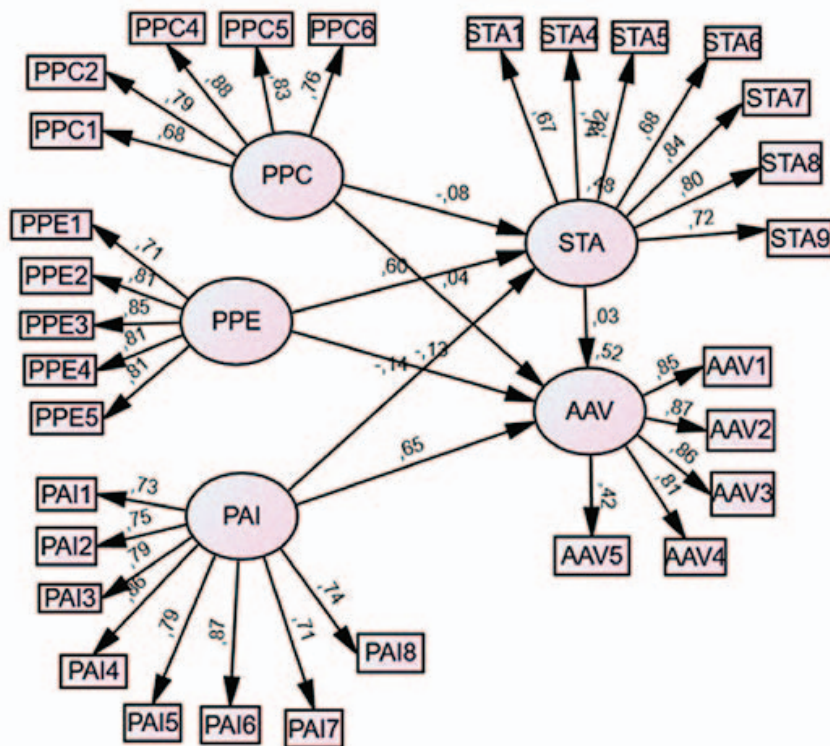
*Maximum Likelihood Estimates

4.4. Research hypothesis testing

Structural equation modelling (SEM) has also been used to test research hypotheses or "tests hypothesized patterns of directional and nondirectional relationships among a set of observed (measured) and unobserved (latent) variables" (MacCallum and Austin, 2000). According to the test results, research hypothesis H1 was not accepted (β = -0.08, C.R. = -1.527, p > 0.05). Privacy concerns have not been found to affect skepticism about ads. Research hypothesis H2 was also not accepted (β = 0.04, C.R. = 0.862, p > 0.05); it was found that privacy concern had no effect on ad avoidance. Research hypothesis H3 was not accepted (β = 0.60, C.R. = 8.769, p < 0.001). The negative correlation between the perception of ad personalization and skepticism towards ads does not exist. Research hypothesis H4 was accepted (β = -0.13, C.R. = -2.101, p < 0.05), a negative impact of personalization perception on ad avoidance was found. Furthermore, a positive effect of perceived ad irritability on ad skepticism was not found, which does not support research hypothesis H5 (β = -0.14, C.R. = -2.496, p <0.05). Research hypothesis H6 (β = 0.65, C.R. = 9.731,

p < 0.001) was accepted, with a positive effect of ad irritation on ad avoidance. Research hypothesis H7 was not accepted (β =0.03, C.R. = 0.563, p > 0.05), which found that skepticism towards advertisements was not positively correlated with ad avoidance.

Table 4: Regression weights structural equation model

Hypothesis	Independent variable	Dependent variable	Standard estimate	CR	P-value	Supported
H1 (+)	PPC	STA	-0.08	-1.527	0.127	N/A
H2 (+)	PPC	AAV	0.04	0.862	0.388	N/A
H3 (-)	PPE	STA	0.60	8.769	***	N/A
H4 (-)	PPE	AAV	-0.13	-2.101	0.036	Accepted
H5 (+)	PAI	STA	-0.14	-2.496	0.013	N/A
H6 (+)	PAI	AAV	0.65	9.731	***	Accepted
H7 (+)	STA	AAV	0.03	0.563	0.574	N/A

PPC – Perceived privacy concerns; PPE – Perceived personalization; PAI – Perceived ad irritation; STA – Skepticism toward advertising; AAV – Advertising avoidance. N/A – Not accepted, *** p < 0,001.

Source: Author's research

The representativeness of the model was measured using the squared multiple correlation coefficient. Coefficient (R^2) indicates "the percentage of the variance in the dependent variable that the independent variables explain collectively" (Hair et al., 2014). The value of the coefficient ranges from 0 to 1. The measured values show that 48% of the variance of the dependent variable skepticism towards advertisements is explained by the influence of independent variables of perceived privacy concerns, perceived ad personalization, and perceived ad irritability. On the other hand, 51.6% of the dependent ad avoidance variable variance was explained by the independent variables of perceived privacy concerns, perceived ad personalization, perceived ad irritability, and skepticism toward advertising. The summary of the research hypothesis testing results is shown in Table 4.

5. Results and discussion

The research aims to determine the factors influencing the avoidance of personalized ads sent via Facebook. This goal examines the correlations between perceived privacy concerns, perceived ad personalization, and the perceived irritability of ads with skepticism about ads and ad avoidance. Previous research in the field of ad avoidance through determining the values and attitudes of

advertising is largely based on the theory of media Uses and Gratifications (Murillo et al., 2016), according to which users expose themselves to the media as needed to meet their needs. However, technological development, primarily in the field of data collection and analysis (Big Data, AI), enables a high level of personalization and prediction, which requires that the personalization of ads be included in models of researching attitudes about advertising and their acceptance or rejection. Therefore, the results of this research allow us to look at the psychological process of accepting or avoiding personalized ads through the aforementioned influencing factors (motivators).

New technologies enable the very efficient collection, storage, analysis, copying, and distribution of data and information related to a particular person, and, as such, it represents the basis for personalization. Personalization enters the area of privacy and increases the possibility of privacy violations, which increases the concern of individuals for their privacy. The research hypothesis H1 and H2 test results did not confirm a positive correlation between privacy concerns and ad skepticism and ad avoidance. The arithmetic mean of the answers to the privacy questions indicates the respondents' relative neutrality regarding their privacy concerns. As over 51% of respondents are up to 23 years of age and over 39% up to 40 years of age, it can be concluded that the younger generation does not attach much importance to the issue of privacy in the online environment. The result is on the trail of more research showing that Millennials and Generation Z generally do not show too much attention to their data privacy in online communication. According to Gallup's research (2016), Millennials are aware of the dangers of sharing information but trust the institutions they share that information with. It is a generation that grows with the development of social networks and realizes that something negative can happen, but it is not the end of the world for them. Similar results come from the Center for Digital Future survey (2013), where the 18-34 generation shows awareness of the problem of privacy and the sharing of personal data. Still, more than 50% of them will share information if they get something in return. Aima research (2011) finds that 50% of Millennials will share their data to access reward programs, while 36% register on a website. These are in the wake of the confirmation of the existence of the so-called "privacy paradox" where the irrational behavior of users who, despite concerns about the security of their data, still share them with some benefit (Norberg et al. 2007; Brown, 2001; Oetzel and Gonja, 2011).

The obtained result is not in accordance with the results of the research Beak and Morimoto (2012), which shows the privacy concern as predictors of ad skepticism and ad avoidance in the context of personalized advertising media (unsolicited commercial e-mail, postal direct mail, telemarketing, text messaging) and Tran, (2017) in the context of personalized ads on Facebook. On the other hand, Youn and Shin (2019) find that younger Facebook users' privacy concern

has no impact on ad avoidance. In their study, Li and Huang (2016) also found that privacy concern has no impact on the negative experience (pandan of ad skepticism) but has on ad avoidance in the context of online behavioural advertising. That privacy concern has no effect on ad avoidance in the generation of Millennials is also established by the research of Nyheim et al. (2015) in the application of smartphones in advertising. Kusyanti et al. (2017) find that younger Facebook users, although believing that a privacy risk exists, it does not affect their intention to share private data. The reason for such behaviour is the benefits that Facebook as a social network provides. The find that Facebook users put benefits ahead of potential privacy risk is also found by Debatin et al. (2009) in his research. The tendency of reduced influence of privacy concerns on the behaviour of social network users is also indicated by the research of Kim and Wang (2020), who find that privacy concern has no influence on behaviour in terms of using social media privacy settings. Fear of misuse of their data is not a sufficient motive to take action to prevent it. In general, several reasons can be given for the absence of privacy concern on ad skepticism and ad avoidance 1) the ability to control one's privacy and control over ads received that Facebook provides through privacy settings (Wiese et al., 2020; Kim and Wang, 2020), and users have knowledge for it (Debatin et al. 2009), 2) the existence of trust in communication through social networks (Wiese et al. 2020; Håkansson and Witmer, 2015) and the GDPR regulation (Presthus and Vatne, 2019), 3) the benefits that Facebook communication provides, which in the younger population goes in the direction of maintaining social contact and self-expression (Youn and Shin 2019; Debatin et al., 2009).

Furthermore, the result shows no negative correlation between perceived personalized Facebook ads and skepticism towards ads (hypothesis H3). The result is not in line with previous research (Beak and Morimoto, 2012; Li and Huang, 2016; Tran, 2017). Ads tailored to specific individuals have been found not to affect their attitude toward advertising. Beak and Morimoto (2012) believe that personalized ads, i.e., ads tailored to specific individuals, reduce his resistance to ads. In that sense, their skepticism about advertising should be lower. The results of this research show the opposite, personalization of ads does not reduce skepticism about advertising. The benefits of personalization still do not improve the attitude about advertising.

Research hypothesis H4 was accepted, and a negative impact of perceived personalized ads on Facebook on ad avoidance was found. The result is consistent with Beak and Morimoto's research (2012) and Nyheim et al. (2015), who find that the values delivered by personalized ads reduce the intention to avoid them. In addition, Van den Broeck et al. (2020) find that personalized ads also contribute to greater engagement of recipients of such ads. On the other hand, Tran (2017) emphasizes the role of personalized Facebook ads in increasing their credibility and

positive attitude about Facebook advertising. His research does not find a significant impact of perceived personalized ads on ad avoidance. However, this indicates that this impact exists through the mediation of a credibility variable.

Research hypothesis H5 was not accepted. Facebook ad irritability has not had a positive effect on ad skepticism, which is not consistent with previous research by Smith (2007), Beak and Morimoto (2012), Nyheim et al. (2015), and (Youn and Shin, 2019). The result is not expected. However, some previous research conducted on a younger population related to determining the impact of ad irritability on ad value perception (in the context of different media) also finds that irritability perception does not negatively affect ad value (Dar et al. 2014; Murillo and Merino 2016; Dobrinić, 2020). Respondents' opinion regarding the irritability of ads is mostly neutral (mean range 2.82 to 3.75, on a 5-point scale), which indicates their resistance to irritability of personalized ads. The reason for this resistance can be found in their technological skills that allow them to easily navigate the social networks and neutralize the negative impact of unwanted content without many cognitive efforts.

Research hypothesis H6 was accepted, a positive correlation was found between Facebook ad irritability and ad avoidance. Path analysis shows the most significant impact (0.65) of ad irritation on ad avoidance. (Table 4). Results are consistent with previous research by Smith (2007), Beak and Morimoto (2012), Nyheim et al. (2015), and Youn and Shin (2019) where it was confirmed that intrusive ads create a sense of irritation for the user and lead him to avoid them.

Research hypothesis H7 has not been accepted. The significant impact of skepticism on ad avoidance has not been established, so skepticism is not a driver of ad intent avoidance. A review of previous research hypotheses found that these were perceived personalization and perceived ad irritation. The obtained result is contrary to Beak and Morimoto (2012) research in contexts of personalized advertising media and Li and Huang (2016) in the context of online advertising negative experience to ad avoidance, but in line with Tran (2017) research in the context of personalized ads on Facebook. Tran (2017) explains this result by the role and significance of personalized ads for Facebook users who, despite some skepticism, maintain a positive attitude about those ads as well as the type of products and brands that are advertised. This study also confirms the high impact of perceived personalization on personalized ad skepticism. Participants show some neutrality regarding skepticism towards Facebook advertising (mean responses range from 2.44 to 3.03 on a scale of 1 to 5). They are neutral in terms of the veracity of the ads, their informativeness, and their reliability. At the same time, they show neutrality towards avoiding these ads (mean responses range from 3.25 to 3.50). They do not hate personalized ads, they do not ignore them, and they do not reject them a priori upon receipt.

6. Conclusion

Social networks are becoming the most important communication medium with a great impact on society as a whole. Social media marketing today is more than ever focused on developing customer engagement in which personalized ads are of great importance. In this section, the scientific, as well as a practical contribution to the development of marketing strategies through social networks, will be presented.

6.1. Contribution to the theory

Currently, different ways and techniques of personalization are used (according to location, interests, searches, preoccupation, etc.) in order to try to meet the needs of a particular individual. Personalization inevitably contributes to increased sales (BCG, 2020), but it can also cause the opposite effect, which in theory is known as the "personalization paradox" Thus, personalization based on the collected (obtained) data and information provide the potential buyer with a more relevant offer; however, it can induce concerns regarding customers' vulnerability and compromised privacy. To keep the negative sides of personalization under control, it is necessary to pay attention to the perception of personalization by Facebook users. Therefore, it is necessary to determine which elements affect the acceptance of personalized ads and their less avoidance.

Previous research in the context of different media has established the relationship between the perception of personalized ads and ad avoiding. There are very few papers that explore this in the context of Facebook ads, which is understandable given those technologies of more recent date support this form of advertising. The research included mainly the younger population, which shows that they are aware of the dangers of sharing personal data and information via Facebook, but this does not affect their behavior in terms of avoiding personalized ads. What bothers them and what is the main reason for avoiding ads is their irritability. Path analysis confirms that fact and shows that the influence of perceived irritability on avoiding personalized ads is the greatest (0,65). Perceived personalization, privacy concern, and perceived ad irritation explain 48% of ad skepticism variance and 51.6% of the variance in avoidance. Although the independent variables from the model satisfactorily predict changes in the dependent variables, the introduction of new variables of influence that the further development of this form of advertising will bring is necessary in order to better predictions.

6.2. Managerial implications

This research shows that a younger group of users does not show much concern about privacy, and it does not affect their attitude about Facebook advertising and avoiding Facebook personalized ads. The result is a trace in the literature of present

knowledge about the behaviour and characteristics of Generation Z and Millennials who are aware that the danger of data misuse exists but trust the institutions. It signifies that advertisers must continue to focus on protecting privacy and not compromise this trust. This ensures the exchange of information that will enable more precise targeting. According to the research results, the younger population of Facebook users is looking for certain benefits that can be considered as the reason for reduced privacy concerns. Those benefits have to be clearly communicated, recognized, and to be on the trail of the credibility of the advertising itself. Precise targeting of users with the offer requires additional effort to create content that users recognize, leading to reducing skepticism and avoidance of ads. The research results show a strong influence of the perception of ad irritation on their avoidance. Irritability can be caused by untrue, confusing, and intrusive content and too many ads or too often to send ads. These are the elements to pay attention to when creating and implementing advertising campaigns. In order to ensure the credibility (as well as greater efficiency) of advertising, these elements must be aligned with the requirements and wishes of the recipient.

6.3. Limitations and future research

The structure of the sample can be highlighted as a limiting factor of this research. The sample consists of a younger population (members of Generation Z and Millennials). Given that the structure of Facebook users is increasingly changing in favour of the older population, future research should include them. It would also be interesting in future research to investigate the impact of ad personalization and ad irritability on advertising skepticism about advertising. Personalization, supported by the development of new technologies, primarily AI and Big Data, is changing the current patterns of marketing activities, which requires constant research of customers' attitudes about it. In adopting these marketing approaches, it is important to consider the generations according to which they are implemented. Younger generations are more receptive to change than older ones, who still have some market power. So, there will be a very turbulent period in which generations will cope differently, and different circumstances (variables) will affect their satisfaction and certain behavior. Exploring these impacts will be a *condition sine qua non* of new customized marketing approaches.

References

Aaker, D.A., Bruzzone, D.E. (1985) "Causes of Irritation in Advertising" *Journal of Marketing,* Vol. 49, No. 2, pp. 47–57.

Aimia (2011) Born This Way: Millennials Loyalty Survey, (https://www.slideshare.net/recsportsmarketing/aimia-gen-yus) [accessed December 20, 2020].

Aktan, M., Aydogan, S., Aysuna, C. (2016) "Web Advertising Value and Student's Attitude Towards Web Advertising" *European Journal of Business and Management,* Vol. 8, No. 9, pp. 86–97. https://core.ac.uk/download/pdf/234627171.pdf.

Altintas, V., Tuzunkan, D. (2017) "Poverty as an obstacle for travel: Domestic tourism activities in Spain" *International Journal of Economics and Financial Issues,* Vol. 7, No. 2, pp. 448–452. https://dergipark.org.tr/en/download/article-file/365847.

Amyx, D. A., Lumpkin, J. R. (2016) "Interaction Effect of Ad Puffery and Ad Scepticism on Consumer Persuasion" *Journal of Promotion Management,* Vol. 22, No. 3, pp. 403–424. https://doi.org/10.1080/10496491.2016.1154920.

Arora, T., Agarwal, B. (2019) "Empirical Study on Perceived Value and Attitude of Millennials Towards Social Media Advertising: A Structural Equation Modelling Approach" *The Journal of Business Perspective,* Vol. 23, No. 1, pp. 56–69. https://doi.org/10.1177%2F0972262918821248.

Baek, T.H., Morimoto, M. (2012) "Stay away from me: Examining the Determinants of Consumer Avoidance of Personalized Advertising" *Journal of Advertising*, Vol. 41, No. 1, pp. 59–76. https://www.jstor.org/stable/23208321.

Bagozzi, R. P., Yi, Y. (1988) "On the evaluation of structural equation models" *Journal of the Academy of Marketing Science,* Vol. 16, No. 1, pp. 74–94. https://link.springer.com/article/10.1007/BF02723327.

Bang, H., Wojdynski, B. W. (2016) "Tracking users' visual attention and responses to personalized advertising based on task cognitive demand" *Computers in Human Behavior*, Vol. 55, pp. 867–876. https://www.sciencedirect.com/science/article/abs/pii/S074756321530203X.

BCG (2020) Boston Consulting Group. (https://www.bcg.com/press/8may2017-profiting-from-personalization) [accessed December 27, 2020].

Bleier, A., Eisenbeiss, M. (2015) "The Importance of Trust for Personalized Online Advertising" *Journal of Retailing*, Vol. 91, No. 3, pp. 390–409. https://www.sciencedirect.com/science/article/abs/pii/S0022435915000263.

Brown, B. (2001) Studying the internet experience. HP Laboratories Technical Report (HPL2001-49) (http://www.hpl.hp.com/techreports/2001/HPL-2001-49.pdf) [accesses November 26, 2020].

Brown, J. D. (1996) *Testing in language programs*. Upper Saddle River, NJ: Prentice Hall Regents, p. 231.

Center for the Digital Future (2013) *The Digital Future Project-2013*, Surveying The Digital Future – Year Eleven. University of Southern California 2013.

Chaffey, D., Chadwick-Ellis, F. (2019) *Digital marketing, Strategy, Implementation and Practice,* Seventh Edition, Pearson, Harlow, p. 261.

Chaffey, D., P.R Smith (2017) *Digital marketing excellence, planning, optimizing and integrating online marketing,* fifth edition, Routledge, New York, p. 476.

Cho, C-H., Cheon, H.J. (2004) "Why Do People Avoid Advertising on the Internet?" *Journal of Advertising,* Vol. 33, No. 4, pp. 89–97. https://www.jstor.org/stable/4189279.

Dar, A.N. et al. (2014) „Facebook verses Television: Advertising value perception among Students" *International Journal of Business and Management Invention,* Vol. 3, No. 9, pp. 61–70. https://www.coursehero.com/file/60707911/Facebook-versus-televisionpdf/.

Debatin, B. et al. (2009) "Facebook and Online Privacy: Attitudes, Behaviors, and Unintended Consequences" *Journal of Computer-Mediated Communication*, Vol. 15, No. 1, pp. 83–108. https://academic.oup.com/jcmc/article/15/1/83/4064812.

Dobrinić, D. (2020) "Advertising value and attitude to cataloges and store flyer ads among Croatian consumers – SEM approach" *Market-Tržište*, Vol. 32, No. 2, pp. 129–146. https://hrcak.srce.hr/file/364116.

Ducoffe, R.H. (1995) "How Consumers Assess the Value of Advertising" *Journal of Current Issues & Research in Advertising,* Vol. 17, No. 1, pp. 1–18. https://www.tandfonline.com/doi/abs/10.1080/10641734.1995.10505022.

Florea, N.V., Tanasescu, D.A., Duica, A. (2018) "Enabling Customer-Centricity and Relationship Management using Net Promoter Score" *Valahian Journal of Economic Studies*, Vol. 9, No. 23, pp. 115–126. 10.2478/vjes-2018-0023.

Ford, G. T., Smith, D. B., Swasy, J. L. (1990) "Consumer skepticism of advertising claims: Testing hypotheses from economics of information" *Journal of Consumer Research*, Vol. 16, No. 4, pp. 433–441. https://doi.org/10.1086/209228.

Gallup research, (2016) *How Millennials Want to Work and Live*, Gallup Inc. NY 2016, p. 129.

Goldsmith, R.E., Freiden, B. J. (2004) "Have it your way: consumer attitudes toward personalized marketing" *Marketing Intelligence & Planning*, Vol. 22, No. 2, pp. 228–239. https://doi.org/10.1108/02634500410525887.

Grmuša, T., Tomulić, A.M., Anđelić, V. (2019) "Zaštita privatnosti djece i maloljetnika na društvenoj mreži Facebook: navike i iskustva roditelja" *Communication Management Review,* Vol. 4, No. 1, pp. 78–97. https://doi.org/10.22522/cmr20190141.

Habeahan, M. (2016) "Text message advertising avoidance: A comparison between location-based text message advertising and unsolicited text message advertising" *Asia Pacific Journal of Advanced Business and Social Studies,* Vol. 2, No. 2, pp. 13–21. https://apiar.org.au/wp-content/uploads/2016/08/2_APJABSS_ICABSS_BRR713_BIZ-13-21.pdf.

Hadija, Z., Barnes, S. B., Hair, N. (2012) "Why we ignore social networking advertising" *Qualitative Market Research: An International Journal,* Vol. 15, No. 1, pp. 19–32. https://www.emerald.com/insight/content/doi/10.1108/13522751211191973/full/html.

Hair, J.F. et al. (2014) "Partial least squares structural equation modeling (PLS-SEM)" *European business review.,* Vol. 2, pp. 106–121. https://www.emerald.com/insight/content/doi/10.1108/EBR-10-2013-0128/full/html.

Håkansson, P., Witmer, H. (2015) "Social Media and Trust — A Systematic Literature Review" *Journal of Business and Economics,* Vol. 6, No. 3, pp. 517–524. 10.15341/jbe(2155-7950)/03.06.2015/010.

Halmi, A. (2016) *Multivarijantna analiza*, Zagreb, 2016, p. 175.

Hanlon, A. (2019) *Digital marketing, Strategic, Planning & Integration*, Sage, p. 91.

HubSpot (2020) *The Ultimate List of Marketing Statistics for 2020* (https://www.hubspot.com/marketing-statistics) [accessed November 20, 2020].

Huh, J., Delorme, D.E., Reid, L. N. (2015) "Do Consumers Avoid Watching Over-the-Counter Drug Advertisements? An Analysis of Cognitive and Affective Factors That Prompt Advertising Avoidance" *Journal of Advertising Research,* Vol. 55, No. 4, pp. 401–415. 10.2501/JAR-2015-022.

Hulland, J. (1999) "Use of Partial Leasr Squares (PLS) in Strategic Management Research" *Strategic Management Journal,* Vol. 20, No. 2, pp. 195–204. https://onlinelibrary.wiley.com/doi/abs/10.1002/%28SICI%291097-0266%281999021%2920%3A2%3C195%3A%3AAID-SMJ13%3E3.0.CO%3B2-7.

Kelly, L., Drennan, J, Kerr, G. (2010) "Avoidance of Advertising in Social Networking Sites" *Journal of Interactive Advertising*, Vol. 10, No. 2, pp. 16–67. 10.1080/15252019.2010.10722167.

Keyzer, F. De, Dens, N., Pelsmacker, P. (2015) "Is this for me? How Consumers Respond to personalized Advertising on Social Network Sites" *Journal of Interactive Advertising,* Vol. 12, No. 2, pp. 1–11. https://doi.org/10.1080/15252019.2015.1082450.

Kim, J., Wang, J. (2020) "Examing Factors that Determine the Use of Social Media Privacy Settings: Focused on the Mediating Effect of Implementation Intention to Use Privacy Settings" *Asia Pacific Journal of Information System,* Vol. 30, No. 4, pp. 919–945.

Kingsnorth, S. (2019) *Digital Marketing Strategy, An integrated approach to online marketing* Second Edition, Kogan Page, p. 175.

Kusyanti, A., et al. (2017) Information privacy Concerns on Teens as Facebook Users in Indonesia, 4th Information Systems International Conference 2017, ISICO 2017, 6-8 November 2017, Bali, Indonesia.

Lacy, K., Diamond, S., Ferrara, J. (2013) *Social CRM for Dummies,* Wiley, Haboken, New Yersey, p. 27.

Lee, J., Kim, S., Ham, C.-D. (2016) "A double-edged sword? Predicting consumers' attitudes toward and sharing intention of native advertising on social media" *American Behavioral Scientist*, Vol. 60, pp. 1425–1441. https://journals.sagepub.com/doi/10.1177/0002764216660137.

Li, C. (2016) "When does web-based personalization really work? The distinction between actual personalization and perceived personalization" *Computers in Human Behavior,* Vol. 54, pp. 25–33. https://www.sciencedirect.com/science/article/abs/pii/S0747563215300613.

Li, H., Edwards, S.M., Lee, J. H. (2002) "Measuring the Intrusiveness of Advertisements: Scale Development and Validation" *Journal of Advertising,* Vol. 31, Vol. 2, pp. 37–47. 10.1080/00913367.2002.10673665.

Li, W., Huang, Z. (2016) "The Research of Influence Factors of Online Behavioral Advertising Avoidance" *American Journal of Industrial and Business Management* Vol. 6, No. 9, pp. 947–957. https://file.scirp.org/pdf/AJIBM_2016091416301591.pdf.

MacCallum, R. C. (1995) *Model specification: Procedures, strategies, and related issues. In Structural equation modeling: Concepts, issues, and applications*, R. H. Hoyle (editor). Thousand Oaks, CA: Sage Publications, Inc., pp. 16–29.

Malheiros, M. et al. (2012) "Too close for comfort: A study of the effectiveness and acceptability of rich-media personalized advertising" *CHI'12: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pp. 579–588.

Maslowska, E., Smith, E.G., van den Putte, B. (2016) "It is all in the name: A study of consumers' responses to personalized communication" *Journal of Interactive Advertising,* Vol. 16, No. 1, pp. 74–85. https://www.tandfonline.com/doi/abs/10.1080/15252019.2016.1161568.

Murillo, E., Merino, M., Nunez, A., (2016) "The advertising of Twitter ads: a study among Mexican millennials" *Review of Business Management,* Vol. 18, No. 61, pp. 436–456. 10.7819/rbgn.v18i61.2471

Norberg, P.A., Horne, D.R., Horne, D.A. (2007) "The privacy paradox: Personal information disclosure intentions versus behaviors" *Journal of Consumer Affairs,* Vol. 41, No. 1, pp. 100–126. https://doi.org/10.1111/j.1745-6606.2006.00070.x.

Nyheim, P. et al. (2015) "Predictors of avoidance toward personalization of restaurant smartphone advertising- A study from Millenials' perspective" *Journal of Hospitality and Tourism Technology, Vol.* 6, No. 2, pp. 145–159. 10.1108/JHTT-07-2014-0026.

Obermiller, C., Spangenberg, E. (1998) "Development of a Scale to Measure Consumer Scepticism Toward Advertising" *Journal of Consumer Psychology,* Vol. 7, No. 2, pp. 159–186. https://doi.org/10.1207/s15327663jcp0702_03.

Oetzel, M.C., Gonja, T. (2011) The online privacy paradox: a social representations perspective. In: Proceedings of CHI'11 Extended Abstracts on Human Factors in Computing Systems, May 7-12, Vancouver, Canada.

PageFair (2017) *The state of the blocked web 2017* Global Adblock Report

Park, E., Kim, K.J. (2014) "An Integrated Adoption Model of Mobile Cloud Services: Exploration of Key Determinants and Extension of Technology

Acceptance Model" *Telematics and Informatics,* Vol. 31, No. 3, pp. 376–385. https://www.sciencedirect.com/science/article/abs/pii/S0736585313000877.

Pasadeos, Y. (1990) "Perceived Informativeness of and Irritation with Local Advertising" *Journalism & Mass Communication Quarterly* Vol. 67, No. 1, pp. 35–39. https://doi.org/10.1177/107769909006700107.

Pine, J.B. (1993) Mass Customization, *Harvard Business School Press*, Boston, MA.

Piorunkiewicz-Soltysik, A., Strzeleckia, A., Abramek, E. (2020) Evaluation of Adblock Software Usage, *Complex Systems Informatics and Modeling Quarterly (CSIMQ) eISSN: 2255-9922,* Vol. 21, pp. 51–63.

Presthus, W., Vatne, D.M. (2019) "A survey on Facebook Users and Information Privacy" *Procedia Computer Science,* Vol. 164, pp. 39–47. https://doi.org/10.1016/j.procs.2019.12.152.

Rau, P.-L., Liao, Q., Chen, G. (2013) "Factors influencing mobile advertising avoidance" *International Journal of Mobile Communication,* Vol. 11, No. 2, pp. 123–139. https://doi.org/10.1504/IJMC.2013.052637.

Seyedghorban, Z., Tahernejad, H., Matanda, M. J. (2015) "Reinquiry into Advertising Avoidance on the Internet: A Conceptual Replication and Extension" *Journal of Advertising*, Vol. 45, No. 1, pp. 120–129. https://doi.org/10.1080/00913367.2015.1085819.

Sheehan, Kim B., Mariea G. Hoy, (1999) "Flaming, Complaining, Abstaining: How Online Users Respond to Privacy Concerns" *Journal of Advertising,* Vol. 28, No. 3, pp. 37–52. https://www.jstor.org/stable/4189116.

Shen, G. C.-C. et al. (2016) "Effective marketing communication via social networking site: The moderating role of the social tie" *Journal of Business Research,* Vol. 69, pp. 2265–2270.

Smit, E., Noort, G., Voorveld, H. (2014) "Understanding online behavioral advertising: User knowledge, privacy concerns, and online coping behavior in Europe" *Computers in Human Behaviour* Vol. 32, pp. 15–22. https://doi.org/10.1016/j.chb.2013.11.008.

Smith, A.D. (2007) "Exploring advergaming and its online advertising implications" *International Journal of Business Information Systems,* Vol. 2, No. 3, pp. 298-311. https://www.inderscienceonline.com/doi/abs/10.1504/IJBIS.2007.011981

Speck, P. S., Elliott, .M.T. (1997) "Predictors of Advertising Avoidance in Print and Broadcast Media," *Journal of Advertising*, Vol. 26, No. 3, pp. 61–76. https://doi.org/10.1080/00913367.1997.10673529.

Statista (2020) (https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/) [accessed Novembar 3, 2020].

Tran, T.P. (2017) "Personalized ads on Facebook: An effective marketing tool for online marketers" *Journal of Retailing and Consumer Services,* Vol. 39, pp. 230–242. https://doi.org/10.1016/j.jretconser.2017.06.010.

Truyens, M., Eecke V.P. (2010) "Privacy and social networks" *Computer Law & security Review*, Vol. 26, No. 5, pp. 535–546. 10.1016/J.CLSR.2010.07.006.

Tucker, C.E. (2014) "Social Networks, Personalized Advertising and Privacy Controls" *Journal of Marketing Research,* Vol. 51, No. 5, Electronic Journal avialable at: http://ssrn.com/abstract=1694319.

Van den Broeck, E., Poels, K., Walrave, M. (2020) "How do users evaluate personalized Facebook advertising: An analysisi of consumer-and adveriser controlled factors" *Qvalitative Market Research*, Vol. 23, No. 2, pp. 309–325. 10.1108/qmr-10-2018-0125.

Yong, A.G., Pearce, S. (2013) "A Beginner's Guide to Factor Analysis: Focusing on Exploratoring Factor Analysis" *Tutorials in Quantitative Methods for Psychology*, Vol. 9, No. 2, pp. 79–94. https://www.tqmp.org/RegularArticles/vol09-2/p079/p079.pdf.

Youn, S., Shin, W. (2019) "Teens' responses to Facebook newsfeed advertising: The effect of cognitive appraisal and social influence on privacy concerns and coping strategies" *Telematics and Informatics*, Vol. 38, pp. 30–45. https://doi.org/10.1016/j.tele.2019.02.001.

Istraživanje čimbenika utjecaja na izbjegavanje personaliziranih oglasa na Facebooku

Damir Dobrinić[1], *Iva Gregurec*[2], *Dunja Dobrinić*[3]

Sažetak

Personalizacija oglasa postaje dominantna promotivna taktika koja se dodatno poboljšava primjenom novih tehnologija. Veća učinkovitost glavni je cilj takvog pristupa oglašavanju koji može uzrokovati i pojavu takozvanog „paradoksa privatnosti" te time izazvati negativne reakcije potrošača u smislu izbjegavanja takvih oglasa. Ovaj rad istražuje čimbenike koji utječu na izbjegavanje personaliziranih oglasa komuniciranih putem društvene mreže Facebook. U okviru istraživačkog modela razmatra se utjecaj percipirane personalizacije, percipirane iritacije i percipirane zabrinutosti za privatnost na skepticizam prema oglasima i njihovom izbjegavanju. Provedeno je empirijsko istraživanje nad podacima prikupljenih putem mobilnih aplikacija Facebook i WhatsApp. U skladu s dobivenim rezultatima, utvrđeno je da ne postoji negativan utjecaj percipirane personalizacije na skepticizam prema oglasima dok postoji prema njihovom izbjegavanju. Izravni pozitivni utjecaj percipirane zabrinutosti za privatnost na skepticizam i izbjegavanje oglasa nije utvrđen. Utvrđeno je da pozitivan utjecaj percipirane iritacije oglasa na skepticizam ne postoji ali postoji vrlo jak utjecaj te varijable na izbjegavanje oglasa. Također, utvrđeno je da skepticizam prema personaliziranim oglasima nema pozitivan utjecaj na izbjegavanje personaliziranih oglasa. Osim novih spoznaja, rezultati ovog rada mogu biti korisni u osmišljavanju i provedbi promotivnih kampanja putem društvenih medija.

Ključne riječi: *Facebook personalizirani oglasi, skepticizam prema oglasima, izbjegavanje oglasa, nove tehnologije*

JEL klasifikacija: *M31, M37*

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Appendix

Table A1: Original measurement items

Variables		Measurement items
Advertising Avoidance	AAV1	I intentionally ignore any personalized advertising on Facebook.
	AAV2	I hate any personalized advertising on Facebook.
	AAV3	It would be better if there were no personalized advertising on Facebook.
	AAV4	I discard (throw away, hang up) personalized advertising on Facebook immediately without opening (reading, listening to) it.
	AAV5	I have asked marketers to take me off their e-mail (mailing, telephone) lists.
Scepticism toward advertising	STA1	We can depend on getting the truth in most personalized advertising on Facebook.
	STA2*	Personalized advertising's aim is to inform the consumer.
	STA3*	I believe personalized advertising on Facebook is informative.
	STA4	Personalized advertising on Facebook is generally truthful.
	STA5	Personalized advertising on Facebook is a reliable source of information about the quality and performance of products.
	STA6	Personalized advertising on Facebook is truth well told.
	STA7	In general, personalized advertising on Facebook presents a true picture of the product being advertised.
	STA8	I feel I have been accurately informed after viewing (reading, listening to) most personalized advertising on Facebook.
	STA9	Most personalized advertising on Facebook provides consumers with essential information.
Perceived Privacy Concerns	PPC1	When I receive personalized advertising on Facebook I feel uncomfortable when information is shared without permission.
	PPC2	When I receive personalized advertising on Facebook I am concerned about misuse of personal information.
	PPC3*	When I receive personalized advertising on Facebook It bothers me to receive too much advertising material of no interest.
	PPC4	When I receive personalized advertising on Facebook I feel fear that information may not be safe while stored.
	PPC5	When I receive personalized advertising on Facebook I believe that personal information is often misused.
	PPC6	When I receive personalized advertising on Facebook I think companies share information without permission.

Variables		Measurement items
Perceived ad irritation	PAI1	When I receive personalized advertising on Facebook, I think it is negative.
	PAI2	When I receive personalized advertising on Facebook, I think it is irritating.
	PAI3	When I receive personalized advertising on Facebook, I think it is pointless.
	PAI4	When I receive personalized advertising on Facebook, I think it is unappealing.
	PAI5	When I receive personalized advertising on Facebook, I think it is regressive.
	PAI6	When I receive personalized advertising on Facebook, I think it is unattractive.
	PAI7	When I receive personalized advertising on Facebook, I think it is vulgar.
	PAI8	When I receive personalized advertising on Facebook, I think it is awful.
Perceived Personalization	PPE1	This personalized advertising on Facebook makes purchase recommendations that match my needs.
	PPE2	I think that this personalized advertising on Facebook enables me to order products that are tailor-made for me.
	PPE3	Overall, this personalized advertising on Facebook is tailored to my situation.
	PPE4	This personalized advertising on Facebook makes me feel that I am a unique customer.
	PPE5	I believe that this personalized advertising on Facebook is customized to my needs.

Source: Author's research

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432

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434

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436

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Martin, C.L. (1998) "Relationship Marketing: a High-Involvement Product Attribute Approach", *Journal of Product and Brand Management* [Internet], Vol. 7, No. 1, pp. 6–26. Available at: <http://www.apmforum.com/emerald/marketing-research-asia.htm> [Accessed: October 3, 2002]

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Porter, M.A. (1993) "The modification of method in researching postgraduate education". In Burges, R.G. ed., *The research process in educational settings: ten case studies,* London: Falmer.

• **Conference papers from conference proceedings:** Author of the conference paper (year of publication) "Title of the conference paper". In *Title of conference proceedings.* Place of publication: Publisher, pagination of section referred to:

Fedchak, E. & Duvall, L. (1996) "An engineering approach to electronic publishing". In *Proceedings of the International Workshop on Multimedia Software Development,* 25-26 March, Berlin, Los Alimos, Ca: IEEE Comput. Soc. Press, pp. 80-88.

• **Theses and dissertations:** Author's name (year) *Title of doctoral dissertation,* the name of the awarding institution:

Whitehead, S.M. (1996) *Public and private men: masculinities at work in education management,* PhD thesis, Leeds Metropolitan University.

• **Official publications:** Title of publication/organisation/institution (year) *Title*, Place of publishing: Publisher. Example:

Department of the Environment (1986) *Landfilling wastes,* London: HMSO (*Waste management paper, 26*).

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440

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conference/seminar websites, and how, when and where conference material will be published and can be obtained (i.e. selected and reviewed conference papers). The review should provide a clear and comprehensive overview of the main objectives of the conference, mentioning the keynote speaker(s), participants' panel discussion on scientific achievements, research findings and suggestions for further research and pressing questions in need of answer. The reviewer's name is stated at the end of the text with his or her academic title and affiliation.

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442

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Zb. rad. Ekon. fak. Rij. • 2021 • vol. 39 • no. 2 • 431-452

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Uredništvo zaprima sve rukopise. Glavni i odgovorni urednik tekstove, nakon pregleda i prihvaćanja, upućuje u postupak prosudbe ("assessment process") članovima Uredništva, ali i ekspertnim stručnjacima izvan Uredništva u slučaju specifičnog sadržaja teksta. Poslije prosudbe, glavni i odgovorni urednik predlaže Uredništvu odluke za daljnji postupak i to: (a) koje se rukopise, u slučaju potrebe, vraća autoru sa sugestijama, preporukama i primjedbama radi poboljšanja, prije svega, metodološke prezentacije građe istraživanja; (b) koje rukopise uputiti u postupak recenzija ("reviewing process"); (c) koje rukopise odbiti, budući da:

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Pregledni rad (Review article). Sadrži poseban problem o kojem je već publiciran znanstveni rad, ali mu se pristupa na nov način.

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Osim tradicionalnog fokusa na empirijske radove, časopis poziva autore da dostave teorijske radove koji bi trebali pokriti nedostatak temeljnih istraživanja i meta-analize literature s ciljem pružanja temelja za kvalitetnija empirijska istraživanja, kao i razvoj novih ideja i uvida u ekonomskoj teoriji i praksi. Posebno pozivamo autore s radovima s visokom razinom teorijske argumentacije (ali za većinu ljudi razumljive) s jasnom analizom / porukama / preporukama usmjerenom na preporuke i buduća istraživanja; studije koje se usredotočuju na međuovisnost različitih, osobito aktualnih, ekonomskih kretanja; studije usmjerene na trans-disciplinarni i interdisciplinarni karakter ekonomskih analiza (tehnička, pravna, socijalna, ekonomska i druga područja).

Časopis crpi metodologiju za teorijske radove iz časopisa Journal of Economic Perspectives (https://www.aeaweb.org/journals/jep), sa sličnim ciljevima: sintetizirati i integrirati naučene lekcije iz najrelevantnijih područja i dilema suvremene ekonomske teorije i prakse; prezentirati ekonomske analize vezane za dileme javnih politika; poticati međusobnu razmjenu ideja među pojedinim znanstvenim područjima; ponuditi čitateljima dostupan izvor za najsuvremenija ekonomska promišljanja i predložiti smjerove za buduća istraživanja. Fokus teorijskih članaka trebao bi biti na razumijevanju središnjih ekonomskih ideja, koje su postojeće dileme i neistražena područja, zašto su navedena pitanja posebno važna, koja su najnovija dostignuća i koje aspekte treba ispitati.

U slučaju predaje teorijskog rada umjesto cjeline *Empirijski podaci i analiza*, autori trebaju obraditi poglavlje *Teorijska/konceptualna analiza* gdje bi autori trebali dati argumentaciju na temelju predložene metodologije/koncepta istraživanja. U ovom dijelu autori trebaju dati novu analizu područja/teme, dati teorijsku argumentaciju koja svoju hipotezu dokazuje korištenjem različitih dostupnih alata kao što su matematički, grafički ili bilo koji drugi koji jasno prikazuju i otkrivaju ekonomske odnose u odnosu na određeno znanstveno područje.

Sadržaj članka

Rad treba biti relevantan za međunarodnu znanstvenu i stručnu javnost s jasno naznačenim ciljevima i rezultatima istraživanja, zaključkom, referencama u tekstu i bibliografskim jedinicama na kraju rada. Ideje u radu moraju biti originalne i trebaju značajno doprinositi razvoju predmeta istraživanja, a metodologija mora biti jasno opisana.

Autori u članku moraju posebnu pozornost obratiti na odgovarajuće strukturiranje teksta sukladno priznatim standardima znanstvene metodologije u ekonomskim istraživanjima, kako je navedeno:

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446

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Članak mora zadovoljavati sve tehničke propozicije navedene u ovim uputama.

Stil i organizacija teksta

Autori se obvezno moraju pridržavati znanstvene metodologije prezentacije građe u pisanju tekstova koja je uobičajena u znanstvenim publikacijama ("Harvard style"). To zahtijeva sljedeći pristup:

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- *Sažetak (Abstract)* – ispod naslova
- *Ključne riječi*
- *JEL klasifikacija.*

Iza toga slijedi glavni dio rada podijeljen u odlomke:

- *Uvod*
- *Pregled literature*
- *Metodologija/metoda/model/koncepcija analize* (treće poglavlje)
- *Empirijski podaci (dokumentacijska podloga) i analiza* (četvrto poglavlje)
- *Rezultati i diskusija* (peto poglavlje)
- *Zaključci* (šesto poglavlje).

(2) Sadržaj pojedinih dijelova prezentirane građe:

a. **Sažetak** – ispisuje se u 100-250 riječi, a obvezno treba sadržavati:

- utvrđeni cilj istraživanja,
- metodu/model/koncepciju analize,
- glavni rezultat istraživanja (analize),
- temeljni zaključak istraživanja.

Sažetak se ne smije pisati u odlomcima!

b. **Ključne riječi** – moraju odražavati suštinu sadržaja rada, a navodi se do pet takvih riječi.

c. **JEL klasifikacija** – autor svoju temu mora razvrstati sukladno kodu časopisa The Journal of Economic Literature (JEL).

d. **Uvod** – sadrži definiranje problema i predmeta istraživanja s pozivom na recentnu literaturu odnosno rezultate istraživanja. Taj se dio može istaknuti i u posebnom, tj. 2., poglavlju kao *Literature review*. Pri kraju uvodnog dijela treba utvrditi radnu pretpostavku (hipotezu) istraživanja o kojoj se treba očitovati (kasnije) na početku poglavlja *Zaključak*. *Uvod* treba završiti s naznakom organizacije teksta.

e. **Pregled literature** – prethodi istraživačkom dijelu, a pruža čitateljima pregled referentne literature s ključnim točkama dosadašnjih spoznaja

temeljenih na relevantnim rezultatima aktualnih istraživanja. Pregled literature ne smije biti taksativno navođenje prethodnog znanstvenog doprinosa, već autori trebaju izvršiti sintezu dosadašnjih istraživanja kako bi dokazali opravdanost teorijskog i empirijskog doprinosa vlastitog rada.

f. Metodologija/Metoda/Model/Koncepcija – obično se prezentira u trećem poglavlju; metoda/model/koncepcija analize mora biti transparentno istaknuta radi eventualnog ponavljanja testiranja rezultata od strane zainteresiranih istraživača (to je jedno od temeljnih pravila znanstvene metodologije).

g. Empirijski podaci i analiza – sadržavaju dokumentacijsku podlogu i rezultate empirijske analize. Potrebno je opisati i prikazati uzorak podataka korišten u analizi te prezentirati i objasniti statistička te ekonometrijska obilježja dobivenih rezutata uz tumačenje njihova ekonomskog sadržaja.

h. Rezultati i rasprava – autor objašnjava rezultate, osobito njihovo ekonomsko značenje i poruke. U ovom dijelu očekuje se argumentacija znanstvenog doprinosa, povezivanje rezultata rada s rezutatima te zaključcima dosadašnjih empirijskih istraživanja te preporuke za promjene javnih i drugih politika.

i. Zaključci – treba imati u vidu da taj dio teksta nije i ne smije biti sažetak! Zaključci su autorovo originalno mišljenje (ocjena) o dobivenim rezultatima i obvezno sadrže:

- očitovanje o polaznoj hipotezi – je li ili nije dokazana;
- ocjenu rezultata istraživanja/analize, novine, te koji je doprinos znanosti;
- osvrt na ograničenja i probleme u istraživanju;
- smjernice za buduća istraživanja;
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450

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