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UVODNA REČ

U proteklom periodu bankarski sektor vodio je svoje bitke na nekoliko frontova.

Na onom najvažnijem, banke nastavljaju da budu značajna podrška građanima i privredi u prevazi-
laženju krize izazvane kovidom i u organizaciji svakodnevnog života i poslovanja. Nastavlja se konsol-
idacija bankarskog sektora i, uz očuvanu stabilnost, svakako možemo reći da je on sve jači.

Na drugom frontu vodi se kontinuirana borba za dobro razumevanje onoga što naše banke rade. U
delu javnosti otvoreno je pitanje naknada, zatim i pitanje cena različitih bankarskih usluga. Udružen-
je banaka Srbije iznelo je u puno navrata različite ubedljive argumente. Uspeli smo da mnogi shvate
društveni značaj ovog pitanja i da organizovana kampanja neće pogoditi samo banke, već i celokupan
finansijski sektor, a posledično i celu zemlju, građane i privredu. Verujemo da se atmosfera menja u
pozitivnom pravcu i da ćemo doći do rešenja koje je i pravično i dobro za razvoj ne samo bankarstva,
već i cele naše ekonomije.

Ova borba i uopšte otvaranje pitanja kao što su osiguranje stambenih kredita, naknade i tarife, pot-
vrđuje nam koliko je velika potreba da svi zajedno radimo na edukaciji svih korisnika bankarskih uslu-
ga. Samo podizanjem finansijske pismenosti dostići ćemo da ljudi razumeju šta je suština bankarskog
posla, šta je uloga bankarskog sistema i kako se formiraju cene određenih usluga. To je oblast koja će
za UBS biti jedan od prioriteta.

Na kraju, podsetimo da je ovo godina u kojoj obeležavamo 100 godina od osnivanja Udruženja bana-
ka. To je trajanje koje potvrđuje koliko je bilo opravdano osnivanje takve institucije. Istovremeno,
jedan takav jubilej za nas je razlog za ponos, ali i obaveza da nastavimo razvoj bankarskog sektora i da
ga budućim generacijama ostavimo još kvalitetnijeg nego što je on danas.

Vladimir Vasić

Generalni sekretar
Udruženje banaka Srbije



A WORD OF INTRODUCTION

Recently, the banking sector has been fighting its battles on several fronts.

On the most important front, banks continue to provide significant support to citizens and the economy in overcoming the crisis caused by the Covid-19 pandemic, as well as in the organisation of everyday life and business. The consolidation of the banking sector continues, and with the preserved stability we can certainly say that it is getting stronger.

On the other front, there is a continuous struggle for a solid understanding of what our banks are doing. A segment of the public raised the issue of fees, as well as the issue of the cost of various banking services. The Association of Serbian Banks has presented various convincing arguments on many occasions. We have managed to help many people understand the social significance of this issue and that the orchestrated campaign will not only affect banks, but also the entire financial sector, and consequently the entire country, citizens and the economy. We believe that the atmosphere is changing in a positive direction and that we will reach a solution which is both fair and just, for the development of not only banking, but also our entire economy.

This struggle, and generally such as housing loan insurance, fees, and tariffs, confirms to us how great the need is for us all to work together on the education of all users of banking services. Only by raising financial literacy will we make people understand what the essence of the banking business is, what the role of the banking system is and how the prices of certain services are formed. This domain will be one of the priorities for the ASB.

Finally, let us mention once again that this is the year in which we mark the 100th anniversary of the founding of the Association of Serbian Banks. This perseverance confirms how justified the foundation of such an institution was. At the same time, such a jubilee is a reason for us to be proud, but also an obligation to continue the development of the banking sector and to leave it to future generations in an even better state than it is today.

Vladimir Vasić

A stylized, cursive handwritten signature in blue ink.

Secretary General
Association of Serbian Banks

SINHRONIZACIJA POSLOVNOG CIKLUSA I MONETARNA POLITIKA U BOSNI I HERCEGOVINI

Prof. Dragan Jović

Rezime

Usvajanjem valutnog odbora krajem prošlog vijeka i vezivanjem svog kursa za evro, prije četvrt stoljeća, Bosna i Hercegovina je predala veliki dio svoje monetarne politike u ruke Evropske centralne banke u nadi da će sinhronizacija poslovnog ciklusa, učiniti stranu monetarnu politiku potpuno pogodnom za Bosnu i Hercegovinu. Istovremeno, tokom ove dvije decenije, Centralna banka Bosne i Hercegovine razvija i koristi obaveznu rezervu i naknadu kao diskrecione instrumente monetarne politike. Istraživanje pokazuje da su domaći i inostrani poslovni ciklus slabo sinhronizovani u odnosu na stepen sinhronizacije drugih zemalja, a ovim nalazima u potpunosti je opravdana trenutna diskreciona monetarna politika i njen dalji razvoj i obogaćivanje novim instrumentima. Bosna i Hercegovina mora nastaviti s razvojem vlastite diskrecione monetarne politike bez oslanjanja na spoljnu monetarnu politiku.

Ključne reči: poslovni ciklus, sinhronizacija poslovnog ciklusa, monetarna politika, valutni odbor, bankarstvo, Bosna i Hercegovina, Hodrik-Preskotov filter, analiza jaza.

JEL klasifikacija: E32, E58, G28.

Uvod

U Bosni i Hercegovini (BiH) postoji posebna vrsta monetarnog režima koja se zove valutni odbor od 1997. Njegove glavne karakteristike su fiksni devizni kurs, odsustvo ustanove posljednjeg utočišta (eng. lender of last resort), zabrana davanja kredita domaćem sektoru i izdavanje domaće valute samo kupovinom deviza. Očito je da je na taj način veliki dio monetarnog suvereniteta predat u ruke monetarne zone ili država čija je valuta rezervna valuta u Bosni i Hercegovini, odnosno zone evra za koju je vezana konvertibilna marka (zvanična valuta BiH). U režimu ortodoksnog valutnog odbora država ne vodi nezavisnu monetarnu politiku u odnosu na devizni kurs ili tehničkim riječima, uvozi jedan veliki dio strane monetarne politike. To znači da na efikasnost BH monetarne politike u velikoj mjeri utiče efikasnost strane monetarne politike, a glavni preduslov za bilo koji stepen efikasnosti monetarne politike u monetarno-zavisnom području je sličnost realnog poslovnog ciklusa u ova dva monetarna područja, tj. u ovom slučaju između poslovnog ciklusa zone evra i poslovnog ciklusa Bosne i Hercegovine. Ako ovi ciklusi imaju veliki stepen kompatibilnosti i sličnosti, onda je monetarna politika koja se vodi u zoni evra sa stanovišta poslovnog ciklusa prikladna za Bosnu i Hercegovinu, monetarna ekspanzija i monetarna kontrakcija u zoni evra prilagođava se poslovnom ciklusu u BiH. Kada ekonomija u zoni evra raste, ona raste i u BiH, a monetarna kontrakcija je pogodna u oba slučaja i obrnuto, kada ekonomija opada, monetarna ekspanzija koju vodi Evropska centralna banka (ECB) najbolja je monetarna politika za BiH.

Ali s druge strane, CBBiH je uvela nekoliko diskrecionih instrumenata monetarne politike (obavezna rezerva, diferencirana obavezna rezerva i naknada na višak iznad obavezne rezerve) i na taj način odstupila od ortodoksnog valutnog odbora prema diskrecionoj monetarnoj politici. Ovo istraživanje povezuje stranu monetarnu politiku i strani i domaći poslovni ciklus, s glavnim ciljem da se utvrdi je li diskreciona monetarna politika primjerena i legitimna strategija monetarne politike za BiH. Ako postoji vrlo snažna sinhronizacija između domaćeg (BiH) i stranog (zona evra) poslovnog ciklusa, tada nema potrebe za diskrecionom BH monetarnom politikom, tj. valutni odbor je dobra strategija monetarne politike. Ali, ako sličnost između ova dva ciklusa nije dovoljno visoka, onda je širenje stepena nezavisnosti monetarne politike BiH i dalji razvoj diskrecionih instrumenata najbolja opcija za BiH i u tom slučaju postoji opravdanje za nacionalnu monetarnu politiku. Iz ovog stava izvodimo glavnu tezu našeg istraživanja, koja je jednaka pretpostavci da ne postoji relativno snažna i jasna sinhronizacija između poslovnog ciklusa zone evra i BH te da je prema stepenu sinhronizacije poslovnog ciklusa diskreciona monetarna politika BiH primjerena monetarna strategija. Ovim istraživanjem želimo dokazati da je nezavisna i diskreciona monetarna politika s razvojem novih instrumenata monetarne politike i intenzivnom upotrebom postojećih instrumenata monetarne politike dobar izbor za vođenje monetarne politike u BiH. Samo istraživanje podijeljeno je u četiri dijela. U prvom dijelu prezentuju se reference kroz kratku diskusiju sa temom istraživanja, a literarni pregled prati opis metodologije i podataka. Kasnije raspravljamo o glavnim nalazima (dio rezultati i diskusija) i predstavljamo glavne zaključke i korištenu literaturu.

Literarni pregled

Jedan od prvih članaka koji spominje poslovni ciklus u BiH u vezi s monetarnom politikom BiH bio je posvećen teorijskim i praktičnim aspektima valutnog odbora (Bašić, 2003). Autor je izričito naveo da "sidrena valuta treba biti valuta zemlje koja ima sličan poslovni ciklus kao i zemlja koja usvaja valutni odbor, jer je usvajanje valutnog odbora jednako usvajanju monetarne politike države u kojoj je rezervna valuta valutnog odbora zakonsko sredstvo plaćanja" (Ibid, 188). Autor je naglasio međuzavisnost između efikasnosti strane monetarne politike i sinhronizacije poslovnog ciklusa u režimu valutnog odbora. U jednom nedavnom istraživanju (Jović, 2020) pokazalo se da je CBBiH, uprkos režimu valutnog odbora, djelimično vodila nezavisnu monetarnu politiku koristeći tri instrumenta monetarne politike; obaveznu rezervu, diferenciranu stopu obavezne rezerve i naknadu na viška iznad obavezne rezerve. Sa ova tri instrumenta BH monetarna vlast pokušava uticati na rast kredita i ročnu strukturu bankarskih depozita, kao posrednih ciljeva monetarne politike. Sama upotreba ovih instrumenata monetarne politike dokaz je da monetarna vlast ozbiljno sumnja u sličnost između BH poslovnog ciklusa i poslovnog ciklusa zone evra. Poslovni ciklus u BiH, tj. u jednom njenom dijelu (entitet Republika Srpska) je analiziran (Stevanović, 2019), ali bez ikakve veze sa poslovnim ciklusom zone evra ili bilo kojim drugim stranim poslovnim ciklusom. S druge strane, davno je dokazano da je u nedostatku sinhronizacije poslovnog ciklusa sa državom rezervne valute, valutni odbor sklon valutnoj krizi (Argentina). Neusklađenost poslovnog ciklusa u slučaju kada je devizni kurs fiksiran, a u nedostatku kredita centralne banke čini stranu monetarnu politiku (u slučaju Argentine to je bila američka monetarna politika, jer je pezo bio vezan za USD) neefikasnom, tačnije procikličnom. Pitanje sinhronizacije poslovnog ciklusa u vezi sa optimalnim valutnim područjem, monetarnom unijom i Evropskom monetarnom unijom široko je analizirano u literaturi, ali bez spominjanja BH slučaja. Jedno od najupečatljivijih otkrića, iako prilično staro (Giannone, Lenza, & Reichlin, 2010), tvrdi da uvođenje evra (1999.) uopšte nije promijenilo poslovni ciklus zemalja članica zone evra. Ako ovo uzmemo kao istinu, logičan je zaključak da monetarna politika ECB-a ne odgovara svim zemljama zone evra u istom stepenu, te da zona evra nije optimalno valutno područje. Suprotno tome, druga grupa autora (Iikka, Fidrmuc, & Camposa F., 2019) zaključila je svoj članak sa mišljenjem da uvođenje evra povećava sinhronizaciju poslovnog ciklusa, kako među članicama zone evra, tako i među zemljama zone evra i zemljama izvan zone evra. Ovakav zaključak pronalazimo i u istraživanju koje analizira period do kraja 2016 (Belke, Domnick, & Gros, 2016). Druga grupa autora (De Grauwe & Yuemei, 2016) otkrila je da je nakon četvrtog kvartala 2007. sinhronizacija poslovnog ciklusa između osnovnih EMU zemalja povećana, dok je suprotan proces izolovan među perifernim zemljama, ali i u odnosu sa najznačajnijim zemljama EMU. Sinhronizacija poslovnog ciklusa je analizirana i u odnosu na relaciju između svjetskog i nacionalnog ciklusa (Monnet & Puy, 2016), a autori su otkrili da je sinhronizacija bila jaka prije i poslije 1971, a sve do 2007. kada je započela globalna finansijska kriza. Autori su otkrili da je unutar zone evra sinhronizacija poslovnog ciklusa izmjerena koeficijentom korelacije u prosjeku 0,82, a među ostalim industrijskim zemljama u prosjeku 0,6, što znači da valutne unije imaju veću sinhronizaciju poslovnog ciklusa od monetarno nezavisnih područja. 2008. godine pojavilo se jedno istraživanje (Rose, 2008) tvrdeći da je EMU na putu da postane optimalno valutno područje, jer rast trgovine povećava sinhronizaciju poslovnog ciklusa, što je dovelo do zaključka da EMU smanjuje potrebu za nacionalnom monetarnom politikom. Vruća tema u literaturi o sinhronizaciji poslovnog ciklusa je sinhronizacija prije i nakon globalne finansijske krize (2007). Pojedini istraživači su primjetili da je jedan broj perifernih zemalja zone evra doživio desinhronizaciju svog nacionalnog poslovnog ciklusa sa širokim ciklusom EU 12 nakon 2007. (Degiannakis, Duffy, & Filis,

2014), ali smatraju da ovo smanjenje sinhronizacije nije razlog za odbijanje valutne unije. Isti zaključak izvođa austrijski autori (Gächter, Ritzberger-Grünwald, Riedl, & Hafner, 2012) ističući činjenicu da se desinhronizacija dogodila tokom krize (mjereno sa disperzijom i korelacijom poslovnog ciklusa). Drugo istraživanje (Darvas & Szapary, 2004) podijelilo je zemlje CESEE (Zemlje centralne i jugoistočne Evrope) u tri kategorije i analiziralo sinhronizaciju poslovnog ciklusa u dva podrazdoblja 1993-1997. i 1998-2002. s različitim metodologijama. Istraživanje pokazuje da je samo prva grupa zemalja (Slovenija, Poljska i Mađarska) postigla visok nivo sinhronizacije, dok su ostale zemlje (Češka, Slovačka i posebno baltičke države) daleko zaostajale. Što se tiče metodoloških pitanja u vezi s izračunavanjem poslovnog ciklusa i filtriranjem, postoji dosta literature, a mi smo koristili jednu standardnu referencu (Bulir, 2013).

Metodologija i podaci

Trebalo je riješiti nekoliko ključnih metodoloških pitanja kako bismo odgovorili na pitanje da li je BH poslovni ciklus sličan poslovnom ciklusu u zoni evra, i ako jeste, koliki je stepen sinhronizacije.

Kao mjera poslovnog ciklusa koristili smo jaz (eng. gap) realnog BDP-a na kvartalnom nivou, izveden iz desezoniranog realnog BDP-a (Evrostat i BHAS). U mjerenju poslovnog ciklusa prošli smo četiri koraka. Prva je bila logaritmovanje podataka o BDP-u, tj. izračunavanje logaritma desezoniranih kvartalnih podataka realnog BDP-u. Drugi korak je detrendiranje logaritma BDP-a primjenom Hodrik-Preskotovog filtra (Formula 1) s lambda (λ) 1600, jer koristimo tromjesečne podatke o BDP-u. Prvi dio jednadžbe predstavlja kvalitet podešenosti (eng. goodness of fit) koju filter pokušava minimizirati, a drugi dio je tzv. kazna za hrapavost ili u algebarskom smislu promjena u potencijalnoj stopi rasta autputa.

Metodologija i podaci

Formula 1 - Hodrik-Preskotov filter

$$\min \sum_{t=0}^T (y_t - \bar{y}_t)^2 + \lambda \sum_{t=2}^{T-1} [(\bar{y}_{t+1} - \bar{y}_t) - (\bar{y}_t - \bar{y}_{t-1})]^2,$$

gdje su λ – stepen glatkoće trenda; y – logaritam aktuelnog autputa; $\bar{y}$ – logaritam trenda autputa

Izvor: Bulir, A. (2013). Techniques to Estimate Output Trends and Output Gaps. IMF Institute for Capacity Development.p.36.

Poslovni ciklusi, jaza u BDP-u, izračunava se (Formula 2) kao razlika između logaritma realnog BDP-u i trenda logaritma BDP-a, tako da se poslovni ciklus predstavlja kao odstupanje od trenda.

Formula 2 Poslovni ciklu/GDP jaz

$\hat{y}_t = y_t - \bar{y}_t$, gdje je $\hat{y}_t$ poslovni ciklus ili GDP jaz deriviran iz logaritma aktuelnog output (y_t) i logaritma outputa trenda ($\bar{y}_t$)

Izvor: Ibid.

Izvor: Ibid.

Prvi pokazatelj koji smo koristili za procjenu sinhronizacije poslovnog ciklusa je glatkoća poslovnog ciklusa u BiH i broj velikih uspona i padova u odnosu na poslovni ciklus zone evra, a drugi i treći bilateralni koeficijent korelacije i disperzije / standardne devijacije s obzirom na jaz outputa, koji predstavlja cikličku komponentu. Konačno, izračunali smo/prebrojali broj kvartala u kojima je znak poslovnog ciklusa u BiH jednak znaku zone evra, a upoređivanjem udjela pozitivnih slučajeva u svim slučajevima sa pozitivnim slučajevima drugih zemalja, takođe smo izveli zaključak o stepenu sinhronizacija između poslovnog ciklusa zone evra i BH poslovnog ciklusa.

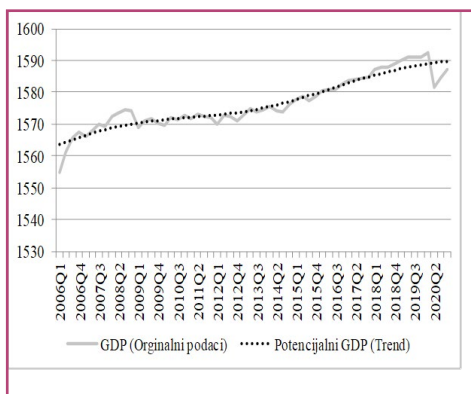
Nakon određivanja poslovnog ciklusa za svaku zemlju u uzorku podataka, izračunali smo matricu korelacije u odnosu prema poslovnom ciklusu eurozone. Upoređivanjem Pearsonovog koeficijenta korelacije za svaku zemlju dolazimo do zaključka da li je BH poslovni ciklus sinhronizovan s poslovnim ciklusom zone evra.

Koristili smo Evrostatovu bazu podataka sa kvartalnim i sezonski prilagođenim realnim podacima o BDP-u za 31 zemlju, te istim podacima za Bosnu i Hercegovinu (Agencija za statistiku Bosne i Hercegovine), a analiza obuhvata period Q1 2006 – Q4 2020.

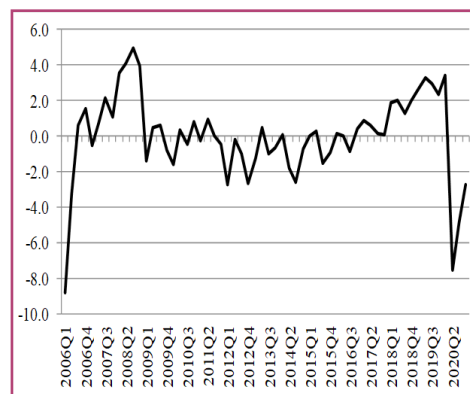
U tekstu su korištene skraćenice; BC - poslovni ciklus/business cycle, BCS - sinhronizacija poslovnog ciklusa/business cycle synchronization, BiH - Bosna i Hercegovina, EA – zona evra/euro area, EU - Evropska unija, Centralna banka Bosne i Hercegovine - CBBiH, Evropska centralna banka – ECB, EMU – Evropska monetarna unija.

Rezultati i diskusija

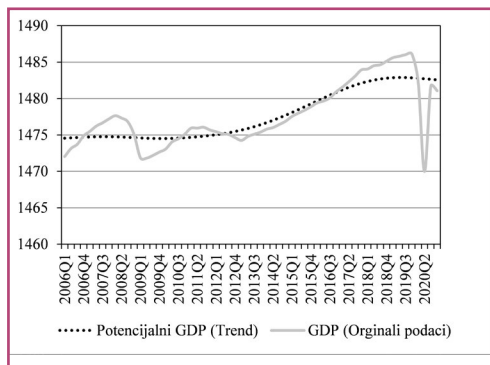
Grafička analiza poslovnog ciklusa u BiH (Grafikon 1 i Grafikon 2) pokazuje da, u poređenju sa poslovnim ciklusom drugih zemalja i poslovnim ciklusom zone evra (Grafikon 3 i Grafikon 4), BiH ne dijeli iste karakteristike sa zonom evra i sa Bugarskom koja ima i valutni odbor (Grafikon 6), a Srbija je izuzetak (Grafikon 5). U analiziranom periodu (Q1 2006 – Q4 2020) BiH ima tri značajna odstupanja od trenda (u Q3 2008, u periodu 2018 - 2019, i nakon izbivanja pandemije u Q2 2020., a u periodu od Q1 2012. do Q3 2015. odstupanja od trenda iščezavaju već u sljedećem kvartalu), dok zona evra ima četiri značajna odstupanja od trenda (u Q1 2008. u Q1 2009., u periodu 2018 - 2019, i nakon izbivanja pandemije u Q2 2020.) BH se razlikuju u odnosu na zonu evra ne samo po broju značajnih odstupanja u odnosu na potencijalni output, već i po glatkoći (eng. smoothness) ciklusa. Uobičajeni dugi i duboki pad u gotovo svim evropskim zemljama tokom 2009. god. je odsutan u BiH, a prema službenim podacima stepen glatkoće ciklusa u BiH je na vrlo niskom nivou u odnosu na zonu evra i druge zemlje. Usponi i padovi u BH ciklusu su vrlo oštri, brzi i brojni tokom perioda Q1 2009 - Q3 2016, a jasna, ali istovremeno ne i glatka slika ciklusa izolirana je samo u periodima velikih promjena u poslovnoj aktivnosti. Takve nagle i česte promjene u poslovnoj aktivnosti ne vide se ni u slučaju Srbije. Sve u svemu,

Grafikon 1 - Realni BDP i potencijalni output/trend – BiH (u logaritmima)

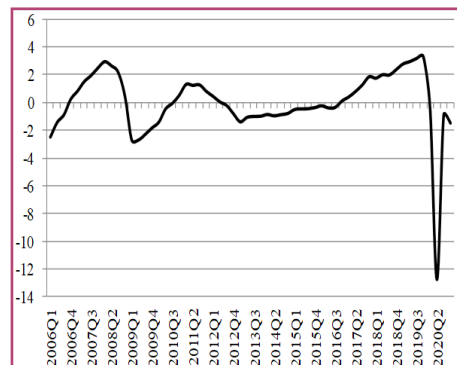
Izvor: BHAS (Obrada autora). Napomena: Realni BDP i trend su u logaritmima, a poslovni ciklus je u % odstupanja od trenda.

Grafikon 2 - Poslovni ciklus - BiH (u % odstupanja od trenda)

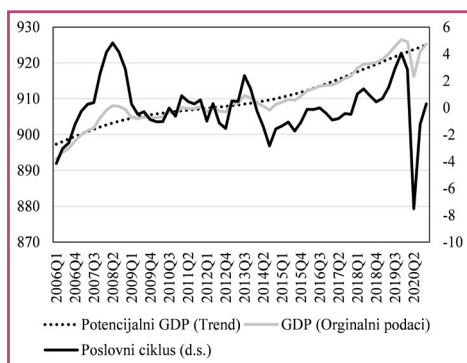
Izvor: Ibid.

Grafikon 3 - Realni BDP i potencijalni output/trend - zona evra (u logaritmima)

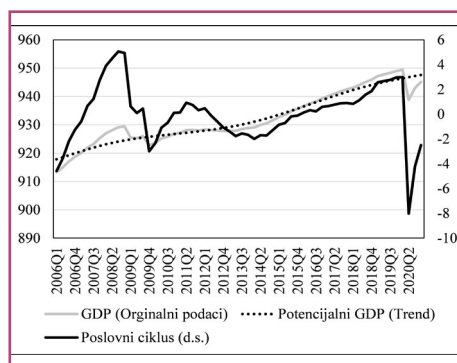
Izvor: Evrostat (Obrada autora).

Grafikon 4 - Poslovni ciklus - zona evra (u % odstupanja od trenda)

Izvor: Ibid.

Grafikon 5 - Realni GDP, trend i poslovni ciklus – Srbija

Izvor: Ibid.

Grafikon 6 - Realni BDP, trend i poslovni ciklus – Bugarska

Izvor: Ibid.

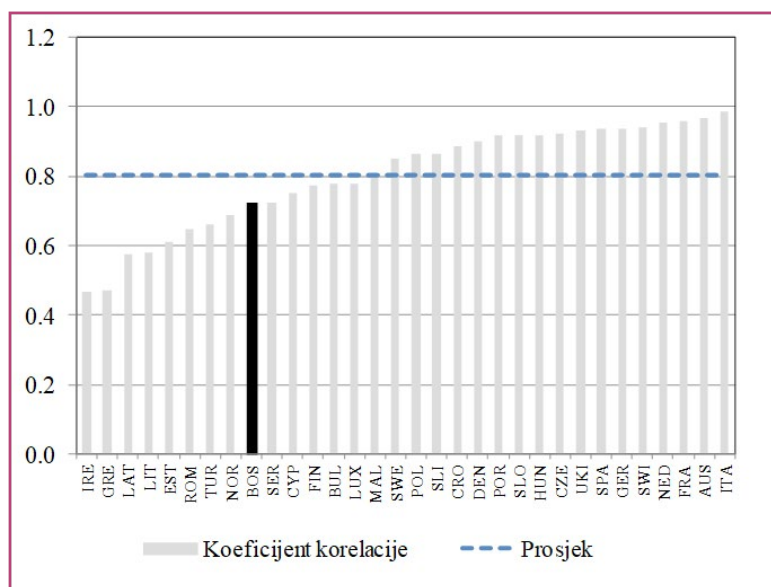
glatkoća u BH poslovnom ciklusu mnogo odstupa od pojedinih zemalja i poslovnog ciklusa zone evra, što je prvi pokazatelj da ne postoji sličnost između BiH i zone evra, u vezi s poslovnim ciklusom.

Dalja analiza pokazala je dodatna odstupanja u sinhronizaciji poslovnog ciklusa mjereno korelacijom (Tabela 1 i Grafikon 7). Prosječna korelacija poslovnog ciklusa, mjerena Pearsonovim koeficijentom korelacije, između pojedinih zemalja i zone evra je vrlo visoka, 0,8. Ako primijenimo direktnu vezu između korelacije i uzročno-posljedične povezanosti (koeficijent determinacije = koeficijent korelacije²) u prosjeku poslovni ciklus zone evra u cjelini objašnjava 64% ($0,8^2$) poslovnog ciklusa pojedinih zemalja. Sinhronizacija BH poslovnog ciklusa mjerena korelacijom je ispod prosjeka i vrlo je blizu Turske, iako ona nije dio EU. Različiti devizni režimi, varijabilni u Turskoj i fiksni u Bosni i mnogo veći relativni udio trgovine sa zemljama zone evra u BiH nego u Turskoj, nisu doveli do velike razlike u sinhronizaciji poslovnog ciklusa sa zonom evra između ovih zemalja. Oko 50% kretanja poslovnog ciklusa u BiH uzrokovano je kretanjem poslovnog ciklusa u zoni evra, a ova metrika (koeficijent determinacije) za Tursku je nešto ispod (44%). U ukupnom uzorku od 32 zemlje, samo 8 zemalja ima nižu metriku sinhronizacije poslovnog ciklusa ove vrste od BiH. U ovoj grupi zemalja nižu sinhronizaciju poslovnog ciklusa imaju zemlje koje su prošle kroz krizu javnog duga (Grčka), Irska, sa svojim razvijenim trgovinskim odnosima sa SAD-om, tri relativno nove zemlje EU i/ili zone evra, tj. baltičke države i Norveška koja uopšte nije dio zone evra, kao i Turska i Rumunija. Ako prihvatimo da su ovo jedinstvene karakteristike ovih zemalja, onda je BiH na samom kraju sinhronizacije poslovnog ciklusa u odnosu na zonu evra. U BiH se primjenjuje režim valutnog odbora od 1997. godine, a ova velika vremenska udaljenost (skoro četvrt stoljeća) donijela je samo 50% usklađenosti BH poslovnog ciklusa sa poslovnim ciklusom zone evra. Isti stepen sinhronizacije poslovnog ciklusa ima i Srbija koja vodi diskrecionu monetarnu politiku, a druge zemlje koje ne pripadaju zoni evra, sa fleksibilnim deviznim kursovima i diskrecionom monetarnom politikom, imaju viši stepen sinhronizacije poslovnog ciklusa od Bosne. Takođe bi se mogla očekivati ista korelacija za Bugarsku i BiH, jer obe zemlje imaju valutni odbor, ali u bugarskom slučaju korelacija je mnogo veća (0,78) gotovo jednaka prosjeku. Sa statističke strane, visoka korelacija između zone evra i BH poslovnog ciklusa, ali istovremeno relativno niska korelacija u odnosu na druge zemlje, dokazuje da bi trenutna diskreciona monetarna politika CBBiH i dalji razvoj diskrecione monetarne politike imali puno opravdanje u slučaju BiH.

Tabela 1 - Koeficijenti korelacije poslovnih ciklusa po zemljama u odnosu na zonu evra
19 - deskriptivna statistika,

Aritmetička sredina	Standardna greška	Medijana	Standardna devijacija	Raspon	Minimum	Maksimum
0,80	0,03	0,86	0,15	0,52	0,47	0,98

Izvor: Ibid.

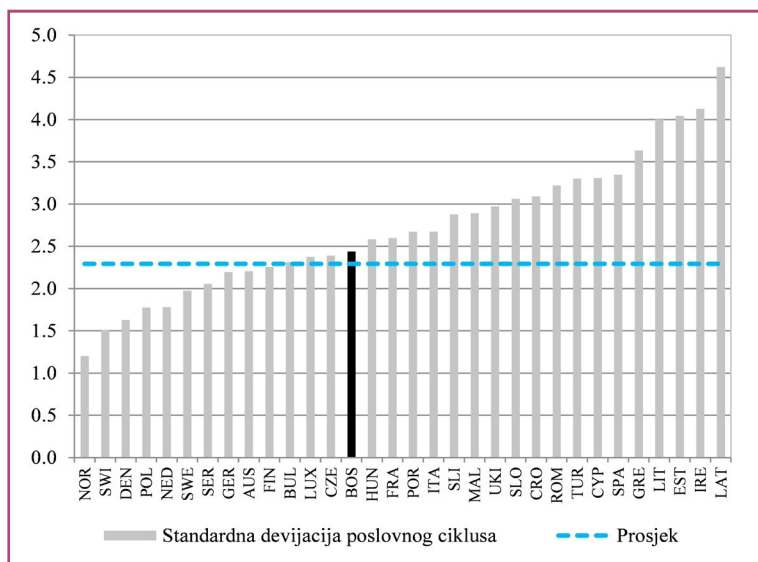
Grafikon 7. Korelacija poslovnih ciklusa po zemljama u odnosu na zonu evra 19

Izvor: Evrostat i BHAS (Obrada autora).

Važno pitanje u analizi sinhronizacije poslovnog ciklusa je amplituda poslovnog ciklusa zemlje i sinhronizacija upravo te amplitude, kao metrike za sinhronizaciju poslovnog ciklusa (Tabela 2 i Grafikon 8). U zoni evra poslovni ciklus odstupa od svog prosjeka, tj. od nule, za 2,3 p.p., a najveću standardnu devijaciju, očekivano imaju baltičke države i zemlje koje su prošle kroz dužničku krizu.

BiH je vrlo blizu prosjeka zone evra, ali opet iznad ovog prosjeka (u negativnom smislu). Prema ovoj metrici Bugarska je tačno na prosjeku, što bi u vezi s činjenicom da je Bugarska ujedno i valutni odbor, moglo značiti da valutni odbor čini amplitudu poslovnog ciklusa jednaku amplitudi zemlje rezervne valute (zona evra). Ovo je jedina metrika u kojoj možemo reći da je BH poslovni ciklus prilično sličan poslovnom ciklusu zone evra. Ali, na samom početku ovog odjeljka opisana neusklađenost BH poslovnog ciklusa u odnosu na stepen glatkoće poslovnog ciklusa u zoni evra i različit broj uspona i padova (U BiH nedostaje jedan veliki pad u 2009), je razlog da se nalaz o sličnosti u amplitudi poslovnog ciklusa treba uzeti s oprezom i rezervom, a ne kao dokaz da su poslovni ciklusi u BiH i u zoni evra slični.

Grafikon 8 - Standardna devijacija poslovnog ciklusa (u procentnim poenima)



Izvor:Ibid.

Tabela 2 - Standardna devijacija poslovnog ciklusa po zemljama - deskriptivna statistika (u procentnim poenima)

Aritmetička sredina	Medijana	Raspon	Minimum	Maksimum
2,7	2,6	3,4	1,2	4,6

Izvor:Ibid.

Istu preporuku za ekonomsku politiku, kao i u slučaju koeficijenata korelacije, izveli smo analizirajući učestalost suprotnog znaka poslovnog ciklusa u odnosu na znak poslovnog ciklusa zone evra (Tabela 3 i Grafikon 9). U prosjeku se u petini (20%) svih opservacija znak poslovnog ciklusa razlikuje u odnosu na znak poslovnog ciklusa zone evra. BH poslovni ciklus je prema ovoj metrici opet iznadprosječna (u negativnom smislu) i bliža je maksimumu, nego minimalnoj vrijednosti ove metrike. U 25% kvartala (od 60) znak BH poslovnog ciklusa kreće se u suprotnom smjeru od znaka poslovnog ciklusa zone evra. Prema ovom kriterijumu lošiji od BiH su opet baltičke države (dvije od tri), Grčka i Irska, ali ovog puta u grupi zemalja sa nižim stepenom sinhronizacije poslovnog ciklusa su Velika Britanija, Malta, Luksemburg, Mađarska i Rumunija, Srbija, Norveška, Turska. Šest od ovih osam posljednjih zemalja vode nezavisnu i diskrecionu monetarnu politiku. Velika Britanija, Srbija, Mađarska, Norveška i Rumunija, Turska vode diskrecionu monetarnu politiku, njihov se poslovni ciklus uveliko razlikuje od

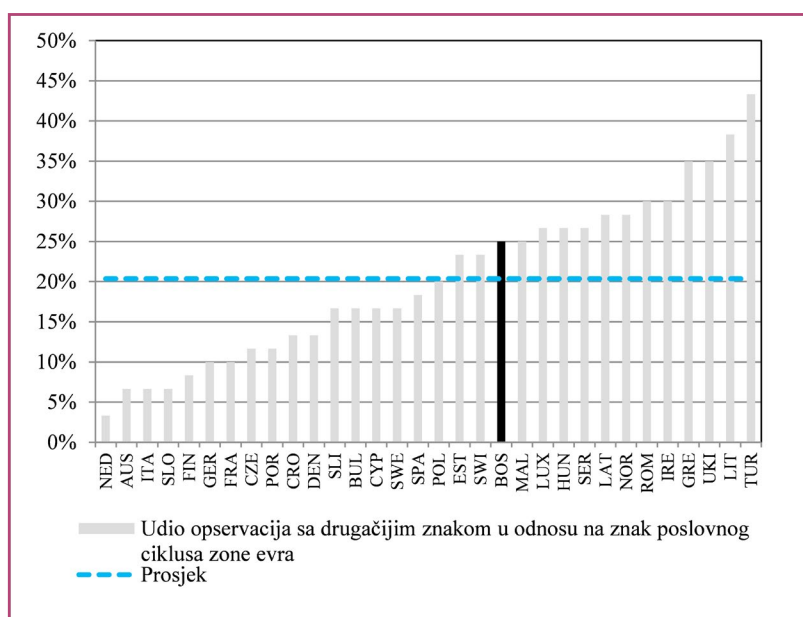
zone evra, a ako bi odlučili odustati od diskrecione monetarne politike, monetarna politika ECB ne bi odgovarala njihovoj ekonomiji. Ova grupa zemalja (sve one imaju fleksibilan devizni kurs) je vrlo aktivna u vođenju diskrecione monetarne politike i prema ovoj metrici BiH pripada ovoj grupi. Iznad prosjeka je 15 zemalja, od kojih 7 (prethodno navedenih 6 zemalja, kao i Švajcarska) vodi diskrecionu monetarnu politiku, a 7 od 15 su članice zone evra. U grupi ispod prosjeka (s obzirom na znak poslovnog ciklusa) od 17 zemalja samo pet vodi diskrecionu monetarnu politiku (Češka, Hrvatska, Danska, Švedska, Poljska), a među njima je samo Hrvatska na putu ka zoni evra. Bugarska je dio EU i ima valutni odbor poput BiH, a njena metrika znaka poslovnog ciklusa je 16,7%, značajno ispod BiH. Dakle, prema svim nalazima postoje snažni argumenti za vođenje diskrecione monetarne politike u BiH u vezi sa dostignutim nivoom sinhronizacije poslovnog ciklusa, a i s obzirom na to da se zemlje bez sinhronizacije poslovnog ciklusa sa zonom evra češće odlučuju za diskrecionu monetarnu politiku.

Tabela 3 - Udio opservacija sa različitim predznakom u odnosu na poslovni ciklus zone evra - deskriptivna statistika (u%)

Aritmetička sredina	Standardna greška	Medijana	Standardna devijacija	Raspon	Minimum	Maksimum
20,42	1,83	19,17	10,33	40,00	3,33	43,33

Izvor:Ibid.

Grafikon 9 - Znak poslovnog ciklusa zemalja u poređenju sa poslovnim ciklusom zone evra



Izvor:Ibid.

Zaključak

Sinhronizacija poslovnog ciklusa stara je tema u finansijama i ekonomiji sa brojnim istraživanjima, ali do sada, bez ikakvog fokusiranja na BiH. Ovo istraživačko područje analizira sinhronizaciju poslovnog ciklusa svih zemalja EU i pojedinih zemalja izvan EU, ali u svim tim istraživanjima nedostaje BiH. Druga novost u ovom istraživanju je pokušaj povezivanja sinhronizacije poslovnog ciklusa u BiH i zoni evra i monetarne politike ECB-u na način predložen u teoriji. Prihvatanjem valutnog odbora BiH je odlučila predati dio svoje monetarne politike u ruke ECB, ali istovremeno koristeći obaveznu rezervu i naknadu, CBBiH vodi nezavisnu monetarnu politiku. Ovakva vrsta diskrecione monetarne politike u režimu valutnog odbora može biti opravdana samo ako postoji relativno nizak stepen sinhronizacije poslovnog ciklusa između BiH i zoni evra, u poređenju sa članicama EU/zone evra i ostalim zemljama iz uzorka.

Koristili smo četiri pokazatelja/metrike sinhronizacije poslovnog ciklusa kako bismo dokazali glavnu istraživačku tezu da je sinhronizacija poslovnog ciklusa između zone evra i BiH relativno niska. I zaista, svi korišteni pokazatelji/metrike pokazuju da je sinhronizacija poslovnog ciklusa u BiH relativno niska u odnosu na druge zemlje. Ovi nalazi opravdavaju ne samo diskrecionu monetarnu politiku, već i dalji razvoj diskrecione monetarne politike u BiH.

U usporedbi sa zonom evra i sa gotovo svim ostalim zemljama u uzorku poslovni ciklus u BiH ima nizak stepen glatkoće, sa brzim i naglim promjenama u znaku poslovnog ciklusa, osim u vrijeme velikih uspona i padova, a sve je ovo jedinstvena karakteristika poslovnog ciklusa u BiH. U 2009. BiH ne bilježi više kvartalni veliki pad poslovnog ciklusa, a ova pojava nije zabilježena u poslovnim ciklusima drugih zemalja.

Korelacija između poslovnog ciklusa BiH i zone evra je statistički visoka (0,72), ali relativno niska u odnosu na druge zemlje u uzorku. Za BiH zaostaje samo osam zemalja, baltičke države s tradicionalno niskom sinhronizacijom poslovnog ciklusa i zemlje koje su prošle krizu javnog duga (Irska i Grčka), kao i Norveška, Turska i Rumunija, pa možemo reći da je u odnosu na korelaciju poslovnog ciklusa, BiH na samom kraju, a ispred nje su 23 zemlje.

Amplituda domaćeg poslovnog ciklusa mjerena standardnom devijacijom takođe je iznad prosjeka uzorka. Pa čak i ako postoji vrlo mala razlika u odnosu na amplitudu stranog poslovnog ciklusa, zaključujemo da i ova posljednja/četvrta metrika pokazuje neke znakove relativnog odsustva sinhronizacije poslovnog ciklusa u poređenju sa zemljama ispod prosječne amplitude poslovnog ciklusa. Izvodeći ovaj zaključak, uzeli smo u obzir činjenicu da su opet u ovoj grupi zemlje koje vode nezavisnu monetarnu politiku, kao i činjenicu da domaći poslovni ciklus ima vrlo brze i česte promjene u predznaku.

Mjerenjem udjela opservacija sa različitim predznakom u odnosu na poslovni ciklus zone evra utvrdili smo da je Bosna i Hercegovina iznad prosjeka, ali ovaj put u negativnom smislu. U prosjeku udio opservacija sa različitim predznakom poslovnog ciklusa zemalja u odnosu na poslovni ciklus zone evra iznosi 20%, a ovaj pokazatelj u Bosni iznosi 25% što pokazuje relativno odsustvo sinhronizacije poslovnog ciklusa. Takođe, većina zemalja u grupi zemalja koje odstupaju od poslovnog ciklusa zone evra imaju vlastitu nacionalnu banku i vode nezavisnu monetarnu politiku, osim nekoliko zemalja zone evra sa specifičnim karakteristikama (baltičke države i države koje su prošle kroz krizu javnog duga), što je dodatni motiv za diskrecionu monetarnu politiku u BiH. Činjenica da se BiH razlikuje od zone evra u jednoj četvrtini opservacija i činjenica da većina zemalja sa nadprosječnom metrikom ove vrste vodi

diskrecionu monetarnu politiku, dokazuje vezu između, odsustva sinhronizacije poslovnog ciklusa sa zonom evra i diskrecione monetarne politike, sa konačnom porukom za BiH da treba voditi i dalje razvijati diskrecionu monetarnu politiku.

Naravno, važno je i to da je Bugarska u sva četiri pokazatelja sinhronizacije poslovnog ciklusa imala bolje rezultate od BiH, iako obe zemlje imaju valutni odbor.

Konačna i najvažnija poruka koja je proizašla iz istraživanja za kreatore politika u Bosni i Hercegovini je da je diskreciona monetarna politika u potpunosti opravdana sa stanovišta sinhronizacije poslovnog ciklusa koja je odsutna u BiH u odnosu na zonu evra. Dalji razvoj i primjena nezavisne i diskrecione monetarne politike ima ekonomsku logiku i dobra je i poželjna monetarna strategija za BiH.

Zanimljiva tema za novo istraživanje bi moglo biti mjerenje sinhronizacije poslovnog ciklusa korištenjem pojedinih dijelova BDP-a i/ili industrijske proizvodnje, te korištenjem drugih filtera kako bi se dodatno testirala teza o stepenu sinhronizacije BiH i poslovnog ciklusa zone evra. Analiza i mjerenje sinhronizacije poslovnog ciklusa između balkanskih zemalja koje nisu članice EU takođe predstavlja proširenje ovog istraživanja, s ciljem da se opravda i podstakne bliža ekonomska i trgovinska povezanost između ovih zemalja.

Literatura

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BUSINESS CYCLE SYNCHRONIZATION AND MONETARY POLICY IN BOSNIA AND HERZEGOVINA

Dragan Jović

Summary

By adopting the currency board at the end of the last century, and by pegging its exchange rate to the euro, a quarter of a century ago, Bosnia and Herzegovina surrendered a great part of its monetary policy in the hand of European Central Bank in the hope that the synchronization of the business cycle will make foreign monetary policy completely suitable for Bosnia and Herzegovina. At the same time during these two decades, the Central Bank of Bosnia and Herzegovina has been developing and using reserve requirement and remuneration as discretionary instruments of monetary policy. The research shows that the domestic business cycle and the foreign one are relatively weakly synchronized compared to other countries' degree of synchronization, and by this findings current discretionary monetary policy and its further development and enrichment with new instruments is fully justified. Bosnia and Herzegovina must continue with developing its own discretionary monetary policy without relying on foreign monetary policy.

Keywords: business cycle; business cycle synchronization; monetary policy; currency board; banking; Bosnia and Herzegovina; Hodrick-Prescott filter; gap analysis.

JEL classification: E32, E58, G28

Introduction

Bosnia and Herzegovina (BH) has been running a specific kind of monetary regime called the currency board since 1997. Its main features are fixed exchange rate, absence of LOLR (lender of last resort), prohibition of providing loans to the domestic sector and issuing domestic currency only by buying foreign exchange. It is obvious that in this way the great part of monetary sovereignty is surrendered to the hand of the monetary zone or countries whose currency is reserve currency in BH i.e., to the euro area (EA) to which the convertible mark (BH official currency) is pegged. In orthodox currency board regime, the country does not run independent monetary policy in relation to the exchange rate or, in more technical terms, it imports one big part of foreign monetary policy. It means that the efficiency of monetary policy is in a great extent influenced by the efficiency of the foreign monetary policy and main precondition for any degree of monetary policy efficiency in monetary dependent area is the similarity of real business cycle (BC) in these two monetary areas i.e., in this case between BC of the EA and BH's BC. If these cycles have a great degree of compatibility and similarity then monetary policy running in the euro area is from the BC point of view suitable for BH, and monetary expansion and monetary contraction in the euro area is accommodated to the BC in BH. When economy goes up in the euro area, it also goes up in BH and monetary contraction is suitable in both cases and vice versa - when economy goes down, the monetary expansion run by the European Central Bank (ECB) is the best monetary policy for BH.

But on the other hand, the Central Bank of Bosnia and Herzegovina (CBBH) introduced a couple of discretionary monetary policy instruments (reserve requirement, differentiated reserve requirement and remuneration of excess reserves) and in such a way deviated from the currency board orthodoxy toward discretionary monetary policy. This research connects foreign monetary policy and foreign and domestic BC, with a main goal to find out if discretionary monetary policy is an appropriate and legitimate monetary policy strategy for BH. If there is very strong synchronization between domestic (BH) and foreign (The Euro area) business cycles, then there is no need for discretionary monetary policy, i.e., the currency board is a good monetary policy strategy. But, if the similarity between these two cycles is not high enough then the broadening of the degree of BH monetary policy independence and further development of discretionary and automatic instruments is the best option for BH, and in that case there is justification for a national monetary policy. From this stance, we derive the main thesis of our research, which is equal to the assumption that there is no relatively strong and clear synchronization between the euro area and BH business cycle, and that according to the degree of BCS, BH discretionary monetary policy is an appropriate monetary strategy. With this research we want to prove that a more independent and discretionary monetary policy with a development of new monetary policy instruments and the intensive use of existing monetary policy instruments is a good choice for running the monetary policy in BH. The research itself is divided in four parts. In the first part, the presentation of references is given through a short discussion on the research subject, and a literary review is followed by methodology and data issues. Later on, we discuss about the findings (results and discussion) and present the main conclusion and used literature.

Literary Review

One of the first articles which mention the business cycle in BH with regards to BH monetary policy was devoted to the theoretical and practical aspects of the currency board (Bašić, 2003). The author explicitly stated that anchor currency should be the currency of a country which has a similar business cycle as the country which adopts the currency board (Ibid, 188) "because adopting the currency board is equal to adopting the monetary policy of the country in which the currency board reserve currency is legal tender". The author stressed the interdependence between foreign monetary policy efficiency and business cycle synchronization in the currency board regime. In one recent research (Jović, 2020) it was shown that the CBBH, despite the currency board regime, partially run independent monetary policy by using three monetary policy instruments; reserve requirements, differentiated reserve requirement rate, and remuneration of excess reserves. With these two instruments the BH monetary authority has been trying to influence credit growth and term structure of banking deposits, as intermediary goals of monetary policy. The use of these monetary policy instruments itself is proof that the monetary authority seriously doubts in the similarity between BH's and The Euro area's business cycle. The business cycle in BH, i.e., in one part of it (entity Republika Srpska) is analyzed (Stevanović, 2019) but without any connection with the euro area business cycle or any other foreign business cycle. On the other hand, it was proven a long time ago that in the absence of business cycle synchronization with a reserve currency country, the currency board is prone to currency crisis (Gerhard & Gerhard, 2002) like in the case of Argentina. Business cycle mismatch in the case when foreign exchange is pegged and in absence of LOLR makes foreign monetary policy (in the case of Argentina it was US monetary policy because the peso was pegged with the USD) inefficient, or more precisely procyclical. The question of BCS (business cycle synchronization) regarding optimal currency area, the monetary union, and the European monetary union is vastly analyzed in literature but without mentioning the BH case. One of the most striking findings, although pretty old (Giannone, Lenza, & Reichlin, 2010) claims that the introduction of the euro (1999) did not change the business cycle of The Euro area member countries at all. If we take this as true, the logical conclusion is that the ECB monetary policy does not fit all The Euro area countries in the same degree, and that the euro area is not an optimal currency area.

On the contrary, another group of authors (Nauro F. Camposa, 2019) concluded their article with the opinion that the introduction of the euro increased BCS among euro countries, as well among euro countries and non-euro countries. We find the conclusion of this kind in research for the period until the end of 2016 (Belke, Domnick, & Gros, Business Cycle Synchronization in the EMU: Core vs. Periphery, 2016). Another group of authors (De Grauwe & Yuemei, 2016) found that after Q4 2007 the synchronization among core EMU countries has been increasing, whereas an opposite process is isolated among peripheral countries, and also with regards to the core. The BCS had been analyzed in terms of the relation between the world cycle and the national one (Monnet & Puy, 2016), and authors found that synchronization was strong before and after 1971, until 2007, when the global financial crisis started. The authors found that inside the Euro area the BCS, measured by coefficient of correlation, is on average 0.82, and among other industrial countries is on average 0.6 which means that currency unions have higher BCS than monetary independent areas. In 2008, one research appeared (Rose, 2008) claiming that EMU is on the path to become an optimal currency area because growth in trade increases BCS which led to the conclusion that EMU reduce the need for national monetary policies. The hot topic in BCS literature is synchronization before and after the start of the global financial crisis (2007). Some research noticed that some of the peripheral Euro area countries experienced desyn-

chronization of their national business cycle with the wide EU 12 cycle after 2007 (Stavros, Duffy, & Filis) but they think that this decrease in the interdependence is not a reason for rejecting the currency union. The same conclusion is derived by Austrian authors (Gächter, Ritzberger-Grünwald, Riedl, & Hafner, 2012) stressing the fact that desynchronization occurred during the crisis, measured by the dispersion and to the correlation of business cycle. Another research (Darvas & Szapary, Business Cycle Synchronization in the Enlarged EU * Zsolt Darvas and György Szapary§ Revised in 004 for the, 2004) split CESEE countries in three categories and analyzes BCS in two sub periods 1993-1997, and 1998-2002 with different methodologies. The research show that only the first group of countries (Slovenia, Poland and Hungary) achieved high level of synchronization whereas other countries (Czech Republic, Slovakia and especially the Baltic states) lagged far behind. Regarding the methodological issues in relation to calculating the business cycle and filtering there is a bulk of literature and we used one standard reference (Bulir, 2013).

Methodology and Data

There were a couple crucial methodological issues we had to solve in order to answer the question if the BH business cycle is similar to the Euro area business cycle, and if yes, what is the degree of synchronization.

As measure of the business cycle, we have used the real GDP output gap on a quarterly level, derived from seasonally adjusted real GDP (Eurostat and BHAS). When measuring the business cycle, we went through four steps. The first is taking the logarithm of the GDP i.e., taking logarithm of seasonally adjusted quarterly real GDP data. The second step is detrending of GDP in logarithms by applying the Hodrick-Prescott filter (Formula 1) with lambda 1600 because we use quarterly GDP data. First part of equation is the goodness of fit which the filter is trying to minimize and the second part is the so called penalty for roughness, or in algebra terms change in potential output growth rate.

Formula 1 Hodric-Prescott filter

$$\min \sum_{t=0}^T (y_t - \bar{y}_t)^2 + \lambda \sum_{t=2}^{T-1} [(\bar{y}_{t+1} - \bar{y}_t) - (\bar{y}_t - \bar{y}_{t-1})]^2$$

where are λ – the degree of smoothness of trend; y – log of actual output; $\bar{y}$ – log of trend output.

Source: Bulir, A. (2013). Techniques to Estimate Output Trends and Output Gaps. IMF Institute for Capacity Development.p.36.

The business cycles, in the form of real GDP gaps, is calculated (Formula 2) as difference between the logarithm of real GDP data and real GDP trend (in logarithms), so the business cycle is presented as deviation from the trend.

Formula 2 Business cycle/GDP gap

$\hat{y}_t = y_t - \bar{y}_t$, where $\hat{y}_t$ is bussines cycle or GDP gap derived from the log of actual output (y_t) and log of trend output ($\bar{y}_t$)

Source: Ibid.

The first one indicator we used to assess BCS is smoothness of BC in BH and number of big ups and downs comparing to the EA BC, and the second and the third ones are bilateral coefficient of correlation and dispersion/standard deviation, both with respect to the output gap, which represent a cyclical component. Finally, we calculated/counted number of quarters in which the sign of the BH business cycle is equal to the sign of the euro area's one, and by comparing the share of positive cases in all cases, with other countries' positive cases, we also derived conclusion about degree of synchronization between the Euro area and BH business cycle.

After finding business cycle for each country in data sample we have calculated the correlation matrix vis-à-vis the Euro area business cycle. By comparing the Pearson's coefficient of correlation for each country we derive the conclusion if the BH business cycle is synchronized with the Euro area business cycle.

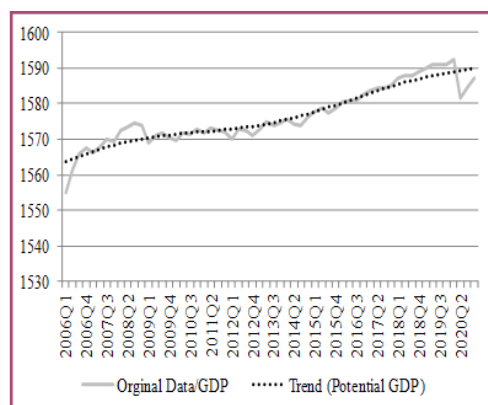
We have used the Eurostat's database with quarterly and seasonally adjusted real GDP data on 31 countries, EA, and the same data for BH (Bosnian Agency for Statistics), for Q1 2006 until Q4 2020.

Abbreviations used in the text are: BC - business cycle, BCS - business cycle synchronization, BH - Bosnia and Herzegovina, EA - euro area, EU - European Union, Central Bank of Bosnia and Herzegovina - CBBH, European Central Bank - ECB.

Results and Discussions

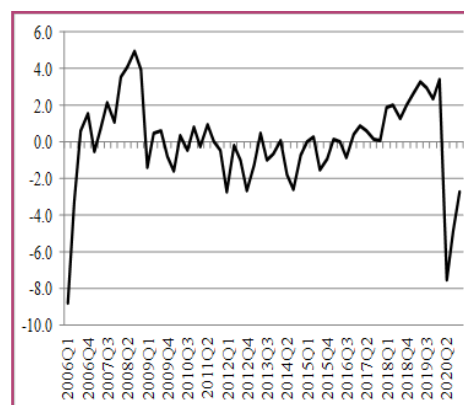
The BH business cycle graphical analysis (Graph 1 and Graph 2) shows that, compared to the others countries' business cycle and to the EA business cycle (Graph 3 and Graph 4), BH does not share same features with the euro area and with Bulgaria which also runs a currency board (Graph 6), and Serbia is the exception (Graph 5). In the analyzed period (Q1 2006 – Q2 2020) BH has three significant departures from the trend line, (in Q3 2008, in period 2018-2019, and after the pandemic breakout (Q2 2020), and in the period from Q1 2012 until Q3 2015, the deviation from the trend disappears already in the next quarter), while the euro area has four significant deviations from trend (in Q1 2008 in Q1 2009 in period 2018-2019, and after the pandemic breakout). BH differs comparing to the EA, not only regarding the number of significant deviations compared to the potential output, but also in relation to the smoothness of cycle. The commonly seen long and deep drop in almost all European countries during 2009 is absent in BH and according to official data the degree of BH cycle smoothness is on a very low level compared to the EA and other countries. The ups and downs in the BH cycle are very sharp, rapid and numerous during the period Q1 2009 - Q3 2016 and the clear, but at the same time not smooth, picture of the cycle is isolated only in the periods of big changes in business activity. Such an abrupt and frequent changes in business activity is not seen even in the case of Serbia and in countries like the Czech Republic, with business cycle ups and downs very close to the EA as a whole. All in all, the smoothness in BH BC differs a lot from individual countries and EA business cycle which is the first indicator that there is an absence of similarity between BH and EA, regarding BC.

Graph 1 - Real GDP and Potential Output/Trend – BH (in logarithms)



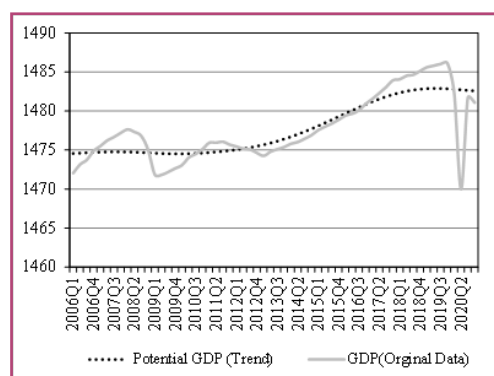
Source: BHAS (Calculated by author). Note: Real GDP and trend are in logarithms, and BC is in % deviation from trend.

Graph 2 - Business Cycle - BH (in % deviation from trend)



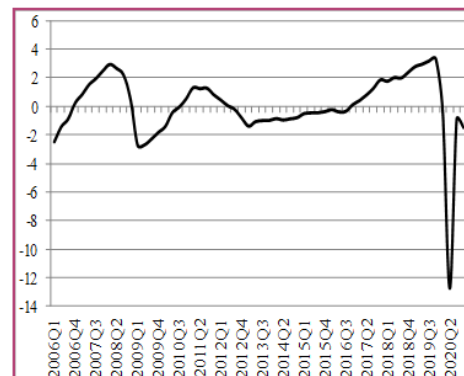
Source: Ibid.

Graph 3 - Real GDP and Potential Output/Trend - the Euro Area (in logarithms)



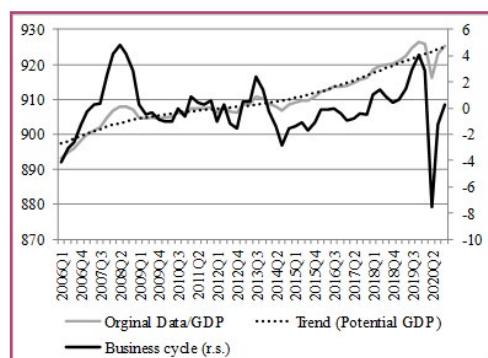
Source: Eurostat (Adopted by author).

Graph 4 - Business Cycle - the Euro Area (in % deviation from trend)



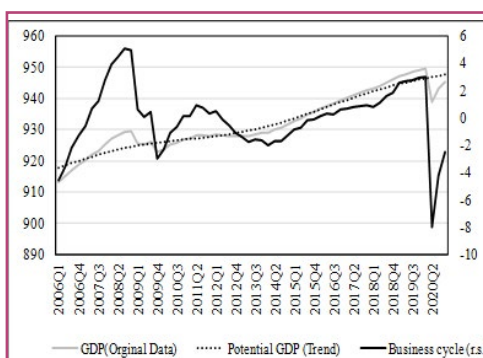
Source: Ibid.

Graph 5 - Real GDP, Trend and Business Cycle - Serbia



Source: Ibid.

Graph 6 - Real GDP, Trend and Business Cycle - Bulgaria



Source: Ibid.

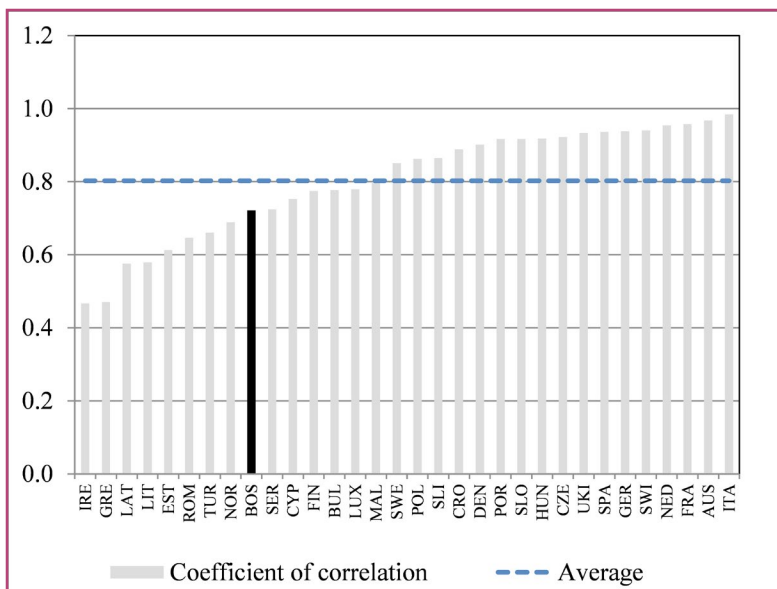
Further analysis has shown additional discrepancy in BCS measured by correlation (Table 1). On average BC correlation, measured by the Pearson coefficient of correlation, among the individual countries, and the EA, is very high, amounting to 0.8. If we apply straightforward relation between correlation and causation (coefficient of determination = coefficient of correlation²) it means that, on average, 50% (0.72^2) of individual countries' BC is explained by EA BC as a whole. BH's BCS measured by correlation is below average, and it is very close to that of Turkey, even if it is not part of EU. Different foreign exchange regimes, flexible in Turkey and fixed in BH, and a much higher relative share of trade with EA countries in BH than in Turkey did not deliver high difference in BCS with EA between these two countries. Around 50% of BC movement in BH is caused by movement in EA BC, and this metric (coefficient of determination) for Turkey is slightly below (44%). In a total sample of 32 countries, only 8 countries have lower BCS metric than BH. In this group of countries lower BCS occurs in those which went through the public debt crisis (Greece), Ireland, with its intense trade relation with the USA, three relatively new EU and/or EA countries i.e., Baltic states, and Norway which is not part of EA at all, as well as Turkey and Romania. If we accept that these countries are some kind of outliers, then BH is at very end of BCS with EA. BH has been running the currency board regime since 1997, and this great time distance (almost quarter of a century) delivered only 50% of co-movements of BC with EA. Serbia has same degree of BCS, which runs discretionary monetary policy, and other countries not belonging to the EA, with flexible exchange rates and discretionary monetary policy, have a higher degree of BCS than BH. One could also expect the same correlation for Bulgaria and BH because both countries run the currency board, but in the case of Bulgaria, correlation is much higher (0.78) almost equal to the average. From a statistical point of view, there is high correlation between EA and BH business cycle, but at the same time relatively low correlation comparing to other countries proves that the current discretionary monetary policy of CBBH, and the further development of discretionary monetary policy, would have full justification in the case of BH.

Table 1 - Descriptive Statistics, Coefficient of Correlation of Business Cycles by Countries
Vis-à-Vis the EA 19

Mean	Standard Error	Median	Standard Deviation	Range	Minimum	Maximum
0.80	0.03	0.86	0.15	0.52	0.47	0.98

Source: Ibid.

Graph 7 - Correlation of Business Cycles by Countries Vis-À-Vis the EA 19

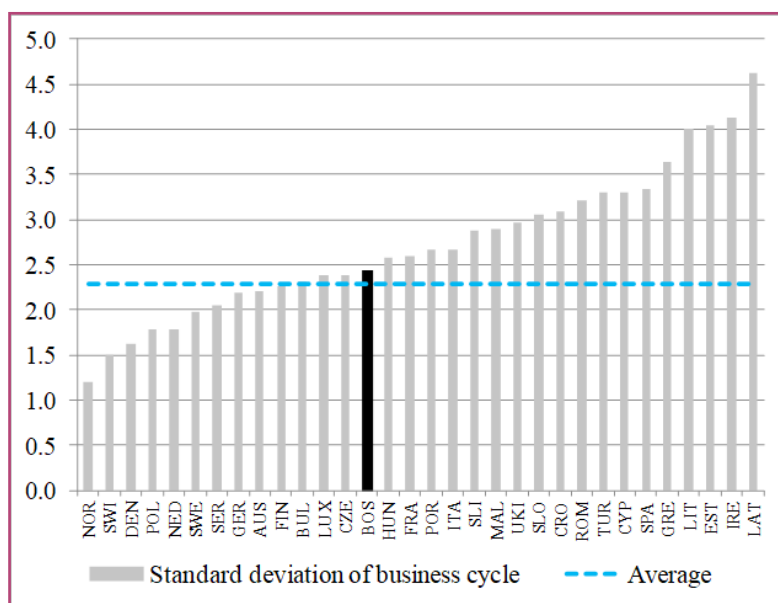


Source: Eurostat and BHAS (Author's calculation).

The important issue in analyzing BCS is the amplitude of the country's BC and synchronization of this very amplitude, as metrics for BCS (Table 2 and Graph 8). In EA BC deviates from its average i.e., from zero for 2.3% and the largest standard deviation expectedly belongs to the Baltic states and the countries which went through the debt crisis.

BH is very close to EA's average but again above this average (in a negative sense). In this metric, Bulgaria is exactly on the average, which in connection with the fact that Bulgaria also has a currency board, could mean that the currency board makes countries' amplitude of BC quite equal to the reserve currency country BC amplitude (euro area). This is the only metrics where we can say that BH's BC is quite similar to the EA BC. But, the very beginning of this section described the misalignment of BC regarding the big difference in degree of smoothness of BC in BH, and different number of ups and downs (BH is missing one big drop in 2009), and thus these findings about the similarity in BC's amplitude should be taken with cautions and reserve, and not as proof that BC in BH and in EA are similar.

Graph 8 - Standard Deviation of Business Cycle (in %)



Source:Ibid.

Table 2 - Standard Deviation of business Cycle by Countries - Descriptive Statistics (in percentage points)

Mean	Median	Range	Minimum	Maximum
2.7	2.6	3.4	1.2	4.6

Izvor:Ibid.

We have derived the same policy recommendation by analyzing the frequency of countries' BC with opposite sign in relation to the EA BC sign (Table 3 and Graph 9). On average in one fifth of all observations, the BC sign differs in relation to the EA BC's sign. The BH's BC is according to this metric again above average (in a negative sense), and it is closer to the maximum than to the minimum value of this metric. In 25% of the cases (out of 60) the sign of BH's BC move into the opposite direction then the sign of EA BC. According to this criterion, the Baltic states are worse than BH (two out of three), as well as Greece and Ireland, but this time the group of countries with a lower degree of BC also includes the UK, Malta, Luxemburg, Hungary and Romania, Serbia, Norway, and Turkey. Six out of these eight last countries run independent and discretionary monetary policy. The UK, Serbia, Hungary, Norway,

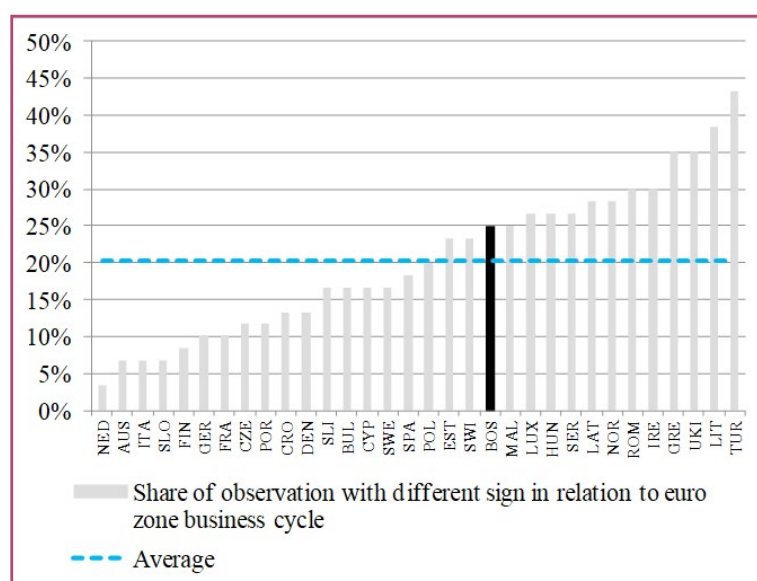
Romania, and Turkey run discretionary monetary policy, their business cycle differ a lot from EA, and if they would decide to give up their discretionary monetary policies, their monetary policy would not be suited to their economy. This group of countries (all of them having a flexible exchange rate) is very active in running discretionary monetary policy, and according this metric BH belongs to this group of countries. Above average are 15 countries and 7 of them (previously mentioned 6 countries and Switzerland) run a discretionary monetary policy, and 7 out of 15 countries are EA's members. In the group of below average (with regard to the sign), out of 17 countries only five run discretionary monetary policy (Czech Republic, Croatia, Denmark, Sweden, Poland Switzerland, and Norway), and among them only Croatia is on the road to EA, and Bulgaria is part of the EU and runs a currency board like BH and its metric is 16.7%, substantially below BH. Thus, according to all facts, there are strong arguments for running a discretionary monetary policy in BH with regards to an achieved level of BCS and as countries with an absence of BCS with the EA opt for discretionary monetary policy more frequently.

Table 3 - Share of Observation with Different Signs in Relation to EA Business Cycles - Descriptive Statistics (in %)

Mean	Standard Error	Median	Standard Deviation	Range	Minimum	Maximum
20.42	1.83	19.17	10.33	40.00	3.33	43.33

Source: Author.

Graph 9 - Sign of Countries' Business Cycle Compared to the Euro Area Business Cycle



Source: Ibid.

Conclusion

The business cycle synchronization is the old topic in finance and economics with numerous research articles, but without any focus on BH, until now. This research field have been analyzing business cycle synchronization of all EU countries and some non-EU countries vis-à-vis the EU and/or EA, but none of the research include BH. The second new and important thing in this research is the attempt to connect business cycle synchronization in BH and EA and monetary policy in ECB in straightforward way suggested in theory. With the adopted currency board BH decided to surrender part of its monetary policy independence, but in the same time by using reserve requirement and remuneration the CBBH run independent monetary policy. This kind of discretionary monetary policy in the currency board regime can be justified only if there is a relatively low degree of the BCS between BH and EA, in comparison to the members of EU/EA and some none-EU countries, and to the others countries from the sample.

We have used four indicators/metrics of BCS in order to prove the main research thesis that there is relatively low BCS vis-à-vis EA and BH. And indeed, all used indicators/metrics show that BCS in BH is relatively low compared to other countries. These findings justify not only the discretionary monetary policy, but also the further development of BH discretionary monetary policy.

Compared to the EA and to almost all other countries in the sample, the business cycle in BH has a low degree of smoothness, with rapid and sharp changes in the sign of the business cycle, except in times of large ups and downs, which is a unique characteristic of the business cycle in BH. The large drop in the business cycle in 2009 in BH is missing, and this event was not noted in other countries' business cycle.

The correlation between BH and EA business cycle is statistically high (0.7) but relatively low compared to other countries' in the sample. Lagging behind BH are only eight countries, the Baltic states (with traditionally low business cycle synchronization), and countries which went through a public debt crisis (Ireland and Greece), as well as Norway, Turkey and Romania, so we can say that regarding correlation BH is at the very end, and 23 countries are in front of it.

The amplitude of the domestic business cycle measured by standard deviation is also above sample average. And, even if there is very small difference in relation to the amplitude of foreign business cycle, we conclude that this last/fourth metrics also shows some signs of relative absence of BCS comparing to the countries with bellow average amplitude of the business cycle. In deriving this conclusion, we took into account the fact that this group again features countries which run an independent monetary policy, and the fact that the domestic business cycle has very rapid and frequent changes in sign.

By measuring the share of observation with different signs in relation to the EA's business cycle we found that Bosnia and Hercegovina is above average, but this time in a negative sense. On average, the share of observations with a different sign of countries business cycle in relation to EA business cycle is 20%, and this metric in Bosnia is 25% which shows an absence of business cycle synchronization. Also, most countries in this group of above average countries have their own national banks and run independent monetary policy, except a few EA countries with specific features (Baltic states and former debt distressed countries) and this is additional motive for discretionary monetary policy in BH. The fact that BH differs in BC sign in one quarter of all observation, and the fact that majority of countries

with the above average sign metric run discretionary monetary policy, prove the connection between countries' absence of business cycle synchronization with the euro area and discretionary monetary policy, with the final message for BH that it should run and further develop a discretionary monetary policy.

Of course, it is worth saying that Bulgaria outperformed BH significantly in all four indicators of business synchronization although both countries have a currency board.

Our final and most important message for Bosnia and Herzegovina policymakers derived from the research is that a discretionary monetary policy is fully justified from the point of view business cycle synchronization which is absent in relation to the EA. Thus, further development and application of independent and discretionary monetary policy is logical in economic terms, and it is a good and desirable monetary strategy.

Some interesting topics for further research could be measuring business cycle synchronization by using the parts of national accounts and/or industrial production, and by using others filters in order to additionally test the thesis about the relatively weak business cycle synchronization in Bosnia and Herzegovina. Analyzing and measuring business cycle synchronization between non-EU Balkan countries can also be an extension of this research with the aim to justify and foster closer economic and trading association between these countries.

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UTICAJ KVALITETA I KARAKTERISTIKA USLUGE NA ZADOVOLJSTVO KLIJENATA U BANKARSKOM SEKTORU SEVERNE MAKEDONIJE

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Rezime

Cilj ovog istraživanja jeste da analizira uticaj kvaliteta usluge na zadovoljstvo klijenata u bankarskom sektoru Severne Makedonije. Rad nastoji da pokaže utemeljenost zadovoljstva klijenata na ulozi i uticaju kvaliteta usluge. Autori su pokušali da odrede koji elementi kvaliteta usluge doprinose većem zadovoljstvu klijenata u banci Y.

Autori su ispitali više teorija i koncepata u vezi sa zadovoljstvom klijenata, uslugama, kvalitetom usluga, lojalnošću, SERVQUAL modelom i finansijskim uslugama. Tokom procesa istraživanja, prikupljeni su podaci putem 68 potpuno i tačno ispunjenih upitnika. Rezultati su potvrdili da postoji veza između kvaliteta usluge i zadovoljstva klijenata. Pronađeni su značajni elementi koje banke treba da poboljšaju kako bi kod klijenata izazvale pozitivne utiske i stvorile pozitivno iskustvo. Zatim je predložena strategiju i instrukcije za delovanje, kao završni deo ovog istraživanja.

Ključne riječi: zadovoljstvo klijenata; kvalitet usluge; SERVQUAL; elementi kvaliteta usluge; unapređenje banaka.

JEL klasifikacija: M15, M30, M31, G21 .

Uvod

Za kvalitet i zadovoljstvo klijenata se već dugo zna da imaju ključnu ulogu u uspehu i opstajanju na današnjem konkurentnom tržištu. Nije iznenađujuće, stoga, da je mnogo istraživanja rađeno na temu ta dva koncepta. Prvenstveno su mnogi istraživači povezivali koncepte kvaliteta i zadovoljstva sa bihevioralnim namerama klijenata, kao što su kupovina i svesna lojalnosti, spremnost da se šire pozitivni utisci, preporuke, kao i namera za ulaganje žalbi.

Bankarski sektor je značajan element ekonomije Severne Makedonije i doživeo je nezapamćen rast i ogromnu konkurenciju u protekloj deceniji. Banka Y se suočava sa ogromnom konkurencijom, uglavnom na osnovu šablona usluga, kvaliteta usluga i očekivanja klijenata. Mnoge banke su u nezavidnom položaju zbog svoje oslabljene mogućnosti da identifikuju nepodudaranja između očekivanja klijenata i percepcije o usluzi banke. Ako ne mogu efikasno identifikovati ta nepodudaranja, uslužne organizacije neće izdržati jaku konkurenciju. Stoga, ovo istraživanje je obavljeno kako bi se ispitao ovaj fenomen i pronašlo empiričko opravdanje, posmatrajući kvalitet usluge kao glavni faktor koji doprinosi zadovoljstvu klijenata.

Najbitniji faktor koji je ključan u današnjem savremenom i uspešnom bankarskom poslovanju jeste kvalitet usluge. Zbog jednoobraznih politika centralne banke, sve komercijalne banke moraju nuditi praktično identične usluge. Najbitnije pitanje je, međutim, kako se te usluge pružaju. Cilj ovog istraživanja jeste da odredi nivo zadovoljstva klijenata banke Y, a u vezi sa kvalitetom različitih usluga koje pruža njihova banka. Koristili smo SERVQUAL kao efikasan pristup merenju kvaliteta usluga ponuđenih od strane banke, kao i za analizu nepodudaranja između očekivanja klijenta i percepcija o uslužnoj organizaciji. Još jedan od ciljeva ovog rada jeste ukazivanje na mogućnost povećanja logičnosti i integriteta upravljanja uslugama. Autori su se, takođe, potrudili da saznaju koji elementi kvaliteta usluga mogu više povećati zadovoljstvo i lojalnost klijenata u banci Y.

Percepcije o kvalitetu usluge i zadovoljstvu klijenata

Zadovoljstvo klijenata se uvek smatra ključnim elementom skoro svakog poslovanja. Različiti faktori zapravo utiču na zadovoljstvo klijenata. Jedan od njih je kvalitet usluge. Kvalitet je jedan od činilaca koje klijenti traže u ponudi, a jedan od činilaca je i usluga (Solomon, 2009). Kvalitet možemo, takođe, definisati kao skup svih odlika i karakteristika proizvoda ili usluge, a koji se odnose na mogućnost zadovoljenja izrečene ili podrazumevane potrebe (Kotler et al., 2002). Čini se da postoji relativni konsenzus među istraživačima tržišta da su kvalitet i zadovoljstvo klijenata odvojeni konstrukti koji su jedinstveni i blisko povezani (Oliver, 1981). Većina istraživača na polju usluga tvrde da su ovi konstrukti različiti (Boulding et al., 1993).

Tabela 1 – Nekoliko ključnih elemenata koji razlikuju zadovoljstvo klijenata od kvaliteta usluge

Zadovoljstvo klijenata	Kvalitet usluge
Zadovoljstvo klijenata može biti uzrokovano bilo kojim elementom, bez obzira na to ima li veze sa kvalitetom, ili ne.	Elementi koji određuju procenu kvaliteta su veoma specifični.
Procene zadovoljstva klijenata mogu se formirati zbog mnoštva činilaca koji nemaju veze sa kvalitetom, kao što su potrebe, jednakost, utisak pravednosti.	Očekivanja koja se odnose na kvalitet zavise od ideala ili utiska o odličnosti.
Veruje se da zadovoljstvo klijenata ima pre konceptualni antecedent.	Antecedent kvaliteta usluge je manje konceptualan.
Procene zadovoljstva zahtevaju iskustvo u radu sa pružanjem i pružaocem usluga.	Procene kvaliteta ne zahtevaju iskustvo u radu sa pružanjem i pružaocem usluga.

Izvor: Adaptirano iz različitih izvora (Taylor, 1993; Oliver, 1993; Rust i Oliver, 1994; Spreng i Mackoy, 1996; Choi et al., 2004; Grace i O'Cass, 2005)

Kvalitet usluga se često smatra ključnim antecedentom uspešnog odnosa sa klijentima. Može se reći i da je to posebno slučaj u sektoru pružanja usluga, gde kvalitet nije lako imitirati i gde kvalitet, kao takav, predstavlja osnovu održive konkurentske prednosti. Pružanjem superiornije usluge, koju konkurencija ne može ponuditi, klijenti dobijaju razlog da odaberu i ostanu kod određenog pružaoca usluge. Sa druge strane, ponuda koja je inferiorna ili slabo definisana može dovesti do većih problema u pridobijanju klijenata i do povećane verovatnoće da klijent neće biti lojalan. Stoga, kvalitet usluga može, teoretski, pružiti osnovu za povećanu lojalnost, zadržavanje i poboljšani poslovni učinak (Ennew i Binks, 1996). Nerazdvojnost, heterogenost i kratkotrajnost su nematerijalni elementi usluge i ključne determinante koje određuju da li će klijent steći utisak o kvalitetu usluge (Ladhari, 2009). Karakteristike usluge moraju biti dobro definisane od strane pružaoca, kako bi se razumeo način na koji klijenti shvataju kvalitet usluge. To znači da pružaoci usluga moraju odrediti nivo nematerijalnosti usluga i pokušati da uključe materijalne elemente koji mogu pomoći da se razumeju očekivanja iz perspektive klijenata (Beamish i Ashford, 2007).

Heterogenost označava razliku koja nastaje na nivou samog pružanja usluge, a zbog razlika u ljudskom ponašanju klijenata i zaposlenih koji nude uslugu. Zato je teško odrediti kvalitet i nivo pružene usluge: pošto su klijenti i pružaoci usluga različiti, isti klijent se može drugačije ponašati sa istim pružaocem usluga. Kratkotrajnost znači da se usluge proizvode i koriste u isto vreme, što implicira da se ne mogu sačuvati za kasniju upotrebu. Ako se usluga ne iskoristi u datom trenutku, ne može se ponovo koristiti. To, međutim, nije slučaj u svakoj uslužnoj industriji. Nerazdvojnost znači da se usluge koriste dok se kupuju (Beamish i Ashford, 2007). Mnogi istraživači su pokušali da razviju različite modele merenja kvaliteta usluga, što je teško merljivo. Kako tvrde Ennew i Binks (1996), interakcija između klijenata i pružaoca usluga je veoma važna kada se meri kvalitet usluge, pošto kroz tu interakciju pružalac usluga lako može bolje razumeti klijenta i identifikovati šta klijent zapravo želi. Sureshchander et al, (2002) tvrde da prednosti revolucije u kvalitetu dolaze samo od zadovoljstva klijenata, što opet umnogome zavisi od percepcije klijenata o sveobuhvatnom kvalitetu usluga. Zato je od velike važnosti razumeti kako klijenti shvataju kvalitet usluga i kako te percepcije mogu uticati na njihovo zadovoljstvo. Zadovoljstvo klijenata treba posmatrati kao multidimenzionalni konstrukt, a predmete merenja treba generisati za istim dimenzijama kvaliteta usluga (Sureshchander et. al, 2002).

Veza između kvaliteta usluga i zadovoljstva klijenata

Parasuraman, Zeithalm i Berry (1985) našli su da je zadovoljstvo klijenata rezultat kvaliteta usluga, a Sureshchandar (2002) predlaže da postoji dvostruka povezanost između kvaliteta usluga i zadovoljstva klijenata. Zadovoljni klijenti su ključni faktor u formiranju želja klijenata da kupe buduće proizvode/usluge. Danas se zadovoljstvo klijenata smatra korporativnom strategijom i uspešno se radi na tom polju. Prema devetom godišnjem globalnom istraživanju stava potrošača koje je izvršila firma Accenture (Accenture Global Consumer Pulse Survey 2013), a koje je merilo iskustva 13.168 potrošača iz 33 zemlje i iz 10 grana industrije kako bi se stekao uvid u promenljivu dinamiku današnjih „non-stop“ potrošača i ispitali stavovi potrošača prema marketingu, prodaji i praksama pružanja usluga potrošačima, zaključeno je da kompanije širom sveta nisu uspele da značajno poboljšaju zadovoljstvo klijenata niti da smanje visoku stopu prelaska na druge pružaoce usluga kod svojih klijenata, iako su imali više podataka i saznanja o željama i preferencijama klijenata, te je 66% klijenata promenilo pružaoca usluga u prethodnih godinu dana, zbog lošeg iskustva sa pružanjem usluga. Na globalnom nivou, trend menjanja pružaoca usluga zbog loše usluge je porastao za 4%, sa 62% na 66%. Stope takvog menjanja su bile najviše kod maloprodaje, pružaoca kablovske i satelitske mreže, kao i kod banaka koje rade sa stanovništvom – što čini ove sektore najranjivijim, ali im takođe i ostavlja najveći potencijal za razvoj.

Literatura koja se bavi upravljanjem uslugama tvrdi da zadovoljstvo klijenata proističe iz uverenja o dobijenoj vrednosti, gde je vrednost „ekvivalentna uverenju o kvalitetu usluge u odnosu na cenu“ (Hallowell, 1996). Stoga, ako je uverenje o vrednosti dobijenoj iz kvaliteta u skladu sa očekivanjima, klijent će biti zadovoljan uslugom. Kako tvrde Fornell et al. (1996), prva determinanta opšteg zadovoljstva klijenata jeste utisak o kvalitetu, a druga determinanta je utisak o vrednosti. Štaviše, oni potvrđuju da utisak o vrednosti ima pozitivni uticaj na zadovoljstvo klijenata. Kvalitet usluge nesumnjivo ima veliki uticaj na spremnost klijenata da kupe ili da kasnije ponovo kupe proizvod. Ako je klijent zadovoljan standardima kvaliteta usluge, veća je verovatnoća da će istu uslugu ponovo kupiti, te da će postati lojalni klijent. Nezadovoljni klijent nikada neće odlučiti da nastavi poslovni odnos i preći će kod drugog pružaoca usluga unutar iste industrije.

Parasuraman et al. (1985) predlažu da uverenje o visokom kvalitetu usluga dovodi do povećanja u zadovoljstvu klijenata. Podržavaju i činjenicu da kvalitet usluga dovodi do zadovoljstva klijenata, kao i drugi autori (Saravanan i Rao, 2007; Lee et al. 2000) koji veruju da je zadovoljstvo klijenata zasnovano na nivou kvaliteta usluga koje pružalac obezbeđuje. I kvalitet usluga i zadovoljstvo klijenata imaju pozitivan uticaj na namere klijenata da ponovo budu klijenti, što pokazuje da i kvalitet usluga i zadovoljstvo klijenata imaju ključnu ulogu u uspehu i opstanku bilo koje firme na konkurentnom tržištu.

Pozitivna i značajna veza između SERVQUAL modela i zadovoljstva klijenata

Kvalitet usluge i zadovoljstvo klijenata su veoma bitni koncepti koje kompanije moraju razumeti kako bi ostale konkurentne i ostvarile rast. Bitno je da kompanije nauče kako da mere ove koncepte iz ugla potrošača, da bi mogle bolje da razumeju njihove potrebe i zadovolje ih. Kvalitet usluga se vrlo bitan jer uzrokuje veće zadovoljstvo klijenata, profitabilnost, smanjene troškove, lojalnost klijenata i zadržavanje klijenata (Chingang i Lukong, 2010). Stavovi klijenata o kvalitetu usluge proizilaze iz poređenja njihovih prethodnih očekivanja od usluge sa njihovim stvarnim iskustvom sa dobijenom uslugom. Uslugu će smatrati odličnom ako njihov utisak nadmaši očekivanja; uslugu će smatrati dobrom ili

dovoljno dobrom ako njihov utisak bude isti kao očekivanja; uslugu će smatrati lošom ili nedovoljno dobrom ako je ispod njihovih očekivanja (Vázquez et al., 2001). Teško je izmeriti kvalitet usluge zbog jedinstvenih karakteristika kao što su nematerijalnost i heterogenost, a koje otežavaju firmama objektivnu procenu nivoa kvaliteta (za razliku od proizvođača koji mogu pregledati i testirati materijalnu robu). Na osnovu ove perspektive, Parasuraman et al. Su razvili skalu za merenje kvaliteta usluge, a koja je poznata pod imenom SERVQUAL.

SERVQUAL ima dve komponente: očekivanja klijenata i utiske klijenata. Očekivanja klijenata su sve šta klijent očekuje da „treba“ i „može“ da se desi u kontekstu usluge. Ponuda usluga se razlikuje u zavisnosti od pružaoca, a stepen varijacija koji klijent može da podnese se naziva tolerancija. Razlika između onoga šta se smatra adekvatnom uslugom i željene usluge se naziva zona tolerancije. Što je bitnija dimenzija kvaliteta usluge (SERVQUAL), to je veći željeni nivo usluge, a uža je zona tolerancije. Ako je kvalitet usluge manje bitan, željeni nivo usluge je znatno niži, a zona tolerancije je šira. Centralna ideja ovog modela jeste da je kvalitet usluge funkcija razlika između očekivanja i utisaka ($P - E$). Osnovu modela predstavlja razlika između utisaka klijenata o stvarnom učinku usluge i njihovih očekivanja o kvalitetu usluge. Ova razlika dalje zavisi od prirode, dizajna i procesa pružanja usluge. Najveći cilj SERVQUAL modela jeste razjašnjavanje niza takvih razlika koje utiču na utisak klijenta o kvalitetu usluge.

Danas bankarske organizacije uče kako da ostvare postepen efekat i efekat velikih razmera da bi unapredile kvalitet usluga. Neprestano unapređivanje treba da pruži ključne smernice za stvaranje i održavanje vrednosti za klijente, kroz bolji dizajn, uvođenje i funkcionisanje usluga, u kombinaciji sa principima, praksama i metodama za upravljanje uslugama i unapređenje pružanja usluga (George, 2007). Banke moraju da uključe pružanje usluga klijentima u svoje poslovne ciljeve, a te strategije moraju uključiti u ciljeve zaposlenih, kako bi banka lakše dostigla zahteve procesa pružanja usluga. Jaka strategija za pružanje usluga klijentima predstavlja razliku između uspešnih organizacija i svih ostalih (Lotich, 2013). Kako bi unapredile svoje sisteme učinkovitosti, kompanije se trude da fokus prebace na uvođenje politika usmerenih na zaposlene, uklanjajući time distancu između menadžmenta – zaposlenih i klijenata (Qadeer, 2013).

Instrumenti korišćeni u istraživanju

Ovo istraživanje koristi SERVQUAL metodu (Parasuraman et al. 1996) da ispita kvalitet usluga u bankarskoj industriji Severne Makedonije. Istraživanje koristi komponentu performansi SERVQUAL metode u empirijskoj anketi sprovedenoj među klijentima Y banke. Iako je SERVQUAL metoda popularan alat za merenje kvaliteta usluga, psihometrijske osobine ovog instrumenta još uvek nisu utvrđene. Sa jedne strane, SERVQUAL se pokazao kao pouzdan kod procene kvaliteta usluga u pet dimenzija: materijalni činioci, pouzdanost, odziv, uverenje i empatija (Parasuraman et al. 1988, Parasuraman, Berry, i Zeithaml, 1991). Razvoj ovog modela je pružio uslužnim i maloprodajnim firmama strukturisan pristup proceni faktora koji utiču na mišljenje klijenata o opštem kvalitetu usluga koje firma nudi. SERVQUAL metoda sadrži stavove za procenu mišljenja klijenata, kao i očekivanja u vezi sa kvalitetom usluga. Nivo slaganja ili neslaganja sa datim stavom ocenjuje se na skali sličnoj Likertovoj skali od sedam podeoka. Instrumenti koji se koriste su Likertova skala od pet podeoka, koji predstavljaju raspon stavova od 1 – izrazito neslaganje, do 5 – izrazito slaganje, a kojom se meri kvalitet usluge, kao i Likertova skala od pet podeoka koji predstavljaju raspon stavova od izrazitog nezadovoljstva (1) do izrazitog zadovoljstva (5), kojom se meri zadovoljstvo klijenata. Nivo kvaliteta usluge predstavljen je razlikom između utiska o usluzi i očekivane usluge. SERVQUAL model je zasnovan na pet dimenzija kvaliteta usluge (Grafik 1):

- **MATERIJALNI ČINIOCI** (fizički objekti, oprema i izgled osoblja);
- **POUZDANOST** (sposobnost pouzdanog i preciznog obavljanja obećane usluge) Radi se o ispunjavanju obećanja, obećanjima o isporuci, određivanju cena, rešavanju žalbi itd.;
- **ODZIV** (spremnost da se pomogne korisnicima i brzo pruži usluga) Ova dimenzija naglašava spremnost osoblja koje pruža uslugu da budu pažljivi prema zahtevima kupaca, pitanjima i žalbama;
- **UVERENJE** (znanje i ljubaznost zaposlenih i njihova sposobnost da steknu poverenje) i;
- **EMPATIJA** (pružanje individualne pažnje kupcima).

U sklopu svake dimenzije instrumenta, kako za očekivan kvalitet, tako i za percepciju kvaliteta usluge, korišćen je niz pitanja (videti Dodatak A). Materijalni činioци se mere upitnikom, tj. izjavama od 1 do 4:

1. Odlične bankarske kompanije će imati modernu opremu.
2. Fizički objekti u odličnim bankama biće vizuelno privlačni.
3. Zaposleni u odličnim bankama će izgledati uredno.
4. Materijali u vezi sa uslugom (pamfleti ili natpisi) biće vizuelno privlačni u odličnoj banci.

Pouzdanost se meri izjavama od 5 do 9:

5. Kada odlične banke obećaju da će nešto učiniti u određenom roku, one to i učine.
6. Kada klijent ima problem, odlične banke će pokazati iskreni interes za njegovo rešavanje.
7. Odlične banke će uslugu obaviti iz prvog pokušaja.
8. Odlične banke će pružiti uslugu u vreme kada to obećaju.
9. Odlične banke će insistirati na evidenciji bez grešaka.

Za odziv, korišćene su sledeće izjave:

10. Zaposleni u odličnim bankama će klijentima tačno reći kada će usluge biti izvršene.
11. Zaposleni u odličnim bankama će klijentima pružiti brzu uslugu.
12. Zaposleni u odličnim bankama uvek će biti spremni da pomognu klijentima.
13. Zaposleni u odličnim bankama nikada neće biti previše zauzeti da odgovore na zahteve klijenata.

Uverenje se meri bodovanjem izjava od 14 do 17:

14. Ponašanje zaposlenih u odličnim bankama uliva poverenje klijentima
15. Klijenti odličnih banaka će se osećati sigurno pri transakcijama.

16. Zaposleni u odličnim bankama biće dosledno ljubazni sa klijentima.

17. Zaposleni u odličnim bankama će imati dovoljno znanja da odgovore na pitanja klijenata.

Što se tiče empatije, bodovanje je izvršeno na osnovu sledećih izjava:

18. Odlične banke će klijentima posvetiti individualnu pažnju.

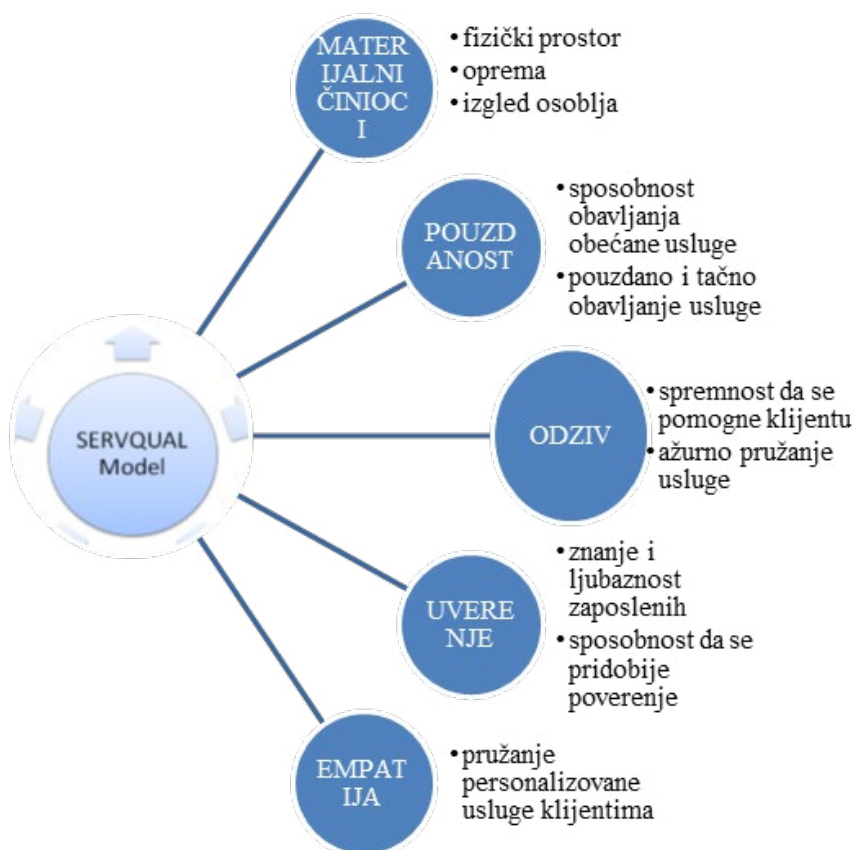
19. Odlične banke će imati radno vreme pogodno za sve svoje klijente.

20. Odlične banke će imati zaposlene koji klijentima pružaju personalizovane usluge.

21. Odlične banke će najbolji interes svojih klijenata stavljati na prvo mesto.

22. Zaposleni u odličnim bankama razumeće posebne potrebe svojih klijenata.

Grafikon 1 – Pet dimenzija SERVQUAL modela



Izvor: Sopstvena ilustracija

SERVQUAL metoda sadrži stavove za procenu mišljenja klijenata, kao i očekivanja u vezi sa kvalitetom usluga. Nivo slaganja ili neslaganja sa datim stavom ocenjuje se na skali sličnoj Likertovoj skali od sedam podeoka. Instrumenti koji se koriste su Likertova skala od pet podeoka, koji predstavljaju raspon stavova od 1 – izrazito neslaganje, do 5 – izrazito slaganje, a kojom se meri kvalitet usluge, kao i Likertova skala od pet podeoka koji predstavljaju raspon stavova od izrazitog nezadovoljstva (1) do izrazitog zadovoljstva (5), kojom se meri zadovoljstvo klijenata.

Da bi se testirala pouzdanost skale SERVQUAL i unutrašnja konzistentnost pet dimenzija, kako su predložili Parasuraman et al. (1988), Kronbahov koeficijent α izračunat je za svaku od pet dimenzija koristeći podatke o percepcijama, očekivanjima i rezultatima (razlike između percepcije i očekivanja). Nivo kvaliteta usluge predstavljen je razlikom između opažene i očekivane usluge.

Rezultati analize iz upitnika

U okviru aktivnosti analize, 150 upitnika je distribuirano u 30 filijala banke. Njih 68 su lično popunili povremeni klijenti banaka. Svi klijenti su koristili neke od usluga banke i bili su upoznati sa opštim iskustvom saradnje sa tom bankom. Nakon prikupljanja popunjenih upitnika, podaci su obrađeni u softveru i dobijeni su konačni rezultati istraživanja. S jedne strane, analiza podataka je proces kroz koji se prikupljeni podaci smanjuju na prikladniju veličinu kojom se može upravljati, a mogu se ispitati i identifikovanjem trendova ili obrazaca, primenom statističkih tehnika i sumiranjem podataka. Ovaj proces je od velikog značaja jer istraživač mora tumačiti nalaze i odgovoriti na istraživačko pitanje. Stoga se mogu izneti preporuke i sugestije (Cooper & Schindler, 2008).

Poređenje percepcije i očekivanja klijenata

Svaka od pet dimenzija u modelu SERVQUAL izmerena je pomoću anketnog instrumenta koji se sastoji od pojedinačnih atributa koji ulaze u svaku dimenziju. Za svako od 22 pitanja u upitniku, koja se odnose i na očekivanja i na percepciju, klijent je dodelio individualnu ocenu rangiranjem od 1-7 (1 označava potpuno neslaganje, a 7 potpuno slaganje).

Tabela 2 - Rezultati po pitanjima i klijentima za očekivanje

OČEKIVANJE																						
Broj pitanja	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Prosek	6	5,88	5,88	5,35	6,09	6,47	6,59	6,47	6,03	6,35	6,5	6,41	6,15	6,17	6,32	6,23	6,44	5,91	5,65	5,91	6,26	5,97

Kao što je prikazano u Tabeli 2, što se tiče materijalnih elemenata, klijenti su dali najveću ocenu - 6 za prvo pitanje. To znači da je posedovanje savremene opreme najvažnije vizuelno očekivanje klijenata.

U delu koji se odnosi na pouzdanost, sva pitanja su visoko ocenjena. Nešto veću ocenu - 6,59, ima pitanje broj 7 koje se odnosi na obavljanje usluge iz prvog pokušaja.

Za odziv, najveća prosečna ocena - 6,41 data je pitanju br. 12, da će odlične banke uvek biti spremne da pomognu klijentima.

Što se tiče kategorije uverenja, najvažnije je bilo 17. pitanje sa ocenom 6,44. Ovo je pitanje koje govori da sposobnost odgovaranja na pitanja klijenata karakteristika odličnih banaka.

U vezi sa empatijom, najvažnije pitanje je 21. - Odlične banke će na prvo mesto staviti interes svojih klijenata, sa ocenom 6,26.

Tabela 3 – Rezultati po pitanjima i klijentima za percepciju

PERCEPCIJA																						
Broj pitanja	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Prosek	5,44	5,91	5,65	5,29	5,23	5,47	5,24	5,44	5,12	5,15	5,56	5,76	5,59	5,73	6,06	5,82	5,67	5,73	5,67	5,5	5,5	5,47

Tabela 3 prikazuje rezultate percepcije kupaca. Od materijalnih elemenata, klijenti najbolje ocenjuju banku kroz njene vizuelno privlačne prostorije. Ovo pitanje se boduje sa 5,91.

Što se tiče pouzdanosti, iskazivanje iskrenog interesa za rešavanje problema klijenata od strane zaposlenih u Banci Y ocenjeno je sa 5,47. Ovo je bila najveća ocena iz dimenzije percepcije.

Za odziv, isto kao i kod očekivanja, najveća prosečna ocena 5,76 se daje pitanju br. 12, koje se odnosi na spremnost zaposlenih u Banci Y da pomognu klijentu.

Najvažnije iz aspekta uverenja jeste percepcija da se osećate bezbedno što se tiče transakcija. Ovo pitanje ima prosečnu ocenu 6,06.

Sa najvišom ocenom u dimenziji empatije - 5,73, ističe se pitanje br. 18. Ovo pitanje je povezano sa načinom na koji se Banka Y doživljava po pitanju pružanja individualne pažnje klijentu.

Iz Tabele 2 i Tabele 3, ocenjeni rezultati za svaku dimenziju su preciznije objašnjeni u nastavku:

Zbog pouzdanosti, klijenti žele da računaju na svog pružaoca usluga. Za banku je mnogo važnije da bude pouzdana nego da ima luksuzne filijale i opremu.

Zbog odziva, stajanje u redovima ili jednostavno čekanje na informacije važan je pokretač za nezadovoljstvo klijenata.

Radi uverenja, klijent očekuje od osoblja Banke Y da budu stručnjaci za uslugu koju pružaju. Osim toga, čak i ako je osoblje visoko kvalifikovano, ali klijent to ne može da primeti, njegovo poverenje u banku će biti manje.

Za empatiju je takođe važna percepcija brige o klijentu. Čak i ako se primljena usluga obavlja profesionalno i besprekorno, ako je osoblje banke neoprezno pri nastupu pred klijentom, klijentovo iskustvo trpi posledice.

Što se tiče materijalnih elemenata, iako je to najmanje važna dimenzija, opšti izgled je bitan. Klijenti žele da se osećaju prijatno i udobno u prostorijama banke i da vide lepo obučeno osoblje.

Ocena razlike (GAP) za svaku dimenziju se izračunava jednostavnim oduzimanjem ocene očekivanja od ocene percepcije za svaki atribut (ocena razlike = percepcija - očekivanje).

Tabela 4 – Ocena razlike

Dimenzija	Dimenzija Materijalni el.	Pouzdanost	Odziv	Uverenje	Empatija
Prosek P-O	-0,205	-1,03	-0,8375	-0,47	-0,366

Ocene razlike između očekivanja i percepcija klijenata, gde su se za svih pet dimenzija javili negativni brojevi, pokazuje da se opšta očekivanja klijenata ne ispunjavaju. Najveća razlika od -1,03 je u pouzdanosti, a zatim slede odziv, uverenje, empatija i najmanja razlika od -0,2 za materijalne elemente, kako je prikazano u tabeli

Diskusija o rezultatima - Razvoj strategije poboljšanja usluga

Zaposleni su uspešni koliko je uspešan menadžment i potrebno je veliko vodstvo da bi se zaposlenima pomoglo da shvate važnost korisničkog iskustva. Zbog toga je važno imati strategiju koja će pomoći stvaranju i jačanju kulture pružanja usluga. Odlično korisničko iskustvo je ono što vraća potrošače. I rukovodioci i zaposleni treba da budu svesni zahteva kupaca u poređenju sa povratnim informacijama kupaca. Zadovoljni kupci su lojalni kupci.

Prvi korak u kreiranju strategije korisničke službe je prenošenje vizije korisničke službe zaposlenima. Zaposleni treba da razumeju šta su vizija i ciljevi banke za korisničku podršku i da razumeju svoju odgovornost da pomognu u postizanju te vizije. Organizacija koja deli viziju korisničke službe i podučava veštinama podrške klijenata imaće bolje iskustvo u pružanju usluga korisnicima nego organizacija koja ostavlja zaposlene na prvoj liniji bez obuke i nespremne za bavljenje pitanjima korisnika. Pružanje visokog kvaliteta bankarskih usluga zahteva odlično rukovodstvo Banke Y, zasnovano na verovanju u sposobnost ljudi da posmatraju svoje uloge kao standard izvrsnosti i na stavu banke za postizanje svojih ciljeva obezbeđivanjem neophodne opreme, alata i odgovarajuće slobode za pos-

tizanje njihovih zadataka. Menadžeri Banke Y veruju u ulaganje u ljudstvo, slušajući njihove brige, pružajući im obuke, treninge i učeći ih kako da se inspirišu i takmiče kako bi povećali produktivnost i standarde kvaliteta kompanije.

U okviru sprovedenog istraživanja, od 68 odgovora klijenata, konstatovano je da su očekivanja najveća u sferi pouzdanosti i odziva, dok je percepcija Banke Y niža u ove dve dimenzije. To znači da, iako pomalo manje važni – materijalni elementi, empatija i uverenje, predstavljaju dimenzije u kojima je Banka Y uspešnija. Što se tiče pouzdanosti i odziva, kao dve najvažnije dimenzije za klijente, Banka Y bi trebalo da radi na poboljšanju svojih rezultata.

Postoje načini da se poboljša kvaliteta usluga u Banci. Bankarske organizacije često greše i rasipaju vredne resurse stvarajući proizvode i usluge koje misle da klijent želi, da bi kasnije otkrili da to uopšte nije ono što klijente interesuje. Banka ne može zadovoljiti potrebe svojih klijenata ako ne razume šta oni žele. Prvi korak u inicijativi za poboljšanje zadovoljstva korisnika je razgovarati sa korisnicima kako bi saznali njihovu percepciju usluga koje se pružaju i utvrdili koje su njihove potrebe i očekivanja. Stoga bi se moglo preporučiti da Banka Y češće vrši ovakva istraživanja, kako bi se videlo kakva su očekivanja i percepcije klijenata nakon nekog vremena i na kojem nivou Banka ispunjava data očekivanja.

Procena potreba kupaca vrši se prikupljanjem povratnih informacija putem fokus grupa, anketa o zadovoljstvu ili kartica sa komentarima klijenata, i razvijanjem sveobuhvatnog plana za zadovoljenje i premašivanje potreba korisnika. Potrebe i očekivanja klijenata su pokretna meta. Ono što klijent želi danas biće veoma različito od onoga što će želeći godinu ili pet godina kasnije. Kako se stvari menjaju, menjaju se i očekivanja i potrebe. Recimo da su pre nekoliko godina ljudi bili pozitivno iznenađeni fizičkim i tehnološkim promenama u bankarskom okruženju i bili su željni istih. Tada je Banka uložila u modernizaciju, fizički izgled i podmlađivanje osoblja. Klijenti su pozitivno prihvatili ove radnje, ali kako se navikavaju na ove promene, očigledno je da nove ili bolje rečeno, ključne potrebe i očekivanja rastu. Kao što je istraživanje pokazalo, to su klijenti koji se više interesuju za pouzdanost Banke. Dakle, opet, fokus banke treba usmeriti ka ovim ključnim dimenzijama. To je vreme kada radne procese treba poboljšati i učvrstiti. Ceo tok rada od prijema upita do pružanja potrebne usluge kao odgovora na upit mora se ponovo proveriti i, ako je moguće, automatizovati sa boljim softverskim sistemima. Ovo bi moglo imati pozitivan efekat na smanjenje vremena i grešaka, kao dva važna segmenta pouzdanosti.

Zatim, fokus treba postaviti na zaposlene u Banci i njihovu odgovarajuću obuku. Kada se identifikuju potrebe i očekivanja klijenata i izmeri zadovoljstvo korisnika, vreme je za stvaranje ciljeva za postizanje zadovoljstva korisnika. Zaposleni moraju da razumeju šta je cilj kako bi mogli pomoći banci da postigne svoje korporativne ciljeve. Obuka treba da objasni kako bi banka želela da se zaposleni ponaša u svakoj situaciji i treba da pomogne zaposlenima da razumeju kako da odgovore svojim klijentima. Zaposleni moraju znati šta želite od njih. Zaposleni treba da dobro razumeju kako njihova usluga klijentima utiče na ukupne performanse banke i treba da odgovaraju za postizanje ciljeva zadovoljstva klijenata. Trebalo bi da postoji dobro osmišljen sistem za priznavanje i nagrađivanje zaposlenih za pružanje dobre usluge korisnicima. Zaposlenima je potrebno pozitivna podrška i treba ih nagraditi kada pokažu željeno ponašanje u skladu sa kulturom pružanja usluga. Nakon što sve ovo uključi u svoju strategiju, Banka će napraviti pozitivna poboljšanja u obezbeđivanju boljeg pružanja usluga.

Banka Y treba da promoviše korporativnu kulturu uz značajno poštovanje svojih zaposlenih, njihov razvoj i orijentaciju prema klijentima. Na najvišoj tački strateških ciljeva uvek treba da bude srećan i lo-

jalan kupac. Zbog toga će korelacija oba elementa na kraju doneti bolje rezultate u ukupnom kvalitetu usluge i zadovoljstvu korisnika. Pružanje odličnih bankarskih usluga zahteva neprestana poboljšanja u organizacionom bankarskom sektoru i kulturi, kulturi u kojoj se ljudi suočavaju sa izazovima da daju sve od sebe, a u kompaniji su nagrađeni i podržani da ostvare svoj puni potencijal. Banka Y može poboljšati kvalitet svojih usluga razvijanjem strategije poboljšanja usluga u organizaciji, koja zahteva nekoliko koraka i mera za pokretanje poboljšanja u unutrašnjem okruženju. Uopšteno, kvalitet definišu kupci i treba ga poboljšati prema specifikacijama kupaca, a ne prema kompaniji. Nedostatak u upravljanju kvalitetom usluga može se ukloniti planiranjem aktivnosti, istraživanjem i analizom, kao i pravilnim raspoređivanjem osoblja, tako da banka može analizirati i predvideti očekivanja klijenata. Takođe, važno je razviti analizu baze podataka, opšte mapiranje kupaca, planiranje kapaciteta i naglašavanje marketinških istraživanja i analiza radi prikupljanja informacija o najnovijim tržišnim trendovima.

Jaz između pružanja usluga i spoljne komunikacije može se smanjiti ako su zaposleni dovoljno obučeni za rad u različitim odeljenjima (kao rezerva) i imaju dovoljno informacija za obradu upita kupaca. Sva pitanja u radu sa klijentima treba jasno da se saopšte i treba izbegavati preterivanja putem lažnih izjava. Pravilnim planiranjem i stalnim praćenjem mogu se prevazići problemi. Nalazi su otkrili da bi zapošljavanje prave osobe u pravo vreme na pravom mestu moglo pomoći da se smanje nedostaci u učinku. Osim ovoga, postoji potreba da se fokus prebaci na tehnološki zasnovane usluge za korisničku podršku. Najvažnije pitanje za pridobijanje poverenja klijenata je usredsređivanje na razvoj sistema rešavanja žalbi. Kako je glavni fokus na zadovoljavanju klijenta koji zahteva dodatni napor da razumeju njegovi problemi. Ponekad malo klimanje glavom ili osmeh mogu učiniti da se kupac oseća vrednim. Male stvari poput gesta, načina ophođenja, pa čak i oblačenja, mogu se koristiti kao inspirativna tehnika.

Osim toga, važno je postupati sa klijentima na način koji oni razumeju. Ako posebno uzmemo u obzir banke, ljudi koji posećuju banku pripadaju različitim starosnim grupama, pa ih banka treba tretirati u skladu sa nivoom njihove udobnosti. Prema Globalnom istraživanju potrošačkog bankarstva za 2014. godinu, poverenje je ono što pretvara klijente iz statičnih izvora prihoda u zagovornike svojih banaka. U eri u kojoj društveni i digitalni mediji omogućavaju potrošačima da odmah podele svoja iskustva, klijenti koji veruju svojoj banci privući će najviše preporuka i biće spremniji da usklade svoje bankarske potrebe sa jednim određenim pružaocem finansijskih usluga. Stoga su klijenti pokretači rasta svake banke. Iako izrada zajedničkih strategija može biti efikasnija, banke koje na isti način pristupaju klijentima rizikuju da pojedinim klijentima ponude pogrešne proizvode, usluge i savete, putem manje efikasnih kanala. Da bi optimizirale ulaganja u iskustvo klijenata, banke treba da primene strategije zasnovane na segmentima koje koriste ove inherentne sličnosti - ali i njihove razlike. Dobra vest je da je poverenje potrošača u bankarsku industriju u porastu, pri čemu je 93% ispitanika prijavilo umereno ili potpuno poverenje u svoje banke. Slično, 77% klijenata je dovoljno zadovoljno svojim bankarskim odnosom da preporuče svog primarnog pružaoca usluga. Čini se da globalni ekonomski oporavak uzima maha, a banke su na dobitku.

Na kraju, iako je istraživanje u okviru ovog rada obuhvatilo samo mali uzorak klijenata Banke Y sa ograničenim rezultatima, ono može biti veoma važno kao prvi korak ka preduzimanju radnji za dalja poboljšanja i dalje detaljne studije.

Zaključak

Cilj ove studije je da vidimo kako se kvalitet usluga u bankarskom sektoru Severne Makedonije odnosi na zadovoljstvo klijenata, prema Banci Y kao ključnoj studiji. Što se tiče kvaliteta usluge kao polazne tačke, navedeno je da je njeno merenje teško zbog njenih jedinstvenih karakteristika, poput neopipljivosti i heterogenosti. Međutim, literatura nudi razvijenu skalu za merenje kvaliteta usluga, poznatu kao SERVQUAL model, koju smo prihvatili kao odgovarajuću za analizu u ovoj tezi.

Nakon analize, usavršili smo naš originalni model do varijante koju sada smatramo da prikladnijom za bankarski sektor. Nalazi će otkriti da kvalitet usluge utiče na zadovoljstvo klijenata do određenog nivoa, jer su oba koncepta različita, a odnos između njih je uzročno-posledičan. Istraživanje sprovedeno među delom klijenata Banke Y pokazalo je da postoji značajna veza između očekivanja usluge, pružene usluge i načina na koji je klijent na kraju doživljava. Kvalitet usluge pravi je faktor zadovoljstva korisnika. Po dimenzijama iz modela SERVQUAL, pouzdanost i odziv su navedeni kao najvažnija polja u kojima banka treba da se poboljša i stvori bolji kvalitet usluge. Rezultati takođe ističu važnost ukupnog bankarskog odnosa i sugerišu da ulaganje u kvalitet i upravljanje odnosima sa klijentima može pomoći banci u poboljšanju stepena zadovoljstva i lojalnosti među klijentima, čime se povećava verovatnoća da će klijenti koji se zadrže kratkoročno, takođe zadržati i dugoročno. Pravilnim planiranjem, razvojem i stalnim praćenjem banka može proizvesti efikasne strategije za poboljšanje nivoa kvaliteta i zadržavanje postojećih i budućih klijenata. Banka mora uključiti korisničku službu u svoje poslovne ciljeve, a te strategije treba uključiti u ciljeve zaposlenih kako banka lakše postigla ciljeve korisničke službe. Snažna vizija i strategija korisničkog servisa kritična su komponenta uspeha svake banke.

I na kraju, možemo reći da se ova studija zapravo može koristiti kao osnova za buduća istraživanja kako bi se ispitaio uticaj kvaliteta usluge na zadovoljstvo korisnika. Takođe može doprineti uslužnim kompanijama u cilju poboljšanja standarda kvaliteta usluga kako bi zadovoljile svoje sadašnje i buduće klijente. Neki od pristupa i predloga poboljšanja koji se razmatraju u ovoj studiji mogu se primeniti i u bankarskom sektoru uopšte, kao i u drugim sektorima usluga.

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THE IMPACT OF SERVICE QUALITY AND SERVICE CHARACTERISTICS ON CUSTOMER SATISFACTION IN THE NORTH MACEDONIAN BANKING SECTOR

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Summary:

The aim of this research is to analyze the impact of service quality on customer satisfaction in the North Macedonian banking sector. The study aims to show that customer satisfaction is based on the role and impact of service quality. We try to find out which service quality dimensions may enhance customer satisfaction in a better way in Bank Y.

We examined a range of theories and concepts related to customer satisfaction, service, service quality, loyalty, SERVQUAL model and financial services. Within the investigation process, we have collected data out of 68 completely and correctly filled questionnaires. The results confirmed that there is a connection between service quality and customer satisfaction. We have found out that there are significant dimensions where banks should make improvements in order to achieve positive impressions and experience of its clients. Following, we gave a proposed strategy and instructions for action as a finalization part of this research.

Keywords: Customer satisfaction; Service quality; SERVQUAL; Service quality dimensions; Banking improvement.

JEL classification: M15, M30, M31, G21.

Introduction

Quality and customer satisfaction have long been recognized as playing a crucial role for success and survival in today's competitive market. Not surprisingly, considerable research has been conducted on these two concepts. Notably, the quality and satisfaction concepts have been linked to customer behavioral intentions like purchase and loyalty intention, willingness to spread positive word of mouth, referral, and complaint intention by many researchers.

The banking sector is a significant sector in North Macedonia's economy and has seen unprecedented growth and raging competition during the last decade. Bank Y is facing tremendous competition, mainly based on service pattern, service quality, and customers' expectation. Many banks are far from an advantageous position because of their scrawny ability to identify the gaps between customer expectations and perception of the bank's service. If they are not able to identify those gaps effectively, service organization will not survive in the stiff competition. Therefore, this study has been specifically conducted to look into this phenomenon and seek empirical justification in this regard by considering service quality as the main contributory factor towards customer satisfaction.

The most important factor that matters a lot in today's modern and successful banking business is the quality of services. Due to uniform policies of the central bank, all commercial banks are required to offer almost identical services. But how these services are provided is the most important phenomenon. The aim of this research study is to determine the satisfaction level of banking customers in Bank Y, regarding the quality of different services provided by their bank. We will use SERVQUAL as an effective approach to measure the quality of provided services and analyze the gaps between customer expectations and perceptions of the service organization. Another aim of this paper is to point out how management of service improvement can become more logical and integrated. An effort will also be made to find out which service quality dimensions may enhance customer satisfaction and customer loyalty in a better way in Bank Y.

Perceived Service Quality and Customer Satisfaction

Customer satisfaction is always taken as a central point in almost all business ventures. Various factors actually generate customer satisfaction. Service quality is one of them. Quality is one of the things that consumers look for in an offer, while service happens to be another (Solomon 2009). Quality can be also defined as the totality of features and characteristics of a product or services that bear on its ability to satisfy stated or implied needs (Kotler et al., 2002). There appears to be a relative consensus among marketing researchers that service quality and customer satisfaction are separate constructs which are unique and share a close relationship (Oliver, 1981). Most researchers in the services field have maintained that these constructs are distinct (Boulding et al., 1993).

Table 1 - Identifies a Number of Key Elements that Distinguish Customer Satisfaction from Service Quality.

Customer Satisfaction	Service Quality
Customer satisfaction can result from any dimension, whether or not it is quality related.	The dimensions underlying quality judgments are rather specific.
Customer satisfaction judgments' can be formed by a large number of non-quality-related issues, such as needs, equity, perceptions of fairness.	Expectations for quality are based on ideals or perceptions of excellence.
Customer satisfaction is believed to have	Service quality has less conceptual antecedents.
Satisfaction judgments do require experience with the service or provider.	Quality perceptions do not require experience with the service or provider.

Source: Adapted from various sources (Taylor, 1993; Oliver, 1993; Rust and Oliver, 1994; Spreng and Mackoy, 1996; Choi et al., 2004; Grace and O'Cass, 2005)

Service quality is widely seen as a key antecedent to successful customer relationships. Arguably, this is particularly so in the service sector where quality can be difficult to imitate and as such can potentially provide the basis for a sustainable competitive edge. Offering a superior service, which the competition cannot match, provides consumers with a reason for selecting and remaining with a particular provider. Conversely, a service offer, which is inferior or indistinct, may lead to greater problems in attracting customers and an increased likelihood of defection. Thus, service quality can, in principle, provide the basis for enhanced loyalty, retention and improved business performance (Ennew and Binks, 1996). Inseparability, heterogeneity and perishability as the intangible elements of a service are the critical determinants that influencing service quality perceived by a consumer (Ladhari, 2009). Service must be well defined by the provider in terms of its characteristics in order to understand how consumers perceive service quality. This means that service providers must try to determine the level of intangibility of services and try to include tangible elements that could aid understanding of expectation from the consumer's perspective (Beamish & Ashford, 2007). Heterogeneity signifies the difference which comes in at the level of delivery of service, due the difference in human behavior of those offering services and the consumer. This is why it is difficult to determine the quality and level of service provided - since consumers and service providers are different, the same consumer could act differently with the same service provider. Perishability means that services are produced and consumed at the same time, implying that they cannot be stored for later usage. If the service is not used then, it cannot be used again. This does not however hold in every service industry. Inseparability means services are consumed as they are purchased (Beamish & Ashford, 2007). Many researchers have tried to develop various models to measure service quality, which is hard to measure. According to Ennew and Binks (1996), interaction between consumer and service provider is very important when measuring service quality because through that interaction, the service provider could easily understand the consumer better and identify what exactly they want. Sureshchander et al, (2002) state that the veritable gains of a quality revolution come only from customer delight, which again to a very great extent depends on the customer's perceptions of overall service quality. This is why it is imper-

ative to understand how consumers perceive service quality and how these perceptions could affect their satisfaction. Customer satisfaction should be viewed as a multi-dimensional construct and the measurement items should be generated with the same dimensions of service quality (Sureshchander et. al, 2002).

Link Between Service Quality and Customer Satisfaction

Parasuraman, Zeithalm and Berry (1985) found that customer satisfaction is the outcome of service quality, and Sureshchandar (2002) suggest that there is a double connection between service quality and customer satisfaction. Satisfied customers are a key factor in the formation of a customer's desire to purchase future products/services. Nowadays, customer satisfaction is considered as the corporate level strategy, and it is a source of successful activities. According the ninth annual Accenture Global Consumer Pulse Survey 2013, which measured the experiences of 13,168 customers in 33 countries and across ten industries to gain insight into the changing dynamics of today's "nonstop" customers and assess consumer attitudes toward marketing, sales and customer service practices, the survey found that despite having more data and insights into consumer desires and preferences, companies in the world failed to meaningfully improve customer satisfaction or reverse rising switching rates among their customers, as 66% percent of consumers switched service providers in the past year due to poor customer service experience. Globally, there is a 4 percent increase in switching due to poor customer service, from 62% to 66%. Switching rates were highest among retailers, cable and satellite providers and retail banks – making companies in these sectors the most vulnerable, but also giving them potentially the most to gain.

The service management literature argues that customer satisfaction comes from the perceptions related to obtained value, where "value is equivalent to service quality perceived in relation with price. . ." (Hallowell, 1996, p.28). Therefore, if the value perceived regarding the performance of quality is according to the expectations, it will lead to satisfied responses by the customer about the service. According to Fornell et al. (1996), for overall customer satisfaction, the first determinant is perceived quality . . . and the second determinant is perceived value. Further, they support that the perceived value has positive influence on customer satisfaction. Undoubtedly, service quality has a great impact on customer willingness to buy or subsequent repurchase intentions. If the customer is satisfied with the service standards, they will be more likely to buy the same service again and will become a loyal customer. Dissatisfied customers would never want to continue the relationship and will switch to other service providers in the same industry.

Parasuraman et al. (1985) suggested that when perceived service quality is high, then it would lead to increase in customer satisfaction. They support the fact that service quality leads to customer satisfaction as few other authors (Saravanan & Rao, 2007; Lee et al. 2000) who acknowledge that customer satisfaction is based upon the level of service quality provided by the service provider. Both service quality and customer satisfaction have a positive effect on customers' re-patronage intentions, showing that both service quality and customer satisfaction have a crucial role to play in the success and survival of any business in the competitive market.

Positive and Significant Relationship Between SERVQUAL and Customers' Satisfaction

Service quality and customer satisfaction are very important concepts that companies must understand in order to remain competitive in business and hence grow. It is very important for companies to know how to measure these constructs from the consumers' perspective in order to better understand their needs and hence satisfy them. Service quality is considered very important because it leads to higher customer satisfaction, profitability, reduced cost, customer loyalty and retention (Chingang and Lukong, 2010). Customers' perceptions of service quality result from a comparison of their before-service expectations with their actual service experience. The service will be considered excellent, if perceptions exceed expectations; it will be regarded as good or adequate, if it only equals the expectations; the service will be classed as bad, poor or deficient, if it does not meet them (Vázquez et al., 2001). Measuring service quality is difficult due to its unique characteristics, such as intangibility and heterogeneity, make it much harder for a firm to objectively assess its quality level (as opposed to a manufacturer who can inspect and test physical goods). Based on this perspective, Parasuraman et al. developed a scale for measuring service quality, which is mostly popular known as SERVQUAL.

SERVQUAL has two components, customer expectations and customer perceptions. Customer expectations are those that the customer expects as "should be" and "can be" type of services. Service offered varies with providers and the amount of variation that customers can tolerate is known as Tolerance. The gap between what is thought to be adequate service and desired service is known as Zone of Tolerance. The more important the SERVQUAL dimension, the higher is the desired service level and narrower the zone of tolerance. For the less important SERVQUAL dimension, the desired level of service is much lower, and the zone of tolerance is broader too. The central idea in this model is that service quality is a function of the difference scores or gaps between expectations and perceptions ($P - E$). Therefore, the axis of this model is represented by the gap between the customers' perceptions of the actual service performance level and their expectations of the service quality. This gap, in turn, depends on the nature, design and provision of this service. The major objective of the 'SERVQUAL' model is to clarify the series of gap, which affect the beneficiary's perception of service quality.

Nowadays, bank organizations are learning to realize incremental and large-scale effects for improvement in service quality. Continual service improvement should provide instrumental guidance in creating and maintaining value for customers through better design, introduction and operation of services, with combining principles, practices and methods from quality management and service improvement (George, 2007). Banks need to incorporate customer service into their business goals and those strategies should be incorporated into employee goals to help banks reach their customer service objectives. Having a strong vision and strategy for customer service is a critical component to the success of any bank. Bank managers need to identify who their customers are, what they want and develop strategies to achieve those customer requirements. A strong customer service strategy is what separates the successful organizations from the rest (Lotich, 2013). To improve performance systems, companies are striving to focus more on introducing employee oriented policies by removing the gaps between management – employees and its customers (Qadeer, 2013).

Research Instrument

This study uses the SERVQUAL method (Parasuraman et al. 1996) to investigate the service quality in the North Macedonian banking industry. The study utilizes the performance component of SERVQUAL in an empirical survey conducted among Bank Y customers. Although SERVQUAL is a popular tool for measuring service quality, the psychometric properties of the instrument are yet to be established. On the one hand, SERVQUAL was found to be reliable in estimating quality of service in the five dimensions of tangibles, reliabilities, responsiveness, assurance, and empathy (Parasuraman et al. 1988, Parasuraman, Berry & Zeithaml 1991). The development of this model provided service firms and retailers with a structured approach to assess the set of factors that influence consumers' perception of the firm's overall service quality. The SERVQUAL instrument contains items for assessing customer perceptions and expectations regarding the quality of service. A level of agreement or disagreement with a given item is rated on a seven-point Likert-type scale. The instrument used is a five-point Likert scales, representing a range of attitudes from 1 – strongly disagree to 5 – strongly agree to measure service quality and a five-point Likert scales, representing a range of attitudes from very dissatisfied (1) and extremely satisfied (5) to measure customer satisfaction. The level of service quality is represented by the gap between perceived and expected service. The SERVQUAL model is based on five-service quality dimension (Figure 1) namely.

- TANGIBLES (physical facilities, equipment and personnel appearance);
- RELIABILITY (ability to perform the promised service dependably and accurately) It is about keeping promises, promises about delivery, pricing, complaint handling, etc.;
- RESPONSIVENESS (willingness to help customers and provide prompt service) This dimension stresses service personnel's attitude to be attentive to customer requests, questions and complaints;
- ASSURANCE (knowledge and courtesy of employees and their ability to gain trust and confidence) and;
- EMPATHY (providing individualized attention to the customers).

Related to each dimension of the instrument, both for the expectation and perception of the service quality, a set of questions were used (See Appendix A). Tangibles were measured in the questionnaire with statements from 1 to 4, as follows:

1. Excellent banking companies will have modern looking equipment.
2. The physical facilities at excellent banks will be visually appealing.
3. Employees at excellent banks will be neat in their appearance.
4. Materials associated with the service (pamphlets or statements) will be visually appealing at an excellent bank.

Reliability was measured with statements from 5 to 9:

5. When excellent banks promise to do something by a certain time, they do.
6. When a customer has a problem, excellent banks will show a sincere interest in solving it.
7. Excellent banks will perform the service right the first time.
8. Excellent banks will provide the service at the time they promise to do so.
9. Excellent banks will insist on error free records.

For the responsiveness, the following statements were used:

10. Employees of excellent banks will tell customers exactly when services will be performed.
11. Employees of excellent banks will give prompt service to customers.
12. Employees of excellent banks will always be willing to help customers.
13. Employees of excellent banks will never be too busy to respond to customers' requests.

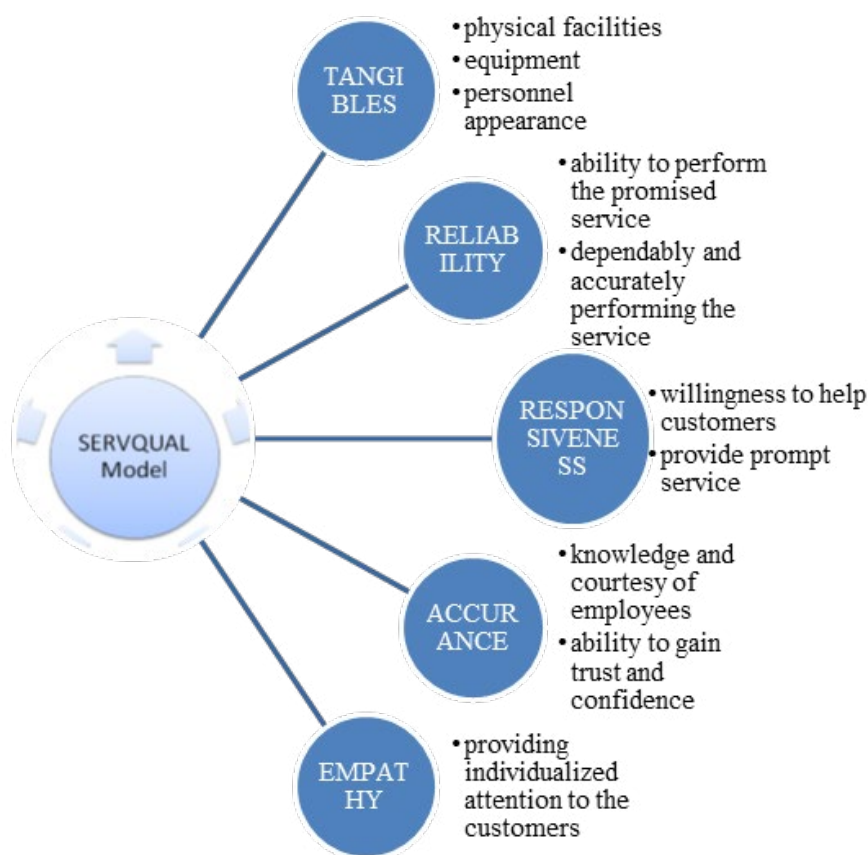
The assurance was measured by scoring the statements from 14 to 17:

14. The behavior of employees in excellent banks will instill confidence in customers
15. Customers of excellent banks will feel safe in transactions.
16. Employees of excellent banks will be consistently courteous with customers.
17. Employees of excellent banks will have the knowledge to answer customers' questions.

And for the empathy, scoring was made over the following statements:

18. Excellent banks will give customers individual attention.
19. Excellent banks will have operating hours convenient to all their customers.
20. Excellent banks will have employees who give customers personal service.
21. Excellent banks will have their customers' best interest at heart.
22. The employees of excellent banks will understand the specific needs of their customers.

Figure 1. Five Dimensions of the SERVQUAL Model



Source: Own illustration

The SERVQUAL instrument contains items for assessing customer perceptions and expectations regarding the quality of service. A level of agreement or disagreement with a given item is rated on a seven-point Likert-type scale. The instrument used is a five-point Likert scale, representing a range of attitudes from 1 – strongly disagree to 5 – strongly agree, to measure service quality and a five-point Likert scale, representing a range of attitudes from very dissatisfied (1) to extremely satisfied (5) to measure customer satisfaction.

In order to test the reliability of the SERVQUAL scale and the internal consistency of the five dimensions as suggested by Parasuraman et al. (1988), Cronbach's coefficient alpha was computed for each of the five dimensions using data on perceptions, expectations, and gap (the differences between the perceptions and expectations) scores. The level of service quality is represented by the gap between perceived and expected service.

Results Analysis from the Questionnaire

Within the analysis activity, 150 questionnaires were distributed to 30 branches of the bank. Sixty-eight of them were personally completed by occasional bank customers. All the clients were using some of the bank's services and were familiar with a general banking experience. After the collection of the completed questionnaires, the data was being processed in a software and the final results were received from the research. On the one hand, data analysis is a process through which the collected data is decreased to a more controllable and convenient size, and it can be examined by identifying trends or patterns, applying statistical techniques, and summarizing the data. This process is of great importance because the researcher has to interpret the findings and answer the research question. Hence, recommendations and suggestions can be expressed (Cooper & Schindler, 2008).

Comparing Customer Perceptions vs. Expectations

Each of the five dimensions in the SERVQUAL model was measured using a survey instrument consisting of individual attributes which role up into each dimension. For each of the 22 questions in the questionnaire, related to both expectation and perception, an individual score was given by the client ranking from 1-7 (1 meaning strongly disagree and 7 being strongly agree).

Table 2 - Results by question and client for expectation

EXPECTATION																						
ID/QUES- TION #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Average	6	5.88	5.88	5.35	6.09	6.47	6.59	6.47	6.03	6.35	6.5	6.41	6.15	6.17	6.32	6.23	6.44	5.91	5.65	5.91	6.26	5.97

KAs presented in Table 2, the clients gave highest the score of 6 for the first question for tangibles. This means that having modern looking equipment is most important visual expectation of the clients.

In the part related to reliability, all questions are highly rated. The question number 7 has a slightly higher mark of 6.59, which is related to performing the service right the first time.

For responsiveness, the highest average score – 6.41 was given to question no. 12, that excellent banks will always be willing to help customers.

For assurance, the most important question was no. 17 with a score of 6.44. This is the question where the knowledge to answer customers' questions is a characteristic for excellent banks.

When it comes to empathy, the most important question is no. 21 - Excellent banks will have their customers' best interest at heart, with a score of 6.26.

Table 3 - Results by question and client for perception

EXPECTATION																						
ID/QUES- TION #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Average	5.44	5.91	5.65	5.29	5.23	5.47	5.24	5.44	5.12	5.15	5.56	5.76	5.59	5.73	6.06	5.82	5.67	5.73	5.67	5.5	5.5	5.47

Table 3 presents the results for customer's perception. From the tangibles, clients see the bank as best with its visually appealing physical facilities. This question is scored with 5.91.

In terms of reliability, showing a sincere interest in solving the clients' problem by Bank Y employees is rated with 5.47. This was the highest mark from the perception dimension.

For responsiveness, same as with expectations, the highest average score of 5.76 was given to question no. 12, which is related to Bank Y employees' willingness to help the client.

Most important in assurance is the perception of feeling safe with regards to transactions. This question scored an average of 6.06.

With a highest score of 5.73, question no. 18 stands out in empathy dimension. This is related to how Bank Y is perceived in giving individual attention to the client.

Out of Table 2 and Table 3, the evaluated results for each dimension are more precisely explained below:

For the reliability, clients want to count on their service provider. It is much more important for the bank to be reliable than to have luxurious branches and equipment.

For the responsiveness dimension, queueing or simply waiting for information is an important trigger for the clients' dissatisfaction.

For the assurance, it is highly expected by the client for the Bank's staff to be experts for the service they are delivering. In addition, even if the staff is highly skilled, but client cannot perceive that, their confidence in the bank will be lower.

For the empathy, the perceived care for the client is also very important. Even if the service received is performed professionally and flawlessly, if the contact given from the bank's personnel is even slightly careless, the client's experience suffers.

And for the tangibles, even if it is the least important dimension, the general appearance does matter.

Clients want to feel comfortable and cozy within the bank's premises and to see sharp looking staff.

The Gap Score for each dimension is calculated by simply subtracting the expectation rating from the perception rating for each attribute (Gap Score = Perception – Expectation).

Table 4 - Gap score

Dimension	Tangibles	Reliability	Responsive- ness	Assurance	Empathy
Average P-E	-0.205	-1.03	-0.8375	-0.47	-0.366

The gap scores i.e., the discrepancy between clients' expectations and perceptions, where negative gaps occurred for all five dimensions, show that clients' general expectations are not being met. Largest gap of -1.03 is in reliability, followed by responsiveness, assurance, empathy and least of -0.2 for tangibles as presented in Table 4.

Results Discussion – Developing a Service Improvement Strategy

Employees only perform at the level they are managed, and it takes great leadership to help employees understand the importance of the customer experience. This is why it is important to have a strategy to help create and reinforce a service culture. A great customer experience is what brings consumers back. Executives and employees alike should be aware of customer requirements as compared to customer feedback. Satisfied customers are loyal customers.

The first step in creating a customer service strategy is communicating the customer service vision to employees. Employees need to understand what the vision and bank goals are for customer service and understand their responsibility to help achieve that vision. An organization that shares a customer service vision and teaches customer service skills will have provide a better customer service experience than an organization that leaves the front-line employees untrained and unprepared for dealing with customer issues. Delivering high bank service quality demands an excellent Bank Y leadership, based on believing in people's capacity to view their own roles as a standard of excellence and on the direction of the Bank to achieve its goals by providing necessary equipment, tools and proper freedom to achieve their tasks. Bank Y managers believe in investing in people by listening to their concerns, providing trainings, coaching, and teaching them how to inspire and compete in order to boost company's productivity and quality standards.

Within the conducted research, out of 68 clients' responses it was stated that the expectations are highest in terms of reliability and responsiveness, while the perception of Bank Y is being lower in these two dimensions. It means that, even though a bit less important - tangibles, empathy, and assurance, are dimensions which are being better met by the Bank. While on the topic of reliability and responsiveness as two most important dimensions to clients, the Bank should work for improvement.

There are ways of taking improvement actions toward better service quality in the Bank. Bank organizations often fail, and waste valuable resources, creating products and services that they thought the customer wanted, only to find out it was not what the customer wanted at all. Banks cannot meet the needs of their customers without understanding what they want. The first step in a customer improvement initiative is to talk to the customers to find out their perception of the services being provided and determining what their needs and expectations are. So, as a recommendation, Bank Y should make this kind of research frequently, in order to see where the clients' expectations and perceptions have reached and in which level the Bank meets them.

A customer needs assessment is done by soliciting feedback through focus groups, satisfaction surveys, or customer comment cards, and developing a comprehensive plan to meet and exceed the customer needs. Customer needs and expectations are a moving target. What a customer wants today will be very different from what the customer wants a year or five years down the road. As things change, expectations and needs change also. We can say that several years ago, people were positively surprised by and keen on physical and technological changes in the banking environment. This is when the Bank invested in modernization, physical appearances, and front desks' staff rejuvenation. These actions were positively accepted by the clients but as they got used to these changes, apparently new or better said, core needs and expectations arose. As the research showed, these are the ones related more to the reliability of the Bank. So again, the focus of the bank should be turned towards these core dimensions. It is a time when work processes should be improved and made quicker. The entire workflow from receiving the queries, to providing the necessary service as response to the query must be re-checked and if possible, automated with better software systems. This could make a positive effect on the time and error minimization, as two important segments of reliability.

Next, the focus should fall on the Bank's employees and their right training. Once customer needs and expectations have been identified and customer satisfaction has been measured, it is time to create goals for achieving customer satisfaction. Employees need to understand what the target is so they can help the bank reach its corporate objectives. The training should explain how bank would like the employee to behave in every situation and should help employees understand how to respond to their customers. Employees need to know what you want them to do. Employees should have a good understanding of how their service to the customer affects the bank's overall performance, and need to be held accountable for achieving customer satisfaction goals. There should be a well thought out system for acknowledging and rewarding employees for good customer service. Employees need positive reinforcement and should be rewarded when they demonstrate the desired behaviors of a strong customer service culture. Having all of this set within the Bank's strategy will make positive improvements in assuring better service delivery.

Bank Y should promote a corporate culture with significant respect of its employees, their development and their client orientation. At the highest point of its strategic goals should always be the happy and loyal customer. Therefore, the correlation of the both will eventually bring better results in overall service quality and customer satisfaction. Providing excellent bank services requires continuous improvements in the organizational banking sector and culture, a culture in which people are challenged to give their best and are rewarded and recognized in the company to perform to their full potential. Bank Y can improve the quality of its services by developing the service improvement strategy in the organization, which requires several steps and measures to trigger improvements in the internal environment. Generally, quality is defined by the customers, and it should be improved according to specifications of the clients, not the company. Service quality management gap can be removed by planning the activities, through research and analysis and by arranging the staff properly bank can analyze and predict customer expectations. Also, it is important to develop data base analysis, customer

general mapping, capacity planning and emphasizing on marketing research and analysis to gather information about latest market trends.

Service delivery and external communication gap can be reduced if employees are trained enough from cross departments (as a backup) and should have enough information to handle customer queries. All matters with the customers should be communicated clearly and over exaggerations through false statements should be avoided. Through proper planning and constant monitoring, one can overcome the issues. Findings revealed that hiring right person at right time at right place could help to reduce the performance gaps. Other than this, there is a need to focus on technological based services for customer support. The most important issue to win customers' trust is to focus on developing customer complaint resolution system. As the main focus is on satisfying the customer who demands to put an extra effort to understand their concerns. Sometimes a little nod or a smile can make a customer feel valuable. There are small things like gestures, way of dealing even dressing can be used as inspirational technique.

In addition, it is important to deal the customer in a way that they understand. If we consider banks in particular, people who visit the bank belong to different age groups, so the bank should deal them according to their comfort level. According to the Global Consumer Banking Survey 2014, trust is what transforms customers from static sources of revenue into advocates for their banks. In an era where social and digital media enable consumers to immediately share their experiences, customers who trust their bank will drive the most referrals and be more willing to consolidate their banking needs with a single financial services provider. This makes them the growth engines of any bank. Although crafting common strategies can be more efficient, banks that approach each customer the same way risk offering individual customers the wrong products, services, and advice across less-effective channels. To optimize investments in customer experience, banks should deploy segment-based strategies that take advantage of these inherent similarities – but also their differences. The good news is that consumer confidence in the banking industry is on the rise, with 93% of survey respondents reporting moderate or complete trust in their banks. Likewise, 77% of customers are satisfied enough with their banking relationship to recommend their primary provider. The global economic recovery appears to be taking hold, and banks are among the beneficiaries.

At the end, even though the research within this paper included just a small sample of Bank Y's clients with limited results, it can be very important as a first step towards taking actions for further improvements and more detailed studies.

Zaključak

Our purpose with this study is to see how service quality in the North Macedonian bank sector relate to customer satisfaction, according to Bank Y as a key study. When it comes to service quality as a starting point, it was stated that it is difficult to measure due to its unique characteristics, such as intangibility and heterogeneity. However, the literature offers a developed scale for measuring service quality, known as SERVQUAL model which we accepted as an appropriate for analysis in this paper.

After the analysis we refined our original model to what we now believe is a more suitable one for the banking sector. Findings reveal that quality of service does affect the customer satisfaction up to a certain level, as both concepts are distinct, and the relationship found between them is causal. The research made among a part of Bank Y's clients showed that there is a significant connection between the service expectation, the service provided and how it has been perceived by the client at the end.

The service quality is a real factor for the customer satisfaction. By dimension from the SERVQUAL model, reliability and responsiveness were the ones which were stated as most important fields where the bank should improve and create better service quality. The results also highlight the importance of the overall banking relationship and suggest that investment in quality and in the management of customer relationships may assist the bank in improving the degree of satisfaction and loyalty among customers, thus increasing the likelihood that customers who are retained in the short run are also retained in the long run. It was found that through proper planning, developing and constant monitoring, the bank can produce effective strategies to improve quality levels and to retain their existing and future customers. The bank needs to incorporate customer service into its business goals and those strategies should be incorporated into employee goals to help the bank reach its customer service objectives. Having a strong vision and strategy for customer service is a critical component to the success of any bank.

And at the end, we can say that this study can actually be used as a starting point for future research to examine the effect of service quality on customer satisfaction. It can also contribute to service companies aiming to improve their service quality standards in order to satisfy their current and future customers. Some of the improvement approaches and suggestions which are discussed in this study can be also applied in the banking sector in general as well as in other service sectors.

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PRIMENA EDAS METODE U EVALUACIJI EFIKASNOSTI BANAKA U SRBIJI

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Rezime

U poslednje vreme, kao što je poznato, sve se više vrši evaluacija performansi (efikasnosti) banaka na bazi višekriterijumske analize. Imajući to u vidu, u ovom radu se analizira efikasnost banaka u Srbiji na bazi EDAS metode. U kontekstu toga predložene su adekvatne mere za unapređenje efikasnosti banaka u Srbiji u budućnosti. Dobijeni rezultati empirijskog istraživanja primenom date metode pokazuju da se u poslednje vreme znatno poboljšala efikasnost banaka u Srbiji. Najbolja je bila u 2019. godini. Na to su pozitivno uticali brojni makro i mikro faktori (ekonomska klima, životni standard, politička stabilnost, digitalizacija poslovanja).

Ključne reči: efikasnost, banke, Srbija, determinante, EDAS metoda

JEL klasifikacija: C02, C44, C61, G21.

Uvod

Vrlo je aktuelna, kompleksna, složena i značajna problematika merenja efikasnosti banaka na bazi višekriterijumske analize (Mandic, 2014; Eraković, 2017; Lukić, 2010; Lukić, 2016; Lukic, 2017; Lukić, 2018; Lukic, 2018; Bukvić, 2020). S obzirom na to, predmet istraživanja u ovom radu je analiza efikasnosti banaka u Srbiji na bazi EDAS metode. Cilj i svrha toga je da se data problematika što kompleksnije obradi i predlože adekvatne mere za poboljšanje efikasnosti banaka u Srbiji u budućnosti (Lukic, 2020 a, b, c). U tome se, pored ostalog, ogleda naučno-stručni doprinos ovog rada. U poslednje vreme, kao što je poznato, sve je bogatija literatura posvećena analizi efikasnosti preduzeća iz različitih privrednih sektora na bazi EDAS metode (Alinezhad, 2019; Keshavarz Ghorabae, 2015, 2016, 2018; Ren, 2020; Stevic, 2019; Torkayesh, 2020; Ersoy, 2017; Lukic, 2019, 2020a,b,s; Gaur, 2020). Za razliku od primene AHP i TOPSIS metoda, „vrlo je malo, međutim, radova ove vrste iz uslužnog, odnosno finansijskog sektora. U literaturi u Srbiji ne postoji, koliko je nama poznato, ni jedan celoviti rad posvećen analizi efikasnosti banaka u Srbiji na bazi EDAS metode“ (Lukic, 2020 a, b, c). U ovom radu se, po ugledu na savremenu stranu literaturu, po prvi put vrši analiza efikasnosti banaka u Srbiji pomoću EDAS metode. i u tome se, pored ostalog, ogleda naučno-stručni doprinos ovog rada.

Istraživanje kroz literaturu u ovom radu služi kao teorijsko-metodološka i empirijska osnova za pravilnu analizu efikasnosti banaka u Srbiji na bazi EDAS metode. To je svakako u funkciji poboljšanja njihove efikasnosti u budućnosti preduzimanjem adekvatnih mera (Lukic, 2020 a, b, c).

Osnovna hipoteza istraživanja u ovom radu je da je kontinuirano praćenje efikasnosti banaka pretpostavka za unapređenje u budućnosti: u našem slučaju u Srbiji. To olakšava i ukazuje na to koje adekvatne mere treba preduzeti za ostvarenje ciljne efikasnosti banaka u Srbiji (Lukic, 2020 a, b, c).

U tome, u metodološkom smislu te reči, značajnu ulogu ima primena EDAS metode.

Potrebni empirijski podaci su prikupljeni od Agencije za privredne registre Republike Srbije. Oni su „proizvedeni“ u skladu sa relevantnim međunarodnim standardima. U pogledu međunarodne uporedivosti ne postoje s obzirom na to nikakva ograničenja (Lukic, 2020 a, b, c).

EDAS metoda

EDAS (*Evaluation based on Distance from Average Solution*) metoda je nova metoda višekriterijumskog odlučivanja (Keshavarz Ghorabae, 2015). Ona je vrlo korisna kada imamo neke oprečne (konfliktne) kriterijume. Izbor najbolje alternative vrši se prema udaljenosti od prosečnog rešenja (AV). Postoje dve mere poželjnosti: (1) pozitivna udaljenost od proseka (PDA), i (2) negativna udaljenost od proseka (NDA). One pokazuju razliku između svakog (alternativnog) i prosečnog rešenja. Procena poželjnosti alternativa se vrši prema većim vrednostima PDA i nižim vrednostima NDA. Visoka vrednost PDA ili niža vrednost NDA pokazuje da je izbor (alternative) bolji od prosečnog rešenja.

Pretpostavimo da imamo n alternativa i m kriterijuma. Procedura EDAS metode je sledeća (Keshavarz Ghorabae, 2015):

Korak 1: Izbor najvažnijih kriterijuma koji opisuju alternative.

Korak 2: Formiranje matrice odlučivanja (X) na sledeći način:

$$X = [X_{ij}]_{n \times m} = \begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1m} \\ X_{21} & X_{22} & \cdots & X_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ X_{n1} & X_{n2} & \cdots & X_{nm} \end{bmatrix}, \quad (1)$$

gde: X_{ij} označava performansnu vrednost i -te alternative u odnosu na j -ti kriterijum.

Korak 3: Određivanje prosečnog rešenja prema svim kriterijumima na sledeći način:

$$AV = [AV_j]_{1 \times m}, \quad (2)$$

gde je:

$$AV_j = \frac{\sum_{i=1}^n X_{ij}}{n}. \quad (3)$$

Korak 4: Izračunavanje pozitivne distance od proseka (PDA) i negativne distance od proseka (NDA) matrice prema vrsti kriterijuma (benefit i troškovi) na sledeći način:

$$PDA = [[PDA_{ij}]]_{n \times m}, \quad (4)$$

$$NDA = [[NDA_{ij}]]_{n \times m}. \quad (5)$$

Ako je j -ti kriterijum benefitni:

$$PDA_{ij} = \frac{\max(0, (X_{ij} - AV_j))}{AV_j}, \quad (6)$$

$$NDA_{ij} = \frac{\max(0, (AV_j - X_{ij}))}{AV_j}, \quad (7)$$

i ako je j -ti kriterijum ne-benefitni:

$$PDA_{ij} = \frac{\max(0, (AV_j - X_{ij}))}{AV_j}, \quad (8)$$

$$NDA_{ij} = \frac{\max(0, (X_{ij} - AV_j))}{AV_j}, \quad (9)$$

gde: PDA_{ij} i NDA_{ij} označavaju pozitivne i negativne distance i -te alternative od prosečnog rešenja u terminima j -tog kriterijuma, respektivno.

Korak 5: Determinisanje težinske sume PDA i NDA za sve alternative na sledeći način:

$$SP_i = \sum_{j=1}^m w_j PDA_{ij}; \quad (10)$$

$$SN_i = \sum_{j=1}^m w_j NDA_{ij}. \quad (11)$$

gde je: w_j težina j -tog kriterijuma.

Korak 6: Normalizacija vrednosti SP i SN za sve alternative na sledeći način:

$$NSP_i = \frac{SP_i}{\max_i(SP_i)}; \quad (12)$$

$$NSN_i = 1 - \frac{SN_i}{\max_i(SN_i)}. \quad (13)$$

Korak 7: Izračunavanje srednje vrednosti (AS) za sve alternative na sledeći način:

$$AS_i = \frac{1}{2}(NSP_i + NSN_i), \quad (14)$$

gde je: $0 \leq AS_i \leq 1$.

Korak 8: Rangiranje alternativa prema opadajućoj srednjoj vrednosti (AS). Alternativa sa najvećom vrednošću AS je najbolja.

Procena efikasnosti banaka u Srbiji na bazi EDAS metode: rezultati i diskusija

Prilikom merenja efikasnosti banaka u Srbiji primenom EDAS metode kao kriterijumi su uzeti: C1 – broj zaposlenih, C2 – aktiva, C3 – kapital, C4 – ukupni neto poslovni prihodi i C5 – neto dobitak. Alternative su posmatrane godine: A1 – 2013, A2 – 2014, A3 – 2015, A4 – 2016, A5 – 2017, A6 – 2018. i A7 – 2019 (Lukić, 2020 a, b, c). (Računanje efikasnosti banaka u Srbiji izvršeno je pomoću EDASSoftware-Excel). Dobijeni rezultati su prikazani u niže priloženim tabelama, kao i na grafikonu.

U Tabeli 1. su prikazani inicijalni podaci za merenje efikasnosti banaka u Srbiji za period 2013 – 2019. na bazi EDAS metode.

Tabela 1 - Inicijalni podaci za merenje efikasnosti banaka u Srbiji

Godine	Broj zaposlenih	Aktiva	Kapital	Ukupni neto poslovni prihodi	Neto dobitak
2013	25188	2809333	589559	120705	30808
2014	23983	2968012	612895	126102	29315
2015	22085	3048183	619442	128962	32324
2016	24096	3243450	634330	136332	38215
2017	22817	3369391	667115	182405	68871
2018	22875	3774098	676704	175871	71349
2019	22739	4083760	705369	175090	65316

Napomena: Podaci su iskazani u milionima dinara. Broj zaposlenih je iskazan u celom broju

Izvor: Agencija za privredni registar Republike Srbije

Težinski koeficijenti kriterijuma su utvrđeni pomoću AHP (Analitički Hijerarhijski Procesi) metode (Saaty, 2008; Lukic, 2020 a, b, c). Oni su prikazani u Tabeli 2, kao i na Slici 1.

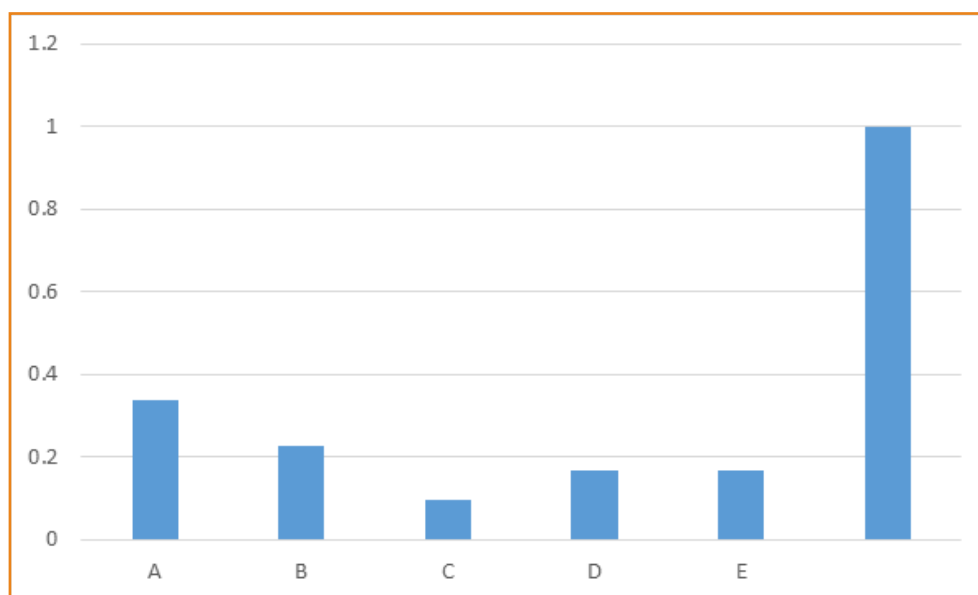
Težinski koeficijenti kriterijuma su utvrđeni pomoću AHP (Analitički Hijerarhijski Procesi) metode (Saaty, 2008). Oni su prikazani u Tabeli 2, kao i na Slici 1.

Tabela 2 - Težinski koeficijenti kriterijuma

AHP sa metodom aritmetičke sredine					
Inicijalna matrica poređenja					
	A	B	C	D	E
A		2,5			1
B	0,4			1,25	2
C	0,25	0,333333		0,5	1
D	0,5	0,8			1
E		0,5			1
SUM	3,15	5,13333		5,75	6

Normalizovana matrica						
	A	B	C	D	E	Težine kriterijuma
A	0,3175	0,4870	0,3636	0,3478	0,1667	0,3365
B	0,1270	0,1948	0,2727	0,2174	0,3333	0,2290
C	0,0794	0,0649	0,0909	0,0870	0,1667	0,0978
D	0,1587	0,1558	0,1818	0,1739	0,1667	0,1674
E	0,3175	0,0974	0,0909	0,1739	0,1667	0,1693
					SUM	1
Odnos konzistentnosti			0,0607	UPOREDITI SA 0,1; TREBA BITI MANJE OD 0,1		

Napomena: A – broj zaposlenih, B – aktiva, C – kapital, D – ukupni neto poslovni prihodi i E – neto dobitak



Slika 1: Težinski koeficijenti kriterijuma

Po značaju kriterijuma na prvom mestu je broj zaposlenih. To je sasvim i razumljivo s obzirom na to da banke pripadaju uslužnom sektoru čija je karakteristika velika zaposlenost i u uslovima digitalizacije celokupnog poslovanja. Zatim slede po redosledu značaja kriterijuma: aktiva, neto dobitak, ukupni neto poslovni prihodi, i kapital. Ovakvo rangiranje izabranih kriterijuma prema značaju je odraz specifičnosti samog poslovanja bankarskog sektora.

U daljim izlaganjima tretirane problematike prikazaćemo dobijene rezultate analize efikasnosti banaka u Srbiji na bazi EDAS metode.

U Tabeli 3 - je prikazana inicijalna matrica odlučivanja.

Tabela 3: Inicijalna matrica

Inicijalna matrica					
Težine kriterijuma	0,3365		0,0978	0,1674	0,1693
Vrsta kriterijuma					
	C1	C2	C3	C4	C5
A1	25188	2809333	589559	120705	30808
A2	23983	2968012	612895	126102	29315
A3	22085	3048183	619442	128962	32324
A4	24096	3243450	634330	136332	38215
A5	22817	3369391	667115	182405	68871
A6	22875	3774098	676704	175871	71349
A7	22739	4083760	705369	175090	65316
Prosečno rešenje	23397,5714	3328032,4286	643630,5714	149352,4286	48028,2857

U Tabeli 4 - je prikazano pozitivno rastojanje od prosečne vrednosti - Dij+.

Tabela 4: Pozitivno rastojanje od prosečne vrednosti

Dij+					
Težine kriterijuma	0,3365		0,0978	0,1674	0,1693
	C1	C2	C3	C4	C5
A1	0,0765	0,0000	0,0000	0,0000	0,0000
A2	0,0250	0,0000	0,0000	0,0000	0,0000
A3	0,0000	0,0000	0,0000	0,0000	0,0000
A4	0,0299	0,0000	0,0000	0,0000	0,0000
A5	0,0000	0,0124	0,0365	0,2213	0,4340
A6	0,0000	0,1340	0,0514	0,1776	0,4856
A7	0,0000	0,2271	0,0959	0,1723	0,3599

U Tabeli 5 je prikazano negativno rastojanje od prosečne vrednosti - Dij-.

Tabela 5: Negativno rastojanje od prosečne vrednosti

Dij-					
Težine kriterijuma	0,3365		0,0978	0,1674	0,1693
	C1	C2	C3	C4	C5
A1	0,0000	0,1559	0,0840	0,1918	0,3585
A2	0,0000	0,1082	0,0478	0,1557	0,3896
A3	0,0561	0,0841	0,0376	0,1365	0,3270
A4	0,0000	0,0254	0,0145	0,0872	0,2043
A5	0,0248	0,0000	0,0000	0,0000	0,0000
A6	0,0223	0,0000	0,0000	0,0000	0,0000
A7	0,0281	0,0000	0,0000	0,0000	0,0000

U Tabeli 6 je prikazana težinski normalizovana suma PDA.

Tabela 6: Težinski normalizovana suma PDA

PDA							
	C1	C2	C3	C4	C5	Qi+	Si+
A1	0,0257	0,0000	0,0000	0,0000	0,0000	0,0257	0,1703
A2	0,0084	0,0000	0,0000	0,0000	0,0000	0,0084	0,0557
A3	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
A4	0,0100	0,0000	0,0000	0,0000	0,0000	0,0100	0,0664
A5	0,0000	0,0028	0,0036	0,0370	0,0735	0,1169	0,7735
A6	0,0000	0,0307	0,0050	0,0297	0,0822	0,1476	0,9767
A7	0,0000	0,0520	0,0094	0,0288	0,0609	0,1512	1,0000
					MAX	0,1512	

U Tabeli 7 je prikazana težinski normalizovana suma NDA.

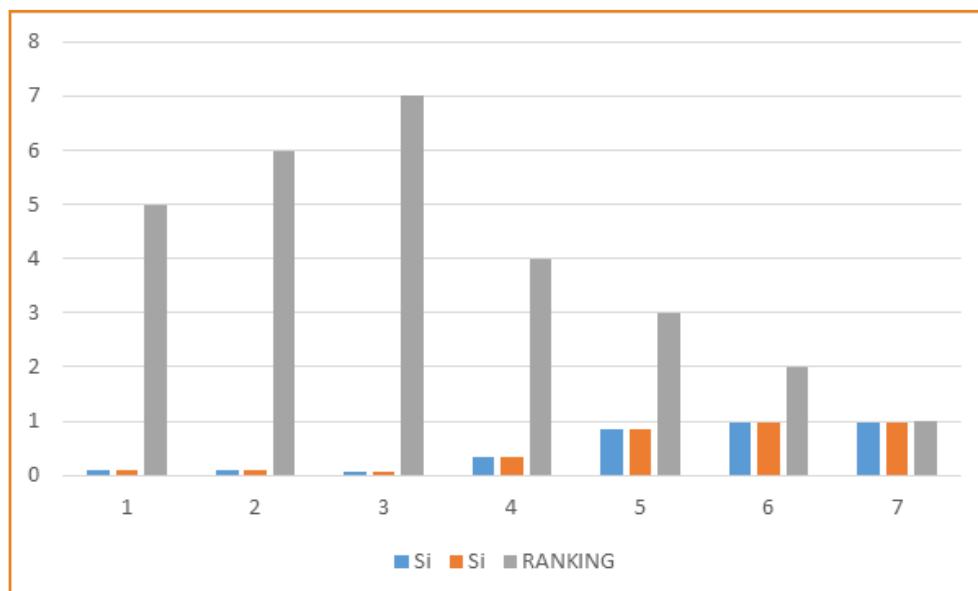
Tabela 7: Težinski normalizovana suma NDP

NDA							
	C1	C2	C3	C4	C5	Qi-	Si-
A1	0,0000	0,0357	0,0082	0,0321	0,0607	0,1367	0,0000
A2	0,0000	0,0248	0,0047	0,0261	0,0660	0,1215	0,1115
A3	0,0189	0,0193	0,0037	0,0229	0,0554	0,1200	0,1221
A4	0,0000	0,0058	0,0014	0,0146	0,0346	0,0564	0,5873
A5	0,0083	0,0000	0,0000	0,0000	0,0000	0,0083	0,9389
A6	0,0075	0,0000	0,0000	0,0000	0,0000	0,0075	0,9450
A7	0,0095	0,0000	0,0000	0,0000	0,0000	0,0095	0,9307
					MAX	0,1367	

U Tabeli 8 i na Slici 2 je prikazano rangiranje alternativa (Si).

Tabela 8: Rangiranje alternativa

	Si	Si	RANKING
2013	0,085	0,085	5
2014	0,084	0,084	6
2015	0,061	0,061	7
2016	0,327	0,327	4
2017	0,856	0,856	3
2018	0,961	0,961	2
2019	0,965	0,965	1



Slika 2: Ocenjivanje i rangiranje alternativa

Dobijeni rezultati empirijskog istraživanja efikasnosti banaka u Srbiji na bazi OCRA metode pokazuju da se ona u poslednje vreme kontinuirano povećavala u posmatranom vremenskom periodu (2013 – 2019) iz godine u godinu. Najbolja je bila u 2019. god. Zatim slede po redosledu: 2018, 2017, 2016, 2013, 2014. i 2015. Na ovakvu dinamiku efikasnosti banaka u Srbiji uticali su brojni makro i mikro faktori (ekonomska klima, životni standard, politička stabilnost, digitalizacija celokupnog poslovanja, i drugi).

Zaključak

Na osnovu dobijenih rezultata empirijskog istraživanja efikasnosti banaka u Srbiji na bazi OCRA metode može se zaključiti da se ona u poslednje vreme kontinuirano povećavala u posmatranom vremenskom periodu (2013 – 2019) iz godine u godinu. Najbolja je bila u 2019. god. Zatim slede po redosledu: 2018, 2017, 2016, 2013, 2014. i 2015. Na ovakvu dinamiku efikasnosti banaka u Srbiji uticali su brojni makro i mikro faktori, kao što su: ekonomska klima, životni standard, politička stabilnost, digitalizacija celokupnog poslovanja, i drugi.

U cilju povećanja efikasnosti banaka u Srbiji u budućnosti neophodno je što efikasnije upravljati ljudskim kapitalom, aktivom, kapitalom, prihodima i profitom.

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APPLICATION OF THE EDAS METHOD IN THE EVALUATION OF BANK EFFICIENCY IN SERBIA

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Summary

Recently, as it is known, the evaluation of the performance (efficiency) of banks is increasingly performed on the basis of multi-criteria analysis. With this in mind, this paper analyzes the efficiency of banks in Serbia based on the EDAS method. In this context, adequate measures have been proposed to improve the efficiency of banks in Serbia in the future. The obtained results of empirical research using the given method show that the efficiency of banks in Serbia has recently significantly improved. It was the best in 2019. It was positively influenced by numerous macro and micro factors (economic climate, living standard, political stability, digitalization of business).

Keywords: efficiency; banks; Serbia; determinants; EDAS method

JEL classification: C02, C44, C61, G21.

Introduction

It is a very current, complex and significant issue to measure the efficiency of banks based on multi-criteria analysis (Mandic, 2014; Erakovic, 2017; Lukic, 2010; Lukic, 2016; Lukic, 2017; Lukic, 2018 a, b ; Bukvic, 2020) . Given that, the subject of research in this paper is the analysis of the efficiency of banks in Serbia based on the EDAS method. The goal and purpose of this is to deal with this issue as comprehensively as possible and propose adequate measures to improve the efficiency of banks in Serbia in the future (Lukic, 2020 a, b, c). This, among other things, reflects the scientific and professional contribution of this paper.

Recently, as is well known, increasingly thorough literature is devoted to the analysis of the efficiency of companies from different economic sectors based on the EDAS method (Alinezhad, 2019; Keshavarz Ghorabae, 2015, 2016, 2018; Ren, 2020; Stevic, 2019; Torkayesh, 2020; Ersoy, 2017; Lukic, 2019, 2020a, b, c; Gaur, 2020). Unlike the application of AHP and TOPSIS methods, however, "there are very few works of this type from the service and financial sectors. In the literature in Serbia, there is, as far as we know, no complete work dedicated to the analysis of the efficiency of banks in Serbia on the basis of the EDAS method" (Lukic, 2020 a, b, c). In this paper, based on the reputation of contemporary foreign literature, for the first time the analysis of the efficiency of banks in Serbia is performed using the EDAS method. And that, among other things, reflects the scientific and professional contribution of this paper.

Research through the literature in this paper serves as a theoretical-methodological and empirical basis for a proper analysis of the efficiency of banks in Serbia based on the EDAS method. This is certainly in the function of improving their efficiency in the future by taking adequate measures (Lukic, 2020 a, b, c).

The basic hypothesis of the research in this paper is that continuous monitoring of bank efficiency is a prerequisite for improvement in the future: in our case in Serbia. This facilitates and indicates what adequate measures should be taken to achieve the target efficiency of banks in Serbia (Lukic, 2020 a, b, c).

In that, methodologically speaking, the application of the EDAS method has a significant role.

The necessary empirical data were collected from the Business Registers Agency of the Republic of Serbia. They are "manufactured" in accordance with relevant international standards. In terms of international comparability, there are no restrictions in this regard (Lukic, 2020 a, b, c).

EDAS Method

The EDAS (Evaluation based on Distance from Average Solution) method is a new method of multi-criteria decision making (Keshavarz Ghorabae, 2015). It is very useful when we have some conflicting criteria. The choice of the best alternative is made according to the distance from the average solution (AV). There are two desirability measures: (1) positive distance from the average (PDA), and (2) negative distance from the average (NDA). They show the difference between each (alternative) and average solution. The desirability of alternatives is assessed against higher PDA values and lower NDA values. A

high PDA value or a lower NDA p value indicates that the choice (alternative e) is better than the average solution.

Suppose we have n alternatives and m criteria. The procedure of the EDAS method is as follows (Keshavarz Ghorabae, 2015):

Step 1: Selection of the most important criteria that describe the alternatives.

Step 2: Forming the decision matrix (X) as follows:

$$X = [X_{ij}]_{n \times m} = \begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1m} \\ X_{21} & X_{22} & \cdots & X_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ X_{n1} & X_{n2} & \cdots & X_{nm} \end{bmatrix}, \quad (1)$$

where: X_{ij} denotes the performance value of the i -th alternative in relation to the j -th criterion.

Step 3: Determining the average solution according to all criteria as follows:

$$AV = [AV_j]_{1 \times m}, \quad (2)$$

where is:

$$AV_j = \frac{\sum_{i=1}^n X_{ij}}{n}. \quad (3)$$

Step 4: Calculate the positive average distance (PDA) and negative average distance (NDA) of the matrix according to the type of criteria (benefit and costs) as follows:

$$PDA = [PDA_{ij}]_{n \times m}, \quad (4)$$

$$NDA = [NDA_{ij}]_{n \times m}. \quad (5)$$

If the j -th criterion is beneficial:

$$PDA_{ij} = \frac{\max(0, (X_{ij} - AV_j))}{AV_j}, \quad (6)$$

$$NDA_{ij} = \frac{\max(0, (AV_j - X_{ij}))}{AV_j}, \quad (7)$$

and if the j -th criterion is non-beneficial:

$$PDA_{ij} = \frac{\max(0, (AV_j - X_{ij}))}{AV_j}, \quad (8)$$

$$NDA_{ij} = \frac{\max(0, (X_{ij} - AV_j))}{AV_j}, \quad (9)$$

where: PDA_{ij} i NDA_{ij} denote the positive and negative distances of the i -th alternative from the average solution in terms of the j -th criterion, respectively.

Step 5: Determine the weight sum of PDA and NDA for all alternatives as follows:

$$SP_i = \sum_{j=1}^m w_j PDA_{ij}; \quad (10)$$

$$SN_i = \sum_{j=1}^m w_j NDA_{ij}. \quad (11)$$

where is: w_j weight of the j -th criterion.

Step 6: Normalize the SP and MV values for all alternatives as follows:

$$NSP_i = \frac{SP_i}{\max_i(SP_i)}; \quad (12)$$

$$NSN_i = 1 - \frac{SN_i}{\max_i(SN_i)}. \quad (13)$$

Step 7: Calculate the mean (AS) for all alternatives as follows:

$$NSN_i = 1 - \frac{SN_i}{\max_i(SN_i)}. \quad (13)$$

where: $0 \leq AS_i \leq 1$.

Step 8: Ranking the alternatives according to the decreasing mean (AS). The alternative with the highest AS value is the best.

Estimation of Efficiency of Banks in Serbia on the basis of EDAS Method: Results and Discussion

When measuring the efficiency of banks in Serbia using the EDAS method, the criteria were: C1 - number of employees, C2 - assets, C3 - capital, C4 - total net operating revenues and C5 - net profit. Alternatives were observed in the years: A1 - 2013, A2 - 2014, A3 - 2015, A4 - 2016, A5 - 2017, A6 - 2018 and A7 - 2019 (Lukic, 2020 a, b, c). (Calculation of bank efficiency in Serbia was performed using EDAS Software-Excel). The obtained results are shown in the tables below, as well as in the graph.

Table 1 shows the initial data for measuring the efficiency of banks in Serbia for the period 2013 - 2019 based on the EDAS method.

Table 1: Initial Data for Measuring the Efficiency of Banks in Serbia

Year	Number of employees	Assets	Capital	Total net operating revenues	Net profit
2013	25188	2809333	589559	120705	30808
2014	23983	2968012	612895	126102	29315
2015	22085	3048183	619442	128962	32324
2016	24096	3243450	634330	136332	38215
2017	22817	3369391	667115	182405	68871
2018	22875	3774098	676704	175871	71349
2019	22739	4083760	705369	175090	65316

Note: Data are expressed in millions of dinars. The number of employees is expressed in whole numbers

Source: Business Registers Agency of the Republic

The weight coefficients of the criteria were determined using the AHP (Analytical Hierarchical Processes) method (Saaty, 2008). They are shown in Table 2 as well as in Figure 1.

Table 2: Weighting coefficients of the Criteria

AHP With Arithmetic Mean Method					
Initial Comparisons Matrix					
	A	B	C	D	E
A		2.5			1
B	0.4			1.25	2
C	0.25	0.333333		0.5	1
D	0.5	0.8			1
E		0.5			1
SUM	3.15	5.13333		5.75	6

Normalized Matrix						
	A	B	C	D	E	Weights of Criteria
A	0.3175	0.4870	0.3636	0.3478	0.1667	0.3365
B	0.1270	0.1948	0.2727	0.2174	0.3333	0.2290
C	0.0794	0.0649	0.0909	0.0870	0.1667	0.0978
D	0.1587	0.1558	0.1818	0.1739	0.1667	0.1674
E	0.3175	0.0974	0.0909	0.1739	0.1667	0.1693
					SUM	1
Consistency Ratio			0.0607	COMPARE WITH 0.1; IT SHOULD BE LESS THAN 0.1.		

Note: A - number of employees, B - assets, C - capital, D - total net operating revenues and E - net profit

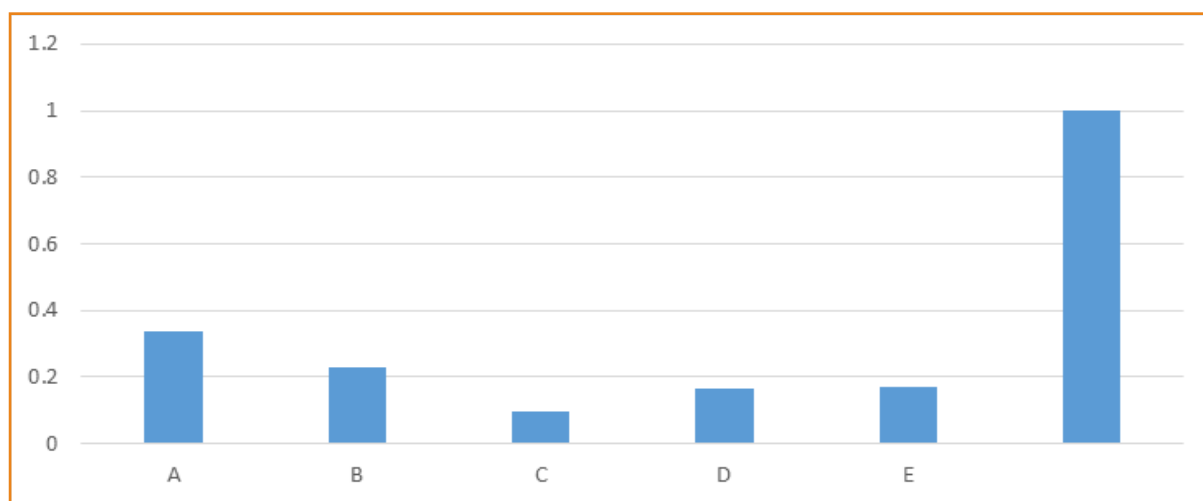


Figure 1: Weighting Coefficients of the Criteria

According to the importance of the criteria, the number of employees is in the first place. This is quite understandable, given that banks belong to the service sector, which is characterized by high employment and in terms of digitalization of the entire business. Followed in order of importance criteria: assets, net profit, total and net operating revenues, and capital. This ranking of the selected criteria according to importance is a reflection of the specifics of the banking sector's operations.

In further presentations of the treated issues, we will present the obtained results of the analysis of the efficiency of banks in Serbia on the basis of the EDAS method.

Table 3 features the initial decision matrix.

Table 3: Initial Matrix

Initial Matrix					
Weights of Criteria	0.3365		0.0978	0.1674	0.1693
Kind of Criteria					
	C1	C2	C3	C4	C5
A1	25188	2809333	589559	120705	30808
A2	23983	2968012	612895	126102	29315
A3	22085	3048183	619442	128962	32324
A4	24096	3243450	634330	136332	38215
A5	22817	3369391	667115	182405	68871
A6	22875	3774098	676704	175871	71349
A7	22739	4083760	705369	175090	65316
Average Solution	23397.5714	3328032.4286	643630.5714	149352.4286	48028.2857

Table 4 shows a positive distance from the average value - D_{ij}^+ .

Table 4: Positive Distance from Average Values

D_{ij}^+					
Weights of Criteria	0.3365		0.0978	0.1674	0.1693
	C1	C2	C3	C4	C5
A1	0.0765	0.0000	0.0000	0.0000	0.0000
A2	0.0250	0.0000	0.0000	0.0000	0.0000
A3	0.0000	0.0000	0.0000	0.0000	0.0000
A4	0.0299	0.0000	0.0000	0.0000	0.0000
A5	0.0000	0.0124	0.0365	0.2213	0.4340
A6	0.0000	0.1340	0.0514	0.1776	0.4856
A7	0.0000	0.2271	0.0959	0.1723	0.3599

Table 5 shows a negative distance from the average value - D_{ij}^- .

Table 5: Negative Distance from the Average Value

D_{ij}^-					
Weights of Criteria	0.3365		0.0978	0.1674	0.1693
	C1	C2	C3	C4	C5
A1	0.0000	0.1559	0.0840	0.1918	0.3585
A2	0.0000	0.1082	0.0478	0.1557	0.3896
A3	0.0561	0.0841	0.0376	0.1365	0.3270
A4	0.0000	0.0254	0.0145	0.0872	0.2043
A5	0.0248	0.0000	0.0000	0.0000	0.0000
A6	0.0223	0.0000	0.0000	0.0000	0.0000
A7	0.0281	0.0000	0.0000	0.0000	0.0000

In Table 6 shows the weight-normalized sum of PDA.

Table 6: Weight-Normalized Sum of PDA

PDA							
	C1	C2	C3	C4	C5	Qi+	Si+
A1	0.0257	0.0000	0.0000	0.0000	0.0000	0.0257	0.1703
A2	0.0084	0.0000	0.0000	0.0000	0.0000	0.0084	0.0557
A3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A4	0.0100	0.0000	0.0000	0.0000	0.0000	0.0100	0.0664
A5	0.0000	0.0028	0.0036	0.0370	0.0735	0.1169	0.7735
A6	0.0000	0.0307	0.0050	0.0297	0.0822	0.1476	0.9767
A7	0.0000	0.0520	0.0094	0.0288	0.0609	0.1512	1.0000
					MAX	0.1512	

In Table 7 shows the weight-normalized sum of NDA.

Table 7: Weight-Normalized Sum of NDA

NDA							
	C1	C2	C3	C4	C5	Qi-	Si-
A1	0.0000	0.0357	0.0082	0.0321	0.0607	0.1367	0.0000
A2	0.0000	0.0248	0.0047	0.0261	0.0660	0.1215	0.1115
A3	0.0189	0.0193	0.0037	0.0229	0.0554	0.1200	0.1221
A4	0.0000	0.0058	0.0014	0.0146	0.0346	0.0564	0.5873
A5	0.0083	0.0000	0.0000	0.0000	0.0000	0.0083	0.9389
A6	0.0075	0.0000	0.0000	0.0000	0.0000	0.0075	0.9450
A7	0.0095	0.0000	0.0000	0.0000	0.0000	0.0095	0.9307
					MAX	0.1367	

Table 8 and Figure 2 feature the ranking of alternatives (Si).

Table 9: Ranking Alternatives

	Si	Si	RANKING
2013	0.085	0.085	5
2014	0.084	0,084	6
2015	0.061	0,061	7
2016	0,327	0,327	4
2017	0,856	0.856	3
2018	0.961	0.961	2
2019	0,965	0.965	1

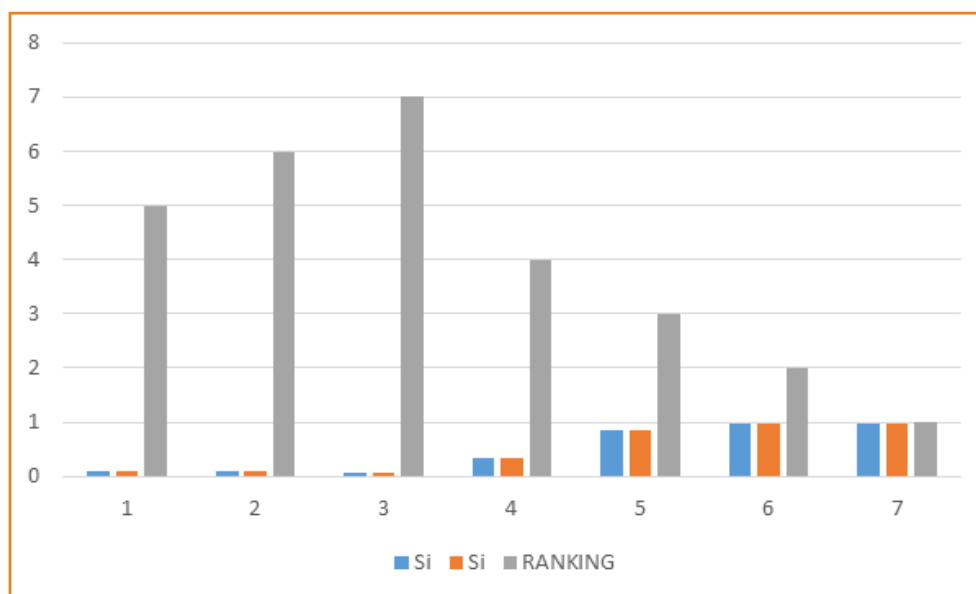


Figure 2: Evaluating and Ranking Alternatives

The results of empirical research of efficiency of banks in Serbia based on OCRA methods show that it has been continuously increasing in the reporting period (2013 - 2019) on an annual basis. The best value was in 2019. Then follow the other years in the following order: 2018, 2017, 2016, 2013, 2014 and 2015. These dynamics of bank efficiency in Serbia were influenced by numerous macro and micro factors (economic climate, living standard, political stability, digitalization of the entire business, and others).

Conclusion

Based on the obtained results of empirical research of the efficiency of banks in Serbia, based on OCRA methods can conclude that has been continuously increasing in the reporting period (2013-2019) on an annual basis. The best value was in 2019. Then the follow the other years in the following order: 2018, 2017, 2016, 2013, 2014 and 2015. These dynamics of bank efficiency in Serbia were influenced by numerous macro and micro factors, such as: economic climate, living standard, political stability, digitalization of the entire business, and others.

In order to increase the efficiency of banks in Serbia in the future, it is necessary to manage human capital, assets, capital, revenues and profits as efficiently as possible.

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JEDNOFAKTORSKI MODEL ZA STOPE NEIZMIRENJA PO TIPOVIMA KREDITA

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Rezime

U radu se istražuje veza između stopa neizmirenja po tipovima kredita i sistemske komponente kreditnog rizika. Ova veza je opisana linearnim modelom koji kombinuje uticaj sistemske i idiosinkratske komponente kreditnog rizika. Sistemska komponenta je latentni faktor koji direktno zavisi od agregatne stope neizmirenja svih kredita, dok idiosinkratska komponenta utiče na specifične varijacije stope neizmirenja za pojedinačne tipove kredita. Transformacijom opservabilnih veličina model se ekonometrijski može predstaviti kao mešoviti linearni model, a sistemska i idiosinkratska komponente predstavljaju, redom, nagib i odsečak koji su specifični za svaki tip kredita ponaosob. Predloženi model je ilustrovan na panelu podataka o plasmanima u statusu neizmirenja Udruženja banaka Srbije. Dobijeni rezultati pokazuju veoma visoku moć modela da objasni prosečne stope neizmirenja svih tipova kredita. Agregatna stopa neizmirenja stoga igra ulogu jedinstvene sistemske komponente koja jednostavno oponaša uticaje stvarnih makroekonomskih faktora rizika bez potrebe za eksplicitnim modeliranjem ove veze.

Ključne reči: kreditni rizik, stopa neizmirenja, sistemski faktori, mešoviti linearni model

JEL klasifikacija: G21, C23.

Uvod

Dekompozicija rizika na faktore koji opisuju njegove različite izvore predstavlja jedno od fundamentalnih pitanja finansijske ekonomije. Doprinosi pojedinačnih komponenata rizika su značajni jer omogućavaju praćenje izvora rizika koji mogu dovesti do gubitaka u portfolijima. Prepoznavanje izvora rizika je posebno značajno za kompleksne portfolije finansijskih institucija, kao i određene vrste instrumenata gde faktori nisu manifestno prepoznatljivi, poput nekih tipova derivata.

Međutim, standardna podela komponenti rizika na sistemsku i idiosinkratsku komponentu (Bodie *et al.*, 2021) implicitno podrazumeva prevashodno cenovne rizike instrumenata na tržištima hartija od vrednosti. Relativno manje pažnje je do sada posvećeno analognoj dekompoziciji kreditnog rizika, koji je svakako najvažnija vrsta rizika za poslovne banke i druge kreditne institucije. Ovakav pristup se umnogome promenio nakon globalne finansijske krize, koja je nedvosmisleno pokazala da kod upravljanja kreditnim rizikom portfolija ne možemo posmatrati samo faktore specifične za dužnika. Potrebno je uzeti u obzir moguće efekte prelivanja rizika pojedinačnih dužnika na čitave sektore privrede, pa čak i na privredu u celini (Ballester *et al.*, 2016). Ova prelivanja možemo (bar na apstraktnom nivou) razumeti upravo kroz sistemsku komponentu kreditnog rizika, koja je zajednička za sve tipove dužnika pa samim tim i za čitave portfolije banaka.

Sistemska komponenta potiče od makroekonomskih faktora rizika i po tome je sasvim analogna sa tržišnim rizikom. Za finansijsku stabilnost, koja je postala jedno od centralnih pitanja u postkriznim regulatornim okvirima (BCBS, 2011), od posebnog su značaja uticaji sistemskih faktora na finansijski i vladin sektor (Acharya *et al.*, 2014), kao i kanal prelivanja sa ovih na nefinansijske sektore (Gross & Siklos, 2020). Ipak, na praktičnom nivou ovi faktori se u bazelskom regulatornom okviru uglavnom ne modeliraju eksplicitno unutar prvog stuba,¹ već se njima upravlja posredno, kroz kontraciklične zaštitne slojeve kapitala i rizik koncentracije. Repullo & Saurina (2011) su kritikovali mehaničku primenu kontracikličnih zaštitnih slojeva i argumentovali da pojačava inherentnu procikličnost regulatornih zahteva za kapitalom.

Strategije upravljanja kreditnim rizikom finansijskih institucija moraju uzeti u obzir poslovne cikluse i povezane promene u kvalitetu i sastavu kreditnog portfolija (Jiménez & Saurina, 2006). Da bi ove strategije bile održive na duži rok, finansijske institucije moraju pratiti osetljivost svojih portfolija na promene različitih makroekonomskih i finansijskih indikatora. Stoga pitanje stepena u kome pojedini segmenti privrede doprinose sistemskom riziku postaje jedno od ključnih (Novales & Chamizo, 2019). Možemo ga u određenoj meri poistovetiti sa izloženošću pojedinih delova kreditnog portfolija finansijske institucije sistemskoj komponenti rizika.

Literatura na temu dekompozicije kreditnog rizika na faktore je mahom novijeg datuma. Rosen & Saunders (2010) su istakli da je jedan od osnovnih izazova vezanih za ovu temu nelinearan uticaj faktora na opservabilne veličine. Oni su predložili višefaktorski model koji se Hoeffdingovom dekompozicijom vezuje za ukupne gubitke portfolija. Faktori koje su koristili su predstavljali kombinaciju makroekonomskih, geografskih, sektorskih i tržišnih faktora (kamatnih stopa, valutnih kurseva, volatilnosti prinosu akcija). Chamizo & Novales (2016) su koristili kreditne derivative (CDS), kako bi iz tržišnih podataka o

¹ Izuzetak predstavlja pristup zasnovan na internim modelima kreditnog rejtinga (engl. Internal Ratings Based [Approach], skraćeno IRB), gde se sistemska komponenta posredno modelira „rizikom portfolija“. Ovaj faktor u IRB pristupu uvek uzima fiksnu vrednost u formuli za kapital dobijenoj na osnovu jednofaktorske Gausove kopule (Vasiček, 2002).

njihovim premijama razdvojili uticaj sistemske od idiosinkratske komponente kreditnog rizika velikih evropskih kompanija. Nešto ranije, determinante premija CDS ugovora proučavali su Ericsson *et al.* (2009). Koristeći pristup analize glavnih komponenti, oni su uspeali da identifikuju jedan dominantan zajednički faktor za sve kreditne izloženosti u uzorku. Rezidualni doprinos nesistemskih komponenta se najverovatnije može pripisati kombinaciji sektorskog i specifičnog faktora rizika (Bhansali *et al.*, 2008; Novales & Chamizo, 2019).

Povezanim pitanjem dekompozicije rizika druge ugovorne strane bavili su se de Graaf *et al.* (2018). Oni su dodatno ukazali na značaj razlaganja komponenta na što manji broj faktora zbog jednostavnijeg praćenja i interpretacije. Campbell *et al.* (2001) su proučavali dinamiku sistemske komponente tržišnog rizika i pokazali da ona ima ponašanje „vodećeg indikatora“ u odnosu na idiosinkratske komponente. U kontekstu kreditnog rizika, u postojećoj literaturi se dinamika sistemske komponente najčešće procenjuje iz podataka sa tržišta obveznica i kreditnih derivata, ili se direktno povezuje sa makroekonomskim fundamentima. U akademskim istraživanjima relativno malo pažnje je do sada posvećeno dekompoziciji faktora rizika kreditnih portfolija poslovnih banaka i drugih nelikvidnih finansijskih instrumenata.

Prepoznajući očigledan istraživački jaz u literaturi, ovaj rad ima za cilj da predloži jednostavan i implementabilan model za dekompoziciju determinanti kreditnog rizika. Sledeći opštu logiku faktorskih modela vrednovanja finansijskih instrumenata, razvili smo linearan model sa jednim faktorom sistemskog rizika. Iako je u modelu taj faktor latentan, vezan je jednostavnom algebarskom transformacijom za opservabilnu stopu neizmirenja svih datih kredita u Srbiji. Rezidualni doprinos ukupnom riziku instrumenta ili portfolija pripisuje se komponenti rizika specifičnoj za tip kredita. Ilustracija modela je data na panel podacima Udruženja banaka Srbije (UBS) o plasmanima u statusu neizmirenja.

Ostatak rada organizovan je na sledeći način. U narednom odeljku izložen je teorijski model dekompozicije faktora kreditnog rizika na sistemsku i idiosinkratsku komponentu. U trećem odeljku su opisani podaci koji su korišćeni za ilustraciju modela, koja je prikazana u četvrtom odeljku. Poslednji odeljak sadrži zaključna razmatranja.

Model

Predloženi model razdvaja kreditni rizik pojedinačnih grupa (tipova) kredita na doprinose koji potiču od sistemske i specifične komponente rizika. Logika modela je donekle slična faktorskim modelima vrednovanja kapitala. Konkretno, pretpostavićemo da se kreditna sposobnost reprezentativnog dužnika unutar svake grupe i može opisati latentnim faktorom y . Dinamika promena ovog faktora data je sledećom linearnom vezom:

$$y_{it} = \alpha_i + \beta_i x_t + \varepsilon_{it}. \quad (1)$$

U jednakosti (1), y_{it} je vrednost indeksa kreditne sposobnosti kategorije dužnika i u trenutku t , x_t je latentni indeks kreditne sposobnosti svih dužnika (tj. svih tipova kredita posmatranih agregirano), dok ε_{it} meri slučajno odstupanje od linearne veze. Koeficijenti α_i i β_i su specifični za svaku grupu dužnika, i predstavljaju mere idiosinkratskog i sistemskog rizika u svakoj grupi. Geometrijski se mogu interpretirati kao pojedinačni odsecci i nagibi u linearnoj regresiji po grupama. Konkretnije, pretpostavićemo da se oba mogu prikazati preko odstupanja od svojih srednjih vrednosti:

$$\alpha_i = \bar{\alpha} + u_i \quad (2)$$

$$\beta_i = \bar{\beta} + v_i.$$

Odstupanja u_i i v_i su pojedinačno nezavisna i potiču iz istih tipova raspodela slučajnih promenljivih, uz mogućnost postojanja korelacije između njih. Asimptotski ih možemo posmatrati i kao elemente dvodimenzionog slučajnog vektora iz zajedničke normalne raspodele:

$$\begin{bmatrix} u_i \\ v_i \end{bmatrix} \sim \Phi \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_u^2 & \rho \sigma_u \sigma_v \\ \rho \sigma_u \sigma_v & \sigma_v^2 \end{bmatrix} \right), \quad (3)$$

gde je $\Phi: \mathbb{R}^2 \rightarrow [0, 1]$ funkcija normalne raspodele opisana odgovarajućim vektorom srednjih vrednosti i matrice kovarijansi.

Budući da su y_{it} i x_t latentni faktori, moramo ih povezati sa opservabilnim veličinama. Konkretno, pretpostavićemo da su vezani sa stopama neizmirenja na sledeći način:

$$d_{it} = \mathbb{P}(y_{it} < \mathbb{E}(y_{it}|x_t)|x_t) \quad (4)$$

$$D_t = \mathbb{P}(x_t < \mathbb{E}(x_t)),$$

gde $\mathbb{P}$ označava verovatnoću. Učestalost neizmirenja za grupu kredita i u trenutku t merimo odgovarajućom stopom neizmirenja d_{it} , a učestalost neizmirenja u trenutku t na nivou svih grupa merimo agregatnom stopom neizmirenja D_t . Relacije (4) nam govore da uspostavljamo jednakosti između (uslovne) verovatnoće da latentni faktori budu manji od svojih očekivanih vrednosti i stopa neizmirenja kao uzoračkih analogona ovih verovatnoća. Uz standardnu pretpostavku linearnih modela da su slučajne greške ε_{it} nezavisne i identično raspodeljene slučajne promenljive srednje vrednosti nula i varijanse σ_ε^2 , ortogonalne na faktor x_t , lako je pokazati da je veličina

$$y_{it} - \mathbb{E}(y_{it}|x_t) = u_i + v_i x_t + \varepsilon_{it} \quad (5)$$

asimptotski normalno raspodeljena, te u podacima možemo koristiti vezu

$$y_{it} = G(d_{it}), \quad (6)$$

gde je $G: [0, 1] \rightarrow \mathbb{R}$ inverzna funkcija jednodimenzione normalne raspodele. Po analogiji ćemo koristiti sličnu vezu i za agregatne stope neizmirenja:

$$x_t = G(D_t). \quad (7)$$

Podaci

Za ilustraciju modela korist ćemo agregirane anonimizovane podatke UBS o broju i iznosu plasmana u statusu neizmirenja. Podaci su granulirani po tipu kredita, tako da ima ukupno deset različitih tipova. Frekvencija podataka je kvartalna i obuhvata period između poslednjeg kvartala 2012. godine i poslednjeg kvartala 2018. godine. Stope neizmirenja računane su kao odnos ukupnih novčanih iznosa u statusu neizmirenja i ukupnih iznosa svih datih kredita. Logika ovog izbora detaljnije je objašnjena u nekim prethodnim radovima (videti, recimo, Fridson, 1991 ili Božović, 2019).

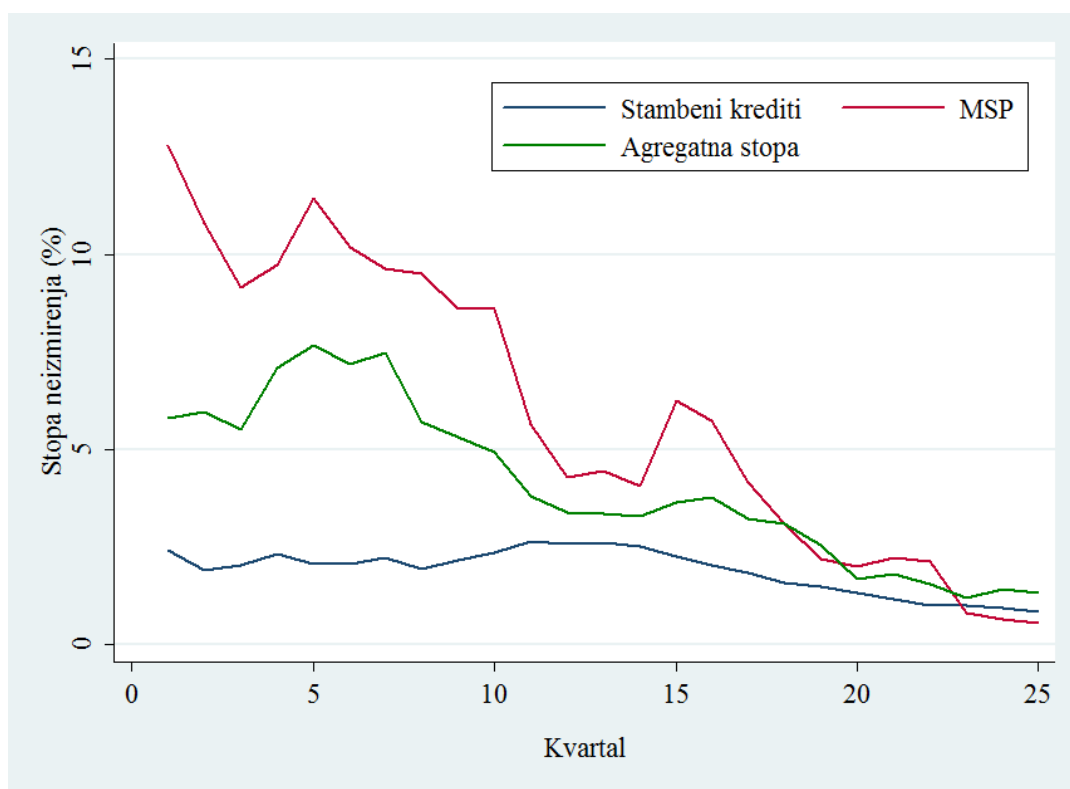
Deskriptivne statistike podataka prikazane su u Tabeli 1. Tabela sadrži informacije o srednjim vrednostima, standardnim devijacijama, minimumima i maksimumima stopa neizmirenja po tipovima proizvoda. Podela kredita po tipovima proizvoda izvršena je prema kategorizaciji u bazi UBS. U poslednjem redu tabele (oznaka „Ukupno“) prikazani su podaci za sve banke u uzorku, tj. podaci dobijeni na osnovu agregatnih stopa neizmirenja. U tabeli lako možemo uočiti jednu pravilnost u podacima: veće prosečne stope neizmirenja idu u paru sa većim standardnim devijacijama ovih stopa. Intuicija za ovakvu pojavu je slična onoj kod tržišnih instrumenata, gde veća prosečna stopa promene prinosa potiče od većeg rizika merenog volatilnošću prinosa. Naravno, ovu analogiju ne treba shvatiti doslovno. Osnovna ideja modela koji prikazujemo u radu jeste da poveže osnovni deo varijacija u stopama neizmirenja sa sistemskom komponentom. Ova intuicija se može uočiti sa Ilustracije 1, koja ilustruje kretanje stopa neizmirenja sa drugom najmanjom i drugom najvećom prosečnom vrednosti (stambeni krediti, i krediti dati malim i srednjim pravnim licima, redom), u odnosu na agregatnu stopu neizmirenja.

Tabela 1: *Deskriptivne statistike stopa neizmirenja po tipu proizvoda*

Redni broj	Tip	Srednja vrednost	Standardna devijacija	Minimum	Maksimum
1	Kreditne kartice	2,54	0,74	1,61	4,02
2	Gotovinski i potrošački krediti	2,93	0,65	2,07	4,10
3	Preduzetnici	3,39	1,24	1,45	5,91
4	Velika pravna lica	4,70	2,92	0,78	11,07
5	Lokalna samouprava	0,31	0,39	0,00	0,96
6	Stambeni krediti	1,89	0,57	0,83	2,65
7	Prekoračenja po tekućem računu	2,18	0,61	1,61	3,57
8	Poljoprivredna gazdinstva	2,13	0,57	1,47	3,16
9	Mikro krediti	8,46	6,54	1,21	20,30
10	Mala i srednja pravna lica	5,95	3,79	0,55	12,81
	Ukupno	4,07	2,07	1,21	7,67

Izvor: Baza podataka o neizmirenjima UBS

Prema načinu konstrukcije kategorija kreditnih plasmana moguća je situacija u kojoj se ista fizička lica pojavljuju u različitim kategorijama neizmirenja. Na primer, isto fizičko lice može kontribuirati neizmirenjima po osnovu kreditnih kartica, gotovinskih i potrošačkih kredita ili prekoračenja po tekućem računu. Međutim, ovde je važno dati nekoliko napomena. Prvo, indeks kreditne sposobnosti, definisan je jednakošću (1) na nivou kategorije, a ne na nivou dužnika. Ovakav pristup je u duhu Međunarodnog standarda finansijskog izveštavanja 9, koji podrazumeva da se ocena kreditne sposobnosti vrši po instrumentu, a ne po dužniku. Drugo, čak i kada se ocene kreditne sposobnosti vrše po licu umesto po instrumentu, veoma često i takve ocene ispoljavaju velike varijacije u zavisnosti od banke (Firestone & Rezende, 2016). Treće, autor nije posedovao mikro-podatke na nivou pojedinačnih dužnika, pa čak ni pojedinačnih banaka kako bi mogao da kontroliše fiksne efekte na ovim nivoima. U svakom slučaju, ovako organizovani podaci su korišćeni samo u svrhu ilustracije izloženog modela. Navedeni problem se svakako ne ispoljava kod plasmana preduzećima pošto tu ne dolazi do preklapanja korisnika kredita.



Ilustracija 1: Kretanje stopa neizmirenja sa drugim najmanjim i drugim najvećim prosekom u odnosu na agregatnu stopu neizmirenja

Izvor: Baza podataka o neizmirenjima UBS

Rezultati

Model ćemo ilustrirati na panel podacima opisanim u prethodnom odeljku. Prethodno ćemo ga postaviti u ekonometrijski pogodniji oblik. Kombinovanjem jednačina (1) i (2) dobijamo:

$$y_{it} = \bar{\alpha} + \bar{\beta}x_t + u_i + v_ix_t + \varepsilon_{it}. \quad (8)$$

U ovakvom obliku model je ekvivalentan mešovitom linearnom modelu (engl. *mixed-effects model*) sa jednim nivoom podele (po tipu kredita i). Model ima stohastički odsečak i nagib. Uzima u obzir fiksne efekte zajedničke za sve tipove kredita (sabirak $\bar{\beta}x_t$), slučajne efekte specifične za pojedinačne tipove kredita (sabirak u_i), kao i mešoviti uticaj fiksnih i slučajnih efekata (sabirak v_ix_t). Vrednosti y_{it} i x_t izračunate su na osnovu relacija (6) i (7).

Parametri modela ocenjeni su metodom maksimalne verodostojnosti pomoću algoritma maksimizacije očekivanja (engl. *expectation-maximization*, skraćeno EM).² Rezultati su sumirani u Tabeli 2. Vidimo da su svi parametri osim srednje vrednosti odsečka $\bar{\alpha}$ značajni na nivou od 0.05. Sam regresioni model je visoko značajan, što vidimo iz relativno velike vrednosti Wald statistike. Ocene parametara korelacione matrice slučajnih efekata (σ_u , σ_v i ρ), kao i standardne devijacije grešaka (σ_ε) su takođe visoko značajne, što vidimo iz njihovih intervala poverenja koji su svi sa iste strane nule. Relativno visoka vrednost koeficijenta korelacije ne predstavlja problem, pošto interval poverenja ne obuhvata jedinicu pa samim tim ni ne ukazuje na postojanje savršene korelisanosti između čistih slučajnih efekata, u_i , i njihovog doprinosa mešovitim efektima, v_i .

Poslednji red u Tabeli 2 prikazuje rezultate testa odnosa verodostojnosti (engl. *likelihood ratio*, skraćeno LR), kojim poredimo mešoviti linearni model sa njegovom restrikcijom na standardni regresioni model bez uticaja slučajnih efekata ($u_i \equiv 0$ i $v_i \equiv 0$). LR statistika je visoko značajna, posebno kada imamo u vidu da u EM pristupu predstavlja konzervativnu ocenu (Gutierrez *et al.*, 2001; McLachlan & Basford, 1988; Self & Liang, 1987; Stram & Lee, 1994). U ovo se možemo jednostavno uveriti i na osnovu Ilustracije 2, koja daje vizuelni prikaz zavisnosti latentne determinante kreditnog rizika po tipu kredita y_{it} od sistemskog faktora x_t . Pojedinačne linije povezuju tačke koje odgovaraju istim tipovima kredita i , što opravdava izvornu intuiciju upotrebe različitih koeficijenata pravca β_i uz sistemsku komponentu, kao i odsečaka α_i . Numeričke oznake na slici odgovaraju oznakama tipova kredita i iz Tabele 1.

² Algoritam su među prvima formalizovali Dempster *et al.* (1977). Za nešto moderniji prikaz algoritma videti reference Gupta & Chen (2010).

Tabela 2: Ocene parametara mešovitog linearnog modela

Parametar	Vrednost	St, greška	p-vrednost	Interval poverenja od 95%
$\bar{\alpha}$	-0,673	0,344	0,051	[-1,348, 0,002]
$\bar{\beta}$	0,722	0,152	0,000	[0,425, 1,019]
Wald (χ^2_1)	22,67		0,000	
σ_u	1,046	0,254		[0,650, 1,684]
σ_v	0,449	0,114		[0,273, 0,738]
ρ	0,962	0,027		[0,849, 0,991]
σ_ε	0,208	0,010		[0,190, 0,229]
LR (χ^2_3)	243,27		0,000	

Izvor: Proračuni autora

Vrednosti zavisne promenljive y_{it} na Ilustraciji 2 su negativne, što je u skladu sa definicijom u jednakosti (6) i odgovara levom kraju normalne funkcije raspodele. Naime, kako se sve stope neizmirenja kreću u intervalu od 0 do 20,3 procenta (Tabela 1), odgovarajuće vrednosti latentne promenljive y_{it} biće manje od $G(0.203) = -0.83$. Slično važi i za nezavisnu promenljivu x_t , koja je vezana za agregatnu stopu neizmirenja preko jednakosti (7). Ova stopa se kreće u intervalu od 1,21 do 7,67 procenata, pa će odgovarajuće vrednosti x_t biti u intervalu od -2,25 do -1,43.

Na osnovu ocena parametara modela iz Tabele 2 i jednačine (8), možemo izvesti regresionu predikciju očekivanih vrednosti zavisne promenljive:

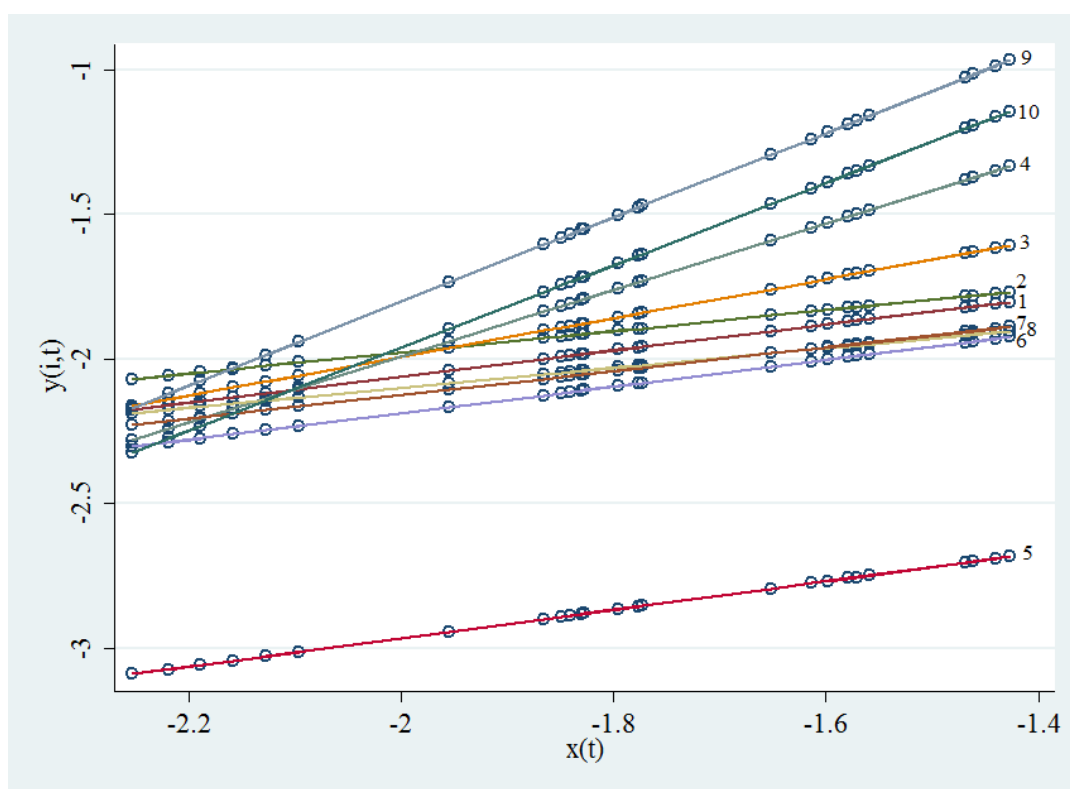
$$\hat{y}_{it} \equiv E(y_{it}|x_t) = \hat{\alpha} + \hat{\beta}x_t + \hat{u}_i + \hat{v}_i x_t, \quad (9)$$

gde su $\hat{\alpha}$ i $\hat{\beta}$ tačkaste ocene parametara $\bar{\alpha}$ i $\bar{\beta}$ iz Tabele 2, a $\hat{u}_i$ i $\hat{v}_i$ su regresiona predviđanja slučajnih efekata za svaki od tipova kredita. Iz jednačina (9) i (6) možemo oceniti stope neizmirenja na osnovu mešovitog linearnog modela kao

$$\hat{d}_{it} = \Phi(\hat{y}_{it}), \quad (10)$$

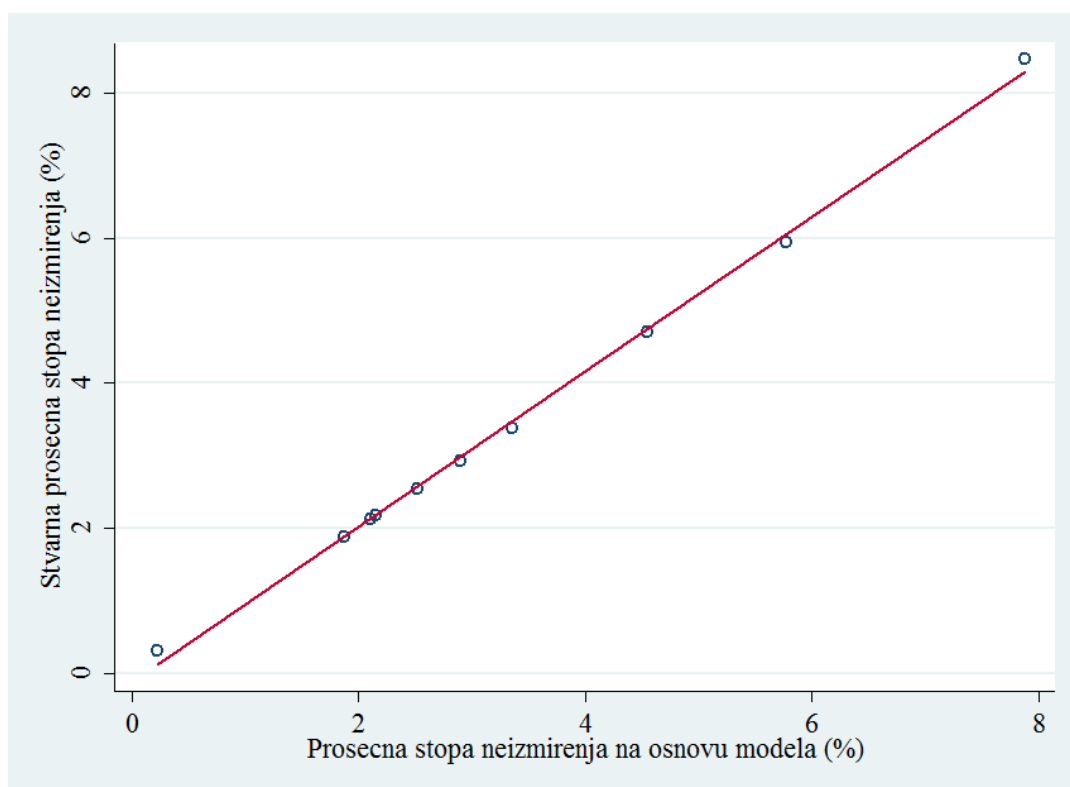
gde je $\Phi: \mathbb{R} \rightarrow [0, 1]$ jednodimenziona funkcija normalne raspodele.

Ilustracija 3 poredi stvarne i modelske stope neizmirenja uprosečene po vremenu. Svaki od deset plavih kružića ima koordinatu $(\hat{d}_{it}, \bar{d}_{it})$, gde nadvučena linija označava usrednjavanje po vremenskoj dimenziji za svaki tip kredita i . Drugim rečima, nezavisna promenljiva $\bar{d}_{it}$ na Ilustraciji 3 je vremenska srednja vrednost stope neizmirenja za svaki tip kredita i , dobijena usrednjavanjem vrednosti izračunate pomoću jednakosti (10). Zavisna promenljiva $\hat{d}_{it}$ predstavlja stvarne prosečne vrednosti stopa neizmirenja po tipu kredita i odgovara koloni sa oznakom 'Srednja vrednost' u Tabeli 1. Ove stvarne prosečne vrednosti kreću se u intervalu od 0,31 do 8,46 procenata. Crvena linija na Ilustraciji 3 predstavlja običan linearni fit i data je samo da bi olakšala vizuelizaciju. Lako je uočiti da model veoma dobro opisuje varijacije u prosečnim stopama neizmirenja po tipovima kredita.



Ilustracija 2: Zavisnost latentnih determinanti kreditnog rizika po tipu kredita y_{it} od sistemskog faktora x_t . Numeričke oznake odgovaraju tipovima kredita u Tabeli 1

Izvor: Proračuni autora



Ilustracija 3: Poređenje stvarnih i modelskih prosečnih stopa neizmirenja za deset tipova kredita

Izvor: Proračuni autora

Zaključak

U radu je predložen relativno jednostavan i praktično primenljiv model za razdvajanje determinanti rizika u kreditnim portfolijima poslovnih banaka na komponente. Model predstavlja linearnu vezu između latentne determinante kreditnog rizika pojedinačnog segmenta portfolija i sistemskog faktora. Ove determinante su, redom, povezane sa stopama neizmirenja unutar svakog segmenta i agregatnom stopom neizmirenja svih datih kredita. Varijacije u uticaju sistemske komponente na pojedinačne segmente se stoga svodi na varijacije u koeficijentima uz sistemski faktor. Ulogu idiosinkratske komponente igra odsečak koji takođe varira po segmentima.

Model je ilustrovan na podacima Udruženja banaka Srbije o plasmanima u statusu neizmirenja. Korišćen je panel od deset portfolio segmenata, organizovanih na osnovu tipova kredita, u periodu između četvrtog kvartala 2012. i četvrtog kvartala 2018. godine. Parametri modela ocenjeni su pomoću metoda mešovitih linearnih modela sa jednim nivoom podele, algoritmom maksimizacije očekivanja. Model pokazuje visoku moć statističkog objašnjavanja podataka unutar uzorka. Dobijeni rezultati ukazuju da predložena dekompozicija veoma dobro opisuje dinamiku stopa neizmirenja po tipovima kredita, kao i razlike u prosečnim stopama neizmirenja po tipovima kredita.

Agregatna stopa neizmirenja je algebarskom transformacijom povezana sa jedinstvenim faktorom, koji u mešovitom modelu predstavlja fiksne efekte zajedničke za sve segmente. Ona stoga igra ulogu jedinstvene sistemske komponente koja jednostavno oponaša uticaje stvarnih makroekonomskih faktora rizika, a ne iziskuje eksplicitno modeliranje ove veze. Ova osobina ima potencijalno veliki praktični značaj, posebno u uslovima nedovoljno dugačkih vremenskih serija gde je teško ustanoviti robusnu statističku vezu. Pored toga, model omogućava da se bilo kakav pristup „gledanja unapred“ (engl. *forward looking*) svede na modeliranje dinamike samo jedne—agregatne—stope neizmirenja, umesto svakog segmenta ponaosob. Uz jednostavnost pristupa, to čini osnovne doprinose ovog rada.

Važno je napomenuti da je zbog ograničenja u broju raspoloživih podataka i varijacija po obe dimenzije panela model testiran samo unutar uzorka. Bilo bi svakako ne samo interesantno nego i neophodno uveriti se u njegove performanse i van uzorka. Na primer, sa dodatnim raspoloživim podacima o agregatnim stopama neizmirenja (ili njihovim projekcijama dobijenim nekim nezavisnim metodom) moguće je uporediti predviđene i realizovane stope neizmirenja po tipovima kredita. Takođe, bilo bi interesantno posmatrati i podatke na nivou pojedinačnih kredita, te proveriti da li se na njima može uočiti dodatni faktor koji bi opisao specifično ponašanje pojedinačnih dužnika. Mešoviti linearni model je upravo pogodan za ovakvu analizu, jer omogućava dodatne nivoe podele na „ugnježdene“ potkategorije. Ovim bi se napravila dobra paralela sa delom literature koji sugeriše razdvajanje na sistemsku, sektorsku i „pravu“ idiosinkratsku komponentu kreditnog rizika.

Napomena

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ONE-FACTOR MODEL FOR DEFAULT RATES BY LOAN TYPE

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Summary:

This paper investigates the link between default rates by loan types and the systemic credit risk component. This link is described by a linear model that combines systemic and idiosyncratic contributions. The systemic component is a latent factor that depends directly on the aggregate loan default rate, while the idiosyncratic component drives specific variations of default rates across loan types. By transforming observable risk measures, the model can be econometrically represented as a mixed-effects model, where the systemic and idiosyncratic components represent, respectively, the slope and the intercept that are specific for each loan type individually. The proposed model is illustrated on a panel of defaulted loans of the Association of Serbian Banks. The obtained results show the model's very high power in explaining average default rates for all loan types. Thus, the aggregate default rate plays the role of a unique systemic component that mimics the influence of fundamental macroeconomic risk factors easily, without the necessity to model this relationship explicitly.

Keywords: credit risk; default rate; systemic factors; mixed-effects model

JEL classification: G21, C23.

Introduction

Decomposing risk into factors that describe its various sources is one of the fundamental issues in financial economics. The contributions of individual risk components are significant because they enable monitoring sources of risk that can lead to portfolio losses. Identifying sources of risk is particularly important for complex portfolios of financial institutions and certain types of instruments where factors are not manifestly identifiable, such as some types of derivatives.

However, the standard division of risk components into systemic and idiosyncratic (Bodie *et al.*, 2021) implicitly subsumes the price risks of instruments in the securities markets. Relatively less attention has so far been paid to the analogous decomposition of credit risk, which is undoubtedly the most critical source of risk for commercial banks and other credit institutions. This approach has significantly changed after the Global Financial Crisis, which has unequivocally shown that we cannot consider debt-specific factors alone in managing the credit risk of a portfolio. It is necessary to consider the possible spillover effects of individual debtors on entire industries and even on the economy as a whole (Ballester *et al.*, 2016). We can understand these spillovers (at least on an abstract level) precisely through the systemic component of credit risk, which is common to all types of debtors and thus to entire portfolios of banks.

The systemic component originates from macroeconomic risk factors and, in that respect, is quite analogous to market risk. For financial stability, which has become one of the central issues in post-crisis regulatory frameworks (BCBS, 2011), the impact of systemic factors on financial and sovereign sectors are of particular importance (Acharya *et al.*, 2014), as well as the channel of spillovers from these to non-financial sectors (Gross & Siklos, 2020). However, at the practical level, in the Basel regulatory framework, these factors are generally not modeled explicitly within Pillar I.¹ Instead, they are managed indirectly through countercyclical capital buffers and concentration risk. Repullo & Saurina (2011) criticized the mechanical application of countercyclical buffers and argued that it enhances the inherent procyclicality of regulatory capital requirements.

Credit risk management strategies of financial institutions must consider business cycles and related variations in the quality and structure of their loan portfolios (Jiménez & Saurina, 2006). For these strategies to be sustainable in the long run, banks have to monitor how sensitive their portfolios are to changes in various macroeconomic and financial indicators. Therefore, the degree to which specific economy segments contribute to systemic risk becomes among the crucial ones (Novales & Chamizo, 2019). To some extent, we can equate it with the exposure of certain parts of a financial institution's loan portfolio to the systemic risk component.

The literature on the topic of credit risk decomposition into factors is mostly of more recent date. Rosen & Saunders (2010) pointed out that one of the primary challenges related to this topic is the nonlinear influence of factors on observable quantities. They proposed a multifactor model linked by the Hoeffding decomposition to total portfolio losses. The variables they used were a combination of macroeconomic, geographical, sectoral and market factors (interest rates, exchange rates, stock volatility). Chamizo & Novales (2016) used credit derivatives to separate the impact of systemic from the idiosyncratic component of large European companies' credit risk using market data on CDS spreads. Earlier, the determinants of CDS spreads were studied by Ericsson *et al.* (2009). Using a principal com-

¹ The exception is the Internal Ratings Based (IRB) approach, where the systemic component is indirectly modeled by "portfolio risk". This factor in the IRB approach always takes a fixed value in the capital requirements formula. It is obtained using a one-factor Gaussian copula model (Vasiček, 2002)

ponent analysis, they were able to identify one dominant common factor for all credit exposures in the sample. The residual contribution of non-systemic components can be most likely attributed to a combination of sector and individual-specific risk factors (Bhansali *et al.*, 2008; Novales & Chamizo, 2019).

The related issue of counterparty risk decomposition has been addressed by de Graaf *et al.* (2018). They additionally pointed out the importance of decomposing the components into as few factors as possible due to more straightforward monitoring and interpretation. Campbell *et al.* (2001) studied the dynamics of the systemic component of market risk and showed that it has the behavior of a “leading indicator” to the idiosyncratic component. In the context of credit risk, the existing literature assesses the dynamics of the systemic component mostly from bond and credit derivative market data. Alternatively, it is directly related to macroeconomic fundamentals. In academic research, relatively little attention has so far been paid to the decomposition of risk factors of commercial banks’ loan portfolios and other illiquid financial instruments.

By recognizing the apparent research gap in the literature, this paper aims to propose an implementable and straightforward model for the decomposition of credit risk determinants. Following the general logic of factor models used in asset pricing, we have developed a linear model with one systemic risk factor. Although this factor is latent in the model, it is related by a simple algebraic transformation to the observable default rate of all loans extended by the Serbian banks. The residual contribution to the total risk of an instrument or a portfolio is attributed to the loan type-specific risk component. An illustration of the model is given using the panel data of the Association of Serbian Banks (ASB) on defaulted loans.

The remainder of the paper is organized as follows. The next section presents a theoretical model for credit risk decomposition. The third section describes the data used to illustrate the model, shown in the fourth section. The last section contains concluding remarks.

Model

We propose a model that separates the credit risk of individual groups of loans (i.e., loan types) into contributions from systemic and type-specific risk components. The logic of the model is somewhat similar to the factor models used in asset pricing. In particular, we will assume that a representative debtor’s creditworthiness within each group i can be described by the latent factor y . The following linear relationship gives the dynamics of changes in this factor:

$$y_{it} = \alpha_i + \beta_i x_t + \varepsilon_{it}. \quad (1)$$

In equation (1), y_{it} is the creditworthiness index of the loans of type i at time t , x_t is the latent creditworthiness index of all debtors (i.e., all loan types considered as an aggregate), while ε_{it} represents a random deviation from the linear relationship. The parameters α_i and β_i are specific for each loan type and measure the idiosyncratic and specific components in each group, respectively. Geometrically, we can interpret them as individual slopes and intercepts in regression by groups. More specifically, we will assume they can be represented as deviations from their means:

$$\alpha_i = \bar{\alpha} + u_i \quad (2)$$

$$\beta_i = \bar{\beta} + v_i.$$

The deviations u_i and v_i are individually independent and identically distributed. However, we allow for the presence of correlations between the two. Asymptotically, we can regard them as elements of a two-dimensional random vector from a joint normal distribution:

$$\begin{bmatrix} u_i \\ v_i \end{bmatrix} \sim \Phi \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_u^2 & \rho\sigma_u\sigma_v \\ \rho\sigma_u\sigma_v & \sigma_v^2 \end{bmatrix} \right), \quad (3)$$

where $\Phi: \mathbb{R}^2 \rightarrow [0, 1]$ is the normal distribution function described by the vector of means and the covariance matrix.

Since y_{it} and x_t are latent factors, we have to relate them to observable quantities. Specifically, we will assume that they are related to the corresponding default rates in the following way:

$$d_{it} = \mathbb{P}(y_{it} < \mathbb{E}(y_{it}|x_t)|x_t) \quad (4)$$

$$D_t = \mathbb{P}(x_t < \mathbb{E}(x_t)),$$

where $\mathbb{P}$ represents the probability measure. We measure the default frequency for loans of type i at time t with the corresponding default rate d_{it} , while the default frequency for all the loans at time t is measured by the aggregate default rate D_t . Expressions in (4) establish the equality between (conditional) probabilities that the latent factors are below their expected values and default rates as the sample analogs of these probabilities. Using the standard assumption of linear models that the error terms ε_{it} are independent and identically distributed random variables with mean zero and variance σ_ε^2 , orthogonal on x_t , it is easy to show that the quantity

$$y_{it} - \mathbb{E}(y_{it}|x_t) = u_i + v_i x_t + \varepsilon_{it} \quad (5)$$

is asymptotically normally distributed. This property implies that we can relate it to the data using

$$y_{it} = G(d_{it}), \quad (6)$$

where $G: [0, 1] \rightarrow \mathbb{R}$ is the inverse of a univariate normal distribution function. By analogy, we will use the same relationship for the aggregate default rates:

$$x_t = G(D_t). \quad (7)$$

Data

To illustrate the model, we will use aggregated anonymized data from the ASB on the number and the monetary value of loans in default status. The data are granulated by loan type, so there is a total of ten different types. The data frequency is quarterly and covers the period between the last quarter of 2012 and the last quarter of 2018. We define the default rate as the fraction of the total outstanding monetary amount of defaulted loans in the total outstanding amount of all extended loans. The rationale behind this choice is explained in more detail in some previous works (see, for example, Friedson, 1991 or Božović, 2019).

Table 1 shows the summary statistics for the data by loan type. The division of loans by types was performed following the one used in the ASB database. The last row of the table (marked “Total”) shows the data for all banks in the sample, i.e., data obtained based on aggregate default rates. We can easily see one regularity from the table: higher average default rates are paired with higher standard deviations of these rates. The intuition for this phenomenon is similar to that of market instruments, where a higher average rate of return is coupled with a higher risk measured by return volatility. Of course, this analogy should not be taken literally. The basic idea of the model we present in this paper relates to the principal source of the variations in default rates to the systemic component. This intuition can be seen in Figure 1, which illustrates the evolution of default rates having the second-lowest and the second-highest average values (housing loans and loans to medium and small enterprises, respectively), relative to the aggregate default rate.

Table 1: *Summary Statistics of Default Rates by Loan Type*

No.	Loan type	Mean	Standard deviation	Minimum	Maximum
1	Credit cards	2.54	0.74	1.61	4.02
2	Cash and consumer loans	2.93	0.65	2.07	4.10
3	Loans to entrepreneurs	3.39	1.24	1.45	5.91
4	Loans to large corporate entities	4.70	2.92	0.78	11.07
5	Loans to local governments	0.31	0.39	0.00	0.96
6	Mortgage loans	1.89	0.57	0.83	2.65
7	Overdrafts	2.18	0.61	1.61	3.57
8	Agricultural loans	2.13	0.57	1.47	3.16
9	Micro loans	8.46	6.54	1.21	20.30
10	Loans to small and medium enterprises	5.95	3.79	0.55	12.81
	Total	4.07	2.07	1.21	7.67

Source: Loan default database of ABS

Based on how the loan types are constructed, multiple individuals may appear in different loan default categories. For example, the same individual can contribute to defaults on credit cards, cash and consumer loans, or overdrafts. However, it is essential to give a few remarks at this point. First, the creditworthiness index is defined by equation (1) on the loan type level, not on the individual level. This approach follows the spirit of the International Financial Reporting Standard 9, which requires that the creditworthiness should be estimated by instrument rather than the borrower. Second, even if the creditworthiness was estimated on the borrower level instead of the instrument level, it is expected that such estimates exhibit significant variations across banks (Firestone & Rezende, 2016). Third, the author did not have any micro data on an individual- or bank-level to control for the relevant fixed effects. In any case, the database was used for model illustration only. The issue is not relevant for loans extended to companies since there is no overlap between borrowers across different loan types.

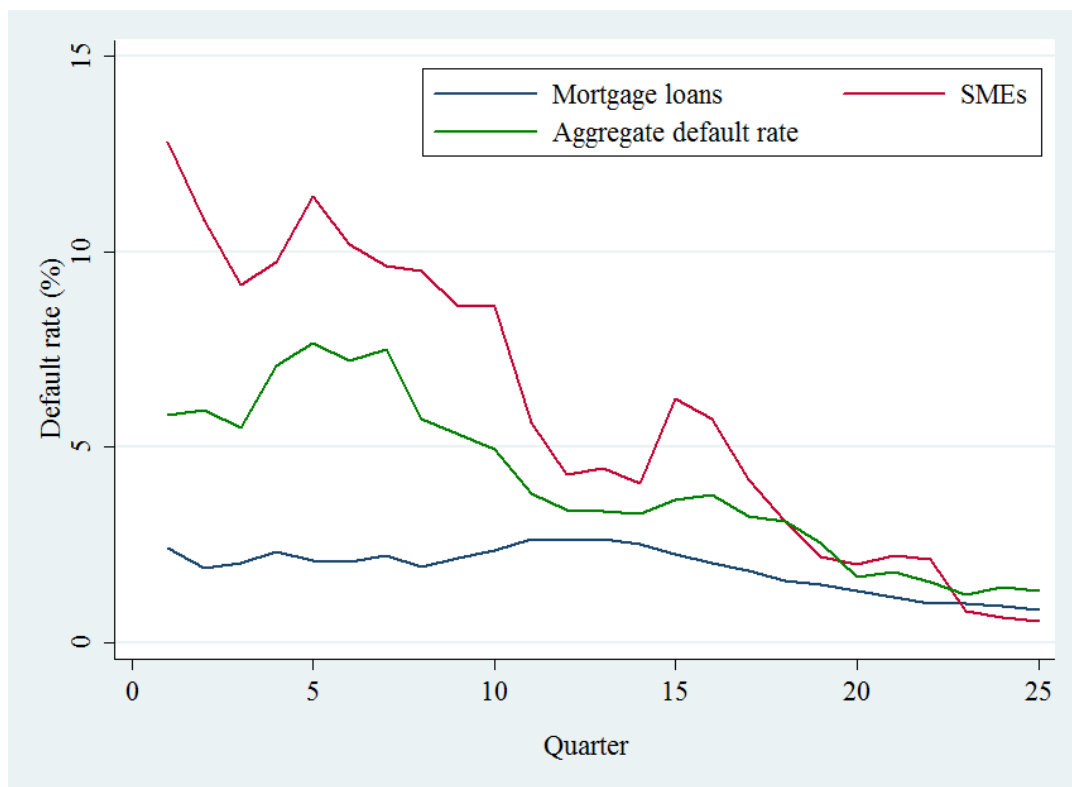


Figure 1: Evolution of Default Rates with the Second-Lowest and the Second-Highest Average, Compared to the Aggregate Default Rate

Source: Loan default database of ABS

Results

We will illustrate the model on the panel data described in the previous section. Before doing so, we will cast it in a more convenient form from the econometric point of view. Combining equations (1) and (2), we get:

$$y_{it} = \bar{\alpha} + \bar{\beta}x_t + u_i + v_ix_t + \varepsilon_{it}. \quad (8)$$

In this form, the model is equivalent to a single-level mixed-effects model. The level here refers to the loan type i . The model has a random intercept and slope. It takes into account the fixed effects common to all loan types (through $\bar{\beta}x_t$), loan type-specific random effects (through u_i), and the mixed effect of fixed and random effects (through v_ix_t). The values for y_{it} and x_t are calculated using equations (6) and (7).

The parameters of the model were estimated by the maximum likelihood method using the expectation-maximization (EM) algorithm.² The results are summarized in Table 2. We see that all parameters except the mean value of the intercept $\bar{\alpha}$ are significant at the 0.05 level. The regression model itself is highly significant, as we see from the relatively large value of Wald statistics. The estimates of the parameters of the correlation matrix of random effects (σ_u , σ_v and ρ), as well as the standard deviations of the error term (σ_ε) are also highly significant, as their confidence intervals are all on the same side of zero. The relatively high value of the correlation coefficient is not an issue, since the value $\rho = 1$ is outside the confidence interval. Thus, at a 95-percent confidence level, there is no perfect correlation between pure random effects, u_i , and their contribution to mixed effects, v_i .

The last row in Table 2 shows the likelihood ratio (LR) test results, which compares the mixed linear model with its restriction to the standard regression model without the influence of random effects ($u_i \equiv 0$ i $v_i \equiv 0$). The LR statistics are highly significant, especially when considering that it represents a conservative assessment in the EM approach (Gutierrez *et al.*, 2001; McLachlan & Basford, 1988; Self & Liang, 1987; Stram & Lee, 1994). We can easily verify this from Figure 2, which gives a visual representation of the dependence of the latent loan type-specific credit risk determinant y_{it} on the systemic factor x_t . The individual lines connect the points corresponding to the same types of loans. This visualization justifies the original intuition of using different slope coefficients β_i corresponding to the systemic component and the different intercepts α_i . The numerical labels in the figure correspond to the designations of loan types from Table 1.

² Dempster *et al.* (1977) were among the first to describe this algorithm formally. For a more recent presentation of the algorithm, see Gupta & Chen (2010).

Table 2: *Parameter Estimates in the Mixed-Effects Model*

Parameter	Value	St. error	p-value	95% confidence interval
$\bar{\alpha}$	-0.673	0.344	0.051	[-1.348, 0.002]
$\bar{\beta}$	0.722	0.152	0.000	[0.425, 1.019]
Wald (χ^2_1)	22.67		0.000	
σ_u	1.046	0.254		[0.650, 1.684]
σ_v	0.449	0.114		[0.273, 0.738]
ρ	0.962	0.027		[0.849, 0.991]
σ_ε	0.208	0.010		[0.190, 0.229]
LR (χ^2_3)	243.27		0.000	

Source: Author's calculations

In Figure 2, all values of the dependent variable y_{it} are negative, which is a consequence of the definition given by equation (6) and corresponds to the left tail of the normal distribution function. Namely, all default rates take the values between 0 and 20.3 percent (Table 1). Thus, the corresponding values of the latent variable y_{it} will all be below $G(0.203) = -0.83$. Similarly, the independent variable x_t is related to the aggregate default rate through equation (7). This rate takes values in the interval between 1.21 and 7.67 percent, implying that the corresponding values of x_t will be between -2.25 and -1.43.

Based on the estimates of the model parameters from Table 2 and equation (8), we can derive the regressional prediction of the expected values of the dependent variable:

$$\hat{y}_{it} \equiv \mathbb{E}(y_{it}|x_t) = \hat{\alpha} + \hat{\beta}x_t + \hat{u}_i + \hat{v}_ix_t, \quad (9)$$

where $\hat{\alpha}$ and $\hat{\beta}$ represent the point estimates for $\bar{\alpha}$ and $\bar{\beta}$ in Table 2, while $\hat{u}_i$ and $\hat{v}_i$ are the regressional predictions of random effects for each loan type. From equations (9) and (6), we can estimate the default rates implied by the mixed-effects model as:

$$\hat{d}_{it} = \Phi(\hat{y}_{it}), \quad (10)$$

where $\Phi: \mathbb{R} \rightarrow [0, 1]$ is the univariate normal distribution function.

Figure 3 compares actual and model-implied time-averaged default rates. Each blue circle has a coordinate $(\bar{\hat{d}}_i, \bar{d}_i)$, where the bar indicates averaging over the time dimension for each loan type i . In other words, the independent variable $\bar{\hat{d}}_i$ in Figure 3 is a time-averaged default rate for each loan type i , obtained by averaging the model-implied values from equation (10). The dependent variable $\bar{d}_i$ represents the actual average default rate by loan type and corresponds to the column labeled 'Mean'

in Table 1. These actual average values range between 0.31 and 8.46 percent. The red line in Figure 3 represents a simple linear fit and is given only to facilitate visualization. It is easy to see that the model describes the variations in average default rates by loan type quite well.

Figure 3 compares actual and model-implied time-averaged default rates. Each blue circle has a coordinate $(\bar{x}_t, \bar{y}_{it})$, where the bar indicates averaging over the time dimension for each loan type i . In other words, the independent variable $\bar{x}_t$ in Figure 3 is a time-averaged default rate for each loan type i , obtained by averaging the model-implied values from equation (10). The dependent variable $\bar{y}_{it}$ represents the actual average default rate by loan type and corresponds to the column labeled 'Mean' in Table 1. These actual average values range between 0.31 and 8.46 percent. The red line in Figure 3 represents a simple linear fit and is given only to facilitate visualization. It is easy to see that the model describes the variations in average default rates by loan type quite well.

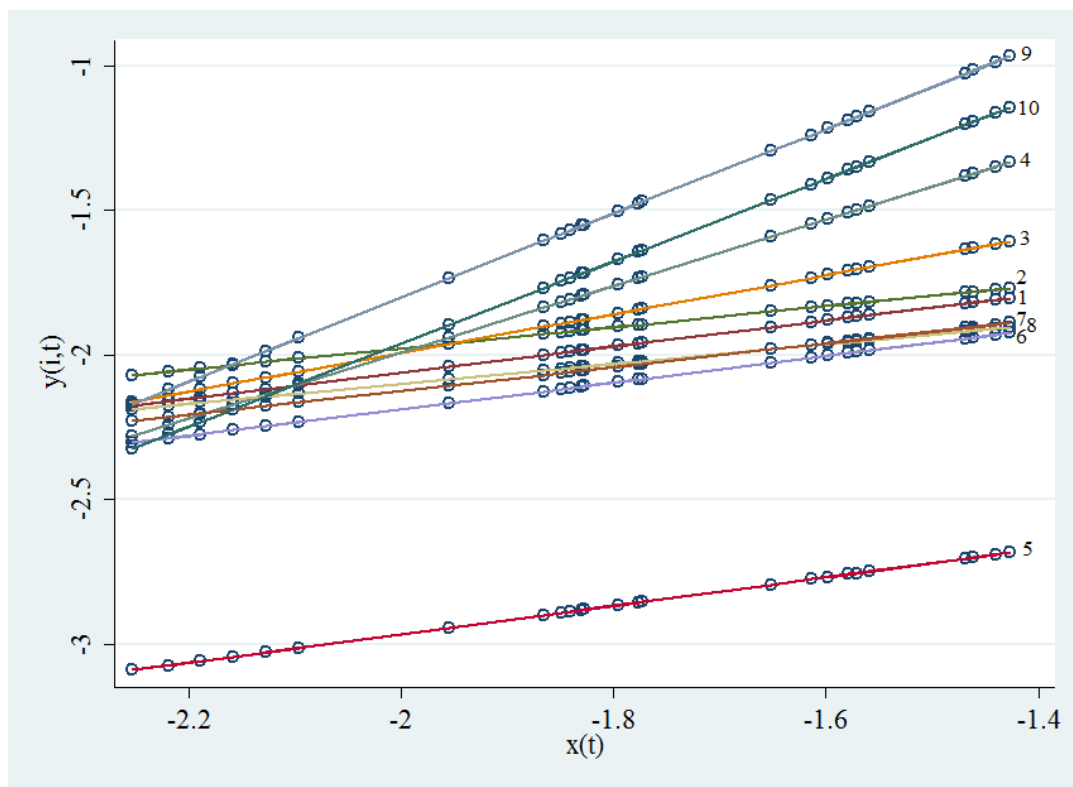


Figure 2: Dependence Between the Latent Credit Risk Determinant y_{it} and the Systemic Factor x_t . Numerical labels correspond to the loan types from Table 1

Source: Author's calculations

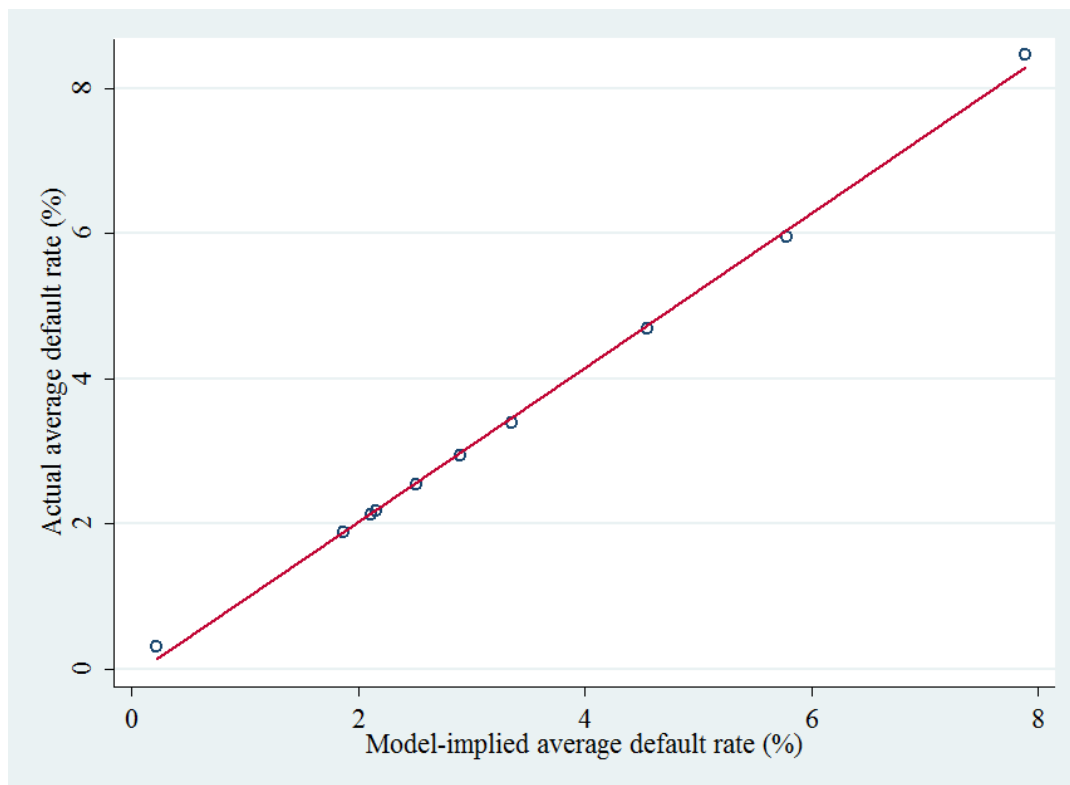


Figure 3: Actual vs. Model-Implied Average Default Rates for Ten Loan Types

Source: Author's calculations

Conclusion

The paper proposes a relatively simple and practically applicable model for separating risk determinants in commercial banks' loan portfolios into components. The model represents a linear relationship between the latent determinant of the credit risk of an individual portfolio segment and the systemic factor. These determinants are, in turn, related to the default rates within each segment and the aggregate default rate of all loans extended. Variations in the influence of the systemic component on individual segments are reduced to variations in the coefficients associated with the systemic factor. The role of the idiosyncratic component is played by the intercept that also varies by segments.

The model is illustrated on the data of the Association of Serbian Banks on defaulted loans. We used a panel of ten portfolio segments, organized based on loan types, between the fourth quarter of 2012 and the fourth quarter of 2018. The model shows high explanatory power for data within the sample. The obtained results indicate that the proposed decomposition well describes the dynamics of default rates by loan type and the differences in average default rates by loan type.

An algebraic transformation relates the aggregate default rate to a unique factor, representing fixed effects common to all segments in a mixed-effects model. Therefore, it plays the role of a unique systemic component that mimics the influences of real macroeconomic risk factors, rather than requiring explicit modeling of this relationship. This feature has potentially great practical significance, especially in insufficiently long time series where it is difficult to establish a robust statistical relationship. The model also allows any forward-looking approach to be reduced to modeling the dynamics of only one— aggregate—default rate instead of modeling the rates for each segment individually. Along with the simplicity of the approach, this makes the main contribution of this paper.

It is important to note that the model was tested only within the sample due to limitations in the number of available data and variations across both panel dimensions. It would undoubtedly be both interesting and necessary to verify its performance out of the sample. For example, with additional available data on aggregate default rates (or their projections obtained by some independent method), it is possible to compare projected and realized default rates by loan type. It would also be interesting to use the data at the individual loan level and check whether we can identify an additional factor that would describe the specific behavior of individual debtors. The mixed-effects model is precisely suitable for this analysis because it allows additional layers of division into “nested” subcategories. This extension would draw a good parallel with the literature strand that suggests a separation of credit risk into systemic, sectoral, and “real” idiosyncratic components.

Acknowledgment

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ODRŽIVO FINANSIRANJE – EVOLUCIJA ILI REVOLUCIJA U BANKARSKOM SEKTORU

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Rezime

Održivi razvoj postao je dominantna paradigma u planovima i aktivnostima javnog i privatnog sektora. Nekoliko strateških programa kao što su Evropski zeleni dogovor, Agenda 2030 za održivi razvoj i ciljevi održivog razvoja, klimatske akcije itd., u svojoj osnovi imaju ambiciozan paket mera koji se kreće od smanjenja emisija gasova sa efektom staklene bašte, preko ulaganja u pojedine projekte do poboljšanja opšteg blagostanja ekonomija i društava. Zbog nedostatka sredstava, raste interesovanje za finansiranje privatnog sektora, posebno održivo finansiranje, i njegovu ulogu i doprinos pomenutim globalnim ciljevima. Cilj istraživanja je da se analiziraju napredak i faktori za uspostavljanje okvira za održivo finansiranje na nivou EU i na međunarodnom nivou. Rad će nastojati da identifikuje pravac i kanale njegovog potencijalnog uticaja na bankarski sektor, kao i način na koji se ova nova kultura razvija u bankarskom sektoru. Rad će posebno pokušati da identifikuje da li je bankarski sektor proaktivan ili reaktivan, analizirajući inicijative i projekte na međunarodnom, evropskom i lokalnom nivou koji su se razvijali tokom protekle dve decenije i na bazi toga, dati ocenu o tome da koncept održivosti i održivog finansiranja predstavlja evoluciju (nadgradnja postojeće kulture i prakse) ili revoluciju (nova paradigma) u bankarskom sektoru.

Ključne reči: Održivi razvoj, održivo finansiranje, ciljevi održivog razvoja, zelene eko obveznice, Pariski sporazum

JEL klasifikacija: G21, G32, K32, O3, Q56.

Uvod

Usvajanjem dve globalne inicijative, vlade širom sveta odabrale su održiviji put za društveno-ekonomski razvoj. Prvu predstavlja Pariski sporazum o klimatskim promenama kao ugovor koji je 2015. godine potpisalo 195 država sa ciljem ostvarenja globalne rezistentnosti na klimatske promene. Drugu inicijativu predstavlja Agenda za održivi razvoj do 2030. godine, koju su Ujedinjene nacije (UN) usvojile u 2015. godini (poznata kao Agenda 2030). Agenda 2030 zasniva se na 17 ciljeva održivog razvoja (SDG), koje treba postići u narednih 15 godina, kao faktorima koji podstiču takvo okruženje u društvu i ekonomiji koje bi trebalo da omogući prosperitet, blagostanje, rezistentnost, zdravlje i pravednost za sve.

Održivost i tranzicija ka niskokarbonskom društvu i ekonomiji uvršteni su u raznim strateškim dokumentima i utemeljeni u osnove ekonomije EU. Shodno tome, sadašnji angažman Evropske komisije u domenu održivosti i održivog finansiranja može se posmatrati kao evolucija vizije koja je postavljena u Ugovoru o osnivanju EU. Jedan od strateški važnih aktivnosti u tom smislu je dokument „Ka održivoj Evropi do 2030. godine“ koji je pokrenuo platformu sa više zainteresovanih strana za razmenu najboljih praksi u vezi sa ciljevima održivog razvoja. Izazovi sprovođenja tih ciljeva su prisutni i poznati, kao što su izvori finansiranja za njihovo ispunjavanje. Tu privatno finansiranje može igrati važnu ulogu i pozvano je da preuzme važnu ulogu. Bankarski sektor, kao dominantni sektor, postaje sve više i više integrisan u operativne programe ovih globalnih ciljeva, kao relevantna zainteresovana strana koja može pružiti potrebna finansijska sredstva i srodne usluge. Štaviše, uticaj je reverzibilan - Agenda održivog razvoja se sve više integriše u način na koji bankarstvo posluje, pružajući mu dodatnu vrednost, ali takođe pokrećući njegove strukturne promene i transformaciju u bliskoj budućnosti. Raznolikost alata za procenu koji su u vezi sa održivošću sve je više dostupna i u istraživanjima i praksi - istraživanje, ocene, analiza scenarija, kriterijumi o uticaju na ekologiju, društvo i upravljanje (ESG), lista skrininga itd.

Značaj privatnog finansiranja za ekonomiju takođe je formulisan u paradigmi pod nazivom Finansiranje rasta, gde su Bankarska unija i Unija tržišta kapitala važni strateški projekti EU čiji je cilj osiguranje pune integracije finansijskih tržišta, snažnog kreditnog potencijala i dejstva efekata multiplikatora.

Cilj istraživanja je analizirati napredak postignut u uspostavljanju okvira za održivo finansiranje na nivou EU i na međunarodnom nivou, i podržati dalju debatu o potrebi proširivanja daljih aktivnosti održivog finansiranja, kao što su: podizanje svesti o složenosti održivog finansiranja, značaju aktivnog angažovanja učesnika na tržištu i njihovom međusobnom partnerstvu u njegovom daljem razvoju, kao i edukaciji šire javnosti i tržišnih učesnika o konceptu održivog finansiranja. U poređenju sa dobrovoljnom praksom koja već postoji tokom nekoliko decenija, uglavnom u oblasti korporativne društvene odgovornosti, svest o održivosti i održivom finansiranju je tokom vremena rasla i postala predmet regulative i supervizije. Propisi se donose veoma ubrzano, posebno u okviru EU. To sve ima pozitivan uticaj na finansiranje održivog rasta, koje se može posmatrati iz dva ugla:

- A) Regulatorna formalno uvodi potpuno novu paradigmu u finansijski sektor, uzrokujući njegovu sopstvenu transformaciju, i shodno tome, održivo finansiranje se može posmatrati kao *revolucija*.
- B) Prvenstveno se radi o daljem razvoju postojećeg koncepta, kulture i prakse koja već postoji u finansijskom sektoru – stoga, održivo finansiranje možemo posmatrati kao *evoluciju*.

U ovom radu, mi zastupamo stanovište da regulatorna, iako uvodi novine, obavezne principe i iznad svega – revoluciju u određenim segmentima privatnog finansiranja (npr. posebno kod principa finan-

siranja u komercijalnom bankarstvu), ona zapravo predstavlja revoluciju samo u određenom stepenu: transformišući praksu i principe iz dobrovoljne osnove u formalnu obaveznost, odnosno, podržavajući dalji razvoj *već postojećih* koncepata održivosti i kulture održivog razvoja u finansijskom sektoru. Analizirajući i poredeći različite inicijative, platforme i dobru praksu na MEĐUNARODNOM, evropskom i nacionalnom nivou koja je evoluirala u finansijskom sektoru tokom prošle dve decenije, namećemo da testiramo Hipotezu H0: koncept održivog finansiranja će radije transformisati i unaprediti postojeću kulturu održivosti od dobrovoljne ka obaveznoj praksi, ponašanju i novom pravilu nego što će uneti potpuno novi koncept.

Praksa bankarskog sektora u vezi sa održivim razvojem – put ka održivom finansiranju

Održivi razvoj je koncept koji je, tokom nekoliko decenija, opisivao na različite načine. Jedan od najčešće korišćenih načina njenog predstavljanja je definicija iz dokumenta „Naša zajednička budućnost“ (poznatog i kao Brundtlandov izveštaj): „Održivi razvoj je razvoj koji zadovoljava potrebe sadašnjosti bez ugrožavanja sposobnosti budućih generacija da zadovolje svoje potrebe“ (Ujedinjene nacije, 1987). Održivost je već dugo prisutna u temeljima bankarskog sektora. On pokriva društvene i ekološke aspekte, pa je stoga blisko povezan sa aktivnostima društveno odgovornog poslovanja (CSR).

Skoro dve decenije, održivost kao kultura prisutna je u finansijskom sektoru kroz različite projekte. Većina njih je na dobrovoljnoj osnovi proistekla iz koncepta korporativne društvene odgovornosti koji je akcenat stavio na doprinos višim društvenim ili javnim ciljevima. Ova praksa i ponašanje izazvali su dalju pojavu standardizovanih pristupa na globalnom nivou (izveštavanje) i zajedničkih principa (npr. Principi odgovornog ulaganja, Principi odgovornog bankarstva). Tokom vremena, CSR se razvijao i približavao se opštim pozivima međunarodnih foruma i platformi da privatni sektor treba da podržava rast, zapošljavanje i razvojne ciljeve. Početkom XXI veka, najbolja međunarodna praksa i trendovi u CSR-u i održivim finansijama pokazali su da vodeće finansijske institucije rade na nekoliko važnih segmenata uvođenja CSR kulture u uobičajeno poslovanje: postavljanjem sistema upravljanja i upravljanja kako bi CSR ugradili u svoje operacije, izveštavanje o učinku CSR-a, razvoj niza proizvoda CSR-a koji integrišu društvena i ekološka pitanja, integrisanje CSR-a u njihove sisteme upravljanja rizikom, razvoj metodologija za procenu njihovih ulaganja na osnovu kriterijuma CSR-a, i na kraju, razvoj strateških politika, inovacija i CSR programa¹ (Strandberg, 2005). U ovom delu analize želeli bismo da otkrijemo neke primere dobre prakse i ponašanja koje su pokrenule različite finansijske institucije u poslednje dve decenije, odnosno pre 2018. godine kada je Evropska komisija objavila Akcioni plan za održivi rast. Neki stariji, ali i neki noviji primeri dobre prakse u održivom finansiranju biće obelodanjeni kao inicijative, projekti, principi, finansijski instrumenti itd.

- a. Rabobank grupa koja osigurava rizični kapital, hipotekarno finansiranje, nekretnine, osiguranje, upravljanje imovinom i investicije i lizing, 1998. godine uspostavila je strategiju korporativne grupe za održivi razvoj. Godine 1999. uključila je održivost u svoju izjavu o misiji i kodeks ponašanja, a 2000. godine je za svoje osoblje sprovela obuku o održivosti. Takođe je razvila mnoge proizvode održivog finansiranja, kao što je Environmental Commoditi linija 2003. godi-

¹ Međunarodna studija „Best Practices in Sustainable Finance“ je sprovedena sa ciljem analiziranja najbolje međunarodne prakse, standarda, inovacija i trendova u CSR ili održivom finansiranju. Grupa od 10 finansijskih institucija iz Kanade je podržala studiju, sa obuhvatom od 21 finansijske institucije iz sektora bankarstva, osiguranja i upravljanja fondovima, kao i 10 međunarodnih standarda, principa i vodiča.

ne, kada je Rabobank Group stekla 50% udela u novoj platformi za elektronsko trgovanje Nove vrednosti: učesnici na tržištu mogu da trguju novim papirima o kojima se može pregovarati ili „robom iz životne sredine“, na 3 portala trgovanja (Strandberg, 2005, 22).

- b. 2003. godine, ABN AMRO kao najveća holandska banka uveo je politiku održivosti na nivou Grupe, organizujući posvećeno odeljenje za održivi razvoj, smešteno u Grupi za upravljanje rizikom (centar znanja) koje nadgleda razvoj strategije Grupe o održivom razvoju, izveštavanju o održivosti, angažovanju zainteresovanih strana, razvijanju unutrašnjeg razumevanja i podršci poslovnim jedinicama u razvoju održivih finansijskih proizvoda. Pored različitih principa koji su razvijeni kako bi se zadovoljile potrebe zainteresovanih strana, neki od proizvoda održivog finansiranja koji su razvijeni su: ABN AMRO Real Microcredito, jedinica u Brazilu specijalizovana za kredite malim formalnim i neformalnim kompanijama koje imaju problema sa pristupom tradicionalnom finansiranju; bankovne obveznice sa fiksnom kamatom i fiksnom kamatnom stopom za ekološki prihvatljive projekte u kojima su zajmovi strukturirani po kamatnim stopama ispod tržišnih, budući da investitori imaju koristi od oslobađanja od poreza na svoja zelena ulaganja. Glavni primaoci zelenih zajmova su projekti u održivoj poljoprivredi, staklenicima zelenih etiketa, očuvanju prirode i održivoj energiji (Strandberg, 2005., str. 14).
- c. Godine 2003, Triodos banka, kao javna banka i jedna od najvećih etičkih banaka u Evropi, odobrila je preko 3.000 kredita projektima društvenog, ekološkog i kulturnog sektora: projekti u prirodi i životnoj sredini (32%), socijalni (20%), kultura (45%) i tzv. Projekti Sever-Jug za mikrofinansijske institucije u zemljama u razvoju (3%). Tokom iste godine, neto dobit kompanije Triodos nakon oporezivanja porasla je za 14% na 3,0 miliona EUR, a odnos efikasnosti dostigao je 77% sa ROE od 3%. Neki od proizvoda održivog finansiranja u 2003. godini bili su, na primer: osnivanje holandskog Instituta za istraživanje održivosti, koji generiše podatke o socijalnoj i ekološkoj politici više od 2.000 kompanija kotiranih širom sveta, Triodos Climate Clearing House (stvoren je platforma za trgovanje kreditima za CO2 putem projekata održivog šumarstva i obnovljive energije), sponzorstva emisije obveznica itd.
- d. Evropska investiciona banka je 2007. godine izdala prvu zelenu obveznicu.
- e. Nedbank iz Južne Afrike implementira inovacije za održivi rast i finansiranje zelene ekonomije. U 2011. god. Nedbank korporativno i investiciono bankarstvo je kreiralo Prvi zeleni indeks Južne Afrike, kao merilo za investitore posvećene zelenim projektima.

Danas nalazimo mnogo primera dobre prakse u finansijskom sektoru (pored platformi, inicijativa, propisa i projekata javnog sektora na međunarodnom nivou).

Prvo, regulatori i supervizori stavljaju održivo finansiranje u svoje planove i prioritete. Mreža centralnih banaka i supervizora za ozelenjavanje finansijskog sistema (NGFS) pokrenuta je 2017. godine, kao mreža koja ima za cilj, na dobrovoljnoj osnovi, razmenu najboljih praksi u razvoju programa zelenih reformi. Banka za međunarodna poravnanja, Basel, izdala je svoj prvi BIS fond zelenih obveznica denominovan u američkim dolarima u septembru 2019. godine, kao i drugi, denominovan u EUR, otvoreni fond za ulaganja u zelene obveznice u januaru 2021. god. Zajedno, ova dva fonda upravljaće iznosom od više od 2 milijarde USD centralnih banaka i zvaničnih institucija.

Drugo, predstavnici bankarske industrije - nacionalna bankarska udruženja prepoznaju održivo finansiranje kao svoju važnu aktivnost. Na primer, Udruženje banaka Turske objavilo je 2014. godine svoje „Smernice o održivosti za bankarski sektor“, kako bi se bavili ESG kriterijumima u bankarskim i finansijskim uslugama. U martu 2021. godine ovaj dokument je uveliko proširen kako bi se uvelo 10

osnovnih principa za finansiranje održivosti kroz: procenu i upravljanje ekološkim i društvenim rizicima koji proizilaze iz bankarskih aktivnosti, doprinos ciljevima održivog razvoja, borbu protiv i prilagođavanje klimatskim promenama, finansijsko zdravlje i sveobuhvatnost, ljudska prava i prava radnika, sveobuhvatnost i jednakost mogućnosti, učešće i komunikaciju akcionara, korporativno upravljanje, izgradnju korporativnih kapaciteta, praćenje i izveštavanje (Udruženje banaka Turske, 2021). Takođe, Špansko udruženje banaka formalizovalo je održivo finansiranje u svoju organizaciju uspostavljanjem odeljenja i direktora za strategiju i održivost (Špansko udruženje banaka, 2021). Još jedan primer inicijative bankarske industrije je Memorandum o održivim finansijama i stvaranje Komisije za održivost (2021), čiji je cilj stvaranje načina za doprinose banaka održivom razvoju Češke Republike.

Treće, inovacije na tržištima kapitala su veoma dinamične. Osim širenja korporativnog tržišta zelenih obveznica, raste i tržište zelenih državnih obveznica: nakon Holandije i Švedske, Nemačka je postala treća zemlja koja je izdala zelene državne obveznice 2021. Osim toga, razne inovacije na finansijskim tržištima su u pripremi, kao što je uvođenje Green Tween Bond obveznica i razvoj krive zelenog prinosa (na nemačkom tržištu). Green Tween Bond je koncept gde se zelena obveznica izdaje sa istim rokom dospeća kao konvencionalna obveznica, ali kao zasebna obveznica sa manjim obimom emisije od konvencionalne obveznice, kako bi se osiguralo da izdavanje zelenih obveznica ne utiče negativno na ukupnu likvidnost u državnim obveznicama države i da pomogne investitorima u razlikovanju zelenih ulaganja. Takođe, međunarodna tržišta kapitala beleže sve veći broj investicionih fondova specijalizovanih za ulaganje ESG-a i proširenje granica za ulaganje u projekte sa visokom komponentom uticaja ESG -a.

Efekti i obim uticaja CSR-a su pozitivni i dalekosežni, u zavisnosti od prirode aktivnosti korporacije, industrije kojoj ta delatnost pripada, kao i od specifičnosti okruženja u kojem posluje (Sredojević, 2006, str. 10). Osim toga, evolucija koncepta održivosti vremenom je donela dodatne funkcije, poput izveštavanja (u skladu s određenim dogovorenim standardima). Ovde vredi napomenuti da Globalna inicijativa za izveštavanje (GRI), kao globalna dobrovoljna platforma koja proizvodi skup standarda kao globalni zajednički jezik za izveštavanje organizacija o svojim uticajima, daje pozitivan uticaj na dalju implementaciju ESG -a i izveštavanje.

Održivo finansiranje - literatura

Kao rezultat postepene evolucije koncepta održivosti u finansijskom sektoru, danas smo došli do faze u kojoj se nova paradigma - održivo finansiranje - brzo pojavila i mogla bi postati glavni tok u sektoru finansijskih usluga. Održivo finansiranje povezano je sa razmatranjem faktora ESG-a u procesu finansiranja, odnosno tokom (investicionog) procesa odlučivanja u finansijskom sektoru, što će na kraju dovesti do višeg nivoa dugoročnih ulaganja u održive ekonomske aktivnosti i projekte (Evropska Komisija, 2018., str. 2). ESG faktori se odnose na: E - faktore životne sredine kao što su klimatske promene, smanjenje emisije CO₂ i ukupno zagađenje, zaštita biodiverziteta i kružna ekonomija; S - socijalni faktori povezani sa polom i drugim pitanjima jednakosti, radnih prava, razvoja ljudskih resursa, ljudskih prava itd; i G - faktori upravljanja koji se odnose na institucije upravljanja u javnom i privatnom sektoru, principe upravljanja, odnose sa zaposlenima, pitanja nagrađivanja itd.

Prema grupi autora, održivo finansiranje znači „Kombinaciju finansijske efikasnosti i stabilnosti sa društvenom posvećenošću, zaštitom životne sredine i odgovornim upravljanjem. To uključuje i zeleno finansiranje (ili zeleno bankarstvo), odnosno ulaganja usmerena na zaštitu prirodnog okruženja, posebno ulaganje u projekte s niskim učešćem ugljenika čiji je cilj ograničiti porast prosečnih glo-

balnih temperatura na granicu od 2C" (Ziolo et al, 2019, 58). Kao što Jeucken definiše u svojoj knjizi o održivim finansijama i bankarstvu, održive finansije su „koncept koji se odnosi na finansijske usluge usmerene na kombinovanje ekoloških, socijalnih i upravljačkih aspekata poslovnog odlučivanja u smislu dugoročnih efekata“, naglašavajući koliko je bankarski sektor od vitalnog značaja za napredak (Jeucken, 2001). Prema Sollovu, održivost se odnosi na pravičnost u distribuciji između sadašnjih i budućih generacija, odnosno problem štednje i ulaganja. Stoga, „postoji sukob između sadašnjosti i budućnosti i zahteva za zadovoljavanjem potreba“ (Sollov, 1992, 187). Neki autori smatraju povećanje održivih investicija ključnim pokretačem održivosti: „Održiva ulaganja uključuju etička i zelena ulaganja ... Ako kompanije posluju prema održivosti i društveno odgovornom poslovanju, finansijska tržišta su društveno odgovorna. [Stoga] kompanije treba da integrišu pitanja ESG-a u proces donošenja odluka kako bi postigle održivost“ (Jednak i Jednak, 2019, 112).

Održivo finansiranje se takođe može posmatrati kroz široki spektar aktivnosti: od digitalizacije aktivnosti banaka, smanjenja nivoa ugljenika u njihovim svakodnevnim aktivnostima, do ponude održivih finansijskih proizvoda (npr. Penzijska štednja, zelene obveznice). Održivo finansiranje se takođe može smatrati i političkom rukom paradigme finansiranja rasta, kao deo doprinosa tržišta kapitala naporima javnog sektora, kanalisanjem privatnih investicija na način koji bi uzeo u obzir ekološka, socijalna i pitanja upravljanja.

Faktori okruženja na međunarodnom nivou koje pogoduju održivom finansiranju

Razvoj različitih faktora koji omogućavaju okruženje za održivo finansiranje i njihovih nosilaca (učesnika) je vrlo dinamičan. Ovi faktori se mogu posmatrati kao različite inicijative, principi, zakoni, strategije finansijskih institucija i institucionalizovani kroz različite oblike (tehničke grupe, ekspertske grupe, platforme, mreže itd.). Oni istovremeno predstavljaju kanale uticaja na dalji razvoj održivih finansija. U ovom odeljku biće predstavljeno i opisano nekoliko velikih globalnih inicijativa i faktora koji se međusobno podržavaju u daljem poboljšanju povoljnog okruženja za održivo finansiranje na osnovu javno dostupnih izvora informacija.

Inicijative međunarodnih organizacija

Mnoge međunarodne organizacije postavile su platforme i agende koje podržavaju održivi razvoj. Oni uključuju, ali nisu ograničene na: Ujedinjene nacije, Međunarodnu finansijsku korporaciju.

Razvojna agenda Ujedinjenih nacija

Ujedinjene nacije su pokrenule agendu razvojnih ciljeva uvođenjem Milenijumskih razvojnih ciljeva, a kasnije i Agende ciljeva održivog razvoja. Milenijumski razvojni ciljevi (MRC) su usvojeni nakon Milenijumskog samita Ujedinjenih nacija 2000. godine, kroz osam međunarodnih razvojnih ciljeva koje treba postići do 2015. godine, a koji pokrivaju pitanja smanjenja ekstremnog siromaštva, pružanja osnovnog obrazovanja itd. 17 ciljeva održivog razvoja (SDGs) koje su uvele i usvojile sve države

članice Ujedinjenih nacija 2015. godine, kao novu Agendu za održivi razvoj do 2030. godine. Osim ovih centralnih platformi održivog razvoja, mnoge agencije UN-a takođe su imale važnu ulogu u daljoj razradi istog programa pokretanjem novih globalnih platformi i pozivima na akciju uz promociju uloge i aktivnosti UN -a.

Finansijska inicijativa Programa Ujedinjenih nacija za životnu sredinu (UNEP FI)

Finansijska inicijativa Programa Ujedinjenih nacija za životnu sredinu (UNEPFI) predstavlja partnerstvo između UNEP-a i finansijskog sektora sa ciljem angažovanja finansija privatnog sektora za ciljeve održivog razvoja. Mreža partnerstva je raznolika i ima više od 300 članova (poput banaka, investitora i osiguravajućih kompanija) i više od 100 institucija koje podržavaju ovu mrežu. Sa organizacione tačke gledišta, UNEPFI ima globalnu pokrivenost i sedište mu je u Ženevi u Švajcarskoj kao jedinica Odeljenja za resurse i tržište UN-a za životnu sredinu, koja je deo Ekonomskog odeljenja (jednog od osam osnovnih odeljenja UN-a za životnu sredinu). Zajedno sa drugim zainteresovanim stranama, UNEP FI je pokrenuo skup principa usmerenih na postizanje odgovornosti i održivosti u sektoru finansiranja, kao što su ulaganje, bankarstvo i oblast osiguranja. Bankarski sektor je, pored doprinosa ovoj platformi, i aktivni promoter vrednosti utvrđenih u agendi SDG-a, sa fokusom na klimatski neutralno i finansiranje zelene ekonomije.

Globalni dogovor UN

Globalni dogovor UN predstavlja još jednu platformu na kojoj globalne poslovne zajednice dobrovoljno deluju i sprovode univerzalne ciljeve, principe i druge održive ciljeve UN. Integracijom kompanija, civilnog sektora i javnih subjekata, Globalni dogovor UN -a zajedno sa svojim akterima radi na različitim inicijativama postizujući složene ciljeve u okviru različitih ciljeva održivog razvoja. Bankarski sektor se intenzivno angažuje kroz članstvo pojedinačnih banaka, bankarskih udruženja i centralnih banaka.

Mreža održivog bankarstva Međunarodne finansijske korporacije

Osim agende UN -a i njegovih agencija, postoje i druge izuzetne globalne inicijative međunarodnih finansijskih institucija usmerene na povezivanje finansijskog sektora sa agendom održivog razvoja. Jedna od njih je Mreža održivog bankarstva Međunarodne finansijske korporacije (IFC SBN, deo Grupe Svetske banke), kao platforme za finansijski sektor iz zemalja u razvoju posvećene poboljšanju prakse održivog finansiranja. Mreža održivog bankarstva pokrenuta je u septembru 2012. godine, u Peking u maju 2012. godine, tokom prvog Međunarodnog foruma zelenih kredita koji su organizovali IFC i Kineska regulatorna komisija za bankarstvo, sa ciljem da katalizuje globalnu mrežu održivih finansija. Nadzorna i regulatorna tela, zajedno sa predstavnicima industrije, poput bankarskih udruženja, aktivni su članovi mreže koja povezuje više od 40 zemalja. Mreža održivog bankarstva danas ima 61 instituciju iz 43 zemlje koje predstavljaju 43 biliona dolara (86 odsto) ukupne bankarske imovine na tržištima u razvoju, koje stoga mogu odigrati značajnu ulogu u daljoj zelenoj transformaciji njihovih nacionalnih ekonomija i implementaciji ciljeva održivog razvoja (Sustainable Banking Network, 2020).

Principi

Principi odgovornog ulaganja

Principi odgovornog ulaganja PRI je inicijativa zajednice investitora (menadžeri imovine) koja je razvijena zajedno sa UNEPFI -om i Globalnim dogovorom UN-a. PRI je predstavio važnost odgovornog ulaganja i naveo ga kao strategiju koja bi, kroz principe, trebala poboljšati postojeću praksu za uključivanje ekoloških, društvenih i upravljačkih faktora (ESG) u odluke o ulaganju. Pojava „Principa za odgovorno ulaganje“ koje je stvorila međunarodna mreža institucionalnih investitora, a podržao ih je generalni sekretar UN-a, doprinela je rastućem značaju pitanja zaštite životne sredine, socijalnog i korporativnog upravljanja za investicione prakse. Oni su sledeći:

Princip 1 obavezuje investitore da „uključuje pitanja ESG-a u analizu ulaganja i procese donošenja odluka“ (UNPRI, 2020).

Princip 2 obavezuje investitore da budu „aktivni vlasnici i uključuje pitanja ESG -a“ u svoju politiku i praksu vlasništva (UNPRI, 2020).

Načelo 3 obavezuje investitore da „traže odgovarajuće obelodanjivanje pitanja ESG -a od subjekata“ u koje ulažu (UNPRI, 2020).

Princip 4 obavezuje investitore da „promovišu prihvatanje i primenu principa u okviru investicione industrije“ (UNPRI, 2020).

Princip 5 obavezuje investitore da rade zajedno na poboljšanju sopstvene efikasnosti u primeni principa (UNPRI, 2020).

Princip 6 obavezuje investitore da izveštavaju o svojim aktivnostima i napretku u primeni principa (UNPRI, 2020).

Sve principe prati niz različitih radnji. Korporativno liderstvo je sve više odgovorno za performanse ESG -a svojih kompanija, čime se obavezuje da će u proces ulaganja uključiti faktore održivosti.

Do kraja 2019. godine, više od 2.500 investitora (što čini više od 80 triliona američkih dolara sredstava) potpisalo je principe UN -a za odgovorno ulaganje.

Principi UN za odgovorno bankarstvo

Principi odgovornog bankarstva (Principles for Responsible Banking - PRB) je platforma koju su 22. septembra 2019. god. pokrenule Ujedinjene nacije i grupa od 130 banaka iz 49 zemalja sa ciljem da „obezbede međunarodni okvir za održivi bankarski sistem i omoguće potpisnicama da demonstriraju svoju posvećenost postizanju ciljeva izraženih u Ciljevima održivog razvoja UN (SDGs) i Pariskom sporazumu o klimi“ (UNPRI, 2020). U poređenju sa UN PRI, kao inicijativom investitora, UN PRB se može smatrati odgovorom bankarske industrije. Prema UNPRI -u, PRB obavezuje potpisnike da usklade svoju poslovnu strategiju i politiku sa ciljevima održivog razvoja i Pariskim sporazumom o klimi (UNPRI, 2020). Principi odgovornog bankarstva su:

Princip 1 odnosi se na usklađivanje - on obavezuje banke da usklade svoje ciljeve „kako bi bile dosledne i doprinele potrebama pojedinaca i ciljevima društva, kao što je izraženo u Ciljevima održivog razvoja, Pariškom klimatskom sporazumu i relevantnim nacionalnim i regionalnim okvirima“ (UNEPFI, 2019).

Princip 2 se odnosi na uticaj i postavljanje ciljeva - on obavezuje banke da „kontinuirano povećavaju naše pozitivne uticaje uz smanjenje negativnih uticaja na, i upravljanje rizicima po ljude i životnu sredinu koji proizilaze iz [njihovih] aktivnosti, proizvode i usluge. U tu svrhu [banke] će postaviti i objaviti ciljeve u kojima oni mogu imati najznačajniji uticaj“ (UNEPFI, 2019).

Princip 3 se odnosi na klijente i korisnike - obavezuje banke da „odgovorno rade sa [svojim] korisnicima i [svojim] klijentima kako bi podstakle održive prakse i omogućile ekonomske aktivnosti koje stvaraju zajednički prosperitet sadašnjim i budućim generacijama“ (UNEPFI, 2019).

Princip 4 se odnosi na zainteresovane strane - obavezuje banke da se „proaktivno i odgovorno konsultuju, angažuju i sarađuju sa relevantnim akterima radi postizanja ciljeva društva“ (UNEPFI, 2019).

Princip 5 se odnosi na upravljanje i kulturu - banke se obavezuju da će „sprovести [svoju] posvećenost ovim principima kroz efikasno upravljanje i kulturu odgovornog bankarstva“ (UNEPFI, 2019).

Princip 6 se odnosi na transparentnost i odgovornost - banke se obavezuju da će „periodično pregledati [svoju] individualnu i kolektivnu primenu ovih principa i biti transparentne i odgovorne za [svoje] pozitivne i negativne uticaje i [svoj] doprinos ciljevima društva“ (UNEPFI, 2019).

Izvršni direktori banaka potpisnica dalje promovišu kulturu održivog razvoja i finansiranja u bankarskoj zajednici i razmenjuju prakse o tome koje su promene sproveli i kako, zašto, i gde su ostavili uticaj i pomogli klijentima u njihovom prelasku na zelenu ekonomiju. Više od 190 potpisnika potpisalo je PRB, uz snažno prisustvo evropskih banaka, poštujući gore navedenih šest principa (UNEPFI, 2020).

Rastuća važnost ESG principa

Rastuća važnost ESG faktora se dešava usled sledećih trendova:

- Svesnost investitora da ESG faktori imaju značajan uticaj na vrednost kompanije, njen povraćaj imovine i kapitala, kao i na njenu reputaciju. U isto vreme, oni pridaju značaj ekološkim i društvenim uticajima subjekata u koje ulažu. Najčešći pristup integrisanju ovih vrednosti u portfelj je isključivanje određenih sektora, kompanija ili praksi (tzv. Negativni skrining), budući da su krajnji korisnici i investitori (klijenti uopšte) svesniji i zahtevniji u pogledu na transparentnost o tome kako i gde se ulaže njihova ušteda.

- Svest industrije i kompanija koje veruju da eksplicitno, sistematsko i kontinuirano uključivanje ESG faktora u analizu ulaganja može dovesti do efikasnijeg upravljanja rizicima i boljih ukupnih performansi (tzv. ESG integracija). Jednak i Jednak (2020) analizirali su održivost i performanse kompanija, pozivajući se na nalaze globalnog izveštaja da kompanije koje u svoje strategije uključuju standarde održivosti imaju 18% veći povrat ulaganja od onih koje još nisu uvele pitanja klimatskih promena. Takođe, kompanije koje su uložile u smanjenje emisije ugljenika dobile su 50% manju nestabilnost prihoda od 2009. godine, kao i 21% jače dividende u odnosu na niže rangirane kompanije (Jednak, 2020, 109).

- Regulatorni aspekt - saradnja između nacionalnih i međunarodnih regulatora povećana je u domenu uloge finansijskog sektora u društvima, tokom poslednjih decenija, sa nekim periodima važnih prekretnica, poput Svetske ekonomske krize 2008. god., itd. Percepcija opšte javnosti da finansijski sektor može imati značajnu ulogu u sprovođenju globalnih ciljeva u vezi sa klimatskim promenama, održivim razvojem, održivim rastom itd. može dovesti do zajedničke platforme donosioca odluka i finansijskog sektora. Prema nedavnom istraživanju Luksemburškog udruženja banaka među bankama članicama o implementaciji održivih finansija, glavni razlozi za usvajanje održivih finansija uglavnom su povezani sa prepoznatljivošću robne marke (76%), zahtevima zainteresovanih strana (64%) i zahtevima akcionara (64%) .

Trenutno su prakse na nacionalnim tržištima širom sveta veoma raznovrsne i fragmentirane. Nivo uporedivosti različitih metodologija je vrlo nizak i stoga ne omogućava jednostavnu upotrebu ESG ocena. Podaci koji su trenutno dostupni još uvek nisu dovoljni da finansijski sektor ispuni predstojeće zakonske obaveze ili poveća održivo finansiranje, budući da postoji prilično mali broj nereguliranih glavnih pružalaca podataka. Centralni registar podataka EU mogao bi značajno poboljšati dostupnost i analizu podataka i povećati razumevanje rizika ESG -a (Evropska bankarska federacija, 2020, str. 22).

Razvoj tržišta zelene finansijske imovine (zelene obveznice itd.)

Razvoj tržišta takođe predstavlja snažan uticaj na podizanje kulture održivog finansiranja. Tržište finansijskih instrumenata stvorenih sa zelenom oznakom raste (poput zelenih, društvenih i razvojnih obveznica itd.). Prema Globalnom stanju tržišta zelenih obveznica 2019. god. (Inicijativa o klimatskim obveznicama, 2020), glavni trendovi u održivim finansijama u 2019. godini bili su:

- Rastući značaj zelenih finansija u finansijskom sektoru;
- Sve veći značaj oznaka povezanih sa pitanjima održivog razvoja (npr. Obveznice održivosti, društvene obveznice) i oznaka koje se odnose na ESG;
- Dalji rad na harmonizaciji i standardizaciji tržišta.

Isti izveštaj otkriva neke trendove na globalnom tržištu u 2019. god. u odnosu na 2018. god., kao što su: 258,9 milijardi USD je emitovano u poređenju sa 171,2 milijardi USD u 2018. na međunarodnom nivou, a 1.802 transakcija u poređenju sa 1.591 transakcijom u 2018. god.. U 2019. god., sertifikovane klimatske obveznice dostigle su prag od 100 milijardi USD na međunarodnom nivou.

Formalni i pravni okvir

Zakonodavstvo u oblasti održivog finansiranja brzo se razvija kroz različite važne direktive i dokumente koji strateški i dugoročno utiču na dalji razvoj održivog finansiranja. Evropska komisija je već uvela različite direktive i propise koji su u skladu sa realizacijom prethodno postavljenih ciljeva i zadataka (Zeleni dogovor, održivi razvojni ciljevi, klimatski ciljevi itd.), a na putu su i mnoge nove.

Evropski zeleni dogovor

Evropski zeleni dogovor je plan EU za njenu održivu ekonomiju i predstavlja paket aktivnosti počevši od smanjenja emisije gasova sa efektom staklene bašte, do ulaganja u istraživanja i inovacije i zaštitu prirodne sredine. Neke inicijative za klimatske akcije u okviru Zelenog dogovora su: a) Evropski zakon o klimi; b) Evropski klimatski pakt za uključivanje građana; i c) Zeleni dogovor Evropske unije koji osigurava važnu ulogu bankama, naglašavajući relevantnost usklađenog pristupa propisima o rizicima i podacima ESG -a.

Evropska komisija pripremila je nekoliko konkretnih akcija koje će ponuditi snažnu osnovu za novi dogovor, kao što su Investicioni plan za održivu Evropu (sa trilion evra ulaganja u narednoj deceniji), Fond za pravednu tranziciju, podrška Evropske investicione banke (Evropska Komisija, 2019). Osim što je strateški važan sistemski paket EU, Zeleni dogovor EU predstavlja i kulturnu promenu u javnom i privatnom sektoru.

Akcioni plan o finansiranju održivog rasta

Akcioni plan za finansiranje održivog rasta uveden je u martu 2018. godine i identifikuje 10 strateških akcija kroz tri kategorije:

I kategorija - Preusmeravanje tokova kapitala za održiviju ekonomiju - stvaranje oznaka za zelene finansijske proizvode, uspostavljanje taksonomije EU, uključivanje održivosti u finansijske savete, podsticanje ulaganja u održive projekte i razvoj merila održivosti (Evropska komisija, 2018).

II Kategorija - Uključivanje održivosti u upravljanje rizicima - pojašnjavanje obaveza menadžera imovine i institucionalnih investitora u pogledu održivosti, bolja integracija održivosti u rejtinge i istraživanje tržišta, itd. (Evropska komisija, 2018).

III kategorija - Podsticanje transparentnosti i dugoročnosti (Evropska komisija, 2018).

Svaka od kategorija sastoji se od nekoliko linija aktivnosti koje su predmet daljeg angažovanja različitih tela čiji je ishod specifičan zakonski akt izrađen u cilju daljeg regulisanja fragmenata koji treba da podrže održivo finansiranje i održivi razvoj i rast. Neki od njih su već kreirani i odobreni (npr. Tehnička ekspertska grupa za održivo finansiranje (TEG) je publikovala svoj izveštaj o EU Green Bond Standard), a mnogi drugi slede uskoro.

Strategija održivog finansiranja i drugi dalji propisi

Evropski zeleni dogovor od 11. decembra 2019. god. naglasio je potrebu za dugoročnim okvirom na tržištima kapitala i finansijskim tržištima prema ulaganjima u zelene projekte. Takođe, dokument je predvideo donošenje obnovljene strategiju održivog finansiranja (Evropska komisija, 2019). Tokom drugog kvartala 2020. godine, Evropska komisija je pokrenula širok spektar javnih konsultacija o Obnovljenoj strategiji održivog finansiranja. Obraćajući se svim zainteresovanim stranama o tome kako finansijski sektor i ekonomija mogu postati održiviji, istraživanje je podeljeno u nekoliko segmenata: a) Jačanje temelja održivih finansija, b) Povećanje mogućnosti za građane, institucije u finansijskom sektoru i korporacije da poboljšati održivost, i c) Smanjiti i upravljati klimatskim i ekološkim rizicima.

Zbog važnosti za finansijski sektor, sve relevantne javne i privatne evropske institucije u finansijskom sektoru objavile su svoje zvanične odgovore na konsultacije Evropske komisije, kao što su Evropska centralna banka ECB, Evropska bankarska uprava EBA i Evropska bankarska federacija EBF. Odgovori na proces konsultacija o RSFS -u koji su dobijeni tokom procesa konsultacija su vrlo temeljni, uključuju stručna mišljenja i odražavaju postojeća iskustva i prakse². Očekuje se da će implementacija Strategije održivog finansiranja iz obnovljivih izvora osnažiti praksu održivosti od (dobrovoljne) kulture do primera, prakse i ponašanja zasnovanih na (obaveznim) propisima. *Stoga se očekuje da će Strategija održivog finansiranja, koja je objavljena od strane Evropske komisije 6. jula 2021. godine, predstavljati prekretnicu u oblasti primene najboljih slučajeva i trendova u održivom razvoju.*

Na kraju, u okviru Evropskog zelenog dogovora, planirano je da Komisija pokrene Evropski klimatski pakt kao platformu sa više zainteresovanih strana sa ciljem da „svima da glas i prostor za osmišljavanje novih klimatskih akcija, razmenu informacija, pokretanje osnovnih aktivnosti i predstaviti rešenja koja drugi mogu slediti“ (Evropska komisija, 2019).

Paralelno sa zakonodavstvom, međunarodno organizaciono okruženje u oblasti Održivih finansija na evropskom nivou razvija se kroz: a.) Ekspertsku grupu na visokom nivou o održivim finansijama - HLEG (od 2016), b.) Tehničku ekspertsku grupu za održive finansije - TEG (2018), c.) ekspertsku grupu država članica o održivim finansijama, d.) Međunarodnu platformu o održivim finansijama itd. (Evropska komisija, 2019). Stoga se očekuje da će se nova Strategija održivog finansiranja iz obnovljivih izvora nadograditi na dosadašnjem radu HLEG-a i TEG-a omogućiti okruženje za dalji rast, održivi razvoj i očekivanja stranaka potražnje i ponude i zainteresovanih strana.

Uticaj održivog finansiranja na banke

Održivo finansiranje donosi dodatnu vrednost bankarskom sektoru, ali i pruža strateške promene i njegovu dalju transformaciju. Neke od međunarodnih finansijskih institucija, poput Evropske investicione banke i Evropske banke za obnovu i razvoj, već su proglasile svoju zelenu politiku, ne kao dodatni program kreditnih linija, već sa strateškom deklaracijom i zalaganjem da bi sve finansije trebalo da postanu zelene u narednim decenijama. U skladu s tim, sve više komercijalnih banaka menja svoje strateške pravce i obaveze sa istim ciljem (Deutsche Bank, 2020).

U današnjem bankarskom sektoru postoji konsenzus da više nije pitanje hoće li se banke prilagoditi, već kako će se prilagoditi. S obzirom da su 99% preduzeća mala i srednja preduzeća, banke će takođe biti važan akter u tranziciji ka zelenoj ekonomiji. Ovo se može ukratko predstaviti promenom paradigme:

- Ne samo ono što banka finansira, već i prelazak na način na koji banka finansira. Ulaganje u ekološke projekte, smanjenje emisije gasova, podrška društveno odgovornim ulaganjima neće i ne bi trebalo da budu segment na način odvojen od tradicionalne ili osnovne poslovne aktivnosti. Ono što održive finansije kao koncept očekuje je promena svesti, promena paradigme koja će sve finansijske aktivnosti označiti kao održive, umesto kao fragment. Na primer, Deutsche Bank je krajem maja 2021. godine promovisala svoje nove ciljeve u finansiranju održivih projekata na oko 220 milijardi evra do 2023. godine, što je 10 odsto više od postojećih ciljeva³.

² Evropska komisija je pokrenula konsultacije o strategiji održivog finansiranja 8. aprila 2020. godine i okončala ih 15. jula 2020. godine.

³ Raspodela ciljeva je: investiciona banka na raspolaganju ima 105 mlrd EUR za zelene projekte, privatno bankarstvo će doprineti u iznosu od 86 mlrd EUR i korporativno bankarstvo će doprineti 30 mlrd EUR.

Ovom prilikom izvršni direktor Deutsche Bank obratio se na temu važnosti održivosti za sve bankarske operacije naglašavajući da „zajmodavci rizikuju da izgube dozvolu za rad“ ako zeleno finansiranje ne postave za prioritet⁴.

- Zbog pomenutih kvalitativnih promena i ESG principa, održivo finansiranje je koncept koji prevazi-
lazi aktivnosti društveno odgovornog poslovanja koje su drugačije definisane u okviru organizacionih
postavki (opšte upravljanje, marketing, ljudski resursi itd.). Održivo finansiranje je način da se transfor-
miše postojeći odnos između poslovanja i finansiranja CSR-a na način koji bi transformisao uobičajene
poslovne finansije i etiku, zahtevajući da ima novu dodatnu vrednost i integrišući ESG faktore.

Globalne banke moraju odražavati klimatska razmatranja u svom ukupnom portfelju ulaganja i srod-
nim okvirima rizika i procesima raspodele kapitala, kao što je potreba za jačanjem sposobnosti za
analizu scenarija, testiranje otpornosti na stres, podatke, tehnologiju i sveobuhvatni okvir upravljanja
klimatskim rizikom. Mnoge međunarodne bankarske inicijative (gore pomenute) pružaju važnu ulogu
bankama, koje ističu važnost usklađenog pristupa prema propisima o rizicima i ESG podacima. Na
primer, to je slučaj sa UNEP -om, koji u svom Izveštaju o napretku održivih finansija za 2018. god. za-
ključuje da tri faktora imaju veoma važan uticaj, kao što su: sistemsko nacionalno delovanje, veća me-
đunarodna saradnja i povećano liderstvo na tržištu. Ovaj izveštaj takođe naglašava različite nove vrste
održivih finansijskih politika koje su se pojavile u 2018. godini, kao što su taksonomije i obeležavanje,
otkrivanje, podsticaji za politike, proizvodi, alati i izgradnja kapaciteta (UNEP, 2019).

Uključivanje bankarske industrije u održivi razvoj finansiranja je direktno, proaktivno i produktivno:
politike, konferencije, radne grupe, podizanje svesti i pomoć u implementaciji su neki od oblika u koje
je bankarska industrija direktno uključena, osim svog finansijskog potencijala. Na ovaj način bankar-
ski sektor aktivno utiče na dalji razvoj održivog finansijskog tržišta, tako da je odnos između održivog
finansiranja i bankarstva postao obostran i refleksivan, razmenjujući uticaj u oba smera. Ovo dodatno
utiče na preferencije i navike korisnika (investitora). Na primer, Deutsche Bank je analizirala da se nova
generacija investitora preusmerava na zeleno ulaganje; budući da imaju mnogo mogućnosti da ulože
svoj novac (npr. u penzioni plan), oni se informisano opredeljuju i stalno se odlučuju za ekološki pri-
hvatljive opcije.

Jedan od primera tako složene proaktivne inicijative bankarske zajednice čiji je cilj da podrži zakono-
davstvo koje je postavila Evropska komisija je sledeći - Evropska bankarska federacija (EBF), kao glas
evropskih banaka, i Finansijska inicijativa Programa Ujedinjenih nacija za životnu sredinu (UNEP FI)
pokrenuli su projekat za procenu u kojoj meri bi se taksonomija EU o održivim aktivnostima mogla
primeniti na osnovne bankarske proizvode. Radnu grupu je činilo 25 banaka, 7 bankarskih udruženja
i 5 posmatrača, a zajedno su radili na razvoju smernica. Sponzor projekta su BBVA, BNP Paribas, Cre-
dit Suisse, Danske Bank, Deutsche Bank, FMO, ING, SEB, Societe Generale, Standard Chartered, UBS
i UniCredit. Radna grupa je javnosti predstavila Preporuku na visokom nivou u januaru 2021. Neke
preporuke su, na primer: a) za stambene kredite - sertifikati o ekološkim performansama (EPC) za sta-
novanje, iako još uvek nisu dostupni u svim zemljama EU, mogli bi se koristiti kao unakrsna referenca
za stvaranje pretpostavki o nekretninama u svim zemljama EU. To bi omogućilo bankama da se oslone
na EPC sertifikaciju, procenjujući da li hipotekarni zajmovi označeni sa A ili B mogu biti podobni za
klasifikaciju u svrhe taksonomije i omogućavajući da se proizvodi sa niskim sadržajem ugljenika sma-
traju direktnim ispunjavanjem DNSH (tj. ne nanose značajne štete) kriterijuma za maloprodaju; b) Za
zajmove za automobile i sektor električnih vozila - s obzirom da verifikacija DNSH kriterijuma za elek-

⁴ Deutsche Bank Chief Executive Officer Mr. Christian Sewing.

trična vozila proizvedena van EU nije moguća, može se razmotriti baza podataka u kojoj proizvođači automobila pružaju detalje o svakom automobilu dostupnom na tržištu EU.

Ovaj projekat je odličan primer proaktivne i odgovorne uloge bankarskog sektora u daljoj implementaciji politike i kulture održivog finansiranja, kao i uključivanja zainteresovanih strana. Osim toga, ovaj projekat otkriva veliki značaj uloge nacionalnih bankarskih udruženja u održivom razvoju finansiranja.

Neke perspektive održivog finansiranja u Srbiji

Kao što je slučaj sa bankama u Evropskoj uniji i širom sveta, više se ne postavlja pitanje da li će banke koje posluju u Srbiji odgovoriti na potrebe društva u finansiranju zelene i cirkularne ekonomije. Prateći globalne trendove u primeni CSR -a kroz najbolje prakse i ponašanja u poslednje dve decenije, zajedno sa sve većim značajem regulative u održivom finansiranju, takva posvećenost je već izvesna. Pitanje je kako će, pod kojim uslovima i kojim instrumentima odgovoriti na tako širok spektar globalnih ciljeva. Pojava i priroda održivog finansiranja u finansijskom sektoru takođe će u bankarski sektor Srbije uvesti dva nova imperativa: (1) poboljšanje doprinosa finansiranja održivom i inkluzivnom rastu finansiranjem dugoročnih potreba društva; i (2) jačanje finansijske stabilnosti uključivanjem ekoloških, društvenih i upravljačkih faktora (ESG) u investicione odluke. Održivo finansiranje je više proces koji bi razmatrao ekološke i društvene aspekte u procesu donošenja odluka o ulaganju, a dodatno bi ga podržalo nekoliko faktora: inicijative grupa banaka, aranžmani sa međunarodnim finansijskim institucijama, lokalne inicijative i propisi, lokalno tržište i druge zainteresovane strane. Jedna od nedavnih inicijativa koja ima uticaja na čitav bankarski sektor, a koju je bankarski sektor pokrenuo preko svog lokalnog udruženja banaka - Udruženja banaka Srbije (UBS). UBS, organizacija koja okuplja sve banke koje posluju u Srbiji, kao i Beogradsku berzu, pridružila se 18. novembra 2020. mreži održivog bankarstva (SBN) Međunarodne finansijske korporacije (IFC). SBN je dobrovoljna zajednica regulatornih agencija u finansijskom sektoru i bankarskih udruženja u razvoju, posvećena poboljšanju održivih finansija u skladu sa dobrom međunarodnom praksom. Zajedno sa 41 državom članicom, ona predstavlja 43 triliona dolara (86 odsto) ukupne bankarske imovine na tržištima u razvoju.

Saradnja polazi od bankarskog sektora, povezujući udruženja banaka, centralne banke i banke kroz dva stuba: 1) izgradnju zajedničkih inicijativa, znanja, iskustva i obrazovanja u oblasti održivog finansiranja i 2) unapređenje prakse u primeni ESG principa u poslovanju. Karakteristike i prednosti članstva koje će imati koristi od bankarskog sektora Srbije pokazuju se u sledećim pravcima: a) fokusiranje na saradnju sa bankarskim sektorom na tržištima u razvoju; b) javno-privatno partnerstvo; c) posvećenost obrazovanju, učenju i razmeni dobre prakse; i d) Pristup stručnosti IFC -a, tehničkoj pomoći i vebinarijama. SBN je živa mreža čiji je cilj da podrži dalji razvoj tržišta kroz obrazovanje. Stoga bi UBS mogao biti odgovarajući partner koji će pomoći daljoj promociji kulture održivosti u bankarskom sektoru Srbije kroz obrazovanje, obuku i druge načine razmene iskustava i podsticanja inicijativa (uključujući finansijsko obrazovanje i angažovanje u društvu u ime banaka) ka daljem podizanju svesti i promociji nove kulture. Evropska regulativa u oblasti održivog finansiranja uskoro će biti obavezna u svim državama članicama EU, a uticaće i na treća tržišta⁵. Ovo će biti posebno relevantno za poslovanje bankarskog sektora u zemljama koje nisu članice EU, poput Srbije. Zbog toga je važno da se Srbija blagovremeno uključi.

⁵ E.g., Evropska komisija je usvojila predlog Direktive o korporativnom izveštavanju o održivosti u aprilu 2021. Zvanično odobrenje Direktive je predviđeno za kraj 2022. godine, što će uvesti obavezu kompanijama da primene standarde i da prve izveštaje počnu da objavljuju u 2024, pokrivajući finansijsku 2023. godinu.

Pored doprinosa industrije bankarskog sektora Srbije, postoje i drugi segmenti srpskog tržišta koji mogu olakšati dalje održivo finansiranje u Srbiji, na primer: nedavno usvajanje Zakona o klimatskim promenama u Republici Srbiji (mart 2021), izmene i dopune Zakon o budžetu (april 2021) uveo je tri puta veći nivo za ulaganja u projekte u infrastrukturi (u poređenju sa početnim Zakonom o budžetu za 2021. god.) koji se mogu smatrati projektima za održivi razvoj, Narodna banka Srbije već ulaže devizne rezerve u zelene obveznice na međunarodnim finansijskim tržištima. Lokalno tržište kapitala već je zabeležilo prvu IPO u sektorima obnovljivih izvora energije (Fintel Energija). Postoje mnogi drugi pravci za dalje angažovanje, kao što su: a) dalje poboljšanje politika, smernica i propisa (na primer, očekivanja da će novo zakonodavstvo u domenu grupnog finansiranja dodatno podržati održivo finansiranje i zelenu transformaciju ekonomije), b) potreba za podizanjem svesti potrošača finansijskih usluga, c) obrazovanje zaposlenih u bankama. U tim procesima mogu se pojaviti i neki posebni izazovi, poput potrebe za odgovarajućom i pravovremenom koordinacijom između različitih pristupa i politika između bankarske industrije (banaka i grupa banaka), Vlade, Centralne banke Srbije, međunarodnih finansijskih institucija i drugih zainteresovanih strana (klijenti, nevladine organizacije, ekološke organizacije itd.).

Zaključak

Činioci održivosti (društveni aspekti, društvena odgovornost preduzeća, ekološki kriterijumi, zeleno finansiranje, energetska efikasnost, finansiranje obnovljivih izvora energije itd.) već dugo su prisutni u bankarskom sektoru. Prisustvo bliske koordinacije između dobiti i razvojnih ciljeva u velikoj meri karakteriše tokove kapitala na međunarodnom nivou i tokom prve decenije XXI veka, a takav dobrovoljni princip postaje sve poželjniji i opšteprihvaćeno ponašanje ne samo razvojnih agencija već i investitora, međunarodnih finansijskih institucija, osiguravajućih društava, revizorskih društava, berze i naravno poslovnih banaka (Sredojević, 2006, str.2). Činjenica da su elementi kulture održivosti prisutni u bankarskom sektoru kao način integrisanja društvenih, ekoloških ili upravljačkih pitanja u poslovne aktivnosti predstavlja važan i pozitivan temelj za buduću uspešnu primenu politike održivih finansija i zakonskih zahteva. Ta pozicija omogućila je bankama da danas budu vrlo aktivni učesnici na tržištu u daljoj implementaciji Agende održivog razvoja i drugih srodnih globalnih ciljeva.

Danas, kada održivo finansiranje predstavlja sam koncept koji je formalizovan kao Strategija održivog finansiranja⁶, možemo reći da javni i privatni sektor podjednako posvećuju visoku i relevantnu pažnju njegovoj pravilnoj primeni, kako na strateškom nivou/nivou politike, tako i na nivou redovne/operativne poslovne aktivnosti. Nakon usvajanja Strategije održivog finansiranja, banke će, kao učesnici na tržištu, imati snažan uticaj na zakonodavstvo koje temeljno priprema Evropska komisija i imati pozitivnu praksu u održivom finansiranju. Štaviše, mnoge međunarodne inicijative analizirane u ovom radu pokazuju da su banke takođe vrlo aktivni učesnici i pokretači principa, standarda, mera i drugih oblika nivoa politike. Na ovaj način se razvijaju usmereni odnosi između banaka i drugih učesnika na tržištu i regulatora, tako da možemo videti pozitivnu, važnu i produktivnu ulogu bankarske industrije u budućem razvoju održivog finansiranja. Udruženja banaka, kao nacionalni predstavnici bankarske industrije, olakšavaju i podržavaju dalje banke u njihovoj važnoj misiji u društvu. Ovi procesi takođe upućuju na zaključak da je pojava koncepta održivog finansiranja zapravo evolucija u bankarskom sektoru, kao i da koncept održivog finansiranja ima stimulativan uticaj na bankarski sektor kroz nekoliko oblika i načina.

⁶ Renewed Sustainable Finance Strategy je objavljena 6. jula 2021. godine.

Međutim, preusmeravanje privatnog kapitala na zelenije i održivije investicije zahteva strukturnije i šire promene u načinu na koji funkcioniše finansijski sistem. Ovo je neizbežno ako želimo održiviji ekonomski rast, stabilnost finansijskog sistema i veći nivo dugoročnosti u ekonomiji. Svi ovi ciljevi su takođe integrisani kao delovi šire slike, projekta tržišta kapitala Evropske unije (CMU), gde se koncept održivog finansiranja komplementarno uklapa. Istovremeno, važno je nastaviti sa proširivanjem daljih aktivnosti održivog finansiranja, kao što su: podizanje svesti o složenosti održivog finansiranja, važnosti aktivnog angažovanja učesnika na tržištu i njihovog međusobnog partnerstva u daljem razvoju. Posebno, kao što je to slučaj sa lokalnim bankarskim sektorom u Srbiji, veoma koristan uticaj može se ostvariti kroz edukaciju i uvođenje kulture održivog finansiranja. To se može postići i kroz primer nedavnog ulaska u članstvo Udruženja banaka Srbije kao predstavnika bankarske industrije, u Mrežu održivog bankarstva Međunarodne finansijske korporacije. Pored toga što je bankarska industrija direktno uključena, drugi segmenti lokalnog tržišta mogu imati značajan uticaj na dalju implementaciju održivog finansiranja kroz svoje institucionalne doprinose (npr. Narodna banka Srbije, Komisija za hartije od vrednosti, Beogradska berza).

Proces implementacije održivog finansiranja takođe će imati mnoge izazove, poput potencijalnog negativnog uticaja učinka ESG -a na cenu kapitala. Na primer, u nedavnom globalnom istraživanju koje je sprovedla kompanija Deloitte Insights, skoro 60 odsto finansijskih direktora navedenih kompanija navodi da performanse ESG-a imaju visok ili umeren uticaj na cenu kapitala, dok je kod porodičnih preduzeća taj ratio 42 odsto usled toga što oni mogu manje zavisiti od finansijskog tržišta za finansiranje poslovanja (Coppola i Rinkel, 2020). Osim ovoga, u budućnosti će biti potrebni blagovremen i sveobuhvatan pristup podizanju svesti i savetodavnim uslugama za klijente i korisnike (mala i srednja preduzeća, klijenti na malo) i širu javnost, ali i aktivnosti usmerene na edukaciju zaposlenih u bankama.

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SUSTAINABLE FINANCE – EVOLUTION OR REVOLUTION IN THE BANKING SECTOR

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Summary:

Sustainable Development nowadays became a dominant paradigm for both public and private sectors. Several Strategic Agendas such as European Green Deal, the 2030 Agenda for Sustainable Development and the SDGs, Climate Action and others, at their core values have a great set of actions ranging from reduction of the CO₂ levels, through financing of particular projects, to the improvement of general welfare of the economies and societies. Due to the funding gap, there is a growing interest for private sector financing, particularly sustainable financing, and its role and contribution to the mentioned ultimate goals. The objective of the research is to analyze the factors and progress that have been made in setting up the framework in sustainable financing at the EU and international level. This paper will aim to identify the direction and the channels of its potential impact on the banking sector, as well as to describe ways in which this new culture is developing in the banking sector. The paper will particularly try to identify if the banking sector is proactive or reactive, by observing initiatives and projects at the international, European, and local level that have been developing for the last two decades, and based on that, to try to assess if a concept of sustainability and sustainable finance represent an evolution (upgrade of the existing culture and practice) or a revolution (new paradigm) in the banking sector.

Keywords: Sustainable Development; Sustainable Financing; Sustainable Development Goals; Green Bonds; Paris Agreement.

JEL classification: G21, G32, K32, O3, Q56.

Introduction

With the adoption of two global initiatives, the public sectors around the world have opted for a more sustainable way for the socio-economic development. The first one is the Paris Agreement as the agreement signed by 195 countries in December 2015 with the aim to achieve overall global resilience to climate changes. The second one is the Agenda for Sustainable Development until 2030 adopted by the United Nations (UN) in 2015 (also known as the Agenda 2030). The Agenda 2030 introduced seventeen Sustainable Development Goals (SDGs) which should be achieved until 2030 and act as enabling environmental factors for future societies and economies that should bring prosperity, well-being, resilience, health and fairness for all.

Visions of sustainable and carbon-emissions-free societies have been embedded in the various strategic documents and deeply rooted in key pillars of the EU economy. Therefore, the current work of the European Commission in the domain of sustainability and sustainable finance should be considered as the evolution of the vision set already in the EU Treaties. One of the strategic works in this respect is the document “Towards a Sustainable Europe by 2030” which has introduced a multi-stakeholder platform with the purpose to share best practices on the Sustainable Development Goals implementation. The challenges of implementing those goals are present, and known, such as financing sources to meet them. This is where private financing may play an important role and is invited to take an important role. Banking sector, as the dominant sector there, is becoming more and more integrated into the operational agendas of those global aims, as the relevant stakeholder that may provide needed funding and related services. Furthermore, the impact is reversible – Sustainable Development agenda is being more and more integrated into the way in which banking is operating, providing the added value to it but also triggering its structural change and transformation in the near future. Variety of sustainability related assessment tools are also more and more available in sustainability research and practice – research, ratings, scenario analysis, environmental, social, and governance (ESG) benchmarks, screening list, etc.

The importance of private financing for the economy is also formulated in the paradigm, entitled Financing Growth, where Banking Union and Capital Markets Union are important strategic EU projects aimed at ensuring the full integration of financial markets, strong credit potential and a multiplier effect.

The objective of this research paper is to analyze the progress that has been made in setting up the framework in sustainable financing at the EU and international level, and to support further debate on a need to scale up further sustainable financing activities, such as: raising awareness on the complexity of sustainable financing, importance of market participants active engagement and their mutual partnerships in its further development, as well as the education of general public and market participants on the sustainable financing concept. Compared to voluntary practices that existed so far during several recent decades, mostly in the domain of the Corporate Social Responsibility, awareness on sustainability and sustainable financing grows over time to the regulations and supervisions today. Regulation development is dynamic, particularly in the EU. It has overall positive impact on financing sustainable development, which can be seen twofold:

- A) Regulation is formally introducing a totally new paradigm in the financial sector, causing its own transformation, therefore it may be considered and may reflect on sustainable financing as a *revolution*.
- B) It is rather facilitating further development of existing concepts, culture and practice that is present already in the financial sector – therefore, we may see it as an *evolutionary* impact.

In this paper, we argue that regulation, although bringing novelty, obligatory principles and even more – revolution in some segments of private financing (e.g. particularly in the commercial banking principles of financing), is bringing revolution only to some certain extent: by transforming voluntary practice and principles into formal commitments, e.g. rather supporting further development of *already existing* concept of sustainability and culture of sustainable development in financial sector. Analyzing and comparing various initiatives, platforms and best practices at international, European, and national levels that have been evolving in the financial sectors during last two decades, we would test the Hypothesis H0: Concept of sustainable financing will transform and upgrade the existing culture of sustainability from voluntary into the obligatory practices, behaviors and mainstream rather than introducing new approach.

Banking Sector Practices in Sustainable Development - the Road to Sustainable Financing

Sustainable development is a concept that has, over several decades, been described in various ways. One of the most often used ways of its presentation, is the definition from the document “Our Common Future” (also known as the Brundtland Report): “*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*” (United Nations, 1987). Sustainability is already present in banking sector’s foundation for a long time. It covers social and environmental aspects, therefore being closely attached to the Corporate Social Responsibility (CSR) actions.

For almost two decades, sustainability as culture has been present in financial sector through various projects. Most of them emerged from the domain of CSR, which put an emphasis on the contribution to the greater social or public goals, on a voluntary basis. This practice and behavior triggered further appearance of standardized approaches at the global level (reporting), and common principles (e.g., Principles of Responsible Investing, Principles of Responsible Banking). Over time, CSR was evolving and converging with the general call of the international forums and platforms that private sector should support growth, jobs, and development goals.

At the beginning of the XXI century, international best practice and trends in CSR and sustainable finance showed that leading financial institutions are working on several important segments of introducing CSR culture into the mainstream business by: setting up governance and management systems to embed CSR into their operations, reporting on the CSR performance, developing a range of CSR products that integrates social and environmental considerations, integrating CSR into their risk management systems, developing methodologies for assessing their investments based on CSR criteria, and finally, developing strategic CSR policies, innovations and programs¹ (Strandberg, 2005).

In this part of the analysis, we would like to disclose some examples of good practices and behaviors that were initiated by various financial institutions during last two decades i.e., earlier than 2018 when the European Commission published Action Plan for Sustainable Growth. Some older, but also some more recent examples of good practice in sustainable financing will be disclosed as initiatives, projects, principles, financial instruments and so on.

- a. Rabobank Group that ensures venture capital, mortgage finance, real estate, insurance, asset management and investment and leasing, in 1998 established its sustainable development corporate group strategy. In 1999, it included sustainability in its mission statement and code of conduct, and in 2000, it implemented training on sustainability to its staff. It also developed many sustainable financing products, such as Environmental Commodity line in 2003, when the Rabobank Group acquired a 50% share in the new electronic trading platform New Values: market players can trade new negotiable papers or 'environmental commodities', on 3 trading portals (Strandberg, 2005, 22).
- b. In 2003, ABN AMRO as the largest Netherlands banks, has introduced sustainability policy at the Group level, organizing a dedicated Sustainable development department, located in Group Risk Management (knowledge center) that oversees developing a Group strategy on sustainable development, sustainability reporting, stakeholder engagement, developing internal understanding and supporting the business units in developing sustainable financial products. Besides various principles developed to meet Stakeholders needs, some of the sustainable financing products developed are: ABN AMRO Real Microcredit, a unit in Brazil specializing in loans to small formal and informal companies that have trouble accessing traditional financing; fixed-term, fixed-rate bank bonds for environmentally friendly projects in which loans are structured at below-market interest rates since the investors benefit a tax exemption on their green investments. Main recipients of the green loans are projects in sustainable agriculture, Green Label Greenhouses, nature conservations, and sustainable energy (Strandberg, 2005, p.14).

¹ An international study "Best Practices in Sustainable Finance" has been conducted on the international best practices, standards, innovations and trends in CSR or sustainable finance. A group of 10 financial institutions from Canada supported the Study, that covered 21 financial institutions from the banking, insurance, and asset management sectors, and 10 international sustainable finance sets of standards, principles and guidelines.

- c. In 2003, Triodos Bank, as a public bank and one of the largest ethical banks in Europe, approved over 3,000 loans to social, environmental and cultural sectors projects: Projects in nature and environment (32%), social (20%), culture (45%) and so called North-South projects for micro-financial institutions in developing countries (3%). During the same year, Triodos' net profit after tax rose by 14% to EUR 3.0 million, and its efficiency ratio came in at 77% with a ROE of 3%. Some of the sustainable financing products in 2003 were e.g.: foundation of the Dutch Sustainability Research Institute, which generates data on the social and environmental policy of over 2,000 listed companies all over the world, The Triodos Climate Clearing House (trading platform for CO2 loans created by sustainable forestry and renewable energy projects), sponsorship of a bond issue etc.
- d. In 2007, European Investment Bank has issued first ever Green Bond.
- e. Nedbank from South Africa is implementing innovations for sustainable growth and financing green economy. In 2011, Nedbank Corporate and Investment Banking has created South Africa First Green Index, as a benchmark for investors dedicated to green projects.

Today, we find many examples of good practices in the financial sector (beside the platforms, initiatives, regulation, and projects of the public sector at the international level).

First, regulators and supervisors put sustainable financing in their agendas. The Network of Central Banks and Supervisors for Greening the Financial System (NGFS) has been launched in 2017, as a network that aims, on a voluntary basis, to share best practices in the development of green reform agenda. Bank for International Settlements, Basel, issued its first BIS Green Bond Fund denominated in US dollars in September 2019, as well as the second one, denominated in EUR, open-ended fund for green bond investments in January 2021. Together, these two funds will manage the amount of more than USD 2 billion by central banks and official institutions.

Second, banking industry representatives - national banking associations recognize sustainable financing as their important activity. E.g., Banks Association of Turkey has published in 2014 its "Sustainability Guidelines for the Banking Sector", in order to address ESG criteria in banking and financial services. In March 2021, this document has been extensively expanded in order to introduce 10 essential principles for sustainability financing through: Evaluation and Management of Environmental and Social Risks Arising from Banking Activities, Contribution to Sustainable Development Targets, Struggle against and Adaptation to Climate Change, Financial Health and Comprehensiveness, Human Rights and Workers' Rights, Comprehensiveness and Equality in Opportunity, Shareholder Participation and Communication, Corporate Management, Corporate Capacity Building, Monitoring and Reporting (The Banks Association of Turkey, 2021). Also, the Spanish Banking Association has formalized sustainable financing into its organization by setting up the department and Director for Strategy and Sustainability (Spanish Banking Association, 2021). Another example of banking industry initiative is the Memorandum for Sustainable Finance and the creation of the Sustainability Commission (2021), which aim is to create ways for contributions of banks to the sustainable development of the Czech Republic.

Third, innovations at the capital markets are very dynamic. Beside expansion of the corporate Green Bonds market, green government bonds market is growing, too: after the Netherlands and Sweden, Germany has become the third country to issue a green government bond in 2021. In addition, various innovations at the financial markets are under way, such as introduction of Green Tween Bonds and developing Green Yield curve (in German market). Twin Bond is a concept where a green bond is issued with the same maturity as a conventional bond, but as a separate bond with a smaller issue volume than the conventional bond, to ensure that the issuance of green bonds does not negatively influence the overall liquidity in sovereign government bonds and to help investors differentiate green investments. Also, international capital markets record an increasing number of investment funds specialized in ESG investing and expanding limits for investing in projects with high component of ESG impact.

The effects and scope of CSR are positive and far-reaching, depending on the nature of the corporation's activity, the industry to which its activity belongs, as well as the specifics of the environment in which it operates (Sredojević, 2006, p. 10). In addition, evolution of the sustainability concept over time brought additional functions, such as reporting (in accordance with certain agreed standards). It is worth to mention here that the Global Reporting Initiative (GRI), as a global voluntary platform that produces set of standards as the global common language for organizations to report their impacts, gives a positive impact on further ESGs implementation and reporting.

Sustainable Financing – Literature Overview

As a result of gradual evolution of the concept of sustainability in the financial sector, today we have reached the phase in which the new paradigm – sustainable financing – has rapid emergence and may become a mainstream in the financial services sector. Sustainable finance is related to the consideration of the ESG factors in the financing process, i.e., during the (investment) decision making process in the financial sector, which eventually will lead to higher level of longer-term investments into sustainable economic activities and projects (European Commission, 2018, pp. 2). ESG factors refer to: E - environmental factors such as climate change, reduction of CO₂ emission and overall pollution, protection of biodiversity, and circular economy; S - social factors related to gender and other issues of equality, labor rights, human resources development, human rights etc.; and G - the governance factors which refer to governance institutions in public and private sector, principles of management, employee relations, remuneration issues, etc.

According to the group of authors, sustainable financing means the “combination of financial efficiency and stability with social commitment, environmental protection and responsible management. This includes also green funding (or green banking), i.e., investments aimed at protecting the natural environment, particularly investing in low-carbon projects that aim to limit the rise in mean global temperatures to a limit of 2C” (Ziolo et al, 2019, 58). As Jeucken defines in his book on Sustainable Finance and Banking, Sustainable finance are “... a concept referring to financial services aimed at combining ecological, social and managerial aspects of business decision-making in terms of long-terms effects”,

emphasizing on how vital the financial sector is for progress (Jeucken, 2001). According to Sollow, sustainability is about equity in distribution between present and future generation, i.e., problem about savings and investments. Therefore, “there is a conflict between present and future and the demand to satisfy needs” (Sollow, 1992, 187). Some authors consider increase in sustainable investments as the key driver for sustainability: “Sustainable investments include ethical and green investments...If companies are operating according to sustainability and CSR, financial markets are socially responsible. [Therefore] companies should integrate ESG issues in their decisions making process, to achieve sustainability” (Jednak and Jednak, 2019, 112).

Sustainable financing also can be considered as a wide range of activities: from digitizing banks’ activities, reducing carbon footprints in their daily activities, to offering sustainable financing products (e.g. pension savings, green bonds). Sustainable finance may also be considered as the policy arm of the paradigm of *financing growth*, as a part of the Capital Markets contribution to public sector efforts, by channeling private investments in a way which would take into consideration environmental, social and governance issues.

Sustainable Financing Enabling Environment Factors at the International Level

Development of various factors that are enabling environment for Sustainable Financing, and their holders (participants) is very dynamic. These factors can be seen as various initiatives, principles, legislation, financial institutions strategies, and institutionalized through various forms (Technical Groups, Expert Groups, Platforms, Networks, etc.). They are, simultaneously, the channels of impact on further development of sustainable finance. In this section, several major global initiatives, and factors that support each other in further improvement of the enabling environment for Sustainable Financing, will be presented and described based on publicly available information sources.

International Organizations Initiatives

Many international organizations have set platforms and agendas that support sustainable development. They include, but are not limited to: United Nations, International Finance Corporation.

United Nations’ Development Agenda

United Nations initiated development goals agenda by introducing Millennium Development Goals, and later on Sustainable Development Goals Agenda. Millennium Development Goals (MDGs) Agenda was introduced after the United Nations Millennium Summit in 2000, through eight international development goals to be achieved by the 2015, covering issues of reduction of extreme poverty, provision of primary education, etc. MDGs were succeeded by the 17 Sustainable Development Goals

(SDGs) that were introduced and adopted by all Member States of the United Nations in 2015, as the new 2030 Agenda for Sustainable Development. Besides these central platforms of sustainable development, many UN agencies also took important role in further elaboration of the same agenda by launching new global platforms and calls for action while promoting the role and activities of the UN.

United Nations' Environment Program Financial Initiative (UNEP FI)

United Nations' Environment Program Financial Initiative (UNEPFI) represents a partnership between UNEP and the financial sector with an aim to engage private sector finance for sustainable development goals. The network of partnership is diversified and has more than 300 members (such as banks, investors, and insurance companies) and more than 100 institutions that support this network. From the organizational point of view, the UNEPFI has a global coverage and is based in Geneva, Switzerland as the Unit of the UN Environment's Resources & Market Branch, which is part of the Economic Division (one of the UN Environment's eight core divisions). Jointly with other stakeholders, UNEP FI has initiated a set of principles aimed at achieving responsibility and sustainability in the financing sector such as in investing, banking, and insurance domain. Banking sector is, besides being a contributor to this platform, also an active promoter of the values set out in the SDGs agenda, with the focus on climate-neutral and green economy financing.

UN Global Compact

The UN Global Compact represents another platform where global business communities voluntarily act and implement universal sustainability goals, principles, and other UN Sustainable Goals. By integrating companies, civil sector, and public entities together, UN Global Compact is working together with its stakeholders on various initiatives achieving complex target sets within various SDGs. Banking sector is engaged intensively through membership of individual banks, banking associations and central banks.

Sustainable Banking Network of the International Finance Corporation

Beside agenda of the UN and its agencies, there are other remarkable global initiatives of the international financial institutions aimed at connecting financial sector with the sustainable development agenda. One of them is *Sustainable Banking Network of the International Finance Corporation* (IFC SBN, part of the World Bank Group), as the platform for financial sector from emerging countries dedicated to improving sustainable financing practice. The Sustainable Banking Network was launched in September 2012, in Beijing in May 2012, during the first International Green Credit Forum organized by the IFC and the China Banking Regulatory Commission, with an aim to catalyze a global network on sustainable finance. Supervisory and regulatory bodies, together with industry representatives such

as banking associations, are active members of the network that connect more than 40 countries. Sustainable Banking Network today has 61 institutions from 43 countries that represent \$43 trillion (86 percent) of the total banking assets in emerging markets, which can therefore play significant role in further Green transformation of their national economies and implementation of Sustainable Development Goals (Sustainable Banking Network, 2020).

Principles

Principles of Responsible Investing

Principles of Responsible Investing PRI is the initiative of the investor community (asset managers) that was developed together with the UNEPFI and UN Global Compact. The PRI introduced the importance of *responsible investment* and stipulated it as a strategy that should, through principles, improve the existing practice to integrate environmental, social and governance (ESG) factors in investment decisions. The appearance of the “Principles for Responsible Investment” that were created by an international network of institutional investors, and supported by the UN Secretary General, contributed to the growing importance of environmental, social and corporate governance issues to investment practices. They are as follows:

Principle 1 commits investors to “incorporate ESG issues into investment analysis and decision-making processes” (UNPRI, 2020).

Principle 2 commits investors to be “active owners and incorporate ESG issues” into their ownership policies and practices (UNPRI, 2020).

Principle 3 commits investors to “seek appropriate disclosure on ESG issues by the entities” in which they invest (UNPRI, 2020).

Principle 4 commits investors to “promote acceptance and implementation of the Principles within the investment industry” (UNPRI, 2020).

Principle 5 commits investors to work together to enhance their own effectiveness in implementing the Principles (UNPRI, 2020).

Principle 6 commits investors to reporting on their activities and progress towards implementing the Principles (UNPRI, 2020).

All principles are followed by a set of various actions. Corporate leadership is increasingly accountable for the ESG performance of their companies, thereby committing themselves to including sustainability factors in the investment process. By the end of 2019, more than 2,500 investors (which accounts for over US\$80 trillion in funds) had signed up to the UN Principles for Responsible Investment.

UN Principles for Responsible Banking

The Principles for Responsible Banking – PRB is the platform that was launched on September 22, 2019, by the United Nations and the group of 130 banks from 49 countries with an aim to “provide an international framework for a sustainable banking system and allow signatories to demonstrate their commitment to achieving the goals expressed in the UN Sustainable Development Goals (SDGs) and the Paris Climate Agreement” (UNPRI, 2020). In comparison to the UN PRI, as the investors initiative, PRB may be considered as the response of the banking industry. According to the UNPRI, PRB commit signatories to harmonize their business strategy and policy with the SDGs and the Paris Climate Agreement (UNPRI, 2020). The principles for Responsible Banking are:

Principle 1 refers to Alignment – it commits banks to align their goals “to be consistent with and contribute to individuals’ needs and society’s goals, as expressed in the Sustainable Development Goals, the Paris Climate Agreement and relevant national and regional frameworks” (UNEPFI, 2019).

Principle 2 refers to Impact & Target Setting – it commits banks to “continuously increase our positive impacts while reducing the negative impacts on and managing the risks to people and environment resulting from [their] activities, products and services. To this end, [the banks] will set and publish targets where [they] can have the most significant impacts” (UNEPFI, 2019).

Principle 3 refers to Clients & Customers – it commits the banks to “work responsibly with [their] clients and [their] customers to encourage sustainable practices and enable economic activities that create shared prosperity for current and future generations” (UNEPFI, 2019).

Principle 4 refers to Stakeholders – it commits banks to “proactively and responsibly consult, engage and partner with relevant stakeholders to achieve society’s goals” (UNEPFI, 2019).

Principle 5 refers to Governance & Culture – banks commit to “implement [their] commitment to these Principles through effective governance and a culture of responsible banking” (UNEPFI, 2019).

Principle 6 refers to Transparency & Accountability – banks commit to “periodically review [their] individual and collective implementation of these Principles and be transparent about and accountable for [their] positive and negative impacts and [their] contribution to society’s goals” (UNEPFI, 2019).

CEOs of the signatory banks are promoting the culture of sustainable development and finance further in banking community and sharing practices about which changes they have implemented and how, why, and where they have made an impact and helped clients in their transition to green economy. More than 190 Signatories have signed up to the PRB, with strong presence of European banks, following the aforementioned six principles (UNEPFI, 2020).

Growing importance of ESG Principles

Growing importance of ESG factors is happening due to the following trends:

- 1 – Awareness of the investors that ESG factors have a significant impact on the value of the company, its return on assets and on capital, as well as on its reputation. At the same time, they are giving importance to the environmental and social impacts of the entities they are investing in. The

most common approach to integrate these values into portfolio is to exclude certain sectors, companies or practices (so called – negative screening), since the final beneficiaries and investors (clients in general) are more aware and more demanding in relation to transparency on how and where their savings are invested.

- 2 – Awareness of the industry and companies that believe that explicit, systematical and continuous inclusion of ESG factors in investment analysis may lead to more effective risk management and better overall performance (so called ESG integration). Jednak and Jednak (2020) analyzed Sustainability and companies' performances, referring to the global report findings that companies that include sustainability standards in their strategies have 18% higher ROI than those that have not yet introduced climate change matters. Also, companies that have invested in carbon reduction have gained a 50% lower volatility of revenues since 2009, as well as 21% stronger dividends than the lower ranked companies (Jednak, 2020, 109).
- 3 – Regulation aspect – cooperation between national and international regulators increased in the domain of the role of the financial sector in the societies, during the last decades, with some periods of important milestones, such as World Economic Crisis of 2008, etc. The perception of the general public that the financial sector may have a significant role in implementation of global goals in relation to climate change, sustainable development, sustainable growth etc. may lead to joint platform of policy makers and of the financial sector itself.

According to the recent research of the Luxembourg Banking Association among member banks on sustainable finance implementation, the main reasons for adopting sustainable finance are mainly linked to brand recognition (76%), stakeholder requirements (64%), and shareholder requirements (64%).

Currently, practices at the national markets worldwide are very diversified and fragmented. The level of comparability of different methodologies is very low and therefore, does not allow for an easy use of ESG ratings. Data that is available currently is still not sufficient for the financial sector to comply with the forthcoming legislative obligations or to scale up sustainable finance, since there are rather few and unregulated major data providers. The EU centralized data register could substantially improve the data availability and analysis and increase understanding of the ESG risks (European Banking Federation, 2020, p.22).

Market development of green financial assets (Green bonds etc.)

Market developments also represent strong impact on raising sustainable financing culture. The market of financial instruments created with a green label is growing (such as green, social and development bonds, etc.). According to the Green Bonds Global State of the Market 2019 (Climate Bonds Initiative, 2020), major trends in sustainable finance in 2019 were:

1. Growing importance of green finance in the financial sector;
2. Growing importance of labels related to SDG issues (e.g., sustainability bonds, social bonds) and labels related to ESG;

3. Further work on market harmonization and standardization.

The same report is disclosing some trends on the global market in 2019 in comparison to 2018, such as: 258.9 bn USD in issuance compared to 171.2bn USD in 2018 at the international level, and 1,802 deals compare to 1,591 deals in 2018. In 2019, Certified Climate Bonds achieved the threshold of 100bn USD at the international level.

Formal and legal framework

Legislation in the field of the Sustainable Financing is developing fast through various important directives and documents that are strategically and in the long-term impacting further development of sustainable finance. European Commission has already put in place various directives and regulations that are in line with realization of previously set goals and targets (Green Deal, SDGs, climate targets, etc.), and many new are on the way.

European Green Deal

The European Green Deal is the Plan of EU for its Sustainable Economy, and it represents a package of activities starting from cutting greenhouse gas emissions, to investing in research and innovation and protecting natural environment. Some climate action initiatives within the Green Deal are: a) European Climate Law; b) European Climate Pact to engage citizens; and c) European Union's Green Deal which ensures an important role for banks, emphasizing the relevance of an aligned approach toward risk regulations and ESG data.

The European Commission has prepared several concrete actions that will offer a strong basis for the new deal, such as Sustainable Europe Investment Plan (with one trillion euros of investment, over the next decade), Just Transition Fund, support of the European Investment Bank (European Commission, 2019). Besides being a strategically important systemic package of EU, EU Green Deal also represents a cultural change both in public and private sector.

Action Plan on Financing Sustainable Growth

The action plan on financing sustainable growth was introduced in March 2018 and it identifies 10 strategic actions through three categories:

I Category – Reorienting capital flows for a more sustainable economy - creating labels for green financial products, establishing EU taxonomy, incorporating sustainability in financial advice, fostering investment in sustainable projects, and developing sustainability benchmarks (European Commission, 2018).

II Category - Mainstreaming sustainability into risk management - clarifying asset managers' and institutional investors' duties regarding sustainability, better integrating sustainability in ratings and market research, etc. (European Commission, 2018).

III Category - Fostering transparency and long-termism (European Commission, 2018).

Each of the categories is comprised of several lines of activities, that are subject of further engagement of various bodies whose outcome is specific piece of legislation produced in order to further regulate fragments that should support sustainable financing and sustainable development and growth. Some of them already produced and approved (e.g., Technical Expert Group on Sustainable Finance (TEG) published its report on EU Green Bond Standard) and many of them are on the way.

Renewed Sustainable Finance Strategy and other further regulations

The European Green Deal of 11 December 2019 emphasized the need for long-term framework in the capital markets and financial markets towards investments in green projects. Also, the document had foreseen a renewed sustainable finance strategy to be introduced (European Commission, 2019). During the Q2 of 2020, European Commission initiated a broad range of public consultations on the Renewed Sustainable Financing Strategy. Addressing all stakeholders on how the financial sector and the economy can become more sustainable, the enquiry has been divided in several segments: a) Strengthening the foundations for Sustainable Finance, b) Increasing possibilities for citizens, institutions in the financial sector, and corporates to enhance sustainability, and c) Reducing and managing climate and environmental risks.

Due to its importance for the financial sector, all relevant public and private European Institutions in the financial sector published their official responses to the European Commission's consultations, such as the European Central Bank, European Banking Authority, and the European Banking Federation. Responses to the consultation process on RSFS generated during the consultation process², are very thorough, involving experts view and reflecting existing experiences and practices. It is expected that the implementation of the Renewable Sustainable Finance Strategy will empower the sustainability practice from (voluntary) culture to the examples, practices and behaviors based on (compulsory) regulation.

Therefore, the **Renewable Sustainable Finance Strategy, published by the European Commission on July 6th, 2021, will represent the milestone in the field of practicing best cases and trends in sustainable development.**

Eventually, within the European Green Deal, it is planned that the Commission should initiate a **European Climate Pact** as a multi-stakeholder's platform with an aim to "give everyone a voice and space to design new climate actions, share information, launch grassroots activities and showcase solutions that others can follow" (European Commission, 2019).

In parallel with legislation, international organizational setting in Sustainable Finance at the European Level is developed through: a.) High Level expert group on sustainable finance – HLEG (since 2016), b.) Technical Expert Group on Sustainable Finance – TEG (2018), c.) Member States expert group on sustainable finance, d.) International Platform on Sustainable Finance, etc. (European Commission, 2019).

²The European Commission launched a consultation on its sustainable finance strategy on 8 April 2020, and closed on 15 July 2020.

Therefore, it is expected that the future Renewable Sustainable Financing Strategy will build up on the work done so far by the HLEG and TEG will enable environment for further growth, sustainable development and expectations of demand and supply sides and stakeholders.

Impact of Sustainable Financing on Banks

Sustainable financing is bringing value added to banking sector, but also providing strategic change and its further transformation. Some of the international financial institutions, like European Investment Bank and European Bank for Reconstruction and Development, already declared their green policy, not as an additional credit lines program, but with a strategic declaration and commitment that all finances should go green in the next decades. In line with that, more and more commercial banks are changing their strategic directions and commitments with the same aim (Deutsche Bank, 2020).

In banking sector today, there is a consensus that it is not anymore the question if banks will adapt, but how they will adapt. Since 99% of businesses are SMEs, banks will be an important stakeholder also in transition to a green economy. These can be shortly presented through the change of paradigm:

1. Not only *what* the bank is financing, it is the shift to *how* the bank is financing. Investing in environmental project, reducing gas emissions, supporting socially responsible investments will not and should not be a segment in a way separated from the traditional or core business activity. What the Sustainable Finance as a concept is expecting is a change of state of minds, shift in paradigm that will label *all* financing activities as a sustainable, instead a fragment. For example, Deutsche Bank promoted at the end of May 2021 its own new targets in financing sustainable projects to about EUR 220 bn by 2023, which is 10 per cent higher than its existing targets³. On this occasion, Deutsche Bank CEO has addressed the importance of sustainability for all banking operations by emphasizing that “lenders risk losing their license to operate” if they fail to make green finance a priority⁴.
2. Due to the mentioned qualitative change and ESG principles, Sustainable Financing is a concept that goes much beyond the CSR activities that are defined differently within organizational settings (general management, marketing, human resources etc.). Sustainable financing is a way to transform existing ratio between business and CSR financing in a mode that would be transforming plain vanilla business finance and ethics, requiring it to have new value-added and integrating ESG factors.

Global banks must reflect climate considerations within their overall investment portfolio and related risk framework and capital allocation processes, such as the need to strengthen capabilities for scenario analysis, stress-testing, data, technology and a comprehensive climate-risk governance framework. Many of international banking initiatives (mentioned above) provide an important role for banks, which emphasize the relevance of a harmonized approach toward risk regulations and ESG data.

³ The split of the targets is: Investment bank will account for EUR 105 bn for the green business, private banking will contribute EUR 86 bn and the corporate bank will contribute EUR 30 bn.

⁴ Deutsche Bank Chief Executive Officer Mr. Christian Sewing.

It is the case for instance with UNEP, which in its 2018 Sustainable Finance Progress Report concludes that three factors have very important impact, such as: systemic national action, greater international cooperation, and increased market leadership. This Report also emphasizes various new types of sustainable finance policies that have emerged in 2018, such as taxonomies and labelling, disclosure, policy incentives, products, tools and capacity-building (UNEP, 2019).

Banking industry involvement in sustainable financing development is direct, proactive and productive: policies, conferences, Task Forces, Raising Awareness and help in implementation are some of the forms in which banking industry is involved directly, besides its funding potential. In this way, banking sector is influencing actively further development of sustainable finance market so that the relationship between sustainable financing and banking became mutual and reflexive, exchanging impact in both directions. This positively affects further the preferences and habits of users (investors). For example, Deutsche Bank has analyzed that the new generation of investors refocus on green investing; having many options to invest their money (e.g., for pension scheme), they make an informed choice consistently opting for the environmentally friendly options.

One of the examples of such a complex proactive initiative of the banking community aimed to support legislation set by the European Commission is the following - The European Banking Federation (EBF), as the voice of European Banks, and the United Nations Environment Programme Finance Initiative (UNEP FI) have launched a project to assess the extent to which the EU Taxonomy on Sustainable Activities could be applied to core banking products. A Working Group was composed of 25 banks, 7 banking associations and 5 observers, and together they were working on developing the guidelines. The project is sponsored by BBVA, BNP Paribas, Credit Suisse, Danske Bank, Deutsche Bank, FMO, ING, SEB, Societe Generale, Standard Chartered, UBS and UniCredit. The Working Group presented the High Level Recommendation to public in January 2021. Some recommendations are, for example: a) for housing loans - Environmental Performance Certificates (EPC) for housing, although not yet available in all EU countries, could be used as a cross-reference to make assumptions for real estate in all EU countries. That would allow banks to rely on EPC certification, assessing if mortgage loans labelled A or B could be eligible to be classified for Taxonomy purposes and allowing low carbon products to be considered as directly meeting DNSH (i.e., Do Not Significant Harm) criteria for Retail. b) For car loans and electric vehicle sector – since verifying DNSH criteria for electric vehicles made outside the EU is not possible, data base where car manufacturers provide details about each car available in the EU market, could be considered.

This project is a great example of the proactive and responsible role of the banking sector in further implementation of the sustainable finance policy and culture, as well as of stakeholder's involvement. In addition, this project discloses high importance of the role of the national banking associations in sustainable financing development.

Some Perspectives of Sustainable Financing in Serbia

As is the case with banks in the European Union and around the world, the question is no longer whether the banks operating in Serbia will respond to society's needs in financing the green and circular economy. Following the global trends in CSR implementation through best practices and behaviors in the last two decades, together with growing importance of the regulation in the sustainable financing, such a commitment is already certain. It is rather question how and under what conditions and instruments will respond to such a wide spectrum of global goals. The appearance and nature of the sustainable financing in the financial sector, will also in Serbian banking sector introduce two new imperatives: (1) improving the contribution of financing to sustainable and inclusive growth by financing the long-term needs of society; and (2) strengthening financial stability by including environmental, social and management factors (ESGs) in investment decisions. Sustainable financing is rather a process that would consider environmental and social aspects in the investment decision-making process, and it would be supported further by several factors: bank group initiatives, arrangements with International Financial Institutions, local initiatives and regulation, local market, and other stakeholders. One of the recent initiatives that has an impact on the whole banking sector and was initiated by the banking sector through its local banking association - Association of Serbian Banks (ASB). ASB, an organization that brings together all banks operating in Serbia, as well as the Belgrade Stock Exchange, joined on 18 November 2020 the Sustainable Banking Network (SBN) of the International Finance Corporation (IFC). The SBN Sustainable Banking Network is a unique, voluntary community of financial sector regulatory agencies and emerging market banking associations, committed to improving sustainable finance in line with good international practice. Together with 41 member countries, it represents \$ 43 trillion (86 percent) of total banking assets in emerging markets.

Cooperation starts from the banking sector, connecting associations of banks, central banks, and banks through two pillars: 1) building joint initiatives, knowledge, experience and education in the field of sustainable financing and 2) improving practice in applying ESG principles in business. The characteristics and advantages of membership that banking sector of Serbia will benefit is shown in the following directions: a) focus on cooperation with the banking sector, in emerging markets; b) Public-private partnership; c) Commitment to education, learning and exchange of good practice; and d) Access to IFC expertise, technical assistance, and webinars. SBN is a living network whose goal is to support further market development through education. Therefore, ASB may be the appropriate partner to help further promotion of a culture of sustainability in the banking sector of Serbia through education, training, and other ways of sharing experiences and encouraging initiatives (including financial education and engagement in society on behalf of banks) towards further awareness raising and promotion of a new culture. The European regulation in Sustainable Financing domain will soon be compulsory in all EU Members States⁵, it will also affect third markets. This will particularly be relevant for banking sectors operation in non-EU Member Countries, like Serbia. Therefore, it is important that Serbia gets involved timely.

⁵ E.g., European Commission adopted the proposal for the Corporate Sustainability Reporting Directive in April 2021. The official approval of the Directive is expected at the end of 2022, which would impose the obligation to the companies to apply the standards for the first time to reports published in 2024, covering financial year 2023.

In addition to the Serbian banking sector industry contribution, there are other segments of the Serbian market that may facilitate further sustainable financing in Serbia e.g.,: recent adoption of the Law on Climate Changes in the Republic of Serbia (March 2021), amendments to the Budget Law (April 2021) introduced three times higher level for the investments into the projects in infrastructure (compared to the initial Budget Law for 2021) that may be considered as projects for the sustainable development, National Bank of Serbia has already invested its foreign exchange reserves in Green Bonds at the international financial markets. Local Capital market already recorded the first IPO in the renewable energy sources sectors (Fintel Energija). There are many other directions for further engagement, such as: a) further improvement of the policies, guidelines, and regulation (for instance, expectations that new legislation in the domain of crowdfunding will support further the sustainable financing and green transformation of the economy), b) need for raising awareness to financial services consumers, c) education of employees in banks. Some particular challenges may arise in those processes, too, such as a need for proper and timely coordination between various approaches and policies between banking industry (banks and Bank Groups), Government, Central Bank of Serbia, International Financial Institutions, and other stakeholders (clients, non-governmental organizations, environmental organizations, etc.).

Conclusion

Ingredients of sustainability (social aspects, corporate social responsibility, environmental criteria, green financing, energy efficiency, renewable energy financing, etc.) have been present in banking sector for a long time already. The presence of close coordination between profit and development goals has largely characterized capital flows internationally and during the first decade of the XXI century, and such a voluntary principle is becoming increasingly desirable and generally accepted behavior not only by development agencies but also investors, international financial institutions, insurance companies, auditing companies, stock exchanges and of course commercial banks (Sredojević, 2006, p.2). The fact that elements of sustainability culture have been present in the banking sector as a way of integrating social, environmental or governance issue in the business activity represent the important and positive foundation for the future successful implementation of sustainable finance policy and legal requirements. That position enabled banks to be very active market participants today in further implementation of the Sustainable Development Agenda and other related global goals.

Today, when sustainable financing represents the concept itself formalized as the Renewed Sustainable Finance Strategy⁶, we may say that equally public and private sector put a high and relevant attention to its proper implementation both at the strategic/policy level and at the level of a regular/operational business activity.

⁶ Renewed Sustainable Finance Strategy is expected to be adopted in June 2021.

After the adoption of the Renewed Sustainable Finance Strategy, banks, as market participants, will receive a strong impact of the legislation that is thoroughly being prepared by the European Commission and they do have positive practice in sustainable financing. Furthermore, many international initiatives analyzed in this paper show that banks are also very active participants and initiators of principles, standards, measures, and other policy level forms. In this way, both directional relationship is developed between banks and other market participants and regulators, so that we may see positive, important and productive role of the banking industry in future development of sustainable finance. Associations of Banks, as national representatives of banking industries, facilitate and support further banks in their important mission in the society. These processes also point to the conclusion that the emergence of the concept of sustainable financing is actually an evolution in the banking sector, as well as that the concept of sustainable financing has a stimulating impact on the banking sector through several forms and ways.

However, redirecting private capital to greener and more sustainable investments demands a more structural and wider change in the way the financial system works. This is inevitable if we want more sustainable economic growth, stability of the financial system and greater level of long-termism in the economy. All these goals are also integrated as the parts of the broader picture, European Union Capital Markets (CMU) project, where concept of sustainable finance complementary fits under the umbrella. At the same time, it is important to continue to scale up further sustainable financing activities, such as: raising awareness on the complexity of the sustainable financing, importance of market participants active engagement, and their mutual partnerships in further development. Particularly, as it is the case for local banking sector in Serbia, very useful impact may be realized through the education and introduction of the culture of sustainable financing. This may happen through the recent membership of the Association of Serbian Banks, as the banking industry representative, in the Sustainable Banking Network of the International Financial Corporation. Other than banking industry being directly involved, other segments of the local market may give significant impact to further implementation of sustainable financing through their institutional contributions (e.g., Central Bank of Serbia, Commission for Securities, Belgrade Stock Exchange).

The process of implementation of sustainable financing will also have many challenges, such as potential negative impact of ESG performance on cost of capital. E.g., in a recent global Survey realized by the Deloitte Insights, almost 60 per cent of CFOs of listed companies state that ESG performance has a high or moderate impact on the cost of capital, and only 42 per cent of family-owned businesses, as they may be less dependent on financial markets for their financing (Coppola and Rinkel, 2020). In addition to this, timely and comprehensive approach to raising awareness and advisory services to consumers (SMEs, retail clients) and to general public, but also activities aimed to the education of banks' employees would be needed in the future.

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SISTEMI ZAŠTITE INFORMACIJA U ELEKTRONSKOM BANKARSTVU

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Rezime

Imajući u vidu da je implementirano u mrežnom okruženju, elektronsko bankarstvo izloženo je različitim sigurnosnim rizicima. Zbog toga je za bezbedno korišćenje bankarskih usluga u elektronskom obliku potrebno identifikovati potencijalne pretnje kroz analizu mrežne infrastrukture i karakteristika aplikacije, kao i odgovoriti na njih primenom odgovarajućih mera zaštite.

Ključne reči: elektronsko bankarstvo, sistemi zaštite, principi bezbednosti, napadi, mere zaštite, aspekti zaštite, zaštitni zid, kriptozastita

JEL klasifikacija: E42, K24, L86, M15.

Uvod

Elektronsko bankarstvo (e-banking), zajedno sa elektronskom trgovinom, upravljanjem odnosima sa klijentima, planiranjem resursa preduzeća, upravljanjem lancima vrijednosti i poslovnom inteligencijom, predstavlja sastavni dio elektronskog poslovanja (e-business).¹ Elektronsko poslovanje se u najširem smislu definiše kao interni ili eksterni poslovni proces koji se realizuje posredstvom računarske mreže.²

Pod elektronskim bankarstvom podrazumijeva se sveukupnost tehnoloških procedura, koje obezbjeđuju vršenje bankovnih transakcija elektronskim putem.³ Drugačije rečeno, elektronsko bankarstvo je vid bankarstva koji se odvija pomoću elektronskih sistema, čiji je zadatak da vrše transfer novčanih sredstava i prave zapise u vezi sa njima, bez papira, koristeći računarsko komunikacione tehnologije.⁴ Tako, klijenti banaka mogu da koriste usluge elektronskog bankarstva putem interneta, mobilnih uređaja, bankomata i POS terminala.

Kako koncept elektronskog bankarstva korisnicima bankarskih usluga, ali i samim bankama, omogućava da ispunjavaju svoje uobičajene aktivnosti elektronskim putem, to je osnovni preduslov za njegovo normalno funkcionisanje ispravan informacioni sistem banke, funkcionalna infrastruktura mreže i zaštita informacija i transakcija.

¹ Elektronska trgovina (e-trgovina) se definiše kao transakcija preko računarske mreže, koja podrazumijeva prenos vlasništva ili prava za korišćenje roba i usluga, kao na primjer: kupovina knjiga preko interneta, rezervacija hotelske sobe preko interneta, naručivanje i preuzimanje besplatnog softvera preko interneta itd. (B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *Elektronsko poslovanje*, Beograd, 2015, s. 131)

Upravljanje odnosima sa klijentima (Customer Relationship Management – CRM) je dio elektronskog poslovanja koji obuhvata niz metoda, tehnika i oprobanih praksi implementiranih u okviru poslovnog sistema, u cilju unapređenja komunikacije i saradnje sa klijentima, promovisanja proizvoda i usluga i maksimiziranja poslovne dobiti. Riječ je o poslovnoj strategiji čiji rezultati istovremeno optimizuju profitabilnost i prihode, doprinose zadovoljstvu klijenata i ostvarenju lojalnosti, a koja podrazumijeva sve aspekte interakcije kompanije sa klijentima, bez obzira na to da li se radi o prodaji ili uslugama. Želi se ostvariti takva situacija u kojoj će svaki od klijenata imati poseban tretman i ponudu koja mu u datom trenutku najviše odgovara i koja će se odnositi samo na njega. (Isto; V. Simović, *Elektronsko poslovanje-skripta (verzija 2)*, Beograd, 2013, s. 10)

Planiranja resursa preduzeća (Enterprise Resource Planning–ERP) predstavlja softverski paket koji prati sve aspekte poslovanja jedne kompanije. Njega karakteriše efektivno upravljanje procesima u preduzeću, postojanje zajedničke (jedinstvene) baze podataka, kao i mogućnost brzog reagovanja na operativne zahteve. (V. Simović, *n.d.*, s. 11; B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *Priručnik za pripremu prijemnog ispita za upis na master studije*, Beograd, 2012, s. 32,33)

Upravljanje lancima vrijednosti (Supply Chain Management–SCM) označava termin koji se koristi da opiše tok materijala, informacija i sredstava kroz lanac nabavke (vrijednosti) od snabdevača preko proizvođača pojedinih komponenti, konačnog spajanja i distribucije (skladišta i maloprodaja) pa do konačnog kupca, pri čemu ovaj proces često sadrži i dodatne usluge koje prate proizvod posle prodaje i povraćaj proizvoda na reciklažu. Lanac vrednosti predstavlja skup poslovnih procesa koji povezuje snabdevače, proizvođače, prodavce na malo, poslovne korisnike, i ostale umešane u stvaranje, prodaju i isporuku robe do krajnjeg kupca. (V. Simović, *n.d.*, s. 11; B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 33)

Poslovna inteligencija (Business Intelligence – BI) je proces prikupljanja raspoloživih internih i značajnih eksternih podataka i njihovog pretvaranja u korisne informacije koje pomažu menadžmentu pri donošenju odluka. (M. Milić, *Odlučivanje i poslovna inteligencija*, Banja Luka, 2014, s. 85)

² B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 4.

³ I. A. Reznik, *Elektronnyi banking*, Orenburg, 2008, s. 7.

⁴ T. Uroš, *Elektronsko bankarstvo*, Beograd, 2014, s. 120.

Svakako da je sa aspekta povjerenja klijenta u pogledu korišćenja sistema elektronskog bankarstva od posebnog značaja da se obezbjedi sigurnost njihovog funkcionisanja, odnosno da se pomoću odgovarajućih sistema zaštite informacija obezbjedi da se sigurnosni rizici kojima je izložena svaka računarska mreža svedu na najmanju moguću mjeru.

Osnovni principi sigurnosti u elektronskom bankarstvu

U osnovne principe sigurnosti na kojima treba da se bazira primjena servisa elektronskog bankarstva ubrajaju se: povjerljivost, integritet, dostupnost, autentičnost, neporecivost, enkripcija i praćenje.⁵

Princip povjerljivosti podrazumijeva nedostupnost informacija neautorizovanim osobama, kao i njihovu zaštićenost od presretanja tokom prenosa.

Poštovanje principa integriteta treba da obezbijedi neizmjenljivost informacija tokom prenosa na mreži.⁶ Drugačije rečeno, princip integriteta podrazumijeva konzistentnost podataka, sprečavajući neovlašćeno generisanje, promjenu i uništenje podataka.⁷

Dostupnost je princip koji autorizovanim korisnicima obezbjeđuje pravovremeni pristup informacijama, tj. riječ je o pristupu informacijama po zahtjevu korisnika.⁸

Princip autentičnosti odnosi se na postojanje mehanizma za izvršavanje autentifikacije korisnika, prije nego što se dozvoli pristup traženim informacijama.

Neporecivost je princip koji podrazumijeva nemogućnost poricanja poruke koju je poslao korisnik, kao i nemogućnost da primalac poruke porekne njeno dobijanje.

Prema principu enkripcije informacije treba da budu enkriptovane i dekriptovane od strane autorizovanog korisnika.

Princip praćenja odnosi se na neophodnost snimanja podataka, kako bi se mogla pratiti dešavanja u sistemu.⁹

Napadi na elektronsko bankarstvo

Elektronsko bankarstvo može biti izloženo različitim vrstama napada kao što su: socijalni inženjering (social engineering), skeniranje portova (port scanners), paket analizator (njuškač paketa-packet sniffers), probijanje lozinke (password cracking), trojanci (trojans), napad uskraćivanjem servisa (denial of service attack), greške na serveru (server bugs), eksploatacije superkorisnika (super user exploits), fišing i dr.¹⁰

⁵ B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 225.

⁶ Isto.

⁷ M. Unković, M. Milosavljević, N. Stanišić, *Savremeno berzansko i elektronsko poslovanje*, Beograd, 2010, s. 231

⁸ D. M. Korać, *Model zaštite informacija u sistemima za menadžment identiteta i upravljanje pristupom (doktorska disertacija)*, Beograd, 2018, s. 10.

⁹ B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 225.

¹⁰ Z.B.Omariba, N.B. Masese, G. Wanyembi, *Security and privacy of electronic banking*, International Journal of Computer Science Issues, Vol. 9, Issue 4, No 3, July 2012, s.440; B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 226.

Socijalni inženjering (social engineering) podrazumijeva takvu situaciju u kojoj napadač, predstavljajući se kao sistemski administrator ili predstavnik korisničke službe, navodi korisnika, zloupotrebljavajući njegove socijalne karakteristike (povjerenje, želju da se pomogne drugome, odgovornost itd), na otkrivanje osjetljivih informacija, kako bi pristupio njegovom nalogu.¹¹

Skeniranje portova (port scanners) se koristi od strane napadača da bi se utvrdile ulazne tačke u sistem, radi korišćenja raznih tehnika za krađu informacija. Ova vrsta softvera šalje signale mašini ili ruteru i bilježi poruku kojom mašina odgovara u cilju utvrđivanja tačke ulaska. Glavna svrha skeniranja portova je prikupljanje informacija povezanih sa hardverom i softverom koji pokreće sistem, kako bi se mogao razviti plan napada.¹²

Paket analizator ili njuškač paketa (packet sniffers) koristi se za prikupljanje podataka koji se prenose mrežom, tj. ovaj softver nadgleda vezu između korisnikovog računara i veb servera kako bi prikupio podatke koji se odnose na korisnika, uključujući lozinke i podatke o kreditnoj kartici. Pošto ne manipulišu protokom podataka, već je njihova funkcija hvatanje mrežnog prometa, njuškače paketa je vrlo teško otkriti.

Probijanje lozinke (password cracking) obuhvata različite mogućnosti napada u svrhu dešifrovanja lozinki, među kojima je najpopularniji napad grubom silom. Da bi se na ovaj način pristupilo podacima korisnika skeniraju se hiljade uobičajenih izraza, aktivnosti i imena, koji se potom kombinuju sve dok se ne dobije odgovarajuća kombinacija, odnosno korisnička lozinka. Probijanje lozinke grubom silom uglavnom se primjenjuje kod sistema koji ne zahtijevaju jake lozinke, pa korisnici koriste uobičajena imena i aktivnosti, što olakšava otkrivanje pasvorda, odnosno pristup sistemu. Druge metode probijanja lozinki uključuju upotrebu heš tabela za dešifrovanje datoteka lozinki, koje mogu otkriti celu listu korisničkih imena i lozinki sistema.¹³

Trojanci (trojans) su kompleksne klijent-server aplikacije, koje omogućavaju pristup udaljenim korisničkim računarima u mreži, (do korisnika stižu putem imejla, diskusionih grupa, popularnih čet programa itd.), na način što ih sami korisnici instaliraju na svoj računar, smatrajući da će im biti od koristi.¹⁴ Trojanac, koji se nalazi na računaru korisnika (žrtve) je u stvari server, a klijent je program koji upravlja trojancem i koji se nalazi na računaru osobe koja namjerava da dođe do bitnih informacija na račun žrtve.¹⁵

Napad uskraćivanjem servisa (denial of service attack) predstavlja tip napada koji ima za cilj da spriječi legitimne korisnike da pristupe mrežnim uslugama, što se postiže preopterećenjem mrežnih servisa ili prekomernom konekcijom, usljed čega dolazi do pada konekcije ili servisa. Naime, infrastruktura međusobno spojenih sistema i mreža sastoji se od ograničenih resursa, što je najbitnija činjenica kod napada uskraćivanjem servisa, koji podrazumijevaju slanje velikog broja zahteva ciljanom serveru, kako bi preplavili njegove ograničene resurse i učinile ga neupotrebljivim.¹⁶

¹¹ Isto.

¹² Z.B.Omariba, N.B. Masese, G. Wanyembi, *n.d.*, s.440.

¹³ Isto.

¹⁴ S. Jo, *Zaštita računarskih mreža–analiza antivirusne zaštite (master rad)*, Beograd, 2015, s. 28; M. Milosavljević, V. Mišković, *Elektronska trgovina*, Beograd, 2016, s. 229.

¹⁵ S. Jo, *n.d.*, Beograd, 2015, s. 28–29.

¹⁶ D.V.Vuletić, *Napadi na računarske sisteme*, Vojnotehnički glasnik, br. 1, Beograd, 2012, s. 236.

Greške na serveru (server bugs) se često otkrivaju i blagovremeno ispravljaju. Međutim, sistemski administratori često sporo primenjuju najnovija ažuriranja, što napadaču daje dovoljno vremena da kreira prijetnju.¹⁷

Eksploatacije superkorisnika (super user exploits) omogućavaju napadaču da preuzme kontrolu nad sistemom kao da je administrator. U tom cilju često se koriste skripte¹⁸ za manipulisanje bazom podataka ili napad prekoračenja bafera¹⁹, koji nanosi štetu sistemu slično kao i napad uskraćivanjem servisa.²⁰

Fišing (phishing) predstavlja vrstu napada koja se odnosi na pokušaj krađe ličnih podataka, tako što se žrtva navodi na lažnu veb-stranicu.²¹ U tu svrhu napadači (fišeri) obično koriste falsifikovane imejlove, koje šalju potencijalnim žrtvama u ime određenih organizacija sa kojima one imaju kontakt (npr. banka, osiguravajuća kuća i slično). Tako se, na primjer, mejl šalje korisniku banke u kome se navodi da će mu račun biti ukinut ukoliko ne ažurira lične podatke. U mejlu se daje i link ka lažnom sajtu, koji predstavlja vjernu kopiju originalnog sajta određene ustanove, gdje potencijalna žrtva unosi broj svog računa i lozinku, što kasnije biva zloupotrijebljeno, pre svega u cilju sticanja finansijske koristi napadača.²²

Mjere zaštite računarskih mreža i informacija

Pod zaštitom mreža i informacija podrazumijeva se skup pravila, procedura, algoritama, hardversko-softverskih komponenata, kao i skup organizaciono-tehničkih mjera kojima se štite funkcije mreže pri izvršavanju mrežnih transakcija.

Zaštita informacija obuhvata zaštitu od: neovlašćenog uvida i korišćenja informacija, nekontrolisanog oticanja informacija, slučajnog ili namjernog oštećenja, izmjene ili uništenja.

Zaštita računarskih mreža i informacija realizuje se kroz primjenu različitih mjera kao što su: mjere kadrovske politike; organizaciono-administrativne mjere; tehničke mjere fizičke, elektronske i protivpožarne zaštite; hardversko-softverske mjere; aplikativno programske mjere i mjere kriptozastite.²³

Mjere kadrovske politike su potrebne zbog toga što korisnici usluga mreže predstavljaju nosioce informacija, ali i najveću potencijalnu opasnost po te informacije.

¹⁷ Z.B.Omariba, N.B. Masese, G. Wanyembi, *n.r.*, s. 442.

¹⁸ U računarskom programiranju, skripta je program ili redosled uputstava koji tumači ili izvršava drugi program. (<https://whatis.techtarget.com/definition/script>)

¹⁹ Pod prekoračenjem bafera (bafer-blok memorije predviđen za privremeno skladištenje podataka) podrazumijeva se upisivanje sadržaja van granica rezervisane memorije bafera. U stvari to je situacija u kojoj se ukazuje na adresu nekog raspoloživog bafera, ali se koriste lokacije koje ne predstavljaju dio njegove memorije. Prekoračenje bafera može da dovede do neočekivanog toka izvršavanja programa, kao i da omogući razne vrste zloupotreba programa. Ovaj problem je naročito prisutan u programima napisanim na programskom jeziku C. (M. Vujošević-Janičić, *Automatsko otkrivanje prekoračenja bafera u programskom jeziku C (magistarski rad)*, Beograd, 2008, s. 9, 87)

²⁰ Z.B.Omariba, N.B. Masese, G. Wanyembi, *n.r.*, s. 442.

²¹ B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 226.

²² D.V.Vuletić, *n.r.*, s. 238

²³ M. Jevtović, *Zaštita računarskih mreža*, Vojnotehnički glasnik br. 5, Beograd, 2005, s. 435.

Organizaciono-administrativnim mjerama se normativno regulišu prava, obaveze i odgovornost korisnika informacionog sistema, uključujući i sankcije prema korisnicima.

U tehničke mjere fizičke, elektronske i protivpožarne zaštite ubrajaju se: fizičko obezbjeđenje, elektronska protivprovalna zaštita i zaštita od nestanka i neadekvatnog napajanja električnom energijom. Ove mjere se primjenjuju radi zaštite: objekata (prostorija u kojima se nalazi računarska i telekomunikaciona oprema), računarske i telekomunikacione opreme i magnetnih i elektronskih nosilaca podataka.²⁴

Hardversko-softverske mjere se koriste radi obezbjeđenja pristupnih tačaka mreži i pojedinim resursima mreže. Ove mjere podrazumijevaju identifikaciju korisnika i utvrđivanje prava i ovlašćenja koja su mu data u pogledu resurse mreže kojima pristupa.²⁵

Aplikativno-programske mere predstavljaju procedure koje se u cilju zaštite ugrađuju u aplikativni softver.

Mere kriptozastite primjenjuju se radi zaštite podataka u memorijskim resursima u računarima i zaštite na prenosnim putevima.²⁶

Različiti aspekti zaštite računarskih mreža i informacija

Različiti aspekti zaštite se veoma često definišu u odnosu na mjesto pozicioniranja mehanizama zaštite u računarskom ili informacionom sistemu ili računarskoj mreži. U tom smislu može se govoriti o zaštiti na nivou aplikacije, zaštiti na nivou operativnog sistema, zaštiti na nivou mrežne infrastrukture, te proceduralnoj i operacionoj zaštiti.²⁷

Zaštita na nivou aplikacije može da obuhvata sljedeće elemente: softversku zaštitu aplikacije, izolovanje kritičnih aplikacija na namenskim hostovima, kao i primenu specifičnih protokola (na primjer, kriptografski zaštićenog SSH protokola umjesto nezaštićenog Telnet protokola).

Zaštita na nivou operativnog sistema predstavlja veoma složeno i obimno područje koje se tiče svih slojeva operativnog sistema. Ovaj nivo zaštite obuhvata i vezu na relaciji operativni sistem – aplikacije, kao i odnos prema mrežnoj arhitekturi, tj. vezama prema drugim sistemima. Prema nekim preporukama, minimalna zaštita obuhvata: blokiranje nepotrebnih servisa (finger, ftp, telnet), obezbjeđivanje sveobuhvatne i obavezne kontrole pristupa na nivou korisnika, obezbjeđivanje integriteta softvera koji čini operativni sistem (većina sigurnosnih napada usmjerena je na operativne sisteme bez primijenjenih zakrpa, pa je zato potrebno redovno ažurirati sve elemente sistema najnovijim zakrpama).

²⁴ Isto, s. 435.

²⁵ Identifikacija korisnika može biti fizička (upotrebljavaju se hardverski uređaji) i logička (koriste se softverske metode). Metode fizičke identifikacije zasnovane su na prepoznavanju identifikacionih sredstava koje korisnik poseduje (inteligentne kartice, magnetne i optičke kartice, bedževi, žetoni i slično) i prepoznavanju fizičkih, biometrijskih karakteristika korisnika (otisak prsta, otisak i oblik šake, oblik uha ili glave, osobine glasa, slika mrežnjače oka i drugo) Metode logičkog prepoznavanja zasnovane su na informacijama koje korisnik u procesu identifikacije i autorizacije ovlašćenja daje sistemu. Te informacije moraju biti jednake informacijama kojima sistem raspolaže. (Isto, s. 435, 436)

²⁶ Isto, s. 435

²⁷ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *Sigurnost računarskih mreža*, Beograd, 2006, s. 25.

Zaštita na nivou mrežne infrastrukture obuhvata sljedeće osnovne elemente: primjena mrežnih barijera (firewalls), blokiranje nepotrebnih portova, šifrovanje putanje, izolovanje putanje pomoću rutera i svičeva ili pomoću posebne infrastrukture.

Kada je riječ o proceduralnoj i operacionoj zaštiti imaju se u vidu sljedeći elementi: zaštita primjenom politika i procedura, detekcija napada, proaktivno delovanje u pogledu zaštite ranjivosti sistema, upravljanje konfiguracijom sistema i obrazovanje korisnika.²⁸

Zaštitni zid (fajervol)

Fajervol (eng. firewall) je ključni element u mrežnoj sigurnosti, koji je, radi zaštite privatnih mreža, našao široku primjenu kako u bankama, tako i u drugim organizacijama i institucijama.²⁹

Pod fajervolom se podrazumijeva bezbjedonosni hardverski ili softverski uređaj, koji je najčešće smješten između lokalne mreže i javne mreže (interneta), a čija je namjena da štiti podatke u mreži od neautorizovanih korisnika (blokiranjem i zabranom pristupa u skladu sa pravilima usvojene bezbjedonosne politike).³⁰ Drugačije rečeno, fajervol je filter na relaciji lokalna mreža – internet, koji ispituje sve pakete koji prolaze između privatne mreže i interneta, a u zavisnosti od toga da li paketi zadovoljavaju pravila definisana listama za kontrolu pristupa, fajervol će dozvoliti ili zabraniti protok tog paketa.³¹

Funkcije fajervola

Najčešće funkcije koje obavlja fajervol su: filtriranje paketa, prevođenje mrežnih adresa i proksi servisi.

Filtriranje paketa

Kod filtriranja paketa, zaglavlje paketa (sastoji od izvorišne adrese, odredišne adrese i broja porta) se analizira i upoređuje sa pravilima zaštitnog zida. Shodno tome da li paket zadovoljava pravila, dozvoljava se njegov prolaz ili se vrši njegovo odbacivanje.³²

Proces filtriranja je moguće sprovoditi na osnovu bilo kojeg dijela zaglavlja paketa, pri čemu većina filtera donose odluku na osnovu:

- tipa protokola (na ovaj način moguće je izvršiti diskriminaciju čitavih skupova protokola, kao što su UDP, TCP, ICMP, IGMP)
- IP adrese (prihvatanje ili odbijanje paketa na bazi IP adrese je najjači oblik zaštite koji se može postići prostim filtriranjem paketa)

²⁸ Isto, s. 25, 26.

²⁹ K.Salah-ddine, *Overview Of Firewalls: Types And Policies Managing Windows Embedded Firewall Programmatically*, The International Conference on Engineering & MIS, Monastir, Tunisia, May 2017, s. 1.

³⁰ M. Veinović, A. Jevremović, *Uvod u računarske mreže*, Beograd, 2008, s. 28.

³¹ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, s. 92.

³² Isto, s. 93.

- TCP/UDP porta – na primer, svim računarima se može dozvoliti da pristupe TCP portu 80 (HTTP), dok je pristup TCP portu 22 (ssh) ograničen za računare koji pripadaju određenom opsegu IP adresa.³³

Na bazi definisanih pravila i zaglavlja konkretnog IP paketa, filter paketa može donijeti odluku da prihvati paket, odbaci paket, kao i da odbaci paket i obavesti pošiljaoca da njegov paket nije prihvaćen.³⁴

Prevođenje mrežnih adresa (Network Address Translation-NAT)

NAT predstavlja postupak prevođenja IP adresa računara iz privatne mreže u adresu fajervola, u cilju skrivanja informacija o mrežnim računarima od napadača sa interneta.³⁵ Nakon što je prilikom prolaska paketa kroz zaštitni zid NAT obavio postupak prevođenja adresa, podaci koji se nalaze u tom paketu šalju se mrežnim računarima sa adrese fajervola, pri čemu se koriste tablice prevođenja adresa.³⁶

Postoji nekoliko vrsta prevođenja IP adresa koje omogućavaju da se sakrije identitet računara u lokalnoj mreži. To su: statičko, dinamičko i dinamičko sa preopterećenjem prevođenja IP adresa.

Kod statičkog prevođenja IP adresa blok javnih IP adresa se na osnovu fiksne tablice prevođenja prevodi u blok privatnih IP adresa, tako da jednoj javnoj IP adresi odgovara jedna privatna IP adresa.

Kod dinamičkog prevođenja IP adresa blok javnih IP adresa se dinamički prevodi u blok privatnih IP adresa.³⁷

Dinamičko sa preopterećenjem (port address translation-PAT) prevođenje IP adresa je najčešći način prevođenja IP adresa, koji podrazumijeva da se na osnovu broja porta jedna ili više javnih IP adresa prevodi u veći broj privatnih IP adresa.³⁸

Proksi servisi

S obzirom na činjenicu da analiziraju i eventualno menjaju zaglavlje paketa a ne i njegov sadržaj, filtriranje i NAT ne obezbeđuju potpunu kontrolu podataka koji prolaze kroz fajervol. Tako je moguće da napadač pomoću mrežnog monitora pregleda saobraćaj koji dolazi iz fajervola i na osnovu dobijenih informacija zaključi da zaštitni zid prevodi adrese računara sa unutrašnje mreže.³⁹

³³ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, s. 95.

³⁴ Isto.

³⁵ Isto, s. 98, 99. Posmatrano iz vizure interneta, cijeli saobraćaj iz privatne mreže djeluje kao da dolazi sa jednog računara. (J. Milojković; R. Šoškić, Zaštita mail servera na nivou mrežne infrastrukture, Naučno stručno savetovanje ZITEX, Tara, Srbija, 2006, s. 7. (<https://singipedia.singidunum.ac.rs/izdanje/40097-zastita-mail-servera-na-nivou-mrezne-infrastrukture>))

³⁶ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, s. 98, 99.

³⁷ Isto, s. 99.

³⁸ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, s. 99.

³⁹ Isto, s. 100.

Ova prijetnja sprečava se pomoću proksi aplikativnog sloja, koji omogućava da se potpuno zabrani protok podataka protokola mrežnog sloja i da se dozvoli saobraćaj samo protokolima viših slojeva, kao što su HTTP, FTP i SMTP.

Proksi aplikativnog sloja predstavlja specifičnu klijentsko-serversku kombinaciju za konkretan protokol koji se koristi, pa je, na primer, web proksi kombinacija web servera i web klijenta. Serverski deo proksi protokola prihvata konekcije klijenata unutrašnje mreže, a klijentski deo protokola povezuje se na javni server. Pošto klijentski proksi dio primi podatke od javnog servera, serverska strana proksi aplikacije šalje podatke krajnjem unutrašnjem klijentu.⁴⁰

Kriptozaštita

Kriptografija⁴¹ je deo primenjene matematike koja proučava modele, metode, algoritme, softverska i hardverska sredstva za transformisanje informacija u cilju prikrivanja njihovog sadržaja, kao i sprečavanja njihove modifikacije ili neovlašćene upotrebe.⁴²

Kriptosistem je sistem koji primjenjuje softver, hardver ili softver i hardver u cilju vršenja kriptografske transformacije informacija.⁴³

Kriptoanaliza je odeljak primenjene matematike koji proučava modele, metode, algoritme, softverske i hardverske alate za analizu kriptosistema ili njegovih ulaznih i izlaznih signala s ciljem izdvajanja poverljivih parametara, uključujući i običan tekst.⁴⁴ Znači, kriptoanaliza se, suprotno kriptografiji, bavi otkrivanjem prikrivenog sadržaja transformisanih informacija. Svaki napad na privatnost podataka ustvari predstavlja pokušaj kriptoanalize.⁴⁵

Kriptologija je nauka koja objedinjuje kriptografiju i kriptoanalizu.⁴⁶

Glavni zadatak kriptografije je da obezbijedi da dvije osobe (pošiljalac i primalac poruke) komuniciraju preko nesigurnog komunikacionog kanala (telefonska linija, računarska mreža itd.) na način da neka treća osoba koja eventualno nadzire komunikacioni kanal ne može razumjeti njihove poruke.⁴⁷

Poruka koju pošiljalac želi da pošalje primaocu naziva se otvoreni tekst (plaintext ili cleartext). Otvoreni tekst se od strane pošiljaoca, pomoću odgovarajućih informacija (ključa za šifrovanje), transformiše u tekst nerazumljiv za treća lica. Takav tekst naziva se šifrat (ciphertext) ili kriptogram, a postupak pomoću kojeg se otvoreni (izvorni) tekst transformiše u kriptogram naziva se kriptovanje ili enkripcija (encryption).⁴⁸

⁴⁰ Isto, s. 100.

⁴¹ Riječ grčkog porijekla koja se prevodi kao tajni zapis (S. Jo, *n.d.*, s. 18).

⁴² N. A. Gatčenko, A. S. Isaev, A. D. Ćkovlev, *Kriptografska zaštita informacija*, Sankt-Peterburg, 2012, s. 31.

⁴³ N. A. Gatčenko, A. S. Isaev, A. D. Ćkovlev, *n.d.*, s. 31.

⁴⁴ Isto.

⁴⁵ I. Lacmanović, *Elektronsko bankarstvo*, Beograd, 2010, s. 55.

⁴⁶ N. A. Gatčenko, A. S. Isaev, A. D. Ćkovlev, *n.d.*, s. 31.

⁴⁷ S. Jo, *n.d.*, s. 18.

⁴⁸ Isto; N. A. Gatčenko, A. S. Isaev, A. D. Ćkovlev, *n.d.*, s. 31; D. Lacmanović, B. Markoski, I. Lacmanović, *Zaštita podataka na internetu (Razvoj i testiranje RSA asimetričnog kriptografskog postupka)*, XI međunarodni naučno-stručni Simpozijum INFOTEH-Jahorina, Republika Srpska, 2012 s. 932. (https://www.researchgate.net/publication/323070387_Zastita_podataka_na_Internetu_Razvoj_i_testiranje_RSA_asimetricnog_kriptografskog_postupka)

Nakon kriptovanja, pošiljalac šalje kriptogram preko nekog komunikacionog kanala, pri čemu osoba koja eventualno prisluškuje kanal može saznati sadržaj šifrata, ali mu neće biti jasno šta je zapisano u otvorenom tekstu. Međutim, primalac, budući da mu je poznat ključ kojim je kriptovana (šifrovana) poruka, u stanju je da dešifruje (dekriptuje), odnosno vrati kriptogram u otvoreni tekst, i da ga pročita.⁴⁹

Kriptografski algoritmi ili šifre predstavljaju matematičku funkciju koja se koristi za šifrovanje i dešifrovanje. Razlikuju se ograničeni algoritmi i algoritmi zasnovani na ključu. Kod ograničenih algoritama bezbjednost se zasniva na tajnosti algoritma, dok se kod algoritama zasnovanih na ključu bezbjednost zasniva na ključevima (algoritam je poznat, a ključ se čuva tajnim).⁵⁰

U modernoj kriptografiji koriste se algoritmi zasnovani na ključu zbog njihovih praktičnih prednosti u odnosu na ograničene algoritme. Mogu se podijeliti na simetrične (često se nazivaju i konvencionalnim), asimetrične i hibridne algoritme.⁵¹

Kod simetričnih kriptografskih algoritama isti tajni ključ se koristi i za kriptovanje i za dekriptovanje poruka.⁵² Najpoznatiji simetrični kriptografski algoritama koji se danas koriste su: 3DES, DES-CBC, IDEA, RC5, RC6, AES i drugi.⁵³

Za razliku od kriptovane poruke, koja može da se šalje preko nezaštićenog komunikacionog kanala, s obzirom na to da ne postoji mogućnost da eventualni napadač bez odgovarajućeg ključa pročita izvornu poruku, ključ se, sasvim je jasno, ne smije prenositi nezaštićenim kanalom komunikacije.⁵⁴

Asimetrični kriptografski algoritmi koriste različite ključeve za kriptovanje i dekriptovanje. Za kriptovanje se koristi javni ključ (koji je poznat svima), dok se za dekriptovanje upotrebljava privatni (tajni) ključ, koji je poznat samo primaocu poruke.⁵⁵

Hibridni algoritmi za kriptovanje predstavljaju kombinaciju simetričnih i asimetričnih algoritama. Primjenom hibridnog algoritma izvorni tekst se prvo kriptuje upotrebom ključa (sesijski ključ), a potom se taj ključ zajedno sa kriptovanom porukom pakuje i opet kriptuje pomoću javnog ključa osobe kojoj se šalje poruka. U postupku dekripcije osoba koja je primila poruku prvo dekriptuje istu sa svojim tajnim ključem, pronalazi zapakovani sesijski ključ i koristi ga da bi pročitala izvornu poruku.⁵⁶

Digitalni potpis je način za potvrđivanje autentičnosti i integriteta poruke zasnovan na asimetričnoj kriptografiji.⁵⁷ Digitalan potpis u stvari predstavlja digitalnu verziju svojeručnog potpisa. Kao što svojeručni potpis identifikuje osobu, digitalni potpis identifikuje autora neke poruke, ali i dokazuje da poruka prilikom prenosa komunikacionim kanalom nije izmjenjena.⁵⁸

⁴⁹ S. Jo, *n.d.*, s. 18; I. Lacmanović, *n.d.*, s. 55; D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, s. 932.

⁵⁰ S. Jo, *n.d.*, s. 18; I. Lacmanović, *n.d.*, s. 56.

⁵¹ I. Lacmanović, *n.d.*, s. 56; D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, s. 932.

⁵² I. Lacmanović, *n.d.*, s. 56.

⁵³ D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, s. 933.

⁵⁴ Isto.

⁵⁵ I. Lacmanović, *n.d.*, s. 56; D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, s. 933.

⁵⁶ D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, s. 935.

⁵⁷ M. Veinović, S. Adamović, *Kriptologija I*, Beograd, 2013, s. 18; M. Milić, *Digitalni potpis u elektronskom poslovanju (specijalistički rad)*, Podgorica, 2016, s. 3.

⁵⁸ I. Lacmanović, *n.d.*, s. 58.

Bio on digitalni ili svojeručni, svaki potpis mora da zadovolji pet osnovnih kriterijuma. Pored toga što mora da bude vjerodostojan, potpis treba da obezbjedi identifikaciju, kao i nemogućnost manipulisanja, opovrgavanja i kopiranja.

Ovi kriterijumi mogu se ispuniti pravilnom upotrebom asimetričnih algoritama enkripcije, uz enkripciju poruke privatnim ključem pošiljaoca.

U najvećem broju slučajeva nije potrebno kriptovati cjelokupnu poruku. Dovoljno je samo da se kriptuje digitalni potpis, a poruka da ostane nepromijenjena. Svakako, ukoliko je tajnost poruke kritična, ona može biti zaštićena.⁵⁹

Za kreiranje digitalnih potpisa upotrebljavaju se heš funkcije.⁶⁰ Heš funkcija predstavlja deterministički postupak koji uzima proizvoljan blok podataka i vraća niz bita fiksne dužine, tj. heš vrijednost. Ukoliko dođe do promjene podataka (slučajno ili namjerno) mijenja se i heš vrijednost.⁶¹

Identifikacija pošiljaoca dokazuje se na osnovu same mogućnosti dekriptovanja enkriptovane heš vrijednosti, što se čini na osnovu javnog ključa za koji se zna da pripada pošiljaocu. Prilikom prijema poruke, jednostavnim poređenjem heš vrijednosti na određenom računaru, lako se može utvrditi da li je poruka bila izmijenjena. Na ovaj način se ostvaruje sigurna identifikacija pošiljaoca, uz očuvanje integriteta poruke.⁶²

Postavlja se pitanje kako primalac poruke može biti siguran u to da je vlasnik određenog javnog ključa upravo pošiljalac poruke. Ovaj problem se rješava korišćenjem digitalnih sertifikata.

Digitalni sertifikat se može definisati kao elektronski dokument koji povezuje javni ključ sa imenom vlasnika na povjerljiv i bezbjedan način, koristeći usluge povjerljivog provajdera, poznatog kao sertifikaciono tijelo (Certificatio Authority-CA), koji garantuje ovaj odnos.⁶³

Nakon što mu je aplikant dostavio tražene podatke (javni ključ, informacije o aplikantu) sertifikaciono tijelo, pošto je izvršilo provjeru podataka, izdaje i potpisuje sertifikat svojim privatnim ključem. Time se obezbjeđuje integritet podataka, odnosno integritet izdatog sertifikata, pri čemu se vjerodostojnost potpisa na sertifikatu može provjeriti pomoću javnog ključa izdavaoca sertifikata. Provjerom potpisa na sertifikatu istovremeno se utvrđuje i identitet vlasnika odgovarajućeg javnog ključa.⁶⁴

⁵⁹ Isto.

⁶⁰ Isto.

⁶¹ Podaci koji se kodiraju često se nazivaju porukom, a heš vrijednost se naziva sažetak ili otisak poruke. Idealna heš funkcija ima četiri glavne osobine: heš vrijednost se lako izračunava za bilo koju poruku; za zadatu heš vrijednost nije moguće pronaći originalnu poruku; sadržaj poruke je nemoguće promijeniti, a da se ne promijeni njena heš vrijednost; nije moguće pronaći dvije poruke koje imaju istu heš vrijednost. (M. Milić, *n.r.*, s. 8.)

⁶² I. Lacmanović, *n.d.*, s. 59.

⁶³ M. Milosavljević, G. Grubor, *Osnovi bezbjednosti i zaštite informacionih sistema*, Beograd, 2006, s. 179.

⁶⁴ M. Veinović, S. Adamović, *n.d.*, s. 142, 143; I. Lacmanović, *n.d.*, s. 61.

Zaključak

S obzirom na činjenicu da se servisi elektronskog bankarstva ostvaruju u mrežnom okruženju, oni podliježu istim sigurnosnim rizicima kao i ostali tipovi veb-aplikacija. Da bi se osigurala sigurnost ovih servisa od raznih napada (socijalni inženjering, skeniranje portova, probijanje lozinke, trojanci, fišing i dr) neophodno je obezbjediti strogu kontrolu svih komponenti sistema i zaštitu na nivoima mreže, operativnog sistema, aplikacije i korisnika, te proceduralnu i operacionu zaštitu. To se postiže primjenom različitih mjera zaštite računarskih mreža i informacija kao što su: mjere kadrovske politike; organizaciono-administrativne mjere; tehničke mjere fizičke, elektronske i protivpožarne zaštite; hardver-sko-softverske mjere; aplikativno programske mjere i mjere kriptozastite. Pri tome se, svakako, treba pridržavati osnovnih principa sigurnosti na kojima se temelji primjena elektronskog bankarstva, u koje spadaju: povjerljivost, integritet, dostupnost, autentičnost, neporecivost, enkripcija i praćenje.

Posmatrano sa aspekta bankarskog elektronskog poslovanja, obezbjeđenje adekvatne zaštite informacija, uz kvalitet servisa koje banka nudi svojim klijentima, sigurno da je od suštinskog značaja prilikom opredjeljivanja klijenata za korišćenja usluge određene banke, pošto oni, sasvim je jasno, ne žele da budu predmet hakerskih napada, koji im u konačnom ishodu uglavnom nanose štetu finansijske prirode. Stoga banke, ukoliko žele da zadrže postojeće i privuku nove klijente, posebnu pažnju moraju da obrate na trendove razvoja sistemima zaštite informacija i njihovu blagovremenu primjenu.

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INFORMATION PROTECTION SYSTEMS IN E-BANKING

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Summary:

Because it is implemented in a network environment, electronic banking is subject to various security risks. Therefore, in order to safely use banking services electronically, it is necessary to identify potential threats through the analysis of network infrastructure and application characteristics, as well as to respond to them by applying appropriate protection measures.

Keywords: electronic banking; protection systems; safety principles; attacks; protection measures; aspects of protection; firewall; cryptosecurity

JEL classification: E42, K24, L86, M15

Introduction

Electronic banking (e-banking), together with e-commerce, customer relationship management, enterprise resource planning, value chain management and business intelligence, is an integral part of e-business.¹ Electronic business is defined in the broadest sense as an internal or external business process that is realised through a computer network.²

Electronic banking means the totality of technological procedures, which ensure the electronic execution of banking transactions.³ In other words, electronic banking is a type of banking that takes place using electronic systems, whose task is to transfer funds and make records related to them, without paper, using computer communication technologies.⁴ Thus, bank clients can use electronic banking services via the Internet, mobile devices, ATMs and POS terminals.

As the concept of electronic banking enables the users of banking services, but also banks themselves, to fulfil their usual activities electronically, the basic precondition for its normal functioning is a correct bank information system, functional network infrastructure and protection of information and transactions.

¹ E-commerce is defined as a transaction via a computer network, which involves the transfer of ownership or rights to use goods and services, such as: buying books online, booking a hotel room online, ordering and downloading free software online, etc. (B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *Electronic Business*, Belgrade, 2015, p. 131)

Customer Relationship Management (CRM) is a part of e-business that includes a number of methods, techniques and proven practices implemented within the business system, in order to improve communication and cooperation with customers, promote products and services and maximize business profits. It is a business strategy whose results simultaneously optimize profitability and revenue, contribute to customer satisfaction and loyalty, and which include all aspects of the company's interaction with customers, regardless of whether it is sales or services. The goal is to create a situation in which each of the clients will have special treatment and offers that suits them best at a given moment and that will apply only to them. (Ibid.; V. Simović, *Electronic Business-Script*) (version 2), Belgrade, 2013, p. 10)

Enterprise Resource Planning (ERP) is a software package that monitors all aspects of a company's business. It is characterized by effective management of processes in the company, the existence of a common (unique) database, as well as the ability to respond quickly to operational requirements. (V. Simović, nd, p. 11; B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *Manual for the preparation of the entrance exam for enrolment in master studies*, Belgrade, 2012, p. 32.33)

Supply Chain Management (SCM) is a term used to describe the flow of materials, information and resources through the supply chain (value) from the supplier through the manufacturer of individual components, final connection and distribution (warehousing and retail) to the final customer, whereby this process often includes additional services that accompany the product after the sale and return of the product for recycling. A value chain is a set of business processes that connects suppliers, manufacturers, retailers, business users, and others involved in creating, selling, and delivering goods to the end customer. (V. Simović, n.d., p. 11; B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, n.d., p. 33)

Business Intelligence (BI) is the process of gathering available internal and significant external data and converting it into useful information that helps management in decision-making. (M. Milić, *Decision Making and Business Intelligence*, Banja Luka, 2014, p. 85)

² B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, n.d., p. 4.

³ I. A. Reznik, *Elektronnyi banking*, Orenburg, 2008, p. 7.

⁴ T. Uroš, *Elektronsko bankarstvo*, Belgrade, 2014, p. 120.

Certainly, from the aspect of the client's trust in terms of using electronic banking systems, it is of special importance to ensure the security of their functioning, i.e., to use appropriate information protection systems to ensure that the security risks to each computer network are minimised.

Basic Principles of Security in Electronic Banking

The basic security principles on which electronic banking services applications should be based include: confidentiality, integrity, availability, authenticity, undeniability, encryption and monitoring.⁵

The principle of confidentiality implies the unavailability of information to unauthorised persons, as well as their protection from interception during transmission.

Respect for the principle of integrity should ensure the invariability of information during online transmission.⁶ In other words, the principle of integrity implies data consistency, preventing unauthorised generating, modification, and destruction of data.⁷

Accessibility is a principle that provides authorised users with timely access to information, i.e., it refers to the access to information at the request of the user.⁸

The principle of authenticity refers to the existence of a mechanism for performing user authentication before allowing access to the requested information.

Non-denial is a principle that implies the impossibility of denying the message sent by the user, as well as the impossibility for the recipient of the message to deny having received it.

According to the principle of encryption, information should be encrypted and decrypted by an authorised user.

The principle of monitoring refers to the need to record data, in order to be able to monitor events in the system.⁹

Attacks on Electronic Banking

Electronic banking can be exposed to different types of attacks such as: social engineering, port scanners, packet sniffers, password cracking, trojans, denial-of-service attacks, server bugs, super user exploits, phishing, etc.¹⁰

⁵ B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 225.

⁶ Isto.

⁷ M. Unković, M. Milosavljević, N. Stanišić, *Savremeno berzansko i elektronsko poslovanje*, Belgrade, 2010, p. 231

⁸ D. M. Korać, *Model zaštite informacija u sistemima za menadžment identiteta i upravljanje pristupom (PhD thesis)*, Belgrade, 2018, p. 10.

⁹ B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, s. 225.

¹⁰ Z.B.Omariba, N.B. Masese, G. Wanyambi, *Security and privacy of electronic banking*, International Journal of Computer Science Issues, Vol. 9, Issue 4, No 3, July 2012, p.440; B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, p. 226.

Social engineering involves a situation in which an attacker, posing as a system administrator or customer service representative, tricks a user, abusing their social characteristics (trust, desire to help others, resilience, etc.), to reveal sensitive information in order to access their account.¹¹

Port scanners are used by attackers to identify entry points into the system, using a variety of information theft techniques. This type of software sends signals to a machine or router and records a message by which the machine responds in order to determine the point of entry. The main purpose of port scanning is to gather information related to the hardware and software that runs the system, so that an attack plan can be developed.¹²

Packet analysers or packet sniffers are used to collect data transmitted over the network, i.e., this software monitors the connection between the user's computer and the web server to collect user-related data, including passwords and credit card information. Since they do not manipulate the flow of data, and their function is to capture network traffic, packet sniffers are very difficult to detect.

Password cracking includes various attack options for the purpose of decrypting passwords, the most popular among which is brute force attack. In order to access user data in this way, thousands of common expressions, activities and names are scanned, which are then combined until the appropriate combination, i.e., the user password, is obtained. Violent password cracking is mainly used on systems that do not require strong passwords, so users use common names and activities, which makes it easier to detect the password, i.e., access the system. Other methods of cracking passwords include the use of hash tables to decrypt password files, which can reveal a full list of system usernames and passwords.¹³

Trojans are complex client-server applications, which allow access to remote user computers in the network (they reach users via email, newsgroups, popular chat programs, etc.), in the way that users install them on their computer, believing that they will be of use to them. The Trojan, which is located on the user's (victim's) computer, is actually a server, and the client is a program that manages the Trojan and which is located on the computer of the person who intends to access important information on the victim's account.¹⁴

A denial-of-service attack is a type of attack that aims to prevent legitimate users from accessing network services, which is achieved by overloading network services or over-connection, resulting in a connection or service drop. Namely, the infrastructure of interconnected systems and networks consists of limited resources, which is the most important fact in denial-of-service attacks, which involve sending a large number of requests to the target server, to overwhelm its limited resources and make it unusable.¹⁵

Server bugs are often detected and corrected in a timely manner. However, system administrators are often slow to apply the latest updates, giving the attacker enough time to create a threat.¹⁶

¹¹ Ibid.

¹² Z.B.Omariba, N.B. Masese, G. Wanyembi, *n.d.*, s.440.

¹³ Ibid.

¹⁴ S. Jo, *n.d.*, Belgrade, 2015, p. 28–29.

¹⁵ D.V.Vuletić, *Napadi na računarske sisteme*, Vojnotehnički glasnik, br. 1, Belgrade, 2012, p. 236.

¹⁶ Z.B.Omariba, N.B. Masese, G. Wanyembi, *n.r.*, p. 442.

Super user exploits allow an attacker to take control of the system as if they were an administrator. For this purpose, scripts are often used¹⁷ to manipulate the database or a buffer overrun attack¹⁸, which damages the system much like a denial-of-service attack.¹⁹

Phishing is a type of attack that involves attempting to steal personal information by tricking the victim into entering a fake website.²⁰ For this purpose, attackers (fishermen) usually use forged emails, which they send to potential victims on behalf of certain organisations with which they have contact (e.g., bank, insurance company, etc.). For example, an email is sent to a bank user stating that their account will be terminated if they do not update their personal information. The e-mail also provides a link to a fake website, which is a true copy of the original website of a certain institution, where the potential victim enters their account number and password, which is later misused, primarily in order to obtain financial benefits for the attacker.²¹

Measures to Protect Computer Networks and Information

Network and information protection refers to a set of rules, procedures, algorithms, hardware and software components, as well as a set of organisational and technical measures that protect network functions when performing network transactions.

Information protection includes protection against: unauthorised access to and use of information, uncontrolled leakage of information, accidental or intentional damage, alteration or destruction.

The protection of computer networks and information is realised through the application of various measures such as: personnel policy measures; organisational-administrative measures; technical measures for physical, electronic and fire protection; hardware and software measures; application program measures and cryptosecurity measures.²²

Personnel policy measures are needed because the users of network services are the information carriers, but also the greatest potential danger for that information.

Organisational-administrative measures normatively regulate the rights, obligations, and responsibilities of information system users, including sanctions against users.

¹⁷ In computer programming, a script is a program or sequence of instructions that is interpreted or executed by another program. (<https://whatistechtarget.com/definition/script>)

¹⁸ Exceeding the buffer (buffer block of memory intended for temporary data storage) means writing content outside the boundaries of the reserved buffer memory. In fact, it is a situation in which the address of an available buffer is indicated, but locations that are not part of its memory are used. Exceeding the buffer can lead to an unexpected flow of program execution, as well as allow various types of program abuse. This problem is especially present in programs written in the programming language C. (M. Vujošević-Janičić, *Automatsko otkrivanje prekoračenja bafera u programskom jeziku C (magisterial thesis)*, Belgrade, 2008, s. 9, 87)

¹⁹ Z.B.Omariba, N.B. Masese, G. Wanyembi, *n.r.*, p. 442.

²⁰ B. Radenković, M. Despotović-Zrakić, Z. Bogdanović, D. Barać, A. Labus, *n.d.*, p. 226.

²¹ D.V.Vuletić, *n.r.*, p. 238

²² M. Jevtović, *Zaštita računarskih mreža*, Vojnotehnički glasnik br. 5, Belgrade, 2005, p. 435.

Technical measures for physical, electronic and fire protection include: physical security, electronic burglary protection and protection against disappearance and inadequate power supply. These measures are applied for the protection of: facilities (premises where computer and telecommunication equipment is located), computer and telecommunication equipment and magnetic and electronic data carriers.²³

Hardware-software measures are used to provide access points to the network and individual network resources. These measures include identifying the user and determining the rights and authorities given to them in relation to the network resources which they access.²⁴

Application-program measures are procedures that are built into the application software in order to protect it.

Cryptoprotection measures are applied to protect data stored in memory resources in computers and for protection on transmission paths.²⁵

Various Aspects of Computer Network and Information Protection

Different aspects of protection are very often defined in relation to the place of positioning of protection mechanisms in a computer or information system or computer network. In this sense, we can talk about protection at the application level, protection at the operating system level, protection at the network infrastructure level, and procedural and operational protection.²⁶

Application-level security can include the following elements: software application protection, isolation of critical applications on dedicated hosts, as well as the application of specific protocols (for example, cryptographically protected SSH protocol instead of unprotected Telnet protocol). Operating system-level protection is a very complex and extensive area that affects all layers of the operating system. This level of protection includes the connection between the operating system and the application, as well as the relationship to the network architecture, i.e., connections to other systems. According to some recommendations, minimal protection encompasses: blocking unnecessary services (finger, ftp, telnet), providing comprehensive and mandatory access control at the user level, ensuring the integrity of the software that makes up the operating system (most security attacks are aimed at operating systems without patches, so it is necessary to regularly update all system elements to the latest patches).

23 Ibid, p. 435.

24 User identification can be physical (hardware devices are used) and logical (software methods are used).

Physical identification methods are based on recognizing the user's identification means (smart cards, magnetic and optical cards, badges, tokens, etc.) and recognizing the user's physical, biometric characteristics, fingerprint, fingerprint and hand shape, ear or head shape, voice characteristics, retinal image and more)

Logical recognition methods are based on the information that the user gives to the system in the process of identification and authorization of authorizations. This information must be identical to the information available to the system. (Ibid, p. 435, 436)

25 Ibid, p. 435

26 D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *Sigurnost računarskih mreža*, Belgrade, 2006, p. 25.

Network infrastructure protection includes the following basic elements: applying network barriers (firewalls), blocking unnecessary ports, encrypting paths, isolating paths using routers and switches, or using special infrastructure.

When it comes to procedural and operational protection, the following elements are taken into account: protection by applying policies and procedures, attack detection, proactive action in terms of protecting system vulnerabilities, managing system configuration and user education.²⁷

Firewall

The firewall is a key element in network security, which, has found wide application both in banks and in other organisations and institutions for the protection of private networks.²⁸

A firewall is a security hardware or software device, usually located between a local network and a public network (Internet), whose purpose is to protect data on the network from unauthorised users (blocking and denying access in accordance with the rules of the adopted security policy).²⁹ In other words, a firewall is a filter on the local area network - the Internet, which examines all packets passing between the private network and the Internet, and depending on whether the packets meet the rules defined by access control lists, the firewall will allow or deny the packet.³⁰

Firewall Functions

The most common functions performed by firewall are: packet filtering, network address translation and proxy services.

Packet Filtering

When packet filtering, the packet header (consisting of the source address, destination address, and port number) is analysed and compared to the firewall rules. Depending on whether the package meets the rules, its passage is either allowed, or rejected.³¹

The filtering process can be performed based on any part of the packet header, with most filters making a decision based on:

- protocol type (in this way it is possible to discriminate against entire sets of protocols, such as UDP, TCP, ICMP, IGMP)

²⁷ Ibid, p. 25, 26.

²⁸ K.Salah-ddine, *Overview Of Firewalls: Types And Policies Managing Windows Embedded Firewall Programmatically*, The International Conference on Engineering & MIS, Monastir, Tunisia, May 2017, p. 1.

²⁹ M. Veinović, A. Jevremović, *Uvod u računarske mreže*, Belgrade, 2008, p. 28.

³⁰ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, p. 92.

³¹ Ibid, p. 93.

- IP addresses (accepting or rejecting packets based on IP address is the strongest form of protection that can be achieved by simply filtering packets)
- TCP/UDP ports - for example, all computers can be allowed to access TCP port 80 (HTTP), while access to TCP port 22 (ssh) is restricted to computers belonging to a certain range of IP addresses.³²

Based on the defined rules and headers of a specific IP packet, the packet filter can make a decision to accept the packet, reject the packet, as well as to reject the packet and inform the sender that its packet has not been accepted.³³

Network Address Translation - NAT

NAT is the process of translating computer IP addresses from a private network to a firewall address, in order to hide information about network computers from attackers from the Internet.³⁴ After the address translation process has been performed during the passage of the packet through the NAT firewall, the data contained in that packet is sent to the network computers from the firewall address, using the address translation tables.³⁵

There are several types of IP address translation that allow you to hide the identity of your computer on the local network. These are: static, dynamic, and dynamic overload translation of IP addresses.

In static IP address translation, a block of public IP addresses is translated into a block of private IP addresses based on a fixed translation table, so that one public IP address corresponds to one private IP address.

In dynamic IP address translation, a block of public IP addresses is dynamically translated into a block of private IP addresses.³⁶

Dynamic overload translation (PAT) of IP addresses is the most common way of translating IP addresses, which means that based on the port number, one or more public IP addresses are translated into a larger number of private IP addresses.³⁷

Proxy Services

Due to the fact that they analyse and possibly change the packet header and not its contents, filtering and NAT do not provide complete control of the data passing through the firewall. Thus, it is possible for an attacker to use a network monitor to view traffic coming from the firewall and, based on the

³² D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, p. 95.

³³ Ibid.

³⁴ Ibid, p. 98, 99.

Viewed from the perspective of the Internet, all traffic from a private network acts as if it came from a single computer. (J. Milojković; R. Šoškić, *Zaštita mail servera na nivou mrežne infrastrukture*, Naučno stručno savetovanje ZITEX, Tara, Serbia, 2006, p. 7. (<https://singipedia.singidunum.ac.rs/izdanje/40097-zastita-mail-servera-na-nivou-mrezne-infrastrukture>))

³⁵ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, p. 98, 99.

³⁶ Ibid, p. 99.

³⁷ D. Pleskonjić, N. Maček, B. Đorđević, M. Carić, *n.d.*, s. 99.

information obtained, conclude that the firewall is translating computer addresses from the internal network.³⁸

This threat is prevented by the proxy application layer, which allows to completely prohibit the flow of network layer protocol data and to allow traffic only to higher layer protocols, such as HTTP, FTP and SMTP.

An application layer proxy is a specific client-server combination for a particular protocol used, so it is, for example, a web proxy combination of a web server and a web client. The server portion of the proxy protocol accepts internal network client connections, and the client portion of the protocol connects to the public server. Since the client proxy part receives data from the public server, the server side of the proxy application sends the data to the end internal client.³⁹

Cryptosecurity

Cryptography⁴⁰ is a part of applied mathematics that studies models, methods, algorithms, software and hardware means of transforming information in order to conceal their content, as well as to prevent their modification or unauthorised use.⁴¹

A cryptosystem is a system that applies software, hardware, or software and hardware to perform cryptographic information transformation.⁴²

Cryptanalysis is a section of applied mathematics that studies models, methods, algorithms, software and hardware tools for analysing a cryptosystem or its input and output signals in order to extract confidential parameters, including plain text.⁴³ Thus, cryptanalysis, in contrast to cryptography, deals with the detection of the hidden content of transformed information. Any attack on data privacy is actually an attempt at cryptanalysis.⁴⁴

Cryptology is a science that combines cryptography and cryptanalysis.⁴⁵

The main task of cryptography is to ensure that two people (sender and receiver of a message) communicate through an insecure communication channel (telephone line, computer network, etc.) in such a way that a third person who is possibly monitoring the communication channel cannot understand their messages.⁴⁶

The message that the sender wants to send to the recipient is called plaintext or cleartext. The plaintext is transformed by the sender, with the help of appropriate information (encryption key), into text

³⁸ Ibid, p. 100.

³⁹ Ibid, p. 100.

⁴⁰ A word of Greek origin that translates as a secret record (S. Jo, *n.d.*, p. 18).

⁴¹ N. A. Gatčenko, A. S. Isaev, A. D. Яkovlev, *Kriptografičeskaja zaučita informacii*, Sankt-Peterburg, 2012, p. 31.

⁴² N. A. Gatčenko, A. S. Isaev, A. D. Яkovlev, *n.d.*, p. 31.

⁴³ Ibid.

⁴⁴ I. Lacmanović, *Elektronsko bankarstvo*, Belgrade, 2010, p. 55.

⁴⁵ N. A. Gatčenko, A. S. Isaev, A. D. Яkovlev, *n.d.*, p. 31.

⁴⁶ S. Jo, *n.d.*, p. 18.

incomprehensible to third parties. Such text is called a ciphertext or cryptogram, and the process by which open (original) text is transformed into a cryptogram is called encryption.⁴⁷

After encryption, the sender sends a cryptogram via a communication channel, whereby the person who is possibly eavesdropping on the channel can find out the content of the cipher, but it will not be clear to them what is written in the open text. However, the recipient, since they know the key with which the message is encrypted, is able to decrypt the message, i.e., return the cryptogram to the plaintext form, and read it.⁴⁸

Cryptographic algorithms or ciphers are a mathematical function used to encrypt and decrypt. There are limited algorithms and key-based algorithms. In limited algorithms, security is based on the secrecy of the algorithm, while in key-based algorithms, security is based on keys (the algorithm is known, and the key is kept secret).⁴⁹

Modern cryptography uses key-based algorithms because of their practical advantages over limited algorithms. They can be divided into symmetric (often referred to as conventional), asymmetric, and hybrid algorithms.⁵⁰

In symmetric cryptographic algorithms, the same secret key is used to encrypt and decrypt messages.⁵¹ The most well-known symmetric cryptographic algorithms used today are: 3DES, DES-CBC, IDEA, RC5, RC6, AES and others.⁵²

Unlike an encrypted message, which can be sent over an unsecured communication channel, since there is no possibility for a potential attacker to read the original message without an appropriate key, the key must not be transmitted through an unsecured communication channel.⁵³

Asymmetric cryptographic algorithms use different keys for encryption and decryption. An encryption uses a public key (known to everyone), while a decryption uses a private (secret) key, which is known only to the recipient of the message.⁵⁴

Hybrid encryption algorithms are a combination of symmetric and asymmetric algorithms. Using a hybrid algorithm, the source text is first encrypted using a key (session key), and then that key is packed together with the encrypted message and re-encrypted using the public key of the person to whom the message is sent. In the decryption process, the person who received the message first decrypts it with their secret key, finds the packed session key and uses it to read the original message.⁵⁵

⁴⁷ Ibid; N. A. Gatčenko, A. S. Isaev, A. D. Яkovlev, *n.d.*, s. 31; D. Lacmanović, B. Markoski, I. Lacmanović, *Zaštita podataka na internetu (Razvoj i testiranje RSA asimetričnog kriptografskog postupka)*, XI međunarodni naučno-stručni Simpozijum INFOTEH-Jahorina, Republika Srpska, 2012 s. 932. (https://www.researchgate.net/publication/323070387_Zastita_podataka_na_Internetu_Razvoj_i_testiranje_RSA_asimetrichnog_kriptografskog_postupka)

⁴⁸ S. Jo, *n.d.*, p. 18; I. Lacmanović, *n.d.*, p. 55; D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, p. 932.

⁴⁹ S. Jo, *n.d.*, p. 18; I. Lacmanović, *n.d.*, p. 56.

⁵⁰ I. Lacmanović, *n.d.*, p. 56; D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, p. 932.

⁵¹ I. Lacmanović, *n.d.*, p. 56.

⁵² D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, p. 933.

⁵³ Ibid.

⁵⁴ I. Lacmanović, *n.d.*, p. 56; D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, p. 933.

⁵⁵ D. Lacmanović, B. Markoski, I. Lacmanović, *n.r.*, s. 935.

A digital signature is a way to verify the authenticity and integrity of a message based on asymmetric cryptography.⁵⁶ A digital signature is actually a digital version of a handwritten signature. Just as a handwritten signature identifies a person, a digital signature identifies the author of a message, but also proves that the message has not been altered during transmission through the communication channel.⁵⁷

Whether digital or personal, each signature must meet five basic criteria. In addition to being authentic, the signature should provide identification as well as the impossibility of manipulation, refutation and copying.

These criteria can be met by the correct use of asymmetric encryption algorithms, with encryption of the message with the sender's private key.

In most cases, it is not necessary to encrypt the entire message. All you have to do is encrypt the digital signature and keep the message unchanged. Certainly, if the confidentiality of a message is critical, it can be protected.⁵⁸

Hash functions are used to create digital signatures.⁵⁹ A hash function is a deterministic procedure that takes an arbitrary block of data and returns it through bits of fixed length, i.e., hash value. If there is a change in the data (accidentally or intentionally), the hash value also changes.⁶⁰

The sender's identification is proven on the basis of the very possibility of decrypting the encrypted hash value, which is done on the basis of the public key that is known to belong to the sender. When receiving a message, by simply comparing the hash values on a particular computer, it is easy to determine whether the message has been altered. In this way, a secure identification of the sender is achieved, while preserving the integrity of the message.⁶¹

The question arises as to how the recipient of a message can be sure that the owner of a particular public key is really the sender of the message. This problem is solved by using digital certificates.

A digital certificate can be defined as an electronic document that associates a public key with the owner's name in a confidential and secure manner, using the services of a trusted provider, known as a Certification Authority (CA), that guarantees this relationship.⁶²

After the applicant has submitted the requested data (public key, information about the applicant), the certification body, after verifying the data, issues and signs the certificate with its private key. This ensures the integrity of the data, i.e., the integrity of the issued certificate, whereby the authenticity of the signature on the certificate can be verified using the public key of the issuer of the certificate.

⁵⁶ M. Veinović, S. Adamović, *Kriptologija I*, Belgrade, 2013, p. 18; M. Milić, *Digitalni potpis u elektronskom poslovanju (specijalistički rad)*, Podgorica, 2016, p. 3.

⁵⁷ I. Lacmanović, *n.d.*, p. 58.

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ The data that is encoded is often called a message, and the hash value is called a summary or imprint of the message. The ideal hash function has four main features: the hash value is easily calculated for any message; it is not possible to find the original message for the given hash value; the content of the message cannot be changed without changing its hash value; it is not possible to find two messages that have the same hash value. (M. Milić, *n.r.*, s. 8.)

⁶¹ I. Lacmanović, *n.d.*, p. 59.

⁶² M. Milosavljević, G. Grubor, *Osnovi bezbjednosti i zaštite informacionih sistema*, Belgrade, 2006, p. 179.

By verifying the signature on the certificate, the identity of the owner of the corresponding public key is also determined.⁶³

Conclusion

Due to the fact that e-banking services are provided in a network environment, they are subject to the same security risks as other types of web applications. In order to ensure the security of these services from various attacks (social engineering, port scanning, password cracking, Trojans, phishing, etc.) it is necessary to provide strict control of all system components and protection at the network, operating system, applications and users, and procedural and operational protection. This is achieved by applying various measures to protect computer networks and information, such as: personnel policy measures; organisational-administrative measures; technical measures for physical, electronic and fire protection; hardware and software measures; application software measures and crypto security measures. In doing so, the basic principles of security on which the application of electronic banking is based should be adhered to, which include: confidentiality, integrity, availability, authenticity, non-repudiation, encryption and monitoring.

Observed from the aspect of e-banking, providing adequate information protection, along with the quality of services that the bank offers to its clients, is certainly essential when clients decide whether to use the services of a particular bank, as they clearly do not want to be hacked, which would ultimately and mainly financially harm them. Therefore, banks, if they want to keep existing and attracting new customers, must pay special attention to the development trends of information protection systems and their timely implementation.

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⁶³ M. Veinović, S. Adamović, *n.d.*, p. 142, 143; I. Lacmanović, *n.d.*, p. 61.

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NJENO VELIČANSTVO TRANSAKCIJA

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Rezime

Transakcija predstavlja jedan od fenomena savremenog sveta. Transakcija je dostupna, sveprisutna, globalna i neophodna, otuda su, a statistike to redovno potvrđuju, broj transakcija i broj korisnika u stalnom porastu. Generatori daljeg razvoja transakcija u svetu finansijskih i posebno bankarskih usluga su svakako ICT- kompanije zajedno sa brojnim provajderima koji razvijaju i unapređuju informacione i komunikacione tehnologije, te stavljaju na raspolaganje pouzdane sisteme prenosa informacija bez kojih svet transakcija koji danas poznajemo ne bi uopšte bio moguć. Banke s posebnom pažnjom prate dalji razvoj i unapređenje svakog pojedinačnog tipa transakcija. Pri tome banke aktivno sarađuju sa ICT- kompanijama, upućivanjem inicijativa i davanjem ocena, te odgovarajućom podrškom, budući da su vitalno zainteresovane za pružanje inoviranih servisa i vrsta transakcija svojim postojećim i potencijalnim klijentima.

Ključne reči: transakcija, plaćanje, doznaka, efikasnost, globalna rasprostranjenost, imperativ

Pojmom transakcija u teoriji i praksi se označavaju dogovor, ugovor, postupak, izvršenje i neka druga srodna značenja shodno kojima se priprema i/ili realizuje određena poslovna aktivnost od značaja za dva ili više učesnika u transakciji.

U nastavku razmatranja uloge i značaja transakcija biće predstavljene osnovne klasifikacije transakcija, zatim uloga Narodne banke Srbije kao regulatora bankarskih operacija neraskidivo povezanih sa transakcijama. Sledi fokusiranje na banke kao primarne finansijske institucije u finansijskom sistemu zemlje, te pregled odabranih transakcija koje banke pružaju u vezi sa poslovanjem pravnih subjekata u zemlji, kao i u vezi sa pružanjem usluga stanovništvu. Razume se posebno mesto zauzima segment poslovanja privrede u domenu spoljnotrgovinskih transakcija, što će biti praćeno prikazom najznačajnijih instrumenata platnog prometa sa inostranstvom razumljivo praćenih posebnim vrstama transakcija.

Predmetno razmatranje će biti zaokruženo posebno značajnim i sve više korišćenim vrstama transakcija bez kojih bi bilo nezamislivo razmišljati o bilo kakvom proširenju ili unapređenju poslovanja, kako od strane pravnih lica i preduzetnika, tako i od strane banaka, osiguravajućih kompanija i drugih aktera u finansijskom sektoru. Reč je svakako o savetničkim/konsultantskim uslugama, koje po prirodi svog formata i značaja zaslužuju da budu posebno predstavljene, radi njihovog potpunijeg sagledavanja.

Transakcija dakle predstavlja volju dva ili više entiteta ili dve ili više osoba da sklope dogovor ili zaključe ugovor o razmeni dobara odnosno imovine, usluga ili u novije vreme finansijske imovine. Postojanje novca kao mere vrednosti dobara odnosno imovine, te kao takvog obaveznog elementa svake transakcije je ono po čemu se transakcija razlikuje od trampe. Razume se, postoje i određeni izuzeci u odnosu na prethodnu konstataciju, kao na primer u slučaju poklona u formi određenog predmeta ili određene usluge, a koji nisu praćeni niti novčanom niti drugom vrste naknade.

Pre nastanka transakcije isključivi način za obezbeđenje određenog dobra bila je trampa u smislu razmene dobara između jedne osobe koja poseduje određeno dobro i druge osobe koja baš takvo dobro želi da ima u svom posedu. Trampa bazira na neposrednoj pogodbi između zainteresovanih osoba i taj model prenosa dobara odnosno imovine iz vlasništva jedne u vlasništvo druge osobe se i dalje zadržava primarno u prostorima u kojima organizovana trgovina nije postala pretežni ili isključivi model snabdevanja.

Pažnje je vredna klasifikacija transakcija sačinjena od strane prof. dr Stobbe-a, koja obuhvata sledeće vrste:

1. roba za robu - razmena roba,
2. roba za potraživanje u novcu - kupoprodaja roba,
3. potraživanje za potraživanje - kupovina odnosno prodaja potraživanja (trgovina zajmom, otplata zajma i drugo),
4. roba za plaćanje - stvarni transfer i
5. potraživanje za transfer - uplata poreza, penzija i drugo.

S obzirom na raznovrsnost i masovnost transakcija, iste mogu biti podeljene prema brojnim kriterijumima, kao na primer:

1. Prema učesnicima na:

- transakcije između fizičkog lica A i fizičkog lica B, na primer u slučaju zamene gume na automobilu u vlasništvu lica A i to u servisu u vlasništvu lica B;
- transakcije između fizičkog lica A kao kupca i fizičkog lica B kao prodavca - vlasnika radnje;
- transakcije između firme A i firme B u smislu standardnog poslovnog odnosa;

2. Prema mestu obavljanja transakcija na:

- transakcije u zemlji;
- prekogranične transakcije;

3. Prema prirodi transakcije na:

- uslužne transakcije, koje imaju efekat na povećanje ili smanjenje finansijske imovine i
- finansijske transakcije, kod kojih iznos finansijske imovine ostaje nepromenjen, uz promenu njegove strukture, kao npr. kod kupovine hartija od vrednosti za gotovinu itd.

U Srbiji aktivno posluju sledeće finansijske institucije: banke, učesnici na tržištu osiguranja, penzioni fondovi, kao i platne institucije uključujući institucije elektronskog novca iz trećih država.

Shodno čl. 4 Zakona o bankama ("Sl. glasnik RS", br. 107/2005, 91/2010 i 14/2015) banka može obavljati sledeće poslove:

- 1) depozitne poslove (primanje i polaganje depozita);
- 2) kreditne poslove (davanje i uzimanje kredita);
- 3) devizne, devizno-valutne i menjačke poslove;
- 4) poslove platnog prometa;
- 5) izdavanje platnih kartica i druge.

Istovremeno Narodna banka Srbije preduzima sistematske aktivnosti u smislu uvođenja, unapređenja i pouzdanog funkcionisanja sledećih platnih sistema:

- RTGS platni sistem
- Kliring platni sistem

- Međubankarski kliring sistem u devizama
- Međunarodni kliring sistem u devizama, koji podržava usluge plaćanja i naplata uz učešće: poslovnih banaka i Narodne banke Srbije, kao i poslovnih banaka iz Bosne i Hercegovine
- DinaCard kliring sistem
- IPS platni sistem

Sa svoje strane Poslovno udruženje Udruženje banaka Srbije je operator sledećih sistema:

- Kliring čekova, Kliring direktnih zaduženja i Kreditni biro

Shodno čl. 2 Zakona o platnim uslugama, Značenje pojedinih pojmova, stav 1, platna transakcija označava uplatu, prenos ili isplatu novčanih sredstava koje inicira platilac ili primalac plaćanja, a obavlja se bez obzira na pravni odnos između platioca i primaoca plaćanja.

U kojoj meri nove tehnologije omogućavaju i doprinose efikasnosti i masovnosti korišćenja raspoloživih sistema plaćanja putem mobilnog bankarstva biće prikazano kroz izveštaj Narodna banke Srbije kako sledi:

U grupi fizičkih lica, broj izvršenih transakcija korišćenjem mobilnog bankarstva u prvom tromesečju 2021. god. bio je za 76,11% viši nego u prvom tromesečju 2020. godine (10.781.314 u odnosu na 6.121.969), dok je broj izvršenih transakcija korišćenjem elektronskog bankarstva u prvom tromesečju 2021. bio za 12,93% viši nego u prvom tromesečju 2020. god. (u kojima je izvršeno 6.068.362, odnosno 5.373.715 transfera).

U grupi pravnih lica i preduzetnika, posmatrano za period od prvog tromesečja 2020. god. do prvog tromesečja 2021. godine, broj izvršenih transakcija korišćenjem mobilnog bankarstva porastao je za 77,99% (sa 775.506 na 1.380.352 transakcija), dok je broj izvršenih transakcija korišćenjem elektronskog bankarstva u istom periodu porastao za 12,63% (sa 26.489.392 na 29.833.815 transakcija).

Banke predstavljaju najsloženije finansijske institucije koje pružaju usluge korisnicima, kao što su:

1. Fizička lica: zaposleni, penzioneri, student i dr.
2. Privredna društva (velika, srednja i mala preduzeća)
3. Preduzetnici
4. Javna preduzeća
5. Specijalizovane finansijske institucije kao što su: brokeri, kastodi banke i druge
6. Nerezidenti i ogranci nerezidentnih firmi
7. Strane banke preko svojih predstavništava, itd.

Stoga je bankarsko poslovanje praćeno brojnim specifičnostima, među kojima neizostavno treba izdvojiti: izrazita diferencijacija i masovnost klijenata, raznovrsnost usluga, stalna tehnološka unapređenja, te digitalizacija, uvođenje aplikacija i platformi za on-line pristupe korisnika i neke druge.

Pred svakim privrednim društvom, odnosno preduzetnikom stoje sledeći ciljevi: obezbeđenje likvidnosti, utvrđivanje optimalnog obima sredstava sa kojima firma posluje, što uključuje kreditnu podršku poslovne banke odnosno banaka, uz smanjivanje transakcionih troškova.

Primarne funkcionalnosti tekućeg računa privrednog društva, odnosno preduzetnika kod banke su: držanje sredstava u lokalnoj i stranoj ili stranim valutama, obavljanje platnog prometa u zemlji i platnog prometa sa inostranstvom, e-banking, kao i korišćenje platnih kartica na ime firme, uz ovlašćenje za raspolaganje od strane određenog broja rukovodilaca/menadžera firme.

Segmentacija klijenata je praksa najpre uvedena od strane globalnih banaka, a potom preuzeta i od strane većine banaka širom sveta. Suština ovog modela je u slojevitom određivanju tarifa za klijente prema internim kriterijumima koje definišu same banke.

U imperativne koje banke podržavaju spadaju pre svega: informacije u realnom vremenu i transparentnost u pogledu promena na računu svakog klijenta, budući da isti omogućavaju procenu i donošenje odluka o investiranju raspoloživih sredstava, te optimizacije poslovanja na kraći i duži rok.

Odobranje kredita predstavlja takođe veoma poznatu vrstu transakcije, u kojoj kreditor, a u skladu sa propisima većine država sveta, to može biti banka ili samo banka, stavlja na raspolaganje, odnosno pozajmljuje određeni iznos novca svom klijentu, pod tačno određenim uslovima u pogledu kamate i roka vraćanja kredita, kao i nekih drugih pratećih uslova kao što su depozit, žiranti i neki drugi.

Kreditna kartica predstavlja veoma korišćen instrument, koji omogućava kombinaciju kupovine sa kreditom. Prodavac prodaje robu, koja se plaća karticom po osnovu kredita odobrenog od strane banke, kao što je slučaj u Srbiji, ili kredita odobrenog od strane platne institucije odnosno kartičarske institucije, shodno propisima u nekim drugim zemljama. U standardne vrste platnih kartica spada tzv. debitna kartica, kod koje se plaćanje vrši automatskim zaduženjem raspoloživih sredstava na računu vlasnika kartice koji se vodi kod banke.

Za razliku od transakcija u zemlji, transakcije u vezi sa poslovanjem pravnih lica i preduzetnika sa inostranstvom su daleko složenije, po pravilu skuplje i često praćene većim rizikom, odnosno rizicima.

Jedan poseban segment transakcija sa inostranstvom predstavljaju transakcije u koje su uključena fizička lica. Naime, fizička lica mogu, shodno propisima zemlje u kojoj je izdata platna kartica, vršiti plaćanja po osnovu kupovine roba ili usluga, kako u zemlji, tako i u inostranstvu. Fizička lica mogu biti korisnici čekova koji glase na stranu valutu, a koje dobijaju po osnovu penzije ostvarene u inostranstvu, kao i po nekim drugim osnovama.

Pre prelaska na detaljnije predstavljanje platnih instrumenata prilika je da se ukaže na jedan posebno značajan globalni fenomen. Reč je o dijaspori odnosno rastućem broju ljudi koji odlaze privremeno ili trajno u druge zemlje pre svega iz ekonomskih razloga. Ovaj fenomen je praćen masovnošću, te velikom frekvencijom slanja sredstava porodici u zemljama porekla, preko banaka ili preko platnih institucija globalnog karaktera, kao što su PayPal, Skrill i brojni drugi.

Takođe treba spomenuti globalno masovan platni promet po osnovu prenosa penzija rezidentima koji privremeno ili stalno žive van zemlje u kojoj su ostvarili penziju, što zahteva transfer iste u inostranstvo.

Tradicionalni instrumenti platnog prometa sa inostranstvom su: doznaka, ček, menica, poštanska uputnica, platna kartica, a u nekim zemljama i direktno zaduženje. Pored navedenih instrumenata postoje brojne varijante istih, od kojih su najmasovniji modeli plaćanja putem doznake.

Book payment predstavlja model izvršenja transakcija plaćanja kod koga banka nalagodavca plaćanja i banka korisnika plaćanja imaju račune kod iste/zajedničke korespondentne banke u inostranstvu. Prednost se ogleda u brzini izvršenja naloga, kao i posebno povoljnim, a često i nultim tarifama.

Bulk payment predstavlja model plaćanja koji koristi banka radi izvršenja velikog broja plaćanja odnosno doznaka po nalogu jednog nalagodavca, dok je broj korisnika veliki. Kao primer se može uzeti isplata plata zaposlenima u firmi. Mehanizam izvršenja takvih naloga obuhvata listu računa svih korisnika kojima će biti izvršene uplate, uz jedno jedino zaduženje računa nalagodavca za ukupan iznos svih pojedinačnih odobrenja.

U želji za postizanjem maksimalne brzine, tačnosti i efikasnosti u izvršenju ekstremno velikog broja naloga, globalne banke, a potom i većina operativnih banaka širom sveta razvijaju posebne sisteme. Naime, suštinski princip se odnosi na definisanje statusa obaveznih podataka za izvršenje svakog naloga za plaćanje (eng. Straight-through-Processing skraćeno STP). Takođe posebna pažnja se posvećuje egzaktnosti podataka koji omogućavaju sveobuhvatnu kontrolu transakcija u domenu „Upoznaj svoga klijenta” (eng. Know Your Customer).

Novijeg datuma je uvođenje doznaka - transakcija pod nazivom Plaćanja male vrednosti (eng. Low Value Payments). Iste se odnose na elektronska plaćanja po nalogu fizičkih lica, firmi, finansijskih institucija i vladinih institucija, nezavisno od visine iznosa na koji takvi nalozi glase. Takođe nalozi za plaćanje dati od strane PayPal, Facebook, Google Wallet i nekih drugih institucija elektronskog novca takođe se mogu smatrati naložima za plaćanje male vrednosti.

Značajnu specifičnost prekograničnih plaćanja predstavlja korišćenje brojnih valuta. S tim u vezi svakako se može konstatovati da evro predstavlja najmasovnije korišćenu valutu u platnom prometu iz Srbije, kao i prema Srbiji. Evropski Komitet za bankarske standarde uz podršku SWIFT-a je formirao IBAN kao model međunarodnog broja bankarskog računa. Do sada je 77 zemalja pristupilo IBAN-u pri čemu treba imati u vidu da SAD, Kanada, Australija i neke druge države nisu članice.

Pristupanje IBAN-u omogućava bankama u Srbiji da preko svojih evropskih korespondenata budu uključene u izvršenje naloga za plaćanje koji glase na evro, kao i priliva iz inostranstva uz korišćenje SEPA-naloga za plaćanje. Upravo to predstavlja značajnu prednost, s obzirom na činjenicu da Srbija nije članica EU niti članica Evro-zone, koju čine zemlje članice EU koje su prihvatile evro u zamenu za svoju nacionalnu valutu, kao i neke druge zemlje po osnovu posebno zaključenih aranžmana sa EU, kao na primer: Andora, San Marino, Monako i Vatikan. Ne sme biti zaboravljena ni Velika Britanija, koja je i posle izlaska iz EU („Brexit”) ostala članica SEPA.

Prilika je da se konstatuje, da uprkos stalnom razvoju i unapređenju instrumenata plaćanja prema inostranstvu ček koji glasi na stranu valutu se dalje koristi. S tim u vezi, neophodno je konstatovati da je ovaj dugovečni instrument plaćanja praćen određenim specifičnostima, kao što su: značajni troškovi slanja čeka od strane korisnika čeka na adresu izdavaoca čeka u inostranstvu, velike razlike u pogledu roka važnosti čeka po zemljama, kao i rizik falsifikata.

Takođe su pažnje vredni instrumenti finansiranja trgovine (eng. Trade finance) koji predstavljaju instrumente namenjene privrednim društvima i preduzetnicima, odnosno kompanijama koje se bave

spoljno trgovinskim poslovima. Za ove vrste instrumenta postoje Jednoobrazna pravila sačinjena od strane Međunarodne trgovinske komore (MTK), sa ciljem da podrže interese učesnike u transakcijama. U ovu vrstu instrumenata spadaju: dokumentarni akreditiv, bankarska doznaka (L/G), SBLC, inkaso i Bankarska platna obligacija (BPO).

Pored predstavljenih vrsta transakcija i instrumenata svakako treba obratiti pažnju i na transakcije koje su podržane od strane specijalizovanih konsultantskih institucija. Reč je o savetovanju klijenata kao što su banke, osiguravajuće kompanije, velike i posebno globalne kompanije. Konkretnije rečeno okvir savetovanja je veoma širok i može obuhvatiti neke od ili sve tematske celine, kao što su:

- Spajanje i preuzimanje (M&A)
- Istraživanje tržišta
- Unapređenje poslovanja
- Razvoj poslovanja
- Upravljanje projektima
- Operativni alati
- Podrška poslovanju u matičnoj zemlji
- Podrška poslovanju na globalnom nivou i drugi.

Konsultantske/savetničke usluge u vezi sa transakcijama (eng. Transactions Advisory Services - TAS) pomažu firmama da procene i upravljaju transakcijama u cilju postizanja ciljeva u skladu sa očekivanjima i rokovima postavljenim od strane osnivača kompanija.

Transakcija predstavlja jedan od fenomena savremenog sveta. Transakcija je dostupna, sveprisutna, globalna i neophodna, otuda su, a statistike to redovno potvrđuju, broj transakcija i broj korisnika u stalnom porastu. Generatori daljeg razvoja transakcija u svetu finansijskih i posebno bankarskih usluga su svakako ICT- kompanije zajedno sa brojnim provajderima koji razvijaju i unapređuju informacione i komunikacione tehnologije, te stavljaju na raspolaganje pouzdane sisteme prenosa informacija bez kojih svet transakcija koji danas poznajemo ne bi uopšte bio moguć. Banke s posebnom pažnjom prate dalji razvoj i unapređenje svakog pojedinačnog tipa transakcija. Pri tome banke aktivno sarađuju sa ICT- kompanijama, upućivanjem inicijativa i davanjem ocena, te odgovarajućom podrškom, budući da su vitalno zainteresovane za pružanje inoviranih servisa i vrsta transakcija svojim postojećim i potencijalnim klijentima.

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HER MAJESTY THE TRANSACTION

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Summary

The transaction is one of the unavoidable phenomena of the modern world. The transaction is accessible, ubiquitous, global, and necessary, hence the number of transactions and the number of users is constantly increasing, as statistics regularly confirm. Generators of further development of transactions in the world of financial and especially banking services are certainly ICT companies together with numerous providers that develop and improve information and communication technologies, and make available reliable information transmission systems without which the world of transactions we know today would not be possible. Banks pay special attention to the further development and improvement of each individual type of transaction. In doing so, banks actively cooperate with ICT companies, sending initiatives and giving ratings, and appropriate support, as they are vitally interested in providing innovative services and types of transactions to their existing and potential clients.

Keywords: Transaction; Payment; remittance; efficiency; global distribution; imperative.

The term transactions in theory and practice means an agreement, contract, procedure, execution, as well as some other related meanings according to which a certain business activity of importance for both participants in the transaction is prepared and/or realized.

In the continuation of the discussion of the role and significance of transactions, the basic classifications of transactions will be presented, followed by the role of the National Bank of Serbia as a regulator of banking operations inextricably linked to transactions. This is followed by a focus on banks as the primary financial institutions in the country's financial system, and an overview of selected transactions that banks provide in connection with the operations of legal entities in the country, as well as in relation to the provision of services to households. Of course, a special place is occupied by the business segment of the economy in the field of foreign trade transactions, which will be accompanied by a presentation of the most important instruments of international payment transactions, understandably accompanied by special types of transactions.

This consideration will be rounded off with particularly significant and increasingly used types of transactions without which it would be unthinkable to consider any expansion or improvement of business, both by legal entities and entrepreneurs, and by banks, insurance companies and other actors in the financial sector. These are certainly advisory/consulting services, which by the nature of their format and importance deserve to be presented separately, in order to have a more complete view of them.

The transaction therefore represents the will of two or more entities, or two or more natural persons, to enter into an agreement or conclude an agreement on the exchange of goods, services or, more recently, financial assets. The existence of money as a measure of the value of goods or assets, and as such a mandatory element of any transaction is what distinguishes a transaction from barter. Of course, there are certain exceptions to the previous statement, such as in the case of gifts in the form of a particular item or a particular service, which are not accompanied by either monetary or other types of compensation.

Prior to the transaction, the only way to secure a certain good was a barter in terms of exchanging goods between one person who owns a certain good and another person who wants to have such a good in their possession. The exchange is based on a direct agreement between the interested persons and that model of transfer of goods, i.e., property from the ownership of one to the property of another person is still retained primarily in areas where organized trade has not become the predominant or exclusive model of supply.

Noteworthy is the classification of transactions made by Prof. Stobbe, PhD, which includes the following types:

1. goods for goods - exchange of goods
2. goods for receivables in cash - purchase and sale of goods
3. receivable for receivable - purchase or sale of receivables (loan trade, loan repayment, etc.)
4. goods for payment - actual transfer
5. receivables for transfer - payment of taxes, pensions, etc.

Given the diversity and pervasiveness of transactions, they can be divided according to a number of criteria, such as:

1. According to the Participants included:

- Transactions between natural person A and natural person B, for example in the case of replacing a tire on a car owned by person A in a service owned by person B;
- Transactions between natural person A as a buyer and natural person B as a seller - shop owner;
- Transactions between firm A and firm B in terms of a standard business relationship;

2. according to the place of performing transactions on:

- Domestic transactions;
- Cross-border transactions;

3. according to the nature of the transaction on:

- Service transactions, which have the effect of increasing or decreasing financial assets and
- Financial transactions, in which the amount of financial assets remains unchanged, with a change in its structure, such as the purchase of securities for cash, etc.

The following financial institutions are active in Serbia: banks, participants in the insurance market, pension funds, as well as payment institutions, including electronic money institutions from third countries.

According to the Art. 4 of the Law on Banks ("Official Gazette of RS", No. 107/2005, 91/2010 and 14/2015), a bank may perform the following tasks:

- 1) Deposit operations (receiving and placing deposits);
- 2) Credit operations (giving and taking loans);
- 3) Foreign exchange operations and foreign exchange transactions;
- 4) Payment operations;
- 5) Issuance of payment cards, etc.

At the same time, the National Bank of Serbia undertakes systematic activities in terms of implementation, improvement and reliable functioning of the following payment systems:

- RTGS payment system

- Clearing payment system
- Interbank clearing system in foreign currency
- International clearing system in foreign currency, which supports payment and collection services with the participation of: commercial banks and the National Bank of Serbia, as well as commercial banks from Bosnia and Herzegovina
- Dina Card clearing system
- IPS payment system

For its part, the Association of Serbian Banks b.a. is the operator of the following systems:

- Cheque Clearing, Direct Debit Clearing and the Credit Bureau.

According to Art. 2 of the Law on Payment Services, Meaning of Certain Terms, paragraph 1, a payment transaction means the payment, transfer or disbursement of funds initiated by the payer or payee, and is performed regardless of the legal relationship between the payer and the payee.

The extent to which new technologies enable and contribute to the efficiency and mass use of available payment systems through mobile banking will be presented in the report of the National Bank of Serbia as follows:

In the group of natural persons, the number of executed transactions using mobile banking in the first quarter of 2021 was 76.11% higher than in the first quarter of 2020 (10,781,314 compared to 6,121,969), while the number of executed transactions using electronic banking in the first quarter of 2021 was 12.93% higher than in the first quarter of 2020 (in which 6,068,362 and 5,373,715 transfers were made).

In respect of legal entities and entrepreneurs, observed for the period from the first quarter of 2020 to the first quarter of 2021, the number of executed transactions using mobile banking increased by 77.99% (from 775,506 to 1,380,352 transactions), while the number of executed transactions using electronic banking in the same period increased by 12.63% (from 26,489,392 to 29,833,815 transactions).

Banks are the most complex financial institutions that provide services to customers, such as:

1. Individuals: employees, pensioners, students, etc.
2. Companies (large, medium, and small enterprises)
3. Entrepreneurs
4. Public companies
5. Specialized financial institutions such as: brokers, custodian banks and others
6. Non-residents and branches of non-resident companies
7. Foreign banks through their representative offices, etc.

Therefore, banking is accompanied by numerous specific characteristics, among which we must highlight: strong differentiation and number of customers, diversity of services, constant technological improvements, and digitalization, introduction of applications and platforms for online user access and some others.

In front of every company or entrepreneur there are the following goals: providing liquidity, determining the optimal amount of funds with which the company operates, which includes credit support of a commercial bank or banks, while reducing transaction costs.

Primary functionalities of the current account of the company, i.e., entrepreneurs at the bank are: holding funds in local and/or foreign currencies, performing payment transactions in the country and foreign payments, e-banking, as well as the use of payment cards in the name of the company, with the usage authorization for a number of managers of the company.

Customer segmentation is a practice first introduced by global banks and then taken over by most banks around the world. The essence of this model is in the layered determination of tariffs for clients according to internal criteria defined by the banks themselves.

The imperatives that banks support include, above all: real-time information and transparency regarding changes in each client's account, since they enable assessment and decision-making on investing available funds, and optimizing operations in the short and long term.

Credit approval is also a very well-known type of transaction, in which the creditor, and in accordance with the regulations of most countries of the world it can be a bank or is exclusively a bank, makes available or lends a certain amount of money to its client, under precisely defined conditions regarding interest and loan repayment period, as well as some other accompanying conditions such as deposit, guarantors and others.

Credit cards are a much-used instrument, which allows the combination of shopping and loans. The seller sells the goods, which are paid by card on the basis of a loan approved by the bank, as is the case in Serbia, or a loan approved by the payment institution or card institutions, according to regulations in some other countries. The standard types of payment cards include the so-called debit card, where the payment is made by automatic debiting of available funds on the cardholder's account kept with the bank.

Unlike transactions in the country, transactions related to the business of legal entities and entrepreneurs abroad are far more complex, and are, as a rule, more expensive and often accompanied by higher risk or risks.

One special segment of foreign transactions is transactions involving individuals. Namely, natural persons may, in accordance with the regulations of the country in which the payment card was issued, make payments based on the purchase of goods or services both in the country and abroad. Individuals can be users of checks denominated in foreign currency, which they receive on the basis of a pension earned abroad, as well as on some other grounds.

Before moving on to a more detailed presentation of payment instruments, we can point out one particularly important global phenomenon. It concerns the diaspora, i.e., a growing number of people

who go temporarily or permanently to other countries, primarily for economic reasons. This phenomenon is widespread, and includes a high frequency of sending funds to families in countries of origin, through banks or through payment institutions of a global nature, such as PayPal, Skrill and many others.

We should also mention the globally widespread payment transactions based on the transfer of pensions to residents who temporarily or permanently live outside the country in which they receive their pension, which requires its transfer abroad.

Traditional instruments of international payment transactions are: remittance, check, bill of exchange, postal order, payment card, and in some countries even direct debit. In addition to the listed instruments, there are numerous variants of the same, of which the most common are the models of payment by remittance.

Book payment is a model of execution of payment transactions in which the bank of the ordering party and the bank of the payee have accounts with the same/joint correspondent bank abroad. The advantage is reflected in the speed of order execution, as well as particularly favourable and often zeros tariffs.

Bulk payment is a payment model used by the bank to make a large number of payments or remittance by order of one principal, while the number of users is large. An example is the payment of salaries to employees in the company. The mechanism for executing such orders includes a list of accounts of all users to whom payments will be made, with a single debit of the client's account for the total amount of all individual approvals.

In order to achieve maximum speed, accuracy and efficiency in executing an extremely large number of orders, global banks and then most operating banks around the world are developing special systems. Namely the core principle refers to defining the status of mandatory data for the execution of every payment order - Straight-through-Processing. Also, special attention is paid to the exactness of the data that enable comprehensive control of transactions in the "Know Your Customer" domain.

The introduction of remittances - transactions called Low Value Payments is more contemporary. They refer to electronic payments on the orders of individuals, companies, financial institutions, and government institutions, regardless of the amount to which such orders refer. Also, payment orders given by PayPal, Facebook, Google Wallet and some other electronic money institutions can also be considered as low value payment orders.

A significant specificity of cross-border payments is the use of many currencies. In this regard, it can certainly be stated that the euro is the most widely used currency in payment transactions from Serbia as well as towards Serbia. The European Banking Standards Committee, with the support of SWIFT, has established the IBAN as a model for an international bank account number. So far, 77 countries have joined the IBAN, bearing in mind that the United States, Canada, Australia, and some other countries are not members.

Accession to IBAN enables banks in Serbia to be involved through their European correspondents in the execution of payment orders denominated in euros, as well as inflows from abroad with the use of SEPA payment orders. This is a significant advantage, given the fact that Serbia is not a member of the EU or a member of the Eurozone, which consists of EU member states that have adopted the euro

in exchange for their national currency, as well as some other countries under specially concluded arrangements with the EU, such as for example: Andorra, San Marino, Monaco, and the Vatican. We must not forget the United Kingdom, which remained a member of SEPA even after leaving the EU ("Brexit Deal").

It is worth mentioning that, despite the constant development and improvement of payment instruments abroad, a check denominated in a foreign currency is still used. In this regard, it is necessary to state that this long-term payment instrument is accompanied by certain specifics, such as: significant costs of sending a check by the check user to the address of the check issuer abroad, large differences in the validity of checks by country, and the risk of counterfeiting.

The instruments of trade finance are also noteworthy, which are instruments intended for companies and entrepreneurs, i.e., companies engaged in foreign trade. These types of instruments fall under the Uniform Rules made by the International Chamber of Commerce (ICC), with the aim of supporting the interests of participants in transactions. This type of instruments include: Documentary Letter of Credit (LC), Bank Guarantee (L/G), Stand-by Letter of Credit (SBLC), Collection and Bank Payment Obligation (BPO).

In addition to the presented types of transactions and instruments, attention should certainly be paid to transactions that are supported by specialized consulting institutions. They deal with advising clients such as banks, insurance companies, large and especially global companies. More specifically, the framework of the consultation is very broad and may include some or all of the thematic units such as:

- Merger and Acquisition (M&A)
- Market research
- Improving business,
- Business development
- Project management
- Operational tools
- Support for doing business in the home country
- Global business support and others.

Transactions Advisory Services (TAS) help firms to assess and manage transactions in order to achieve goals in accordance with the expectations and deadlines set by the founders of the companies.

The transaction is one of the unavoidable phenomena of the modern world. The transaction is accessible, ubiquitous, global, and necessary, hence the number of transactions and the number of users is constantly increasing, as statistics regularly confirm. Generators of further development of transactions in the world of financial and especially banking services are certainly ICT companies together with numerous providers that develop and improve information and communication technologies,

and make available reliable information transmission systems without which the world of transactions we know today would not be possible. Banks pay special attention to the further development and improvement of each individual type of transaction. In doing so, banks actively cooperate with ICT companies, sending initiatives and giving ratings, and appropriate support, as they are vitally interested in providing innovative services and types of transactions to their existing and potential clients.

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BEOGRADSKA BERZA
BELGRADE STOCK EXCHANGE

BAROMETAR/BAROMETER JANUAR 2021 – JUL 2021. / JANUARY 2021 – JULY 2021

1. PROMET / TURNOVER

Mesec/ Month	Listing	Open Market	Regulisano tržište/ Regulated market	MTP/MTF	Ukupno/Total	Broj transakcija/ Number of transactions
Jul 2021	1.613.119.599	41.696.072,00	1.654.815.671	46.265.397,00	1.701.081.068	1.148,00
Jun 2021	3.621.882.419	565.050.460,00	4.186.932.879	105.562.078,00	4.292.494.957	1.770,00
Maj 2021	364.708.913	181.873.825,00	546.582.738	164.023.381,00	710.606.119	1.657,00
April 2021	4.741.499.773	95.863.461,00	4.837.363.234	219.210.473,00	5.056.573.707	2.051,00
Mart 2021	1.384.264.827	144.884.876,00	1.529.149.703	198.744.779,00	1.727.894.482	1.810,00
Februar 2021	5.088.160.062	44.949.749,00	5.133.109.811	155.648.215,00	5.288.758.026	1.857,00
Januar 2021	1.347.760.980	16.481.850,00	1.364.242.830	26.775.647,00	1.391.018.477	1.038,00
Decembar 2020	4.574.035.074	288.316.813,00	4.862.351.887	144.728.160,00	5.007.080.047	1.923,00
Novembar 2020	2.697.283.452	17.597.428,00	2.714.880.880	69.874.336,00	2.784.755.216	1.289,00
Oktobar 2020	2.767.941.193	116.908.135,00	2.884.849.328	63.331.505,00	2.948.180.833	1.463,00
Septembar 2020	3.451.939.927	10.300.290,00	3.462.240.217	41.511.949,00	3.503.752.166	1.009,00
Av gust 2020	769.981.610	25.293.837,00	795.275.447	23.454.407,00	818.729.854	1.167,00
	32.422.577.828	1.549.216.796,00	33.971.794.624	1.259.130.327,00	35.230.924.951	18.182,00

*RSD

2. INDEKSI / INDICES

Januar/January 2021. Jul/July 2021		BELEX15	BELEXline
	Poslednja vrednost / Last value	775,6	1.650,42
	Promena (abs) / Change (abs)	27,05	84,39
	Promena (%) / Change (%)	3,61%	5,39%
	Najviša vrednost / Maximum value	785,9	1.662,48
	Najniža vrednost / Minimum value	722,66	1.523,61
	Istorijski max / History maximum value	3.335,20	5.007,34
	Istorijski min / History minimum value	347,46	841,99
	Vrednost prometa / Value of turnover	1.514.128.624	2.518.215.485

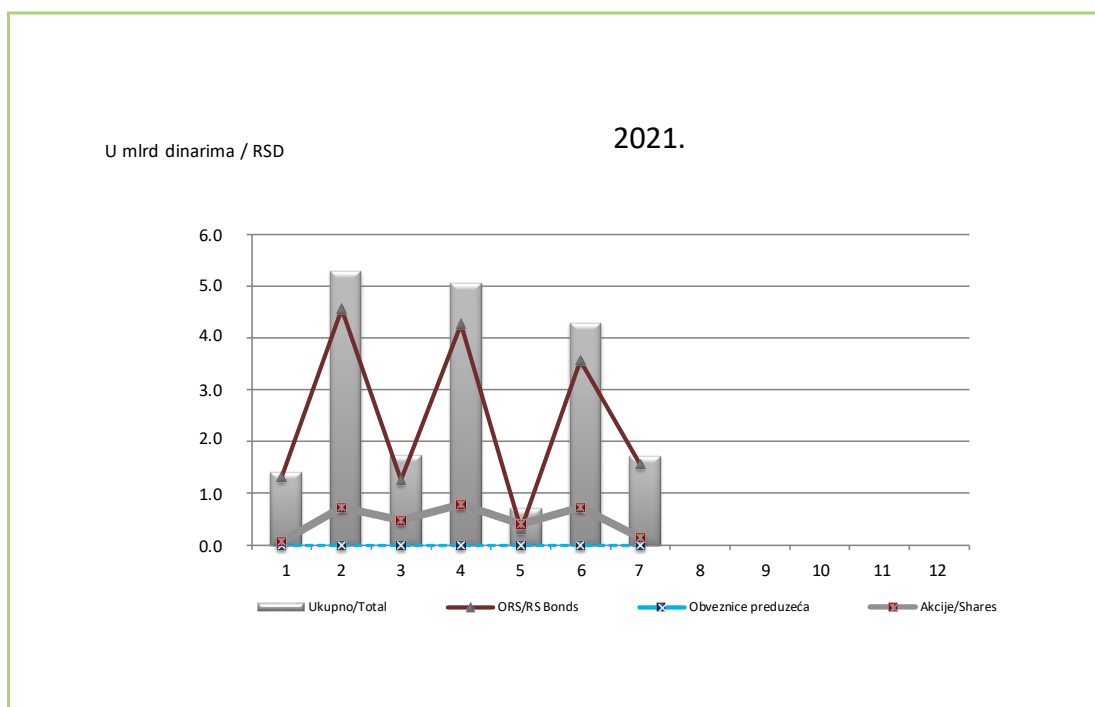
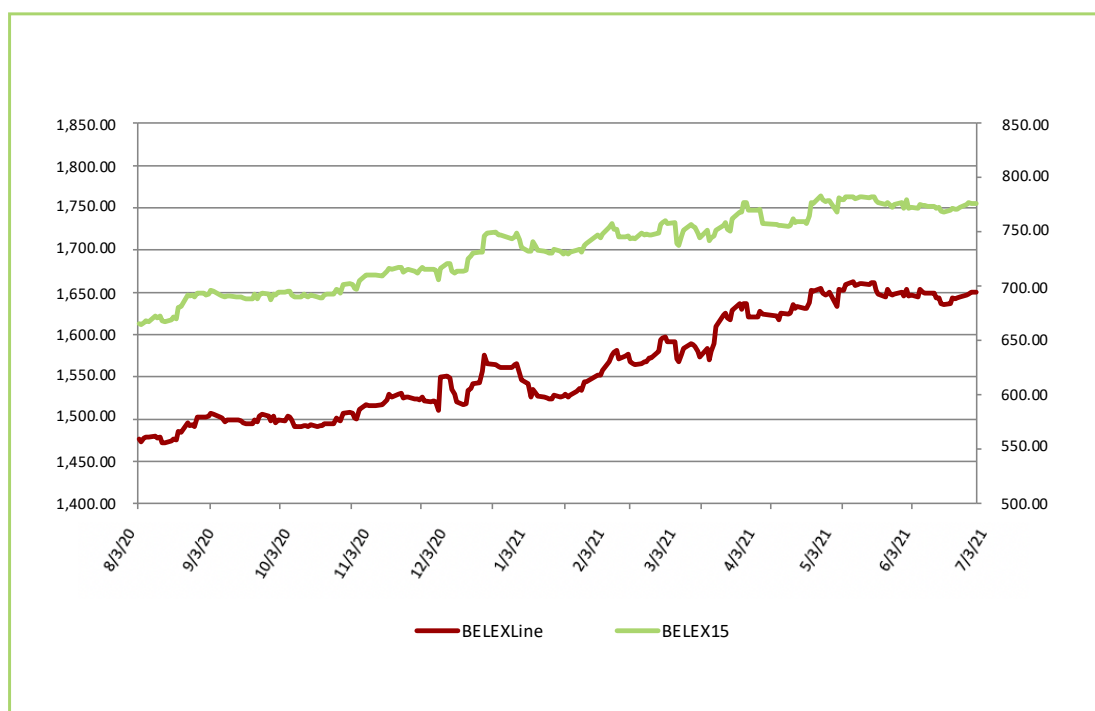
3. TRŽIŠNA KAPITALIZACIJA / MARKET CAPITALISATION

	April / April	Maj / May	Jun / June	Jul / July
Ukupna tržišna kapitalizacija/ Total market capitalisation	539.257.576	541.185.714	525.374.742	510.262.065
Regulisano tržište/Regulated Market	291.360.289	293.564.110	297.533.972	288.254.683
Listing	219.086.463	221.574.280	224.460.174	221.286.494
Prime Listing – akcije/ Prime Listing – shares	157.528.352	156.968.154	156.297.839	152.998.634
Standard Listing – akcije/ Standard Listing – shares	61.558.111	64.606.126	68.162.335	68.287.860
Open Market	72.273.827	71.989.830	73.073.797	66.968.190
MTP/MTF	247.897.287	247.621.604	227.840.770	222.007.381
BELEX15	263.143.810	264.667.605	267.541.617	258.244.443
BELEXline	275.084.339	276.580.752	279.568.558	269.569.679

*u hiljadama RSD / in RSD thousands

4. UČEŠĆE STRANIH INVESTITORA / FOREIGN INVESTORS PARTICIPATION

Januar/January 2021. Jul/July 2021	Učešće stranih investitora / Foreign Investors Participation		
	FIS	total	17,83%
		b-FIS	16,74%
		s-FIS	18,92%
	FIB		8,79%
	FIT		10,28%





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