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UVODNIK

Darko Šehović

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Udruženje banaka Srbije

Digitalno uporni i otporni

Ukrašavajući jelku i finiširajući mnogobrojne izveštaje, staru godinu ostavljamo uspomenama i spremamo se za Novu, nadajući se da ćemo u ovom mesecu decembru tradicionalno uhvatiti predah i sumirati sve uspehe i neuspehe, željni pouka i mudrosti koje ćemo, kao i prethodnih godina, pokušati da primenimo u godini koja je pred nama.

Dok slika rasplamsale korone ubrzano blede, navike koje nam je donela izgleda ostaju sa nama, kao trajno podsećanje. Jedan od njih je i udaljeni rad koji se, svidelo se to nekima ili ne, uvukao u sve pore biznisa, od svakodnevnih operacija, preko onih koje su do juče bile nezamislive za obavljanje izvan kompanijskih zidova, pa do oglasa za poslove koji sad već po komandi sadrže reč *remote* i/ili hibrid. Udaljeni rad prihvatili su i korisnici finansijskih usluga, pa se broj korisnika koji svoje najraznovrsnije finansijske poslove obavljaju posredstvom digitalnih kanala iz udobnosti svoga doma nezaustavljivo povećava. Zanimljiva je informacija da je u pojedinim bankama broj digitalno odobrenih kredita premašio 50%. Efekti ovih promena u najmanju ruku su izazvali kontroverze, po nekima otvaranje novih rizika i pretnji, a po drugima mogućnost povećanja prihoda za biznis. I jedni i drugi su u pravu! Umetnost je balansirati ovim rizicima i iskoristiti prednosti koje su ove promene donele, a uz sve to kreirajući moderne, brze, ali i otporne digitalne servise.

Spremajući se za talas digitalnih promena u finansijskom svetu, Evropska komisija je u novembru mesecu odlazeće godine usvojila dve strateški bitne direktive: *Network and Information Security Directive* (NIS2), namenjenu široj populaciji, i *Digital Operational Resilience Act* (DORA), usmerenu ka finansijskim institucijama. Ova dva dokumenta imaju za cilj da pruže podršku digitalnoj revoluciji koja je započeta kroz insistiranje na slojevitom pristupu upravljanju rizicima, obezbeđivanju informacione bezbednosti, sajber otpornosti, poboljšanju efikasnosti sistema za razmenu informacija i izveštavanja o incidentima, kao i upravljanju kritičnim segmentima kao što su pružaoci IKT usluga i treće strane u lancu pružanja usluga. Uz doslednu integraciju u lokalne regulative širom Evrope doživljaj korišćenja digitalnih servisa trebalo bi da bude iskustvo koje će nam olakšati poslovanje i učiniti prijatnijim put ka nekim novim i inovativnijim sistemima.

Udruženje banka Srbije, posmatrajući znakove kraj puta, zajedno sa svojim članicama osetilo je potrebu i pravi trenutak da uhvati korak sa trendovima i pokuša da doprinese u borbi sa predstojećim izazovima. U 2021. godini, pod okriljem Udruženja banka Srbije, formiran je i registrovan Finansijski CERT (FIN-CSIRT), kao prvi sektorski CERT u zemlji, peti u Evropi i dvanaesti u svetu. Ovim činom otvoren je put saradnji finansijskih institucija u cilju postizanja bolje sajber otpornosti čitavog sektora. Proslavljajući prvi rođendan i iščekujući izazove u Novoj godini poželeli smo svim učesnicima na finansijskom tržištu da zajedničkim snagama pokušamo da doprinesemo kreiranju što bezbednijeg i otpornijeg sistema za sve postojeće i one buduće korisnike finansijskih usluga u našoj zemlji.



EDITORIAL

Darko Šehović

Head of FIN-CSIRT,
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Digitally Persistent and Resistant

By decorating the Christmas tree and finishing numerous reports, we leave the old year behind, together with our memories, and we prepare for the New Year, hoping that in this month of December we will traditionally catch a break and summarise all the successes and failures, eager for lessons and wisdom that we will, once again, try to apply in the year ahead.

As the image of the COVID wildfire rapidly fades, the habits it has brought us seem to remain, as a permanent reminder. One of them is remote work that, whether some like it or not, has crept into all pores of business, from everyday operations, and those that were until recently thought to be impossible to perform outside the company walls, to advertisements for jobs that now contain the word *remote* and/or hybrid. Remote work has also been accepted by users of financial services, so the number of users who perform their most diverse financial tasks through digital channels, from the comfort of their home, is increasing unstopably. It is interesting to note that, in some banks, the number of digitally approved loans exceeded 50%. The effects of these changes have caused controversy to say the least, according to some they brought about new risks and threats, and according to others they brought the possibility of increasing revenue for business. Both are right! It is an art to balance these risks and take advantage of the benefits that these changes have brought, while creating modern, fast, but also resilient digital services.

Preparing for a wave of digital change in the financial world, the European Commission adopted two strategically important directives in November of this year: the *Network and Information Security Directive* (NIS2), aimed at the wider population, and the *Digital Operational Resilience Act*. (DORA), directed towards financial institutions. These two documents aim to support the digital revolution that began by insisting on a layered approach to risk management, ensuring information security, cyber resilience, improving the efficiency of information exchange and incident reporting systems, as well as managing critical segments such as ICT service providers and third parties in the service chain. With consistent integration into local regulations across Europe, using digital services should be an experience that will make our business easier and more enjoyable, so that it can lead to some new and more innovative systems.

The Association of Serbian Banks, observing the signs by the road, together with its members felt the need and opportunity to catch up with trends and try to contribute to the fight against the challenges ahead. In 2021, under the auspices of the Association of Serbian Banks, the Financial CERT (FIN-CSIRT) was formed and registered, as the first sectoral CERT in the country, the fifth in Europe and the twelfth in the world. This act opens the way for cooperation between financial institutions to achieve better a cyber resilience of the entire sector. Celebrating our first birthday and anticipating challenges in the New Year, we wished all participants in the financial market to jointly try to contribute to the creation of a safer and more resilient system for all existing and future users of financial services in our country.

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UTICAJ CSR KAO ELEMENTA KORPORATIVNOG IMIDŽA NA PERFORMANSE POSLOVANJA BANAKA

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Rezime: U radu se ispituje uticaj CSR na finansijske performanse banaka koje posluju u Republici Srbiji. Istraživanje je sprovedeno na primeru sedam banaka za period od 2006 do 2019. godine, primenom analize panel podataka. Ocene parametara dobijene su primenom tri različita ocenjivača, PooledOLS, ocenjivača fiksnih efekata i ocenjivača slučajnih efekata. Rezultati istraživanja pokazuju da dve dimenzije CSR imaju statistički značajan uticaj na finansijske performanse banaka; ekološka odgovornost ima pozitivan uticaj poslovnih rezultata iskazanih preko ROA, dok kod dimenzije poštovanje osnovnih principa poslovanja i uspeha poslovanja, banke imaju negativan uticaj.

Ključne reči: CSR - Corporate Social Responsibility; panel analiza; finansijski sektor; rezultati poslovanja banaka.

JEL klasifikacija: G21, G39, G32

Uvod

Još od svoje pojave početkom 1950-ih godina prošlog veka koncept društvene odgovornosti preduzeća (CSR – *Corporate Social Responsibility*) predstavlja jednu od najkontroverznijih i najznačajnijih tema. Koncept je nastao iz potrebe da se preduzeća ponašaju vodeći računa ne samo o svojim interesima, već i interesima društva. Otuda, Berber et al., (2019) CSR predstavljaju kao koncept koji je omogućio da se uspostavi balans između ekonomskih, društvenih i ekoloških ciljeva preduzeća i društva. Čelić (2019) ističe da se na taj način ostvaruju i koristi za preduzeće i društvo u kome ono egzistira. Sekulić i Pavlović (2018) CSR opisuju kao ponašanje preduzeća koje se ogleda u usvajanju i realizaciji diskrecione poslovne prakse i ulaganjima koja pružaju podršku zajednici da unapredi svoje blagostanje i zaštitu životne sredine. Međutim, reč je o izuzetno kompleksnom konceptu, koji se može posmatrati s različitih aspekata poslovanja preduzeća. Preciznije, rezultat empirijskih istraživanja o najistaknutijim dimenzijama bitisanja društva, odnosno različitih stejkholdera sa kojima preduzeće ostvaruje interakcije. Identifikovano je pet dimenzija koncepta: ekološka odgovornost, odgovornost prema zaposlenima, odgovornost prema lokalnoj zajednici, odgovornost prema osnovnim principima ponašanja i odgovornost poslovanja preduzeća.¹ Upravo iz ove kompleksnosti proizlazi izazov efikasne implementacije CSR, ali i brojnih kontroverzi u smislu njegove efikasne primene. Osnovno pitanje koje se nameće jeste da li je moguće istovremeno zadovoljiti zahteve različitih stejkholdera koji nisu kompatibilni, već slobodno se može reći međusobno suprotstavljeni i isključivi. Bowen (1953) ističe da pozitivan stav prema CSR dovodi do superiornih performansi preduzeća. Slične tvrdnje izneli su Cruz et al. (2009), ističući da su CSR inicijative značajne u kontekstu poslovne etike i ponašanja zaposlenih, te da kao rezultat toga preduzeće ostvaruje superiornije performanse.

Nezavisno od prethodno rečenog, povećanje svesti društva u vezi ograničenosti resursa, potrebi očuvanja životne sredine, ponašanja svih participanata u društvu u skladu sa principima održivog ponašanja uticali su da preduzeća u svoje obrasce ponašanja i etičke kodekse ugrade principe (CSR). Sa druge strane, jačanje konkurencije u poslovanju, brze tehnološke inovacije, migracije i starenje stanovništva kao društveni fenomen uticali su na potrebu da se preduzeća pored ekonomskih interesa pozabave i pitanjima iz domena održivog ponašanja.

Međutim, uprkos relativno dugoj istoriji proučavanja CSR, ali i pozitivnim stavovima o uticaju CSR na performanse preduzeća, implementacija CSR u pojedinim oblastima još uvek nije dovoljno istražena i predstavlja predmet značajnih diskusija. Jedna od takvih oblasti jeste uticaj CSR na finansijske performanse, posebno u oblasti finansijskih institucija. Das i Bhunia (2016) ističu da se čitava akademska i stručna javnost po ovom pitanju dele na one koji smatraju da CSR ima pozitivan uticaj na finansijske performanse, kao što su Wu et al. (2020), na one koji smatraju da postoji negativan uticaj, kao što su Hirigoyen i Rehm (2016) i Madugba i Okpara (2016) i na one koji smatraju da CSR nema uticaj na finansijske rezultate poslovanja Chetty et al., (2019), Kwanbo R (2011).

¹ Identifikovane dimenzije koncepta CSR propisane su ISO 26000 standardom.

Imajući u vidu nepostojanje jedinstvenog stava, sa jedne, ali i činjenice da izučavanja uticaja CSR na finansijske performanse na primeru finansijskih institucija koje posluju u Republici Srbiji nije bio predmet značajnijih istraživanja, cilj ovog rada jeste da se ispita uticaj različitih dimenzija CSR, definisanih standardom ISO 26000, na finansijske performanse banaka.

Rad je strukturisan na sledeći način. Prvi deo rada uvodnog je karaktera. U drugom delu rada dat je pregled najznačajnijih empirijskih istraživanja koja se bave ovom problematikom i prikazani su rezultati dosadašnjih istraživanja u ovoj oblasti. U trećem delu rada dat je kratak opis analiziranih podataka i korišćene metodologije. U narednom sektoru predstavljeni, analizirani i diskutovani su rezultati. Završni deo rada predstavlja osvrt i u njemu se sumiraju nalazi i izlažu zaključci ove studije.

Pregled literature

Kako je već istaknuto u akademskim i stručnim krugovima nema jedinstvenog stava u pogledu uticaja CSR na finansijske performanse finansijskih institucija i uopšte preduzeća. Celokupna istraživanja na ovu temu mogu se podeliti u tri grupe. Prvu grupu čine istraživanja čiji nalazi impliciraju pozitivan uticaj implementacije CSR na finansijske performanse banaka. Takva istraživanja sprovedi su Esen (2013), Famiyeh et al., (2016), Choongo (2017), Makhdoomi & Nika FA (2018), Petkevičienė (2015), Prieto et al., (2020), Schmeltz A (2012), Plewa (2018), Wu et al., (2020) i dr. Karakteristično za ove autore jeste da pozitivan uticaj CSR na finansijske performanse preduzeća, objašnjavaju različitim argumentima. Tako Esen (2013), i Famiyeh et al., (2016), ističu da pozitivan uticaj implementacije CSR na finansijske performanse preduzeća posledica je dobrog imidža kompanije koji se stvara među stakeholderima svaki put kada preduzeće inicira aktivnosti koje se odnose na CSR. Choongo (2017), Plewa (2018) i Wu et al., (2020) ističu da je to rezultat povećanja zadovoljstva stakeholdera koje oni imaju svaki put kada preduzeće preduzme akcije koje dovode do unapređenja društvene odgovornosti preduzeća. Sličan stav iznose i Bhattacharya i Sen (2004) i Nassivera et al., (2017), ističući da sprovođenje aktivnosti od strane preduzeća, koje se odnosi na unapređenje društvene odgovornosti dovodi do povećanja lojalnosti kupaca, kao rezultata jačanja imidža preduzeća. Nassivera et al., (2017) utvrdili su da su kupci spremni da plate veću cenu za proizvode i usluge koje su rezultat CSR inicijative, što se u krajnjoj instanci odražava na unapređenje finansijskih performansi preduzeća. Turban i Greening (1996) utvrdili su da preduzeća koja ispoljavaju CSR inicijative mogu da privuku više potencijalnih klijenata, što se odražava na povećanje njihove konkurentnosti. Rezultati istraživanja Greening-a i Turban-a (2000) svedoče u prilog tome da preduzeća koja ispoljavaju CSR inicijative mogu da privuku kvalitetnije zaposlene i na taj način ostvare konkurentsku prednost i povećanje profita. Istovremeno, Greening i Turban (2000) pokazali su da u takvim preduzećima, zaposleni pokazuju veći stepen zadovoljstva i organizacione posvećenosti, odnosno da je stopa fluktuacije zaposlenih veoma niska u odnosu na konkurente, što se preko smanjenja troškova vezanih za zapošljavanje i obuku novih radnika, pozitivno odražava na finansijske rezultate preduzeća. Slične nalaze istraživanja predstavili su i Chen et al., (2019), koji ističe uticaj na osećaj pripadnosti organizaciji i Lee, et al., (2018), koji ističu povećanje zadovoljstva poslom.

Drugu grupu istraživanja čine studije koje nisu pronašle postojanje pozitivnog uticaja CSR na finansijske performanse preduzeća. Takva istraživanja sprovedi su Hirigoyen i Rehm P (2015), Madugba i Okpara (2016), Lahouel et al., (2020), Preston & O'Bannon (1997), Vance (1975). Vance (1975). Nalazi ovih istraživanja ukazuju da implementacija CSR ne doprinosi nikakvom boljitku poslovanja preduzeća, već naprotiv samo umanjuje prinose po akciji. U svojim istraživanjima Aupperle et al., (1985) jasno su utvrdili da implementacija CSR negativno utiče da finansijske performanse preduzeća u poređenju sa konkurentima iz grane. Razlog negativnog uticaja CSR na finansijske performanse preduzeća Preston i Bannon (1997) otkrili su u tome što implementacija CSR dovodi do rasipanja resursa koji mogu da se iskoriste u produktivnijim aktivnostima za preduzeće. Isti autori ističu da menadžeri često iniciraju implementaciju CSR kako bi ostvarili lične koristi. U prilog iznetog svedoče i nalazi istraživanja Krüger-a (2015), prema kojima često glavni motiv za implementaciju CSR jeste lična promocija menadžera i unapređenje njihove reputacije.

Protivnici implementacije CSR, kao glavni argument nasuprot ovog koncepta navode da preduzeća imaju samo jednu odgovornost, a to je da maksimiziraju dobit za svoje akcionare. U ovom kontekstu Orlitzky (2015) ističe da je društveno odgovorno poslovanje motivisano socijalističko-kolektivističkom agendom koja je u paradoksu sa kapitalističkim/liberalnim vrednostima slobodnog preduzetništva i individualizma. Štaviše, Mohr et al., (2001) sugerišu da potrošač ne proverava da li je kompanija CSR ili ne, kada donosi odluke o kupovini. Ispitujući da li prilikom donošenja odluka o kupovini kupci uzimaju u razmatranje da li se preduzeće ponaša društveno odgovorno ili ne Öberseder et al., (2011) utvrdili su da se pozitivni stavovi potrošača u vezi sa društveno odgovornim ponašanjem preduzeća na prenose na njihove odluke o kupovini proizvoda ili usluge.

Treću grupu istraživanja čine studije u kojima nije otkriven ni pozitivan, niti negativan uticaj CSR na finansijske performanse preduzeća. Takva istraživanja sprovedi su Margolis et al., (2009), Nyeadi et al., (2018) Nollet et al., (2015). Proučavajući uticaj različitih dimenzija CSR na finansijske performanse banaka, Kilić (2016) je otkrio da nemaju sve dimenzije značajan uticaj na finansijske performanse banaka. Feng et al., (2017) i Dabic et al., (2016) utvrdili su da ovaj uticaj zavisi od zemlje do zemlje, ali i od grane do grane privrede. U tom kontekstu Simnett et al., (2009) veruju da je uticaj CSR na finansijske performanse preduzeća značajniji u tzv. kontroverznim granama privrede više izložene ekološkom i društvenom riziku, dok Barnett (2007) zagovara potrebu da se istraživanja o potencijalnoj heterogenosti uticaja CSR na performanse preduzeća vrše u različitim granama privrede, jer one imaju različite vrste uticaja na društvo. S obzirom na to da nema podataka kako različite dimenzije CSR utiču na finansijske performanse banaka koje posluju u Republici Srbiji, cilj ovog rada je da to ispita.

Podaci i metodologija istraživanja

Kao što je već istaknuto, glavni cilj ovog rada jeste da se ispita uticaj CSR na finansijske performanse finansijskih institucija koje posluju u Republici Srbiji. Istraživanje je sprovedeno na primeru sedam banaka koje su u svoje poslovne strategije i etičke kodekse ponašanja implementirale osnovne principe koncepta CSR. Istraživanje pokriva period od 2006. do 2019. godine. Podaci su prikupljeni na osnovu zvaničnih izveštaja banaka koji su javno objavljeni.

U skladu sa preporukama ISO 26000 standarda, uticaj CSR na finansijske performanse banaka proučavan je kroz 5 dimenzija: ekološka odgovornost, odgovornost prema zaposlenima, odgovornost prema lokalnoj zajednici, odgovornost prema osnovnim principima ponašanja i odgovornost poslovanja preduzeća. U skladu sa pokazateljima ispunjenosti standarda ISO 26000 po različitim dimenzijama CSR, primenom analize sadržaja na osnovu obavljenih godišnjih izveštaja o poslovanju banaka prikupljeni su podaci o dimenzijama CSR. Prikupljeni kvalitativni podaci zatim su uz pomoć tehnike kodiranja transformisani na dihotomnu varijablu (1) ukoliko u bankarskim izveštajima postoje informacije u vezi sa sprovođenjem aktivnosti koje se odnose na jednu od pet dimenzija CSR, odnosno (0) u suprotnom.

Za potrebe istraživanja korišćen je multivarijabilni linearni regresioni model, uz napomenu da se ROA koristi kao indikator za predstavljanje finansijskih performansi banaka. Model se može predstaviti na sledeći način:

$$ROA = \beta_0 + \beta_1 Ecol + \beta_2 Empl + \beta_3 LC + \beta_4 Beh + \beta_5 Buss + \beta_6 Size + \beta_7 Age + \varepsilon \quad (1)$$

Pri čemu su: ROA – prinos na aktivu banke, Ecol – dimenzija CSR koja se odnosi na ekološku odgovornost banke, Empl - dimenzija CSR koja se odnosi na odgovornost banke prema zaposlenima, LC - dimenzija CSR koja se odnosi na odgovornost banke prema lokalnoj zajednici, Beh - dimenzija CSR koja se odnosi na poštovanje osnovnih principa ponašanja, Buss - dimenzija CSR koja se odnosi na poštovanje osnovnih principa poslovanja, Size – veličina banke, Age – starost banke, ε - greška modela za koju se pretpostavlja da sledi IID normalnu distribuciju

Veličina banke iskazana logaritmom vrednosti ukupne imovine banke, kao i starost banke iskazane prirodnim logaritmom broja godina od osnivanja, u modelu (1) korišćeni su kao kontrolne varijable.

Za ocenu parametra modela (1) korišćena su tri ocenjivača panel podataka: metod fiksnih efekata (FE); metod slučajnih efekata (RE) i metod najmanjih kvadrata (Pooled OLS). Ocenjivači su izabrani imajući u vidu kvalitet podataka, ali i njihove različite sposobnosti da kooptiraju neopažene heterogenosti između jedinica posmatranja.

Empirijska analiza i diskusija dobijenih rezultata

U tabeli 1 prikazani su rezultati deskriptivne statistike skupa podataka. Kao što se može videti iz tabele 1 prosečna vrednosti ROA iznosi oko 0,00, što implicira da u proseku tokom perioda posmatranja banke nisu ostvarile dobit. Maksimalna i minimalna vrednost ove varijable kreću se od -0,26% do 0,12%, što ne ukazuje na značajnu diskrepancu među bankama. U prilog ovome svedoči i vrednost standardne devijacije koja iznosi oko 5%. Analiza deskriptivne statistike pokazuje da su banke zadovoljile uslove standarda koji se tiču poštovanja osnovnih principa ponašanja, kao i dimenzija CSR koja se odnosi na poštovanje osnovnih principa poslovanja. U pogledu ostalih dimenzija CSR, banke tokom celog perioda poslovanja nisu u svojim izveštajima iznele podatke. To implicira da ne sprovedu svake godine aktivnosti CSR koje se odnose na sve dimenzije koncepta.

Tabela 1 - Deskriptivna statistika odabranih varijabli

	<i>ROA</i>	<i>Ecol</i>	<i>EmPLY</i>	<i>LC</i>	<i>Beh</i>	<i>Buss</i>	<i>Size</i>	<i>AGE</i>
Srednja vrednost	0,00	0,429	0,612	0,520	1,000	0,959	24,66	2,94
St. devijacija	0,05	0,497	0,490	0,502	0,000	0,200	1,34	0,39
Excess Kurotsis	12,41	-1,954	-1,819	-2,035		20,390	-1,17	0,58
Skjuvnos	-2,80	0,293	-0,468	-0,083		-4,687	0,05	0,54
Minimum	-0,26	0	0	0	1	0	22,26	2,20
Maksimum	0,12	1	1	1	1	1	27,06	3,95
Br. ops.	98	98	98	98	98	97	98	98

Izvor: Autor

U tabeli 2 prikazana je matrica korelacije između izabranih varijabli

Tabela 2 - Matrica korelacije

	<i>Ecol</i>	<i>EmPLY</i>	<i>LC</i>	<i>Beh</i>	<i>Buss</i>	<i>ROA</i>	<i>Size</i>	<i>AGE</i>
Ecol	1,00							
EmPLY	-0,24	1,00						
LC	0,38	-0,30	1,00					
Beh	-	-	-	1,00				
Buss	0,08	0,15	-0,20	-	1,00			
ROA	0,19	0,00	0,17	-	-0,16	1,00		
Size	0,16	0,08	0,35	-	-0,18	0,28	1,00	
AGE	-0,01	-0,16	0,34	-	0,00	-0,05	0,03	1,00

Izvor: Autor

Kao što se može videti ne postoji značajnija korelacija između varijabli. Iz tog razloga nijedna nije isključena iz dalje analize.

U tabeli 3, u prilogu rada, prikazane su ocene parametara modela (1) dobijene primenom različitih ocenjivača. Vrednost testa zajedničkih regresora ukazuje da ocenjivač fiksnih efekata ne može pouzdano da se koristi za ispitivanje validnosti. Sa druge strane, vrednost istog testa pokazuje da se model slučajnih efekata može pouzdano koristiti za ocenu parametara modela (1). Vrednost Hausman-ovog testa pokazuje da je u ovom slučaju ispravnije koristiti modele sa slučajnim efektima, nego koji ove efekte tretiraju fiksnim. Međutim, vrednost Breusch-Pagan-ovog testa ukazuje da je u ovom slučaju ispravnije koristiti metod najmanjih kvadrata namenjen panel podacima. Iz tog razloga u nastavku rada interpretirani su samo podaci dobijeni ovom metodom, uz napomenu da nalaze treba prihvatiti sa izvesnom dozom rezervi imajući u vidu nisku vrednost koeficijenta determinacije, koji ukazuje da svega 11% varijacije u finansijskim performansama banaka je objašnjeno izabranim varijablama.

Rezultati *PooledOLS* ocenjivača ukazuju na sledeće:

- 1) Da veličina banke ima značajan uticaj na finansijske performanse banke. Dobijeni nalaz ukazuje da se sa povećanjem veličine banke unapređuju njeni finansijski rezultati. Ovo se može objasniti time da veće banke ostvaruju veće tržišno učešće i da kroz ostvarivanje ekonomije obima ostvaruju bolje rezultate poslovanja;
- 2) Da postoji značajna i pozitivna veza između ekološke odgovornosti banke i njenih poslovnih rezultata iskazanih preko ROA. Uopšte govoreći, nalaz se može interpretirati da svako povećanje ekološke odgovornosti banke od 1% će dovesti do povećanja performansi poslovanja za oko 1,4%. Drugim rečima, svakim ulaganjem u aktivnosti koje se tiču društvene odgovornosti unapređuje se imidž kompanije, što se u krajnjoj instanci reflektuje na njene finansijske rezultate;
- 3) Da postoji značajna i negativna veza između poštovanja osnovnih principa poslovanja i uspeha poslovanja banke. Na prvi pogled ovaj nalaz može da deluje iznenađujuće. Međutim, ukoliko se uzme u obzir šta se prema ISO 26000 standardu podrazumeva pod ovom dimenzijom koncepta CSR, onda oni i nisu u tolikoj meri iznenađujući. Naime, dobijeni nalaz se može protumačiti da svako dalje ulaganje banaka u aktivnosti ove dimenzije, kao što su donošenje novih radnih procedura, učestalija i kompleksnija izveštavanja, češće evaluacije ocene rada i sl., negativno utiču na uspeh poslovanja banke.

Što se tiče ostalih dimenzija koncepta CSR, istraživanje nije pokazalo da imaju značajan uticaj na finansijske performanse banaka. Svakako prilikom interpretiranja dobijenih nalaza treba uzeti u obzir i ograničenja ovog istraživanja koje je vezano pre svega za primenu tehnike analize sadržaja i nekompatibilnosti između pokazatelja ispunjenosti uslova standarda ISO 26000 i izveštaja banaka.

Zaključak

Od svoje pojave početkom 50-tih godina prošlog veka koncept CSR je budio pažnju stručne i šire javnosti, izazivajući oprečna mišljenja i kontroverze. Različiti i često kontradiktorni nalazi raznovrsnih studija još više su doprineli ovim raspravama. Tako danas u literaturi mogu se izdvojiti dve, tri grupe istraživanja, ona koja naglašavaju pozitivan uticaj implementacije koncepta CSR na uspeh poslovanja preduzeća, ona koja ističu negativnu povezanost i ona koja nisu dokazala postojanje ni negativnog, niti pozitivnog uticaja na uspeh poslovanja. Pored nepostojanja jedinstvenog stava u vezi uticaja koncepta CSR, u stručnim i akademskim krugovima nema saglasnosti niti oko definicije CSR. Nepostojanje jedinstvene definicije još jedan je dokaz kompleksnosti samog koncepta. Ukoliko bi trebalo doneti jedinstven zaključak na osnovu ovih istraživanja, onda bi to bilo da uticaj zavisi od karakteristika društvenog ambijenta u kome preduzeće posluje, vrste privredne grane u kojoj preduzeće posluje i od vladajućeg sistema vrednosti u trenutku u kome se istraživanje sprovodi. Iz tog razloga važno je sprovoditi istraživanja u različitim periodima u različitim granama privrede.

S obzirom na to da do sada ova problematika nije bila predmet značajnih istraživanja na primeru finansijskih institucija koje posluju u Republici Srbiji, to je cilj ovog rada bio da se ispita uticaj različitih dimenzija CSR na finansijske performanse banaka. Nalazi ovog istraživanja u skladu su sa rezultatima brojnih autora. Naime, otkriveno je da ekološka odgovornost ima pozitivan uticaj na finansijske performanse banaka. Ovo se može objasniti time da povećanje ekološke odgovornosti banke jača njen imidž, što se u krajnjoj instanci odražava pozitivno na njene finansijske rezultate. Sa druge strane, istraživanje pokazuje da je značajna i negativna veza između poštovanja osnovnih principa poslovanja i uspeha poslovanja banke. Dobijeni nalaz se može protumačiti da svako dalje ulaganje banaka u aktivnosti ove dimenzije, kao što su donošenje novih radnih procedura, učestalija i kompleksnija izveštavanja, češće evaluacije ocene rada i sl. negativno utiču na uspeh poslovanja banke.

Na kraju, treba istaći ograničenje ovog istraživanja, a pre svega tiče se tehnike analize sadržaja. Naime, primena same tehnike ograničena je iz razloga što često u izveštajima o poslovanju banaka, aktivnosti vezane sa CSR, nisu iskazane preko pokazatelja o ispunjenosti standarda ISO 26000. Iz tog razloga nalaze istraživanja treba prihvatiti za izvesnom dozom opreza.

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Tabela 3 - Ocene parametara modela (1)

Model 1: Fixed-effects, using 97 observations Included 7 cross-sectional units Time-series length: minimum 13, maximum 14 Dependent variable: ROA					Model 1: Random-effects (GLS), using 97 observations Included 7 cross-sectional units Time-series length: minimum 13, maximum 14 Dependent variable: ROA					Model 9: Pooled OLS, using 97 observations Included 7 cross-sectional units Time-series length: minimum 13, maximum 14 Dependent variable: ROA				
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>		<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>		<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>
const	-0.044	0.142	-0.313	0.755	const	-0.155	0.099	-1.57	0.1164	const	-0.158	0.089	-1.789	0.124
VEL	0.005	0.005	0.887	0.377	VEL	0.007	0.0036	2.157	0.031	VEL	0.008	0.002	3.392	0.015
AGE	-0.018	0.016	-1.191	0.237	Ecol	0.015	0.009	1.543	0.1227	Ecol	0.014	0.007	2.148	0.075
Ecol	0.016	0.011	1.455	0.150	Empl	0.003	0.010	0.36	0.7175	Buss	-0.029	0.006	-5.273	0.002
Empl	-0.003	0.012	-0.29	0.772	Buss	-0.031	0.0241	-1.295	0.1952	AGE	-0.006	0.014	-0.499	0.635
LC	-0.010	0.014	-0.77	0.441	AGE	-0.006	0.011	-0.52	0.6022	R squared	0.113			
Buss	-0.020	0.029	-0.708	0.480	Joint test on named regressors - Asymptotic test statistic: Chi-square(5) = 11.762 with p-value = 0.0381987 Breusch-Pagan test - Null hypothesis: Variance of the unit-specific error = 0 Asymptotic test statistic: Chi-square(1) = 0.79588 with p-value = 0.372328 Hausman test - Null hypothesis: GLS estimates are consistent Asymptotic test statistic: Chi-square(5) = 4.58096 with p-value = 0.469125									
Joint test on named regressors - Test statistic: F(6, 84) = 1.00679 with p-value = P(F(6, 84) > 1.00679) = 0.426511														
Test for differing group intercepts - Null hypothesis: The groups have a common intercept Test statistic: F(6, 84) = 0.851299 with p-value = P(F(6, 84) > 0.851299) = 0.53422														

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THE INFLUENCE OF CSR AS AN ELEMENT OF CORPORATE IMAGE ON THE PERFORMANCE OF BANK OPERATIONS

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Abstract: The paper examines the impact of CSR on the financial performance of banks operating in the Republic of Serbia. The research was conducted on the example of seven banks for the period from 2006 to 2019, using panel data analysis. Parameter estimates were obtained using three different estimators, Pooled OLS, fixed effects method, and random effects method. The research results show that two dimensions of CSR have a statistically significant impact on the financial performance of banks; environmental responsibility has a positive influence on the business results expressed through ROA, while respect for the basic principles of business and the success of the bank's business has a negative influence.

Keywords: CSR - Corporate Social Responsibility; panel analysis; financial sector; the performance of bank operations.

JEL classification: G21, G39, G32

Introduction

Ever since its appearance in the early 1950s, the concept of corporate social responsibility (CSR - Corporate Social Responsibility) has been one of the most controversial and significant topics. The concept arose out of the need for companies to behave taking into account not only their own interests but also the interests of society. Hence, Berber et al., (2019) present CSR as a concept that allowed the establishment of a balance between the economic, social and environmental goals of the company and society. Čelić (2019) points out that in this way benefits are realized for the company and the society in which it exists. Sekulić and Pavlović (2018) describe SSR as the behaviour of companies that is reflected in the adoption and implementation of discretionary business practices and investments that provide support to the community to improve its well-being and environmental protection. However, it is an extremely complex concept, which can be viewed from different aspects of the company's operations. More precisely, the result of empirical research on the most prominent dimensions of the existence of society, i.e. the various stakeholders with which the company interacts. Five dimensions of the concept were identified: environmental responsibility, responsibility towards employees, responsibility towards the local community, responsibility towards the basic principles of behaviour and responsibility for the company's operations¹. It is precisely from this complexity that the challenge of effective implementation of CSR arises, as well as numerous controversies in terms of its effective application. The basic question that arises is whether it is possible to simultaneously satisfy the demands of different stakeholders that are not compatible, but one can say that they are mutually opposed and exclusive. Bowen (1953) points out that a positive attitude towards SSR leads to superior company performance. Similar claims were made by Cruz et al. (2009), pointing out that SSR initiatives are significant in the context of business ethics and employee behaviour, and that as a result, the company achieves superior performance.

Regardless of the above, the increase in society's awareness of limited resources, the need to preserve the environment, and the behaviour of all participants in society in accordance with the principles of sustainable behaviour have influenced companies to incorporate the principles of (SSR) into their behavioural patterns and ethical codes. On the other hand, the strengthening of competition in business, rapid technological innovations, migration and the ageing of the population as a social phenomenon have influenced the need for companies to deal with issues from the domain of sustainable behaviour in addition to economic interests.

However, despite the relatively long history of studying SSR, as well as positive attitudes about the impact of CSR on company performance, the implementation of SSR in certain areas is still not sufficiently researched and is the subject of significant discussions. One such area is the impact of CSR on financial performance, especially in the area of financial institutions. Das and Bhunia (2016) point out that the entire academic and professional public is divided on this issue by those who believe that SSR has a positive impact on financial performance, such as Wu et al. (2020), to those who believe that there is a negative impact, such as Hirigoyen and Rehm (2016) and Madugba and Okpara (2016) and to those who believe that CSR has no impact on the financial results of operations Chetty et al., (2019), Kwanbo R (2011).

¹The identified dimensions of CSR concepts were defined by ISO 26000 standards.

Bearing in mind the lack of a unified position, on the one hand, but also the fact that the study of the impact of SSR on financial performance on the example of financial institutions operating in the Republic of Serbia has not been the subject of significant research, the aim of this paper is to examine the impact of different dimensions of CSR, defined by the ISO standard 26000, on the financial performance of banks.

The paper is structured as follows. The first part of the paper is of an introductory nature. In the second part of the paper, an overview of the most significant empirical research dealing with this issue is given and the results of previous research in this area are presented. In the third part of the paper, a brief description of the analyzed data and the methodology used is given. In the next section, the results are presented, analyzed and discussed. The final part of the paper is a review, summarizing the findings and presenting the conclusions of this study.

Literature Review

As already stated in academic and professional circles, there is no consensus on the impact of CSR on the financial performance of financial institutions and companies in general. All research on this topic can be divided into three groups. The first group includes research whose findings imply a positive impact of CSR implementation on the financial performance of banks. Such research was conducted by Esen (2013), Famiyeh et al., (2016), Choongo (2017), Makhdoomi & Nika FA (2018), Petkevičienė (2015), Prieto et al., (2020), Schmeltz A (2012), Plewa (2018), Wu et al., (2020) and others. Characteristic of these authors is that they explain the positive impact of CSR on the financial performance of companies with different arguments. Thus, Esen (2013) and Famiyeh et al., (2016) stress that the positive impact of CSR implementation on the financial performance of companies is a result of the good company image created among stakeholders every time the company initiates CSR-related activities. Choongo (2017), Plewa (2018) and Wu et al., (2020) emphasize that this is the result of increased shareholder satisfaction that they have each time the company takes action to improve the company's social responsibility. Similar views are also expressed by Bhattacharya and Sen (2004) and Nassivera et al., (2017), emphasizing that the implementation of activities by the company related to improving social responsibility leads to an increase in customer loyalty as a result of strengthening the company's image. Nassivera et al., (2017) found that customers are willing to pay a higher price for products and services resulting from CSR initiatives, which ultimately reflects an improvement in the company's financial performance. Turban and Greening (1996) found that companies that exhibit CSR initiatives can attract more potential clients, which reflects an increase in their competitiveness. The results of Greening and Turban's (2000) research support the idea that companies that exhibit CSR initiatives can attract higher quality employees and thus gain a competitive advantage and increase profits. At the same time, Greening and Turban (2000) showed that in such companies, employees show a higher level of satisfaction and organizational commitment, and that the rate of employee turnover is very low compared to competitors, which, through reduced costs associated with hiring and training new employees, has a positive impact on the company's financial results. Similar findings were presented by Chen et al., (2019), who emphasized the impact on a sense of belonging to the organization and Lee, et al., (2018), who emphasized an increase in job satisfaction.

The second group of research includes studies that did not find a positive impact of CSR on the financial performance of companies. Such research was conducted by Hirigoyen and Rehm P (2015), Madugba and Okpara (2016), Lahouel et al., (2020), Preston & O'Bannon (1997), Vance (1975). The findings of these research indicate that CSR implementation does not contribute to any improvement in the business of the company, but rather only reduces earnings per share. In their research, Aupperle et al., (1985) clearly established that CSR implementation has a negative impact on the financial performance of companies compared to competitors in the industry. The reason for the negative impact of CSR on the financial performance of companies was discovered by Preston and Bannon (1997) in the fact that CSR implementation leads to the waste of resources that can be used in more productive activities for the company. The same authors emphasize that managers often initiate CSR implementation to achieve personal benefits. Supporting the above, the findings of Krüger's (2015) research indicate that the main motivation for CSR implementation is often the personal promotion of managers and improving their reputation.

Opponents of the implementation of CSR, as the main argument against this concept, argue that companies have only one responsibility, which is to maximize profit for their shareholders. In this context, Orlitzky (2015) emphasizes that socially responsible business is motivated by a socialist-collectivist agenda that is in paradox with capitalist/liberal values of free entrepreneurship and individualism. Furthermore, Mohr et al., (2001) suggest that the consumer does not check whether a company is CSR or not when making purchasing decisions. Examining whether consumers take into account whether a company behaves socially responsibly or not when making purchasing decisions, Öberseder et al., (2011) found that positive consumer attitudes towards a company's socially responsible behaviour are translated into their purchasing decisions for products or services.

The third group of research includes studies in which no positive or negative impact of CSR on the financial performance of companies has been found. Such research was conducted by Margolis et al., (2009), Nyeadi et al., (2018) Nollet et al., (2015). Studying the impact of different dimensions of CSR on the financial performance of banks, Kiliç (2016) found that not all dimensions have a significant impact on the financial performance of banks. Feng et al., (2017) and Dabic et al., (2016) found that this impact depends on the country and the industry. In this context, Simnett et al., (2009) believe that the impact of CSR on the financial performance of companies is more significant in so-called controversial industries that are more exposed to environmental and social risk, while Barnett (2007) advocates the need for research on the potential heterogeneity of the impact of CSR on company performance in different industries because they have different types of impact on society. Given that there is no data on how different dimensions of CSR impact the financial performance of banks operating in the Republic of Serbia, the aim of this study is to examine this.

The Data and Methodology of the Research

As already stated, the main aim of this study is to examine the impact of CSR on the financial performance of financial institutions operating in the Republic of Serbia. The research was carried out using the example of seven banks that have implemented the basic principles of the CSR concept in their business strategies and ethical codes of conduct. The research covers the period from 2006 to 2019. The data was collected based on the official reports of the banks that were publicly published.

In accordance with the recommendations of the ISO 26000 standard, the impact of CSR on the financial performance of banks is studied through five dimensions: environmental responsibility, responsibility towards employees, responsibility towards the local community, responsibility towards the basic principles of behaviour, and corporate responsibility. In accordance with the indicators of the ISO 26000 standard for different dimensions of CSR, the data on the dimensions of CSR were collected by applying content analysis based on the annual reports of the banks. The collected qualitative data was then transformed into a dichotomous variable (1) if there is information in the banking reports regarding the implementation of activities relating to one of the five dimensions of CSR, or (0) otherwise, using the coding technique.

A multivariate linear regression model was used for the purposes of the research, with the note that ROA is used as an indicator to represent the financial performance of banks. The model can be represented as follows:

$$ROA = \beta_0 + \beta_1 Ecol + \beta_2 Empl + \beta_3 LC + \beta_4 Beh + \beta_5 Buss + \beta_6 Size + \beta_7 Age + \varepsilon \quad (1)$$

Where: ROA – return on assets of the bank, Ecol – CSR dimension relating to the bank's environmental responsibility, Empl – CSR dimension relating to the bank's responsibility towards employees, LC – CSR dimension relating to the bank's responsibility towards the local community, Beh – CSR dimension relating to the respect of the basic principles of behaviour, Buss – CSR dimension relating to the respect of the basic principles of business, Size – size of the bank, Age – age of the bank, ε – model error which is assumed to follow an IID normal distribution

The size of the bank, expressed as the logarithm of the total assets of the bank, as well as the age of the bank, expressed as the natural logarithm of the number of years since its establishment, are used as control variables in model (1).

Three estimators of panel data were used to evaluate the parameters of the model (1): the fixed effects method (FE); the random effects method (RE), and the Pooled ordinary least squares method (Pooled OLS). The evaluators were chosen taking into account the quality of the data, as well as their different abilities to co-opt unobserved heterogeneity among the units of observation.

Empirical Analysis and Discussion of the Obtained Results

Table 1 shows the results of the descriptive statistics of the data set. As can be seen from Table 1, the average value of ROA is about 0.00, which implies that on average, during the period of observation, the banks did not achieve a profit. The maximum and minimum values of this variable range from -0.26% to 0.12%, which does not indicate a significant discrepancy among the banks. In support of this, the standard deviation value of about 5% also suggests this. The analysis of the descriptive statistics shows that the banks met the conditions of the standard regarding the respect of the basic principles of behaviour, as well as the CSR dimension relating to the respect of the basic principles of business. In terms of the other dimensions of CSR, the banks did not provide data in their reports throughout the period of operation. This implies that they do not carry out CSR activities that relate to all dimensions of the concept every year.

Table 1 - Descriptive statistics of selected variables

	<i>ROA</i>	<i>Ecol</i>	<i>EmPLY</i>	<i>LC</i>	<i>Beh</i>	<i>Buss</i>	<i>Size</i>	<i>AGE</i>
mean	0,00	0,429	0,612	0,520	1,000	0,959	24,66	2,94
St.dev	0,05	0,497	0,490	0,502	0,000	0,200	1,34	0,39
Excess Kurotsis	12,41	-1,954	-1,819	-2,035		20,390	-1,17	0,58
Skewness	-2,80	0,293	-0,468	-0,083		-4,687	0,05	0,54
Minimum	-0,26	0	0	0	1	0	22,26	2,20
Maksimum	0,12	1	1	1	1	1	27,06	3,95
N.obs.	98	98	98	98	98	97	98	98

Source: Author

Table 2 shows the correlation matrix between the selected variables.

Table 2 - Correlation matrix

	<i>Ecol</i>	<i>EmPLY</i>	<i>LC</i>	<i>Beh</i>	<i>Buss</i>	<i>ROA</i>	<i>Size</i>	<i>AGE</i>
Ecol	1,00							
EmPLY	-0,24	1,00						
LC	0,38	-0,30	1,00					
Beh	-	-	-	1,00				
Buss	0,08	0,15	-0,20	-	1,00			
ROA	0,19	0,00	0,17	-	-0,16	1,00		
Size	0,16	0,08	0,35	-	-0,18	0,28	1,00	
AGE	-0,01	-0,16	0,34	-	0,00	-0,05	0,03	1,00

Source: Author

As can be seen, there is no significant correlation between the variables. For this reason, none of them has been excluded from further analysis.

In Table 3, shown in the appendix of the paper, the ratings of the parameters of the model (1) obtained using different evaluators are presented. The value of the joint regression test indicates that the fixed-effect evaluator cannot be reliably used to test validity. On the other hand, the value of the same test shows that the random-effect model can be reliably used to evaluate the parameters of the model (1). The value of the Hausman test shows that in this case, it is more correct to use models with random effects than those that treat these effects as fixed. However, the value of the Breusch-Pagan test indicates that in this case, it is more correct to use the method of least squares for panel data. For this reason, in the following part of the paper, only data obtained with this method are interpreted, with the caveat that the findings should be accepted with some reservation, considering the low value of the coefficient of determination, which indicates that only 11% of the variation in the financial performance of banks is explained by the selected variables.

The results of the *PooledOLS* evaluator indicate the following:

1. That the size of the bank has a significant impact on its financial performance. The obtained finding indicates that as the size of the bank increases, its financial results improve. This can be explained by the fact that larger banks achieve larger market share and through the realization of economies of scale, they achieve better business results;
2. That there is a significant and positive relationship between the environmental responsibility of the bank and its business results expressed through ROA. Generally speaking, the finding can be interpreted to mean that every 1% increase in the environmental responsibility of the bank will lead to an increase in business performance by about 1.4%. In other words, every investment in socially responsible activities improves the company's image, which ultimately reflects on its financial results;
3. That there is a significant and negative relationship between respect for the basic principles of business and the success of the bank's business. At first glance, this finding may seem surprising. However, if we consider what the ISO 26000 standard means by this dimension of the CSR concept, then they are not so surprising. Namely, the obtained result can be interpreted as meaning that any further investment by banks in activities of this dimension, such as the adoption of new working procedures, more frequent and complex reporting, more frequent evaluations of work performance, etc., has a negative impact on the success of the bank's business.

As for the other dimensions of the CSR concept, the research did not show that they have a significant impact on the financial performance of banks. When interpreting the obtained findings, it is certainly necessary to take into account the limitations of this research, which are mainly related to the use of content analysis techniques and the incompatibility between the indicators of compliance with the ISO 26000 standard and the reports of banks.

Conclusion

Since its emergence in the early 1950s, the CSR concept has attracted the attention of experts and the general public, sparking conflicting opinions and controversies. Various and often contradictory findings of diverse studies have further contributed to these discussions. Therefore, in the literature today, two or three groups of research can be distinguished: those that emphasize the positive impact of the implementation of the CSR concept on the success of the business of companies, those that emphasize the negative correlation, and those that have not proved the existence of either a negative or a positive impact on the success of the business. In addition to the lack of a single opinion on the impact of the CSR concept, there is no agreement in professional and academic circles on the definition of CSR. The lack of a single definition is yet another proof of the complexity of the concept itself. If a single conclusion were to be drawn on the basis of these studies, it would be that the impact depends on the characteristics of the social environment in which the company operates, the type of economic sector in which the company operates, and the governing system of values at the time the research is conducted. For this reason, it is important to conduct research at different times in different branches of the economy.

Since this issue has not been the subject of significant research on the example of financial institutions operating in the Republic of Serbia, the aim of this study was to examine the impact of different dimensions of CSR on the financial performance of banks. The findings of this research are in line with the results of many authors. Namely, it has been discovered that environmental responsibility has a positive impact on the financial performance of banks. This can be explained by the fact that increasing the environmental responsibility of the bank strengthens its image, which ultimately has a positive impact on its financial results. On the other hand, the research shows that there is a significant and negative relationship between respect for the basic principles of business and the success of the bank's business. The obtained result can be interpreted as meaning that any further investment by banks in activities of this dimension, such as the adoption of new working procedures, more frequent and complex reporting, more frequent evaluations of work performance, etc., has a negative impact on the success of the bank's business.

Finally, it should be noted that this research is limited, primarily with respect to the content analysis technique. Specifically, the application of the technique itself is limited because activities related to CSR are not often indicated by indicators of compliance with the ISO 26000 standard in the reports of banks. For this reason, the findings of the research should be accepted with a certain degree of caution.

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Appendex

Table 3 - Estimates of model parameters (1)

Model 1: Fixed-effects, using 97 observations Included 7 cross-sectional units Time-series length: minimum 13, maximum 14 Dependent variable: ROA					Model 1: Random-effects (GLS), using 97 observations Included 7 cross-sectional units Time-series length: minimum 13, maximum 14 Dependent variable: ROA					Model 9: Pooled OLS, using 97 observations Included 7 cross-sectional units Time-series length: minimum 13, maximum 14 Dependent variable: ROA				
	Coefficient	Std. Error	t-ratio	p-value		Coefficient	Std. Error	z	p-value		Coefficient	Std. Error	t-ratio	p-value
const	-0.044	0.142	-0.313	0.755	const	-0.155	0.099	-1.57	0.1164	const	-0.158	0.089	-1.789	0.124
VEL	0.005	0.005	0.887	0.377	VEL	0.007	0.0036	2.157	0.031	VEL	0.008	0.002	3.392	0.015
AGE	-0.018	0.016	-1.191	0.237	Ecol	0.015	0.009	1.543	0.1227	Ecol	0.014	0.007	2.148	0.075
Ecol	0.016	0.011	1.455	0.150	Empl	0.003	0.010	0.36	0.7175	Buss	-0.029	0.006	-5.273	0.002
Empl	-0.003	0.012	-0.29	0.772	Buss	-0.031	0.0241	-1.295	0.1952	AGE	-0.006	0.014	-0.499	0.635
LC	-0.010	0.014	-0.77	0.441	AGE	-0.006	0.011	-0.52	0.6022	R squared	0.113			
Buss	-0.020	0.029	-0.708	0.480	Joint test on named regressors - Asymptotic test statistic: Chi-square(5) = 11.762 with p-value = 0.0381987									
Joint test on named regressors - Test statistic: F(6, 84) = 1.00679 with p-value = P(F(6, 84) > 1.00679) = 0.426511					Breusch-Pagan test - Null hypothesis: Variance of the unit-specific error = 0 Asymptotic test statistic: Chi-square(1) = 0.79588 with p-value = 0.372328									
Test for differing group intercepts - Null hypothesis: The groups have a common intercept Test statistic: F(6, 84) = 0.851299 with p-value = P(F(6, 84) > 0.851299) = 0.53422					Hausman test - Null hypothesis: GLS estimates are consistent Asymptotic test statistic: Chi-square(5) = 4.58096 with p-value = 0.469125									

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ANALIZA SAJBER PRETNJI KAO FAKTORA RIZIKA U BANKARSKOM SEKTORU

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Rezime: Bankarska industrija se suočava sa povećanim rizicima po osnovu sajber pretnji, većim delom putem mobilnih aplikacija i veb portala, a manjim delom preko drugih kanala komunikacije. Sajber napadi nastavljaju da rastu, a bankarski sektor može da bude posebno ranjiv, naročito u kontekstu pandemije virusa Covid19. Predmet rada je analiziranje stavova ispitanika korisnika bankarskih usluga u Republici Srbiji o problemu sajber pretnji kao faktora rizika u bankarskom sektoru. Glavni zaključak je da najveći broj ispitanika, čak njih 70% nije zabrinuto ili nije mnogo zabrinuto za bezbednost u sektoru bankarskih usluga. Ovo ukazuje na postojanje visokog stepena poverenja u bezbednost bankarskih usluga i aktivnosti koje banke preduzimaju na čuvanju podataka i deponovanih finansijskih sredstava. Pored toga banke ipak treba da stave akcenat na preventivne aktivnosti, kako bi se rizici po osnovu sajber pretnji sveli na prihvatljivo nizak nivo. Neke od preventivnih aktivnosti mogu da budu angažovanje na edukaciji internih revizora i povećanju učinkovitosti revizija informacione bezbednosti.

Ključne reči: banke; sajber pretnje; operativni rizik

JEL klasifikacija: G21, G32

Uvod

U deceniji nakon globalne finansijske krize, banke sve više vode računa o potrebi upravljanja rizikom. Međutim, dok su banke razvijale sofisticirane sisteme za kontrolu finansijskog rizika, operativni rizik se po svemu sudeći našao u drugom planu. Finansijski rizik uključuje kreditni rizik, odnosno verovatnoću da će zajmoprimci otplatiti svoje kredite i tržišni rizik, odnosno verovatnoću da će vrednost hartije od vrednosti varirati i rizik likvidnosti i sposobnost banke da ispunji svoje obaveze prema deponentima i ugovornim stranama. Sa druge strane operativni rizik je rizik od gubitka usled grešaka, oštećenja ili prekida, bilo namernih ili nenamernih, uzrokovanih ljudima, sistemima unutrašnjim procesima, spoljnim događajima ili sajber pretnjama. Događaji operativnog rizika mogu izazvati ogromne gubitke kod bankarskih sistema (Jakovljević, 2021a). Gubici od konkretizovanja operativnog rizika mogu biti katastrofalni, ne samo u striktno monetarnom smislu, već i u kontekstu uticaja na ukupno poslovanje i reputaciju banke, ponekad ugrožavajući njeno postojanje. Poslednjih godina, banke širom sveta bile su uhvaćene u skandalima koji su se našli na naslovnim stranama brojnih novinskih tekstova, a pokreće ih neuspeh u obuzdavanju operativnog rizika (Uddin, et al., 2020). Većina ovih gubitaka proizilazi iz grešaka koje se mogu sprečiti kada su zaposleni i sistemi u interakciji sa klijentima, nedostataka u načinu na koji su transakcije obrađene ili direktne prevare. Regulatori periodično preispituju ranjivost banke na operativni rizik. Kao i sa finansijskim rizikom, regulatori zahtevaju od banaka da održavaju kapitalne rezerve kako bi im pomogli da upravljaju operativnim rizikom (Jakovljević, 2021c). Procena regulatora o sposobnosti banke da kontroliše operativni rizik može direktno da utiče na to koliko kapitala banka ima na raspolaganju za obavljanje normalnih bankarskih aktivnosti. Kada dođe do konkretizacije pretnji po osnovu operativnog rizika, to može da ima duboke, dugotrajne efekte preliivanja. U poređenju sa finansijskim rizikom, operativni rizik je složeniji i izazovniji za praćenje, kontrolu i upravljanje. Iako on može da ima širok ekonomski uticaj na banku, banke su se borile da integrišu upravljanje operativnim rizikom u svoj opšti okvir upravljanja rizikom na nivou cele banke kao poslovnog entiteta (Al-Sassam & Al-Alawi, 2019). Kako bankarstvo postaje sve više usredsređeno na klijente i klijenti sve više koriste digitalne kanale, banke mogu da steknu veću vidljivost i bolje uvide u ono što bi moglo poći naopako. Sa digitalizacijom i direktnom obradom, banke mogu da smanje ili eliminišu ljudsku intervenciju u mnogim transakcijama, kontrolišući na taj način rizike grešaka i prevare zaposlenih. Tako zahvaljujući manje birokratskim organizacijama i agilnim načinima rada, menadžeri mogu da prepoznaju pretnje i brzo reaguju na njih. Međutim operativni rizik se time preliiva u domen sajber napada i sajber pretnji (Staffler, 2022). Dok automatizacija procesa jednom obavljena ručno može da smanji operativni rizik za ljude, ona istovremeno može, ako se ne prati pravilno da poveća rizik po osnovu sajber bezbednosti.

Napadači koriste napade distribuiranog uskraćivanja usluge da bi preplavili i srušili targetiranu veb lokaciju preplavljujući je saobraćajem (Jakovljević, 2021b). Akteri pretnji generišu saobraćaj napada iz različitih kompromitovanih računarskih sistema, uključujući računare i druge uređaje povezane na mrežu (Tullo, 2020). Oni prekidaju poslovanje, rezultiraju značajnim finansijskim gubicima za žrtvu i predstavljaju značajnu opasnost za finansijske institucije. Primarni vektor napada je ranjivost koja omogućava korisniku bez autentifikacije da izvršava daljinske komande na ranjivim serverima. Hakovanjem pomenutih servera od treće strane, napadači mogu da prikupe lične podatke koji pripadaju klijentima banke. Napadi iskorišćavanja ranjivosti omogućavaju akterima pretnji da dobiju pristup ciljnim mrežama kako bi izvršili dodatne operacije sa višim privilegijama.

Bez obzira na sofisticirane tehnike koje zlonamerni akteri koriste da prodru u mrežu organizacije, mnogi bezbednosni incidenti se pripisuju insajderskim pretnjama koje predstavljaju sadašnji ili bivši zaposleni i nesvesnim greškama osoblja (Mehmet & Ganji, 2021). Insajderi izazivaju poremećaje i kritične gubitke podataka, bilo namerno ili nenamerno. Kako neprijateljski napadači razvijaju svoje taktike i tehnike kako bi ciljali na najvrednije podatke i usluge, banke moraju da poboljšaju svoju odbranu kako bi ublažile pretnje koje se stalno razvijaju. Da bi ovo postigle, organizacije u bankarskom sektoru moraju da primene strategiju bezbednosti koja (Anghelache & Olteanu, 2011) uključuje unutrašnje procese, tehnologiju i ljudske resurse koji će je učiniti sposobnom da uči iz pretnji i prilagođava svoj fokus odbrambenih aktivnosti. Istovremeno, da bi osigurala maksimalnu sigurnost u slučaju sajber kriminala, banke moraju da razviju strateški plan koji ne samo da se odupire početnom sajber napadu sa minimalnim uticajem i gubicima, već i održava tu otpornost kontinuirano na nove pretnje (Jakovljević, 2021c). Tri značajne sajber pretnje za bankarski sektor su napadi nacionalnih država koje preduzimaju strane vlade, napadi koje sponzorise država koje izvode povezane sajber kriminalne bande i napredne trajne pretnje. Ovi akteri pretnji koriste mnoge iste vektore napada kao manje sposobni akteri pretnji, kao što su phishing i ransomware, ali sa više tehničkih kapaciteta i finansiranja (Camillo, 2017). Organizovane grupe neprijateljskih napadača sarađuju i dele taktike, procedure, tehnike i alate kako bi kompromitovali banke, što dovodi do povećanja opasnosti od uspešnosti sajber napada (Creado&Ramteke, 2020). Napadi na nacionalne bankarske sisteme nacionalnih države odražavaju globalne geopolitičke tenzije, koje su podstakle rast sajber aktivnosti usmerenih na vlade, vojsku i poslovni sektor, poput rata u Ukrajini, lansiranje raketa od strane Severne Koreje i drugih.

Većina banaka se oslanja na provajdere usluga trećih strana da bi ispunili svoje digitalne usluge. Čak i ako su sopstveni bezbednosni sistemi veoma otporni na sajber napade, pružaoci usluga treće strane mogu predstavljati slabu kariku u lancu sajber bezbednosti. Akteri pretnji sve više ciljaju na prodavce softvera, a zatim isporučuju zlonamerni kod kupcima u lancu snabdevanja putem preuzimanja proizvoda ili ažuriranja za koje se čini da su legitimni. Ovi napadi kompromituju sisteme distribucije softvera i omogućavaju akterima pretnji da dobiju pristup mrežama kupaca i dobavljača. Očekuje se da će rizici sajber bezbednosti koje stvaraju dobavljači trećih strana postati značajnije pitanje u budućnosti pošto regulatori stavljaju veći naglasak na kontinuitet poslovanja i operativnu otpornost (Servidio & Taylor, 2015). Nedavne promene načina rada koje su ubrzane širenjem pandemije virusa Covid19, kao što je hibridni radni prostor koji kombinuje rad u kancelariji i rad na daljinu, povećale su rizik za organizacije. Kako pandemija ulazi u treću godinu, rad na daljinu, hibridna radna snaga i softverske tehnologije zasnovane na cloud-u postale su praktično sveprisutne. Banke su bile primorane da u kratkom roku usvoje nove tehnologije i da brzo primene nove načine rada koji su omogućili daljinski pristup, komunikaciju i saradnju. Kao rezultat toga, hibridna okruženja na radnom mestu povećavaju složenost IT sistema, proširuju površinu napada i donose nove sajber rizike i pretnje. Sve navedeno sugerise da se bankarska industrija intenzivirano suočava sa povećanim rizicima po osnovu sajber pretnji, većim delom putem mobilnih aplikacija i veb portala, a manjim delom preko drugih kanala komunikacije. Sajber napadi nastavljaju da rastu i po učestalosti i po sofisticiranosti za sve industrije, a bankarski sektor je posebno ranjiv, naročito u kontekstu pandemije virusa Covid19. Banke postaju žrtve neprijateljskog napada mnogo češće nego poslovni entiteti u drugim industrijama, a narušavanje informacione bezbednosti dovodi do gubitka prihoda za bankarske institucije, prekida u poslovanju i gubitka ugleda i klijenata. Predmet rada je analiziranje stavova ispitanika korisnika bankarskih usluga u Republici Srbiji o problemu sajber pretnji kao faktora rizika u bankarskom sektoru.

Pregled literature

Autori (Dmitrović, et al., 2021) smatraju da izuzetno dinamičan rast i napredak tehnološkog okruženja i IT alata koji se koriste u svakodnevnom izvršavanju finansijskih usluga dovodi do povećanja ranjivosti banaka u oblasti informacione bezbednosti, što se pre svega ogleda u sve većoj izloženosti hakerskim napadima, računarskim sistemima, kvarovima na hardveru i pristupu neovlašćenih strana poverljivim i bezbednosno osetljivim podacima. Oni tvrde da takvo okruženje stvara snažnu potrebu da banke razmotre efikasne strategije i praktične alate koje će koristiti u svojim svakodnevnim operacijama, a koje su direktno ili indirektno povezane sa bezbednošću informacija, kako bi zaštitile poverljive i bezbednosno osetljive podatke. Phishing je i dalje uobičajen oblik napada koji se koristi za dobijanje početnog pristupa mrežama jedne poslovne organizacije. Učesnici pretnji su dosledno ulagali značajna sredstva da prošire ekonomiju phishing-a (Akinbowale, et al., 2020). Danas je phishing sveobuhvatan posao, koji omogućava napadačima brojne prednosti uključujući lažno razvijanje stranice za prijavljivanje, hostovanje veb lokacija, kreiranje šablona e-pošte za krađu identiteta, distribucija phishing-a, e-poruka i drugo (Barakat & Hussainey, 2013). Napadači više ne moraju da hakuju veb sajtove, a kao rezultat toga, sajber kriminal je postao pristupačniji. Sa phishing-om i početnici u sajber kriminalu mogu da pokrenu i realizuju neprijateljske napade. Oni koriste lažne veb sajtove i stranice za prijavu koje izgledaju identično zvaničnom veb sajtu targetirane banke. Korisnici se vode na lažnu veb lokaciju, gde se od njih traži da unesu svoje korisničko ime i lozinku. Nakon što korisnici unesu svoje podatke, oni se prosleđuju na originalnu veb stranicu banke (Khan, 2018). Sajber kriminalci nanose značajnu finansijsku i poslovnu štetu nakon sticanja korisničkih podataka primenjujući prethodno objašnjenu tehniku. Brojni neprijateljski napadi na podatke uticali su na bankarstvo i finansije prethodnih godina, naročito od početka širenja pandemije virusa Covid19. Razumevanje načina razmišljanja napadača može da bude važno za izgradnju čvrste odbrane i većeg nivoa otpornosti na napade (Jakovljević, 2021b). Razmena iskustava banaka može da bude od velike koristi, a učenje iz prošlih neuspeha je pomoglo brojnim bankama u jačanju svojih odbrambenih sposobnosti. Analizirajući incidente u bankama iz oblasti sajber-bezbednosti, kvalifikovani stručnjaci mogu da identifikuju najveće vektore pretnji kako bi dali prioritet investicijama u sajber bezbednost sa najvećim povraćajem ulaganja i izgradili efikasan plan sajber bezbednosti prilagođen za okruženje bankarskog sektora (Putnik, et al., 2014). Jedan od verovatno najrasprostranjenih oblika napada na banke je ransomware koji predstavlja vrsta virusa koji sprečava ili ograničava korisnike da pristupe njihovom sistemu ili podacima, nakon čega obično dolazi pretnja da će objaviti ili prodati ukradene podatke sve dok žrtva ne plati naknadu za otkupninu napadaču. On je vremenom postao široko rasprostranjena i dobro poznata pretnja organizacijama širom sveta već nekoliko godina i izgleda da neće nestati u skorije vreme. Kao glavni razlog za proliferaciju ransomware-a, se u literaturi navodi da je ransomware visoko profitabilan posao sa niskim rizikom za aktere pretnji. Istovremeno, tehnička prepreka za ulazak u posao sa softverom za ransomwer je veoma niska za neprijateljske napadače.

U početku je ransomware sprečavao organizacije da pristupe njihovim podacima šifrovanjem datoteka u zaraženim sistemima i držanjem ključa za dešifrovanje za otkup za iznudiivanje novca. Žrtve napada plaćaju otkupninu da bi povratile pristup šifrovanim podacima (Butler & Butler, 2018). Međutim, većina finansijskih institucija se prilagodila napadima šifrovanja tako što su poboljšali svoje procedure za pravljenje rezervnih kopija podataka (Jakovljević, 2021a). Nema razloga da platite otkupninu ako možete samo da povratite svoje podatke iz rezervnih kopija, operativni sistemi na računarima se reinstaliraju i napune se podacima iz rezervnih kopija (Covers & Doeland, 2020). Međutim napadači su odgovorili eksfiltriranjem kritičnih podataka pre nego što su ih šifrovali, a zatim zapretile da će ih procuriti ili otkriti ako se otkupnina ne plati.

To nije problem koji se može rešiti putem oporavka iz rezervne kopije, pa je ravnotežna situacija vraćena na početak i prevagu u korist napadača koji ima prednost u odnosu na banku. Pretnja kombinacijom šifrovanja i eksfiltracije podataka je dvostruka pretnja (Peret, 2022). Važno je razumeti da akter pretnje ransomwareom nije odgovoran za uklanjanje ukradenih podataka bez obzira da li je otkup plaćen (Agba, et al., 2020). Pored šifrovanja i eksfiltracije podataka, napadači koriste i druge metode iznude, kao što su pretnja da će se kontaktirati klijenti banke, pretnja ometanjem operacija napadima uskraćivanja usluge i pretnja prodajom osetljivih podataka. Uglavnom pre pokretanja napada, napadači ransomware-a sprovode istraživanje javno dostupnih informacija, kao što su procena primamljivosti banke ili podložnosti za napad, poput uvođenja nove digitalne usluge, novog informacionog sistema ili spajanje dve banke (Hoffman, 2020). Ako banke ne plate otkupninu na vreme, napadači ransomware-a prete da će otkriti preuzete informacije, potencijalno izazivajući javnu reakciju investitora (Nitescu & Cristea, 2020). Kao rezultat objašnjenih primenjenih metoda iznuđivanja, napadi ransomware-a imaju ogroman uticaj na banke, a mogu da uključe zastoje u poslovanju, gubitak reputacije, gubitak prihoda, gubitak podataka i javno objavljivanje osetljivih informacija.

Javni računar, na primer u Internet kafiću ili hotelskom poslovnom centru, možda nema ažurirani bezbednosni softver i može biti zaražen virusom (Gonchar, 2020). Slično tome, kod prenosivih uređaja poput laptop računara ili mobilnog telefona koji se koriste za online bankarstvo ili kupovinu, treba izbegavati da se povezuju na bežičnu mrežu na javnoj „hotspot“ kao što je hotel, kafić ili aerodrom. Bežičnu mrežu na javnim mestima neprijateljski napadači mogu da koriste za presretanje signala uređaja i kao mesto za prikupljanje ličnih podataka, naročito podataka o bankovnim transakcijama (Cristea, 2021). Suština, posebno za osetljiva pitanja kao što su online bankarstvo i aktivnosti koje uključuju lične podatke, jeste da se razmotri pristup Internetu samo pomoću sopstvenog računara sa bezbednom, pouzdanom vezom i povezivanje laptopova i mobilnih uređaja sa pouzdanim mrežama. Gde god da pogledate, ljudi koriste pametne telefone i tablete kao prenosive, ručne računare (Dorogovs, et al., 2013). Međutim neprijateljski napadači su takođe zainteresovani da koriste ili pristupe ovim uređajima za krađu informacija ili vršenje drugih zločina. Zato je neophodno za korisnike mobilnih uređaja, odnosno klijente banke da preduzmu mere da ih obezbede, baš kao što bi to učinili za desktop računare. Treba izbegavati aplikacije koje mogu da sadrže virus (Lu, 2013). Kupovina ili preuzimanje iz poznatih prodavnica aplikacija, kao što su one koje je uspostavio proizvođač vašeg telefona ili provajder mobilnih usluga. Redovno, periodično ažuriranje operativnog sistema je neophodno. Treba razmisliti o izboru automatskih ažuriranja, jer će to osigurati da se poseduju najnovije ispravke za sve bezbednosne slabosti koje otkrije proizvođač. Neprijateljski napadači pokušavaju da iskoriste poznate nedostatke, tako da će ažuriranje softvera pomoći u smanjenju ranjivosti.

Metodologija

Istraživanje je sprovedeno kreiranjem kratkog upitnika na temu ispitivanja stavova korisnika bankarskih usluga o pitanjima iz oblasti sajber pretnji kao faktora rizika u bankarskom sektoru. Upitnik je poslat na adrese više od 200 nasumično odabranih ispitanika u Republici Srbiji, a uz njega je poslato i uputstvo za popunjavanje upitnika. Upitnik je bio dostupan za popunjavanje tokom prve nedelje septembra 2022. godine. Pristiglo je ukupno 107 kompletnih odgovora koji su ocenjeni kao dovoljni i relevantni za dalju analizu. Inicijalna hipoteza glasi da je većina ispitanika zabrinuta za bezbednost u sektoru bankarskih usluga. Alternativna hipoteza glasi da većina ispitanika nije zabrinuta za bezbednost u sektoru bankarskih usluga. Odgovori su analizirani grafičkom metodom i kroz tekstualni opis i grafikone su prikazani u nastavku rada.

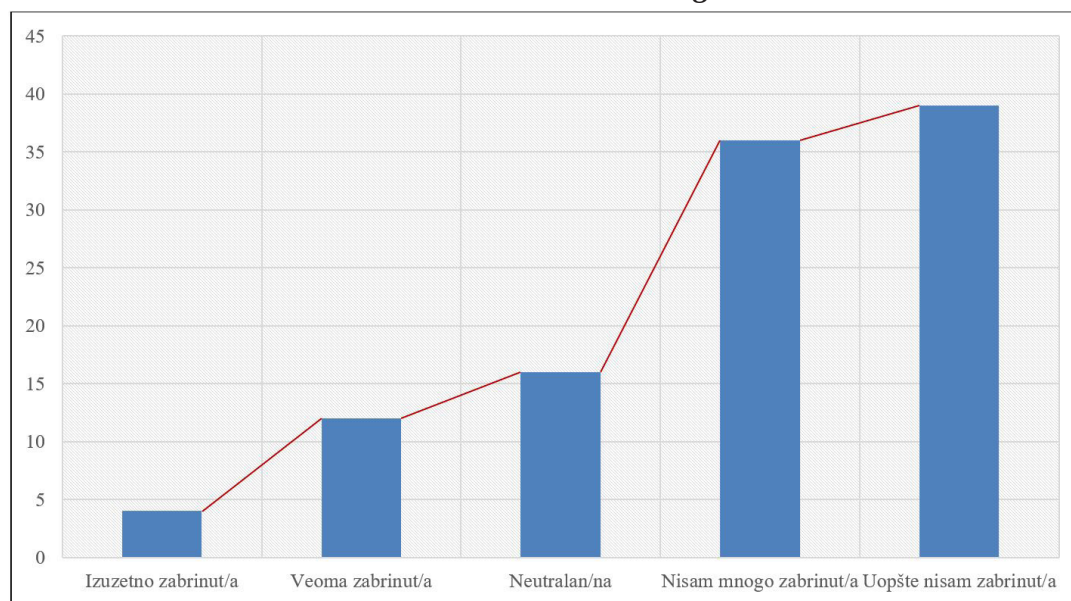
Kao potencijalni ključni nedostaci istraživanja mogu se navesti reprezentativnost uzorka, previše optimistički odgovori ili odgovori koji u potpunosti ne odražavaju stvarne stavove ispitanika. Usled svega navedenog potrebno je prezentovane podatke uzeti sa određenom dozom opreznosti prilikom njihovog tumačenja i zvanične upotrebe.

Kao potencijalni ključni nedostaci istraživanja mogu se navesti reprezentativnost uzorka, previše optimistički odgovori ili odgovori koji u potpunosti ne odražavaju stvarne stavove ispitanika. Usled svega navedenog potrebno je prezentovane podatke uzeti sa određenom dozom opreznosti prilikom njihovog tumačenja i zvanične upotrebe.

Rezultati

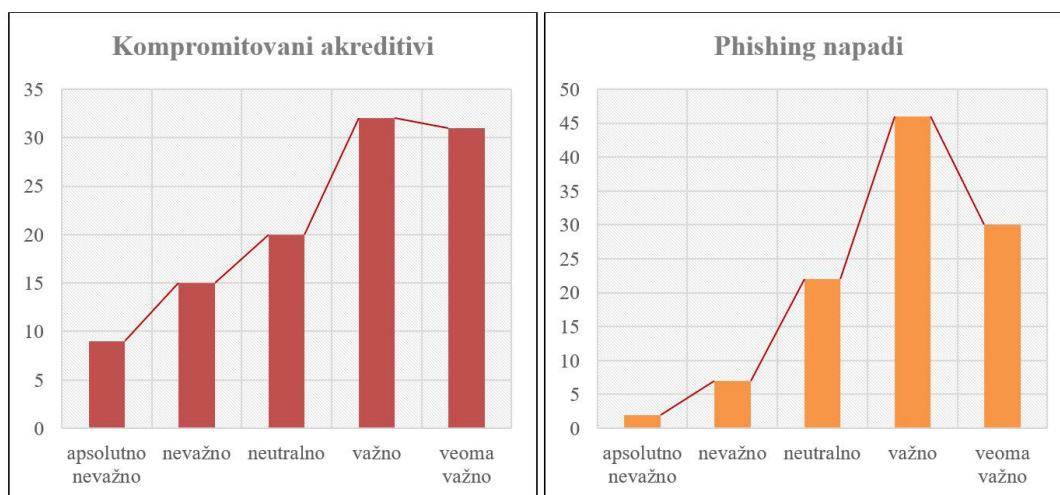
Na pitanje koliko ste zabrinuti za bezbednost u sektoru bankarskih usluga, 4% ispitanika je odgovorilo sa izuzetno zabrinut/a, 11% ispitanika je odgovorilo sa veoma zabrinut/a, 15% ispitanika je odgovorilo sa neutralan/na, 34% ispitanika je odgovorilo sa nisam mnogo zabrinut/a i preostalih 36% ispitanika je odgovorilo sa opšte nisam zabrinut/a, što je prikazano na grafikonu broj 1.

Grafikon 1: Odgovori ispitanika na pitanje: Koliko ste zabrinuti za bezbednost u sektoru bankarskih usluga?



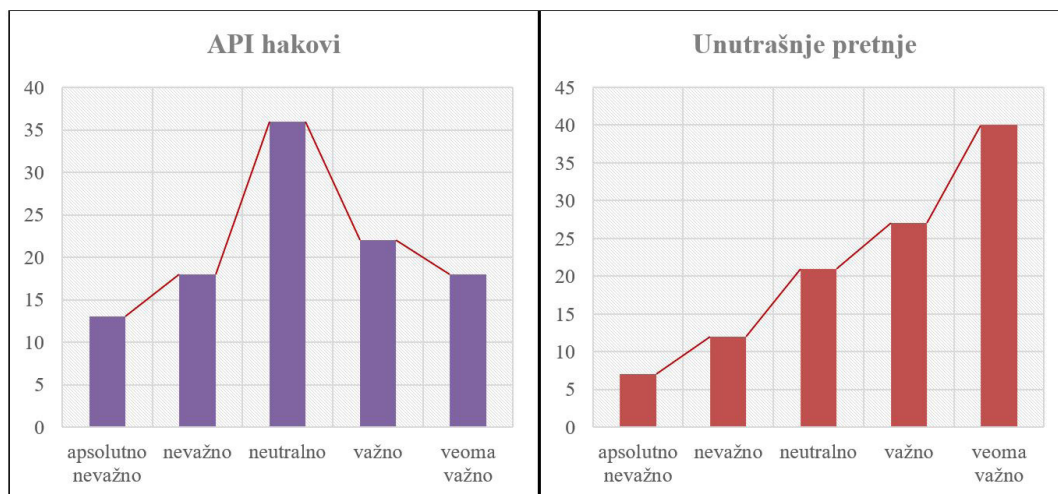
Izvor: Autor

Na pitanje koje bezbednosne pretnje vas najviše brinu, u domenu kompromitovanih akreditiva, 8% ispitanika je odgovorilo sa apsolutno nevažno, 14% ispitanika je odgovorilo sa nevažno, 19% ispitanika je odgovorilo sa neutralno, 30% ispitanika je odgovorilo sa važno i preostalih 29% ispitanika je odgovorilo sa veoma važno. Na pitanje koje bezbednosne pretnje vas najviše brinu, u domenu phishing napada 2% ispitanika je odgovorilo sa apsolutno nevažno, 7% ispitanika je odgovorilo sa nevažno, 21% ispitanika je odgovorilo sa neutralno, 43% ispitanika je odgovorilo sa važno i preostalih 28% ispitanika je odgovorilo sa veoma važno, što je prikazano na grafikonu broj 2.

Grafikon 2: Odgovori ispitanika na pitanje: Koje bezbednosne pretnje vas najviše brinu?

Izvor: Autor

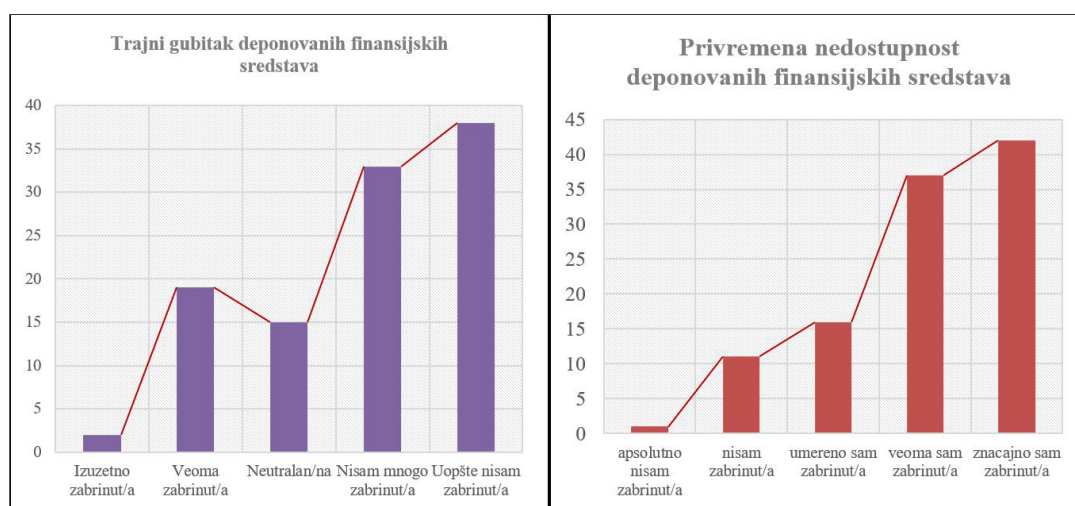
Na pitanje koje bezbednosne pretnje vas najviše brinu, u domenu API hakova, 12% ispitanika je odgovorilo sa apsolutno nevažno, 17% ispitanika je odgovorilo sa nevažno, 34% ispitanika je odgovorilo sa neutralno, 21% ispitanika je odgovorilo sa važno i preostalih 17% ispitanika je odgovorilo sa veoma važno. Na pitanje koje bezbednosne pretnje vas najviše brinu, u domenu unutrašnjih pretnji, 7% ispitanika je odgovorilo sa apsolutno nevažno, 11% ispitanika je odgovorilo sa nevažno, 20% ispitanika je odgovorilo sa neutralno, 25% ispitanika je odgovorilo sa važno i preostalih 37% ispitanika je odgovorilo sa veoma važno, što je prikazano na grafikonu broj 3.

Grafikon 3: Odgovori ispitanika na pitanje: Koje bezbednosne pretnje vas najviše brinu?

Izvor: Autor

Na pitanje na skali od 1 do 5 koliko ste zabrinuti u vezi sa trajnim gubitkom deponovanih finansijskih sredstava koji se dešavaju zbog incidenata u informacionim sistemima banke, 2% ispitanika je odgovorilo sa apsolutno nisam zabrinut/a, 18% ispitanika je odgovorilo sa nisam zabrinut/a, 14% ispitanika je odgovorilo sa umereno sam zabrinut/a, 31% ispitanika je odgovorilo sa veoma sam zabrinut/a i preostalih 36% ispitanika je odgovorilo sa značajno sam zabrinut/a. Na pitanje na skali od 1 do 5 koliko ste zabrinuti u vezi sa privremenom nedostupnošću deponovanih finansijskih sredstava koji se dešavaju zbog incidenata u informacionim sistemima banke, 1% ispitanika je odgovorilo sa apsolutno nisam zabrinut/a, 10% ispitanika je odgovorilo sa nisam zabrinut/a, 15% ispitanika je odgovorilo sa umereno sam zabrinut/a, 35% ispitanika je odgovorilo sa veoma sam zabrinut/a i preostalih 39% ispitanika je odgovorilo sa značajno sam zabrinut/a, što je prikazano na grafikonu broj 4.

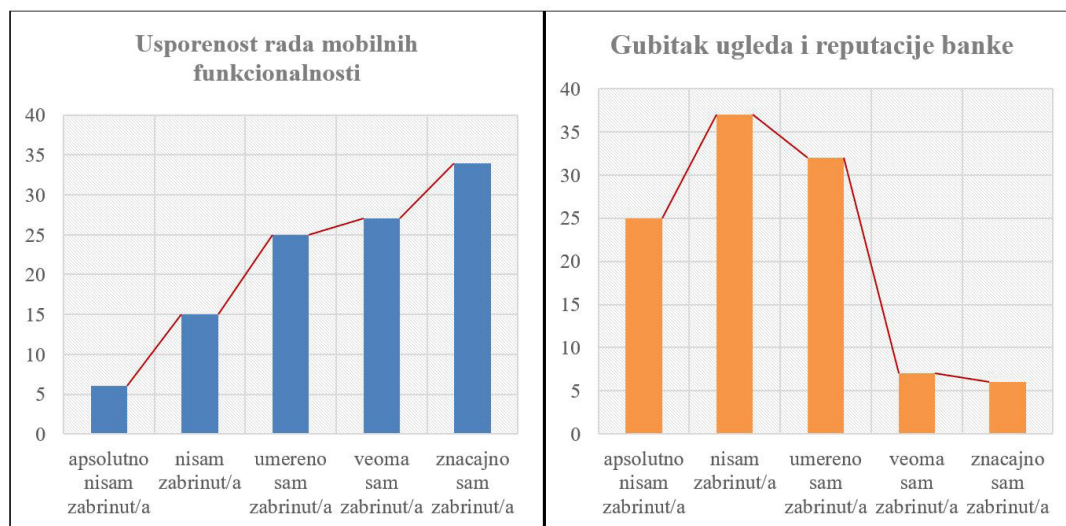
Grafikon 4: Odgovori ispitanika na pitanje: Koliko ste zabrinuti u vezi sa sledećim radnjama koje se dešavaju zbog incidenata u informacionim sistemima banke?



Izvor: Autor

Na pitanje na skali od 1 do 5 koliko ste zabrinuti u vezi sa usporenošću rada mobilnih funkcionalnosti koji se dešavaju zbog incidenata u informacionim sistemima banke, 6% ispitanika je odgovorilo sa apsolutno nisam zabrinut/a, 14% ispitanika je odgovorilo sa nisam zabrinut/a, 23% ispitanika je odgovorilo sa umereno sam zabrinut/a, 25% ispitanika je odgovorilo sa veoma sam zabrinut/a i preostalih 32% ispitanika je odgovorilo sa značajno sam zabrinut/a. Na pitanje na skali od 1 do 5 koliko ste zabrinuti u vezi sa gubitkom ugleda i reputacije banke koji se dešavaju zbog incidenata u informacionim sistemima banke, 23% ispitanika je odgovorilo sa apsolutno nisam zabrinut/a, 35% ispitanika je odgovorilo sa nisam zabrinut/a, 30% ispitanika je odgovorilo sa umereno sam zabrinut/a, 7% ispitanika je odgovorilo sa veoma sam zabrinut/a i preostalih 6% ispitanika je odgovorilo sa značajno sam zabrinut/a, što je prikazano na grafikonu broj 5.

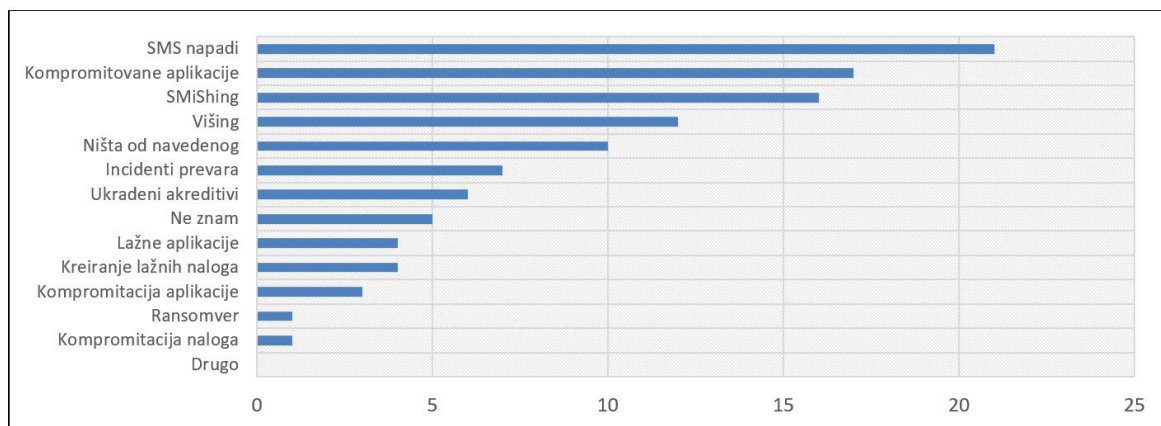
Grafikon 5: Odgovori ispitanika na pitanje: Koliko ste zabrinuti u vezi sa sledećim radnjama koje se dešavaju zbog incidenata u informacionim sistemima banke?



Izvor: Autor

Na pitanje da li ste u proteklih godinu dana doživeli neki od sledećih incidenata prevare koji se posebno odnose na mobilni kanal, 1% ispitanika je odabralo kompromitacija naloga zbog izgubljenog/ ukradenog mobilnog uređaja, 3% ispitanika je odabralo kompromitacija aplikacije zbog korišćenja root telefona, 4% ispitanika je odabralo kreiranje lažnih naloga (uključivanje korisnika) preko mobilnog kanala, 4% ispitanika je odgovorilo sa preuzimanje klonirane ili modifikovane verzije aplikacije sa nepouzdatih veb lokacija/prodavnica, 7% ispitanika je odabralo incidenti prevara putem mobilnog kanala, 1% ispitanika je odgovorilo sa ransomver koji potiče sa mobilnog kanala, 16% ispitanika je odabralo porast incidenata prevara kao rezultat kompromitovanih mobilnih aplikacija, 15% ispitanika je odabralo SMiShing (pecanje putem teksta), 20% ispitanika je odgovorilo sa SMS napadi sa zlonamernom vezom, 6% ispitanika je odgovorilo sa ukradeni akreditivi putem zlonamernog softvera na mobilnom telefonu (lažne tastature, scraping SMS, memorija itd.), 11% ispitanika je odgovorilo sa višing (pecanje putem glasa), 5% ispitanika je odgovorilo sa ne znam, nedostaje nam vidljivost ranjivosti mobilnih kanala i preostalih 9% ispitanika je odgovorilo sa ništa od navedenog, što je prikazano na grafikonu broj 6.

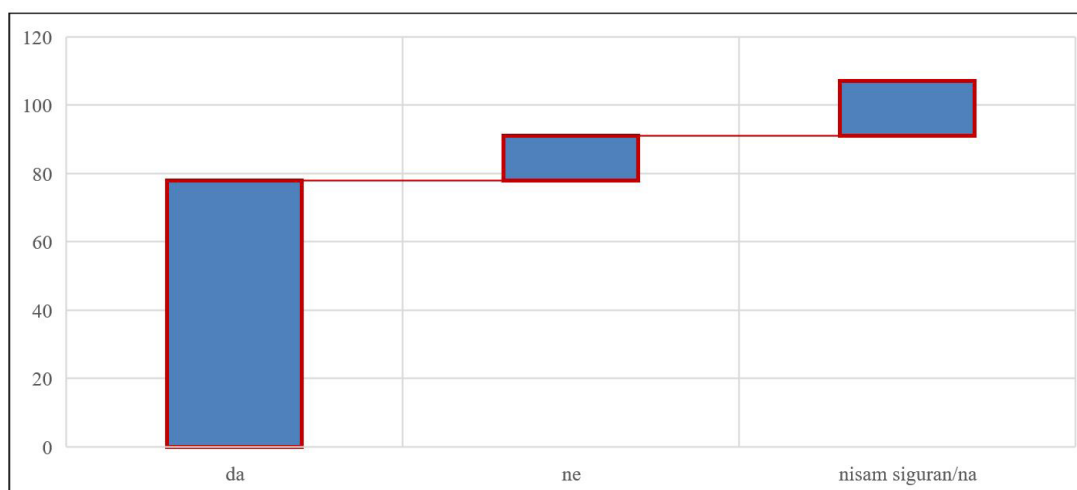
Grafikon 6: Odgovori ispitanika na pitanje: Da li ste u proteklih godinu dana doživeli neki od sledećih incidenata prevare koji se posebno odnose na mobilni kanal?



Izvor: Autor

Na pitanje da li smatrate da Vaša banka dobro razume podatke koji prolaze kroz vaše mobilne aplikacije, 73% ispitanika je odgovorilo sa da, 12% ispitanika je odgovorilo sa ne i preostalih 15% ispitanika je odgovorilo sa nisam siguran/na, što je prikazano na grafikonu broj 7.

Grafikon 7: Odgovori ispitanika na pitanje: Da li smatrate da Vaša banka dobro razume podatke koji prolaze kroz vaše mobilne aplikacije?



Izvor: Autor

Najveći broj ispitanika, čak njih 70% nije zabrinuto ili nije mnogo zabrinuto za bezbednost u sektoru bankarskih usluga. Ovo ukazuje na postojanje visokog stepena poverenja ispitanika u bezbednost bankarskih usluga i aktivnosti koje banke preduzimaju na čuvaju podataka i deponovanih finansijskih sredstava. Ispitanici veću važnost pridaju bezbednosnim pretnjama koje proizilaze iz kompromitovanih akreditiva, phishing napada i unutrašnjih pretnji. Sa druge strane najveća zabrinutost proizilazi iz mogućnosti trajnog i privremenog gubitka deponovanih finansijskih sredstava, dok je najmanja zabrinutost za gubitak ugleda i reputacije banke. Najveći broj ispitanika ocenjuje porast incidenata prevara kao rezultat kompromitovanih mobilnih aplikacija, SMiShing (pecanje putem teksta) i SMS napadi sa zlonamernom vezom kao incidente koje su doživeli u prethodnih godinu dana, ali ove rezultate treba uzeti sa naročitom oprežnošću, jer i pored dostavljenog uputstva za popunjavanje upitnika ispitanici možda nisu u dovoljnoj meri razumeli pitanje i ponuđene odgovore na pitanje.

Diskusija

Sve gore navedeno obara pretpostavke inicijalne hipoteze i svedoči u korist alternativne hipoteze koja glasi da većina ispitanika nije zabrinuta za bezbednost u sektoru bankarskih usluga. To je jasan pokazatelj da su banke u Republici Srbiji ostvarila zapažene rezultate u oblasti informacione bezbednosti korisnika i njihovih podataka i to u sva tri glavna pravca napada koje su trebale da razmotre. Prvi je lična sigurnost pojedinačnih korisnika bankarskih usluga koji pristupaju njihovim naložima, drugi je sigurnost alata za pristup naložima, a treći su zaposleni u bankama koji pristupaju back-end serverima i poverljivim podacima na internoj mreži. Ljudi generalno imaju sklonost da u svojim domovima postavljaju brave na vratima i prozorima kako bi zaštitili svoju imovinu i kako sprečili lopove da im ukradu gotovinu, nakit, elektroniku ili druge vredne oblike imovine. Isti tretman bi trebao da postoji i slučaju elektronske, odnosno digitalne imovine koja obuhvata bankovni račun i druge informacije na računarima na kućnoj mreži ili u oblaku. Treba razmišljati o pristupnim tačkama do personalnih računara, kao što su Internet veze, nalozi e-pošte i bežične mreže (Dupont, 2019). Preduzimanje dodatnih mera predostrožnosti za prijavljivanje na bankovne i druge finansijske račune može da bude korisno (Jakovljević & Jakovljević, 2021). Ove mere mogu da uključuju korišćenje jakih korisničkih naziva i lozinki biranjem kombinacija velikih i malih slova, brojeva i simbola koje je neprijateljskom napadaču teško da pogodi (Rahman&Arif, 2021). Ne treba koristiti lični datum rođenja, adresu ili druge reči ili brojeve koje napadačima može biti lako da saznaju ili pogode. Ne treba koristiti istu lozinku za različite naloge jer neprijateljski napadač koji dobije jednu lozinku može da se prijavi na vaše druge naloge. Treba čuvati parametre za logovanje u tajnosti i redovno ih treba ažurirati. Odjava sa bankarskog naloga kada se završi transakcija ili kada se privremeno udalji od računara se može smatrati neophodnom. U nekim slučajevima korišćenje zasebnog računara, mobilnog telefona ili tableta isključivo za online bankarstvo ili online transakcije preko bankarskog računa može da bude korisno (Belevetz, 2018). Sve veći broj ljudi kupuje osnovne računare i koristi ih samo za bankarstvo na mreži, a ne za čitanje vesti, slanje e-pošte, društveno umrežavanje, igranje igrice ili druge aktivnosti koje su podložnije neprijateljskim napadima (Raičević, et al., 2014). Kao alternativu klijenti banaka mogu da koriste stare uređaje za ovu ograničenu svrhu, ali prethodno treba deinstalirati softvere koji više nisu potrebni i treba skenirati ceo računar u cilju izvršenja provere da li ima zlonamernih softvera pre nego što se pristupi personalnom bankarskom nalogu (Vasić, 2020).

Ako je u pitanju transakcija većeg rizika treba temeljno istražiti kompaniju koja stoji iza veb stranice, uključujući i uveravanje da li je u pitanju posao sa legitimnim entitetom, a ne sa lažnim sajtom (Jakovljević, 2021a). Istovremeno treba ispitati koja vrsta zaštitnog zida nudi veb lokacija ako dođe do povrede podataka ili gubitka podataka (Andrović, et al., 2017). Povremeno treba proveravati bankovne račune u kontekstu odgovora na pitanje da li ima bilo kakvih znakova prevare. Treba proveravati sopstvene depozitne račune i kreditne linije u redovnim intervalima kako bi bilo moguće uočiti i prijaviti grešku ili lažnu transakciju, na identičan način kao što bi se vršio pregled izvoda bankovnog računa na papiru (Xu, et al., 2021). Internet bankarstvo olakšava i nudi brojne mogućnosti za brže nadgledanje računa, a što pre se otkrije problem sa transakcijom, to bi trebalo da bude lakši za rešavanje (Đorić, 2020). Države širom sveta zakonima uglavnom ograničavaju odgovornost korisnika za neovlašćeno korišćenje kreditnih, debitnih i pripejd kartica, posebno ako se prijavi problem nadležnoj banci u određenim vremenskim periodima, koji se razlikuju u zavisnosti od okolnosti. Dobro pravilo je proveravanje sopstvenih računa na mreži jednom ili dva puta nedeljno (Chernobai, et al., 2020). Mnoge banke olakšavaju klijentima da prate svoje račune nudeći obaveštenja e-poštom ili tekstualnim porukama kada stanje padne ispod određenog nivoa ili kada postoji transakcija iznad određenog iznosa (Allodi & Massaci, 2017). Kompletan operativni sistem na uređaju sa koga se pristupa bankarskom nalogu treba proveriti i ažurirati prema preporukama od strane proizvođača ili kada se pronađu nedostaci i to važi za sve, od operativnog sistema do softvera za obradu teksta, Internet pretraživača, softvera za proračunske tabele, pa čak i aplikacija za digitalnu fotografiju. Neki proizvođači softvera mogu izdati „zakrpe“ koje moraju da se instaliraju u procesu ažuriranja programa. Drugi jednostavno pružaju potpuno novu verziju softvera. Poznato je da kriminalci limitiraju prodavce softvera koji obezbeđuju bezbednosnu ispravku kada distribuiraju virus (Jeremić, et al., 2021). Kada se potvrdi da je ažuriranje legitimno, softver treba instalirati u najkraćem roku, kako bi se ispravio bilo kakav bezbednosni nedostatak koji bi mogao da postoji. Neprijateljski napadači uvek razvijaju novi virus koji može da pristupi računarima i ukrade informacije, kao što su lozinke naloga ili brojevi kreditnih ili debitnih kartica. Ovi programi mogu da unište podatke sa čvrstog diska zaraženog računara (Frank&Greenman, 2020). Virus može da uđe u računar na različite načine, možda kao prilog e-poruci, preuzeta datoteku sa zaražene veb lokacije ili sa kontaminiranog USB diska ili drugo (Braun, 2021). Uvek treba instalirati antivirusni softver koji se povremeno pokreće u pozadini vašeg računara da bi tražio i uklonio virus. Takođe, obavezno treba podesiti da se softver automatski ažurira, kako bi štitio od najnovijih virusa (Falzon&Vella, 2020).

Ograničenja ovog istraživanja mogu da uključuju odabir uzorka koristi metoda uzorkovanja verovatnoće, ali taj uzorak reprezentativnosti opšte populacije ili odgovarajuće populacije, u predmetnom slučaju korisnika bankarskih usluga i pristrasnosti uzorka. Veličina uzorka možda nije dovoljna da bi se izvukli validni zaključci. U pregledu literature primetan je nedostatak prethodnih istraživačkih studija sličnog karaktera, sa identičnim sadržajem, na definisanoj populaciji korisnika bankarskih usluga u Republici Srbiji. Dalja istraživanja mogu da budu fokusirana na nove trendove u oblasti sajber bezbednosti sa uključivanjem novih tipova incidenata i pretnji u sektoru finansijskih usluga i sa proširenim obimom ispitanika i proširenim sadržajem ispitivanih tvrdnji kroz anketna pitanja. Istraživači mogu da ispituju stručne i profesionalne kapacitete lica angažovanih na poslovima interne revizije u Republici Srbiji, kako u privatnom, tako u javnom sektoru, za razumevanje informacione bezbednosti korisnika bankarskih usluga. Takvo istraživanje može da bude sprovedeno korišćenjem standardizovanog upitnika udruženja revizora informacionih sistema ISACA kojim se testira znanje kandidata za sticanje profesionalnih sertifikata.

Zaključak

S obzirom da je upotreba informacionih tehnologija postala veliki deo svakodnevnog života, a još više tokom pandemije virusa Covid19, potencijalne negativne strane sve veće zavisnosti od tehnologije postale su još očiglednije. Zaštita kritičnih usluga, kao što su snabdevanje električnom energijom i pristup finansijskom sistemu od napada i prekida je ključna. Banke su odgovorne za upravljanje svojim IT rizicima i održavanje rada svojih IT sistema bez značajnih prekida ili pada kvaliteta usluga uzrokovanih zlonamernim namerama ili nezgodama. Tokom krize izazvane virusom Covid19, banke su morale da se suoče sa blokadama, privremenim zatvaranjem filijala i povećanom potražnjom za uslugama online bankarstva, a sve to istovremeno prihvatajući svoje osoblje koje radi na daljinu u velikim razmerama. To svedoči da bankarski sektor postaje sve više zavisn od informacionih tehnologija. Nema sumnje da povećana upotreba informacionih tehnologija daje dodatnu vrednost, ali povezanim rizicima se mora pravilno upravljati. Svest o značaju pravilnog upravljanja IT rizicima, posebno u finansijskom sektoru, značajno je porasla i napravljen je veliki napredak. Ali ovo je samo prvi segment, jer se IT pejzaž banaka i pretnje po njih se stalno razvijaju, tako da banke ne mogu sebi priuštiti da miruju. Sve zainteresovane strane, a posebno same banke, treba da nastave da rade na tome da korišćenje tehnologije bude bezbedno i predvidljivo. Iako su sve banke potencijalne mete neprijateljskih napada u sajber prostoru, akteri sajber pretnji obično biraju svoje žrtve na osnovu dva kriterijuma, trenutnog stanja i finansijske koristi. Finansijske institucije, kao što su banke i osiguravajuća društva, su glavne mete za napadače upravo zato jer ispunjavaju dva pomenuta kriterijuma. Organizacije u bankarskom sektoru čuvaju osetljive, poverljive i vredne podatke elektronski, od kreditnih kartica i informacija o depozitima do imanja i drugih osetljivih podataka i jednostavno rečeno rutinski rukuju bilionima evra, dolara na dnevnom nivou. Osim toga, njihovi kontinuirani naponi za digitalnu transformaciju, složeni ekosistem lanca snabdevanja, komplikovano regulatorno okruženje, i prakse hibridnog radnog prostora koje je ubrzao Covid19 povećavaju priliku za neprijateljske napadače u sajber prostoru da dođu u posed poverljivih podataka i da ih unovče. Primetno je kod rukovodstva banaka da su već duže vreme zabrinuti zbog kršenja sajber bezbednosti, a ta zabrinutost je sada još veća, jer sajber pretnje sada predstavljaju još veće operativne i reputacione rizike, naročito u pandemijskom i postpandemijskom okruženju. Stoga bi rukovodstvo banaka pre svega, trebalo da razume najznačajnije vektore pretnji, što im omogućava da daju prioritet inicijativama za sajber bezbednost sa najvećim povratom ulaganja i kreiraju uspešan plan sajber bezbednosti. Ransomware, phishing, napadi eksploatacije veb aplikacija i ranjivosti, napadi uskraćivanja usluge, DDoS napadi i unutrašnje pretnje su najčešći izazovi sa kojima se banke suočavaju u prethodne tri godine.

Banke moraju da poboljšaju svoje bezbednosne mehanizme kako bi ublažile ove pretnje koje se stalno razvijaju. Iako su potrošili milione dolara i postavile više nivoa odbrane u svoju infrastrukturu, generalno posmatrano, komponenta koja nedostaje je efikasna upotreba bezbednosnih kontrola. Od ključne je važnosti da se kontinuirano meri efikasnost njihove ukupne IT bezbednosne infrastrukture u odnosu na sajber napade u stvarnom svetu, kako biste ostali korak ispred aktera pretnji. Rukovodstvo banaka treba da usvoji pristup validacije bezbednosne kontrole koji omogućava bankama da procene i verifikuju svoj položaj sajber bezbednosti i ukupnu sajber otpornost i potvrde da bezbednosne kontrole uspešno ublažavaju sajber napade. Pretnje sajber bezbednosti predstavljaju i operativni i reputacioni rizik. Sajber napad može oštetiti ili potpuno poremetiti sposobnost finansijske institucije da obavlja posao, a to može da se klasifikuje kao operativni rizik. Sa druge strane, postojeći klijenti banke mogu da izgube poverenje i da premeste svoje poslovanje na drugo mesto zbog sajber napada, a to može da se klasifikuje kao reputacioni rizik.

Razumevanje izazova koji povećavaju sajber rizike sa kojima se suočava bankarski sektor je ključno za otpornost na sajber pretnje. Ovi izazovi su povezani jedan sa drugim i potrebno je da se njima upravlja holističkim pristupom. Banke usvajaju nove tehnologije, kao što su računarstvo u oblaku, veštačka inteligencija i digitalne usluge. Većina banaka sve više koristi softvere zasnovane na oblaku za povećanje mogućnosti obrade informacija, otkrivanja prevara i finansijske analitike. U međuvremenu, pandemija virusa Covid19 ubrzala je digitalnu transformaciju finansijskih institucija i pojavu virtuelnih banaka i digitalnih finansijskih usluga, poput odobrenja keš kredita i drugo. Kao rezultat digitalne transformacije, brojna fizička lica i poslovne organizacije sada koriste sve više i više novih aplikacija, uređaja, digitalnih bankarskih usluga i infrastrukturnih komponenti koje povećavaju obim neprijateljskih napada na banke. Svi ovi faktori doprinose porastu rizika od sajber bezbednosti za banke. Dok rast novih tehnologija u bankarskom sektoru ima značajan uticaj na profile sajber pretnji, istovremeno može pozitivno da utiče na upravljanje rizikom, kao što je poboljšanje sajber bezbednosti i kontrola usklađenosti. Banke se više oslanjaju na tehnologiju i podatke za isporuku proizvoda i usluga klijentima, tako da su sve više suočene sa regulatornim okruženjem koje se razvija. Državni, savezni i međunarodni regulatori odgovorili su na povećanje sajber pretnji bankarskih usluga uspostavljanjem novih pravila. Bankarski sektor je sve više regulisan u mnogim državama, uz konstantno menjanje standarda zaštite podataka i privatnosti, kao i zahteva za sajber bezbednost. Iako su propisi korisni, njihovo poštovanje može biti skupo i dugotrajno.

Većina banaka je rasporedila više nivoa odbrane u svojoj infrastrukturi, uključujući rešenja za prevenciju i otkrivanje sajber napada. Međutim, ovi sigurnosni slojevi su često izolovani. Komponenta koja nedostaje je efikasna upotreba bezbednosnih kontrola i vidljivosti širom mreže i krajnjih tačaka da bi se identifikovale i popravile praznine. Iako je od ključnog značaja imati adekvatan budžet za sajber bezbednost, podjednako je ključno efikasno koristiti kupljene bezbednosne uređaje. Iako je sjajno videti da banke teže visokim nivoima sajber zrelosti, preporuka je da se pomenute pretpostavke objektivno procene i da se rukovodstvo banaka angažuje na odstranjivanju svih praznina između očekivanja i rezultata procene. Da bi bile korak ispred aktera pretnji, banke i druge finansijske organizacije moraju kontinuirano da testiraju efikasnost svojih bezbednosnih kontrola protiv sajber napada u stvarnom svetu. Validacija bezbednosne kontrole je pristup usredsređen na pretnje koji omogućava organizacijama da procene i analiziraju svoj položaj sajber bezbednosti i ukupnu sajber otpornost i provere da li bezbednosne kontrole efikasno funkcionišu protiv sajber napada. Sajber rizici za banke postajuće sve značajniji. IT i bezbednosni lideri u ovom sektoru moraju nastaviti da ulažu u pravu kombinaciju tehnologije i stručnosti kako bi poboljšali sigurnost. Iako ne postoji jedinstvena strategija za sajber bezbednost, kontinuirani pristup validacije kontrole bezbednosti može značajno i brzo da poboljša bezbednosni položaj kompanije. U kombinaciji sa prelaskom sa reaktivne na proaktivnu bezbednost, finansijske institucije će se osećati opremljenije sa ovim pristupom za suočavanje sa novim pretnjama. Glavni zaključak je da banke treba da stave akcenat na preventivne aktivnosti, kako bi se rizici po osnovu sajber pretnji sveli na prihvatljivo nizak nivo, a među preventivnim aktivnostima primaran fokus treba da bude na edukaciji internih revizora i povećanju učinkovitosti revizija informacione bezbednosti.

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ANALYSIS OF CYBER THREATS AS A RISK FACTOR IN THE BANKING SECTOR

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Summary: The banking industry faces increased risks based on cyber threats, mostly through mobile applications and web portals, and to a lesser extent through other communication channels. Cyber-attacks continue to increase, and the banking sector can be particularly vulnerable, especially in the context of the Covid-19 pandemic. The subject of the paper is to analyze the views of respondents of users of banking services in the Republic of Serbia on the problem of cyber threats as a risk factor in the banking sector. The main conclusion is that the largest number of respondents, as much as 70% of them, are not concerned or not very concerned about security in the banking services' sector. This indicates the existence of a high degree of trust in the security of banking services and the activities that banks undertake to protect data and deposited financial assets. In addition, banks should still emphasize preventive activities to reduce the risks based on cyber threats to an acceptably low level. Some of the preventive activities can be engaging in the education of internal auditors and increasing the effectiveness of information security audits.

Keywords: banks; cyber threats; operational risk

JEL classification: G21, G32

Introduction

In the decade after the global financial crisis, banks are increasingly aware of the need to manage risk. However, while banks were developing sophisticated systems to control financial risk, operational risk apparently took a back seat. Financial risk includes credit risk, the probability that borrowers will repay their loans and market risk, the probability that the value of securities will fluctuate, liquidity risk and the bank's ability to fulfill its obligations to depositors and counterparties. On the other hand, operational risk is the risk of loss due to errors, damage, or interruptions, whether intentional or unintentional, caused by people, systems, internal processes, external events, or cyber threats. Operational risk events can cause huge losses in banking systems (Jakovljević, 2021). Losses from concretizing operational risk can be catastrophic, not only in a strictly monetary sense, but also in the context of the impact on the overall operations and reputation of the bank, sometimes endangering its existence. In recent years, banks around the world have been caught up in headline-grabbing scandals driven by failure to curb operational risk (Uddin, et al., 2020). Most of these losses stem from preventable errors when employees and systems interact with customers, flaws in the way transactions are processed, or outright fraud. Regulators periodically review the banks' vulnerability to operational risk. As with financial risk, regulators require banks to maintain capital buffers to help manage operational risk. The regulator's assessment of a bank's ability to control operational risk can directly affect how much capital a bank has available to perform normal banking activities. When operational risk threats materialize, it can have profound, long-lasting spillover effects. Compared to financial risk, operational risk is more complex and challenging to monitor, control and manage. Although it can have a broad economic impact on a bank, banks have struggled to integrate operational risk management into their overall bank-wide risk management framework as a business entity (Al-Sassam & Al-Alawi, 2019). As banking becomes more customer-centric and customers increasingly use digital channels, banks can gain greater visibility and insights into what could go wrong. With digitization and direct processing, banks can reduce or eliminate human intervention in many transactions, thereby controlling the risks of employee errors and fraud. Thus, thanks to less bureaucratic organizations and agile ways of working, managers can recognize threats and quickly react to them. However, the operational risk thereby spills over into the domain of cyber-attacks and cyber threats (Staffler, 2022). While process automation once done manually can reduce human operational risk, it can also, if not properly monitored, increase cybersecurity risk.

Attackers use distributed denial of service attacks to flood and crash a targeted website by flooding it with traffic (Jakovljević, 2021b). Threat actors generate attack traffic from various compromised computer systems, including computers and other network-connected devices (Tullo, 2020). They disrupt business, result in significant financial losses for the victim, and pose a significant threat to financial institutions. The primary attack vector is a vulnerability that allows an unauthenticated user to execute remote commands on vulnerable servers. By hacking said third-party servers, attackers can collect personal data belonging to the bank's clients. Exploitation attacks allow threat actors to gain access to target networks to perform additional operations with elevated privileges. Regardless of the sophisticated techniques that malicious actors use to penetrate an organization's network, many security incidents are attributed to insider threats posed by current or former employees and unwitting staff mistakes (Mehmet & Ganji, 2021). Insiders cause disruptions and critical data losses, either intentionally or unintentionally. As hostile attackers evolve their tactics and techniques to target the most valuable data and services, banks must improve their defenses to mitigate the ever-evolving threats.

To achieve this, organizations in the banking sector must implement a security strategy that (Anghelache & Olteanu, 2011) includes internal processes, technology and human resources that will make it capable of learning from threats and adapting its focus of defensive activities. At the same time, in order to ensure maximum security in case of cybercrime, banks must develop a strategic plan that not only resists the initial cyberattack with minimal impact and losses, but also maintains that resistance continuously against new threats (Jakovljević, 2021c). Three significant cyber threats to the banking sector are nation-state attacks by foreign governments, state-sponsored attacks by connected cybercriminal gangs, and advanced persistent threats. These threat actors use many of the same attack vectors as less capable threat actors, such as phishing and ransomware, but with more technical capacity and funding (Camillo, 2017). Organized groups of hostile attackers collaborate and share tactics, procedures, techniques and tools to compromise banks, leading to an increase in the risk of cyber-attack success (Creado & Ramteke, 2020). Attacks on the national banking systems of nation states reflect global geopolitical tensions, which have fueled the growth of cyber activities targeting governments, the military and the business sector, such as the war in Ukraine, missile launches by North Korea and others.

Most banks rely on third-party service providers to fulfill their digital services. Even if your own security systems are highly resistant to cyber-attacks, third party service providers can be the weak link in the cyber security chain. Threat actors are increasingly targeting software vendors and then delivering malicious code to customers in the supply chain via product downloads or updates that appear to be legitimate. These attacks compromise software distribution systems and allow threat actors to gain access to customer and supplier networks. Cybersecurity risks posed by third-party vendors are expected to become a more significant issue in the future as regulators place greater emphasis on business continuity and operational resilience (Servidio & Taylor, 2015). Recent changes in the way work has been accelerated by the spread of the Covid19 pandemic, such as the hybrid workspace that combines office work and remote work, have increased the risk for organizations. As the pandemic enters its third year, telecommuting, hybrid workforces and cloud-based software technologies have become virtually ubiquitous. Banks were forced to adopt new technologies in a short period of time and to quickly implement new ways of working that enabled remote access, communication, and collaboration. As a result, hybrid workplace environments increase the complexity of IT systems, expand the attack surface, and bring new cyber risks and threats. All the above suggests that the banking industry is increasingly facing heightened risks based on cyber threats, mostly through mobile applications and web portals, and to a lesser extent through other communication channels. Cyber-attacks continue to grow in both frequency and sophistication for all industries, and the banking sector is particularly vulnerable, especially in the context of the Covid19 pandemic. Banks fall victim to hostile attack far more often than business entities in other industries, and breaches of information security led to loss of revenue for banking institutions, business interruption, and loss of reputation and customers. The subject of the paper is to analyze the views of respondents of users of banking services in the Republic of Serbia on the problem of cyber threats as a risk factor in the banking sector.

Literature Review

The authors (Dmitrović, et al., 2021) believe that the extremely dynamic growth and progress of the technological environment and IT tools used in the daily execution of financial services leads to an increase in the vulnerability of banks in the field of information security, which is primarily reflected in the increasing exposure to hackers' attacks, computer systems, hardware failures and access by unauthorized parties to confidential and security-sensitive data. They argue that such an environment creates a strong need for banks to consider effective strategies and practical tools to use in their day-to-day operations, which are directly or indirectly related to information security, to protect confidential and security-sensitive data. Phishing remains a common form of attack used to gain initial access to a business organization's networks. Threat actors have consistently invested significant resources to expand the phishing economy (Akinbowale, et al., 2020). Nowadays, phishing is an all-encompassing business, which allows attackers numerous advantages including developing fake login page, hosting websites, creating phishing email templates, distributing phishing emails, and more (Barakat & Hussainey, 2013). Attackers no longer need to hack into websites, and as a result, cybercrime has become more accessible. With phishing, even beginners in cybercrime can launch and carry out hostile attacks. They use fake websites and login pages that look identical to the official website of the targeted bank. Users are taken to a fake website, where they are asked to enter their username and password. After users enter their information, it is forwarded to the bank's original website (Khan, 2018). Cybercriminals cause significant financial and business damage after acquiring user data using the previously explained technique. Numerous hostile data attacks have affected banking and finance in previous years, especially since the beginning of the spread of the Covid-19 virus pandemic. Understanding the attacker's mindset can be important for building a solid defense and a higher level of resistance to attacks (Jakovljević, 2021f). Sharing the experience of banks can be very beneficial and learning from past failures has helped a number of banks strengthen their defensive capabilities. By analyzing bank cyber security incidents, qualified experts can identify the biggest threat vectors to prioritize cyber security investments with the highest return on investment and build an effective cyber security plan tailored for the banking sector environment (Putnik, et al., 2014). One of probably the most widespread forms of attacks on banks is ransomware, which is a type of virus that prevents or restricts users from accessing their system or data, after which there is usually a threat to publish or sell the stolen data until the victim pays a ransom fee to the attacker (Zelenović, et al., 2020). It has become a widespread and well-known threat to organizations around the world for several years now, and it doesn't look like it's going away anytime soon. As the main reason for the proliferation of ransomware, the literature states that ransomware is a highly profitable business with low risk for threat actors. At the same time, the technical barrier to entry for the ransomware business is very low for hostile attackers.

Initially, ransomware prevented organizations from accessing their data by encrypting files on infected systems and holding the decryption key for ransom. Attack victims pay a ransom to regain access to encrypted data (Butler & Butler, 2018). However, most financial institutions have adapted to encryption attacks by improving their data backup procedures (Jakovljević, 2021d). There is no reason to pay the ransom if you can only restore your data from backups, operating systems on computers are reinstalled and populated with data from backups (Covers & Doeland, 2020). However, the attackers responded by exfiltrating critical data before encrypting it and then threatening to leak or reveal it if the ransom was not paid. This is not a problem that can be solved by recovery from the backup, so the equilibrium situation is returned to the beginning and the advantage is in favor of the attacker who has an advantage over the bank.

The threat of a combination of encryption and data exfiltration is a double threat (Peret, 2022). It is important to understand that the ransomware threat actor is not responsible for removing the stolen data regardless of whether the ransom is paid (Agba, et al., 2020). In addition to data encryption and exfiltration, attackers use other extortion methods, such as threatening to contact bank customers, threatening to disrupt operations with denial-of-service attacks, and threatening to sell sensitive data. Generally before launching an attack, ransomware attackers conduct research on publicly available information, such as assessing a bank's attractiveness or vulnerability to attack, such as the introduction of a new digital service, a new information system, or the merger of two banks (Hoffman, 2020). If the banks do not pay the ransom on time, the ransomware attackers threaten to reveal the downloaded information, potentially causing a public backlash from investors (Nitescu & Cristea, 2020). As a result of the extortion methods explained, ransomware attacks have a huge impact on banks and can include business interruption, loss of reputation, loss of revenue, loss of data and public disclosure of sensitive information.

A public computer, for example in an Internet cafe or hotel business center, may not have updated security software and may be infected with a virus (Gonchar, 2020). Similarly, portable devices such as laptops or mobile phones used for online banking or shopping should avoid connecting to a wireless network in a public hotspot such as a hotel, coffee shop or airport. A wireless network in public places can be used by hostile attackers to intercept device signals and as a place to collect personal data, especially bank transaction data (Cristea, 2021). The bottom line, especially for sensitive matters such as online banking and activities involving personal data, is to consider accessing the Internet only using your own computer with a secure, reliable connection and connecting laptops and mobile devices to trusted networks. Everywhere you look, people are using smartphones and tablets as portable, handheld computers (Dorogovs, et al., 2013). However, hostile attackers are also interested in using or accessing these devices to steal information or commit other crimes. That is why it is necessary for users of mobile devices, i.e., bank clients, to take measures to secure them, just as they would do for desktop computers. Apps that may contain a virus should be avoided (Lu, 2013). Purchase or download from known app stores, such as those established by your phone manufacturer or mobile service provider. Regular, periodic updating of the operating system is necessary. You should consider opting for automatic updates, as this will ensure that you have the latest fixes for any security vulnerabilities discovered by the manufacturer. Hostile attackers try to exploit known flaws, so updating your software will help reduce vulnerabilities.

Methodology

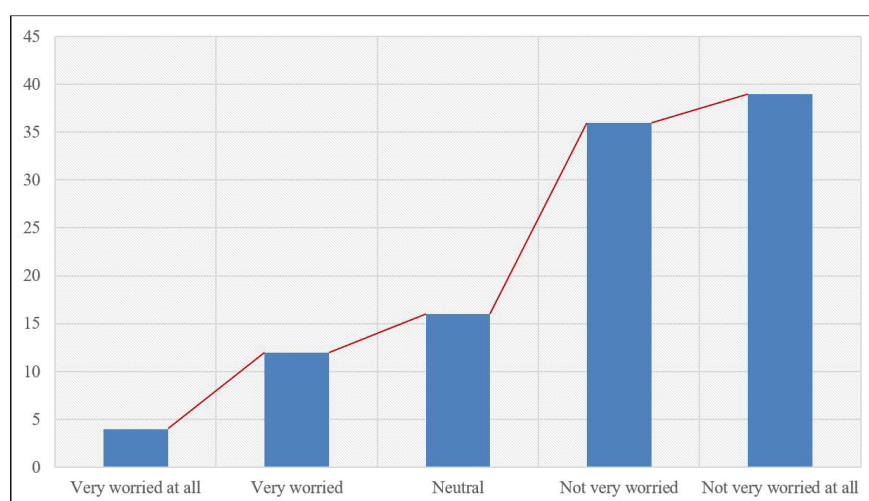
The research was conducted by creating a short questionnaire on the topic of examining the attitudes of users of banking services on issues in the field of cyber threats as a risk factor in the banking sector. The questionnaire was sent to the addresses of more than 200 randomly selected respondents in the Republic of Serbia, and instructions for filling out the questionnaire were also sent with it. The questionnaire was available for filling during the first week of September 2022. A total of 107 complete responses were received, which were assessed as sufficient and relevant for further analysis. The initial hypothesis is that most respondents are concerned about security in the banking services sector. An alternative hypothesis is that the majority of respondents are not concerned about security in the banking services sector. The answers were analyzed using the graphic method and through the textual description and graphs are presented in the continuation of the paper.

The representativeness of the sample, overly optimistic answers or answers that do not fully reflect the real attitudes of the respondents can be mentioned as potential key shortcomings of the research. Due to all the above, the presented data should be taken with a certain amount of caution when interpreting and officially using them.

Results

When asked how concerned they are about security in the banking services sector, 4% of respondents answered extremely concerned, 11% of respondents answered very concerned, 15% of respondents answered neutral, 34% of respondents answered with I am not very worried and the remaining 36% of the respondents answered with generally not worried, which is shown in graph 1.

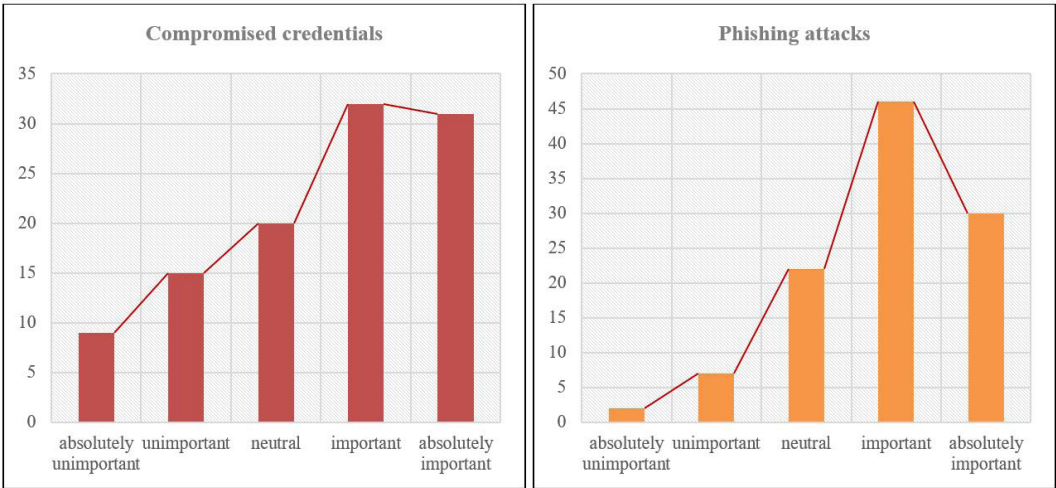
Graph 1: Respondents' Responses to the Question of How Concerned They are About Security in the Banking Services' Sector



Source: Author

When asked which security threats worries them the most, in the domain of compromised credentials, 8% of respondents answered absolutely unimportant, 14% of respondents answered unimportant, 19% of respondents answered neutral, 30% of respondents answered important and the remaining 29% respondents answered with very important. When asked which security threats worry them the most, in the domain of phishing attacks, 2% of respondents answered absolutely unimportant, 7% of respondents answered unimportant, 21% of respondents answered neutral, 43% of respondents answered important and the remaining 28% of respondents answered with very important, which is shown in graph 2.

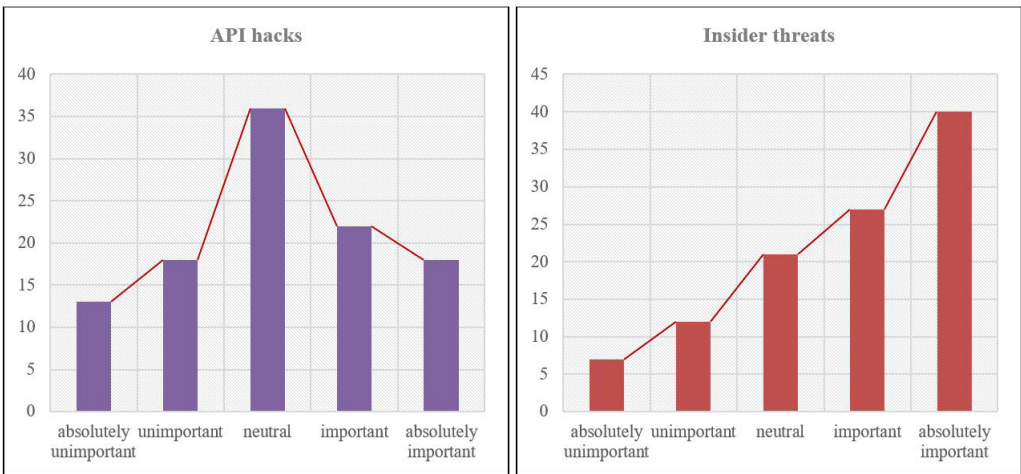
Graph 2: Respondents' Answers to the Question About Which Security Threats Worry Them the Most



Source: Author

When asked which security threats worry them the most, in the domain of API hacks, 12% of respondents answered absolutely unimportant, 17% of respondents answered unimportant, 34% of respondents answered neutral, 21% of respondents answered important and the remaining 17% respondents answered with very important. When asked which security threats worry them the most, in the domain of internal threats, 7% of respondents answered absolutely unimportant, 11% of respondents answered unimportant, 20% of respondents answered neutral, 25% of respondents answered important and the remaining 37% respondents answered with very important, which is shown in graph 3.

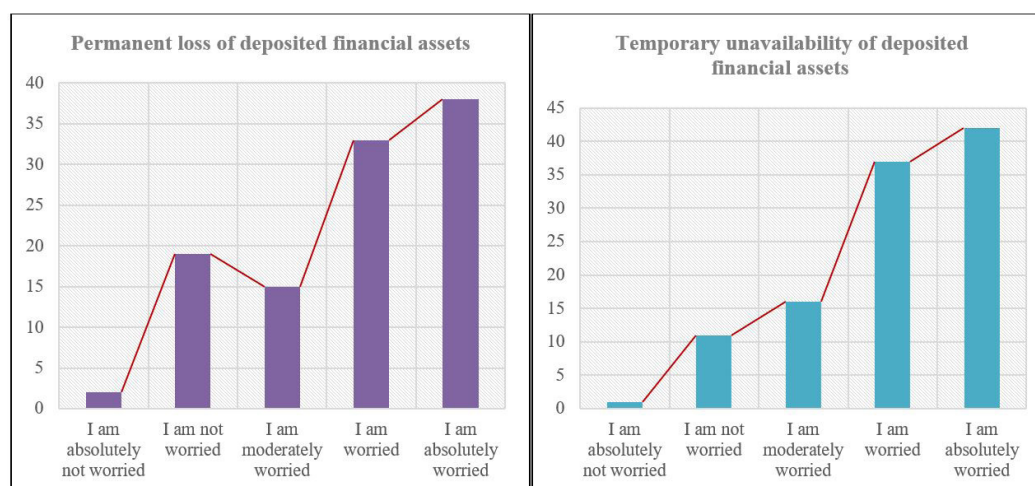
Graph 3: Respondents' Answers to the Question About Which Security Threats Worry Them the Most



Source: Author

When asked on a scale of 1 to 5 how worried they are about the permanent loss of deposited financial assets that occur due to incidents in the bank's information systems, 2% of respondents answered with "absolutely not worried", 18% of respondents answered with "not worried" and, 14% of the respondents answered "I am moderately worried", 31% of the respondents answered "I am very worried" and the remaining 36% of the respondents answered "I am significantly worried". When asked on a scale of 1 to 5 how worried they are about the temporary unavailability of deposited financial resources that occur due to incidents in the bank's information systems, 1% of respondents answered with "absolutely not worried", 10% of respondents answered with "not worried" and, 15% of respondents answered "I am moderately worried", 35% of respondents answered "I am very worried" and the remaining 39% of respondents answered "I am significantly worried", which is shown in graph 4.

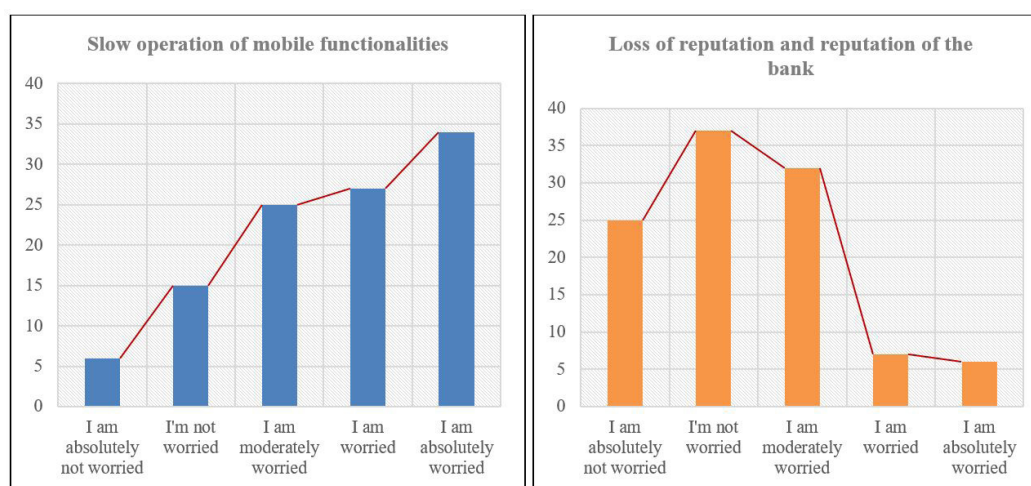
Graph 4: Respondents' Responses to the Question of How Concerned They Are About the Following Actions That Occur Due to Incidents in the Bank's Information Systems



Source: Author

When asked on a scale of 1 to 5 how worried they are about the permanent loss of deposited financial assets that occur due to incidents in the bank's information systems, 2% of respondents answered with "absolutely not worried", 18% of respondents answered with "not worried" and, 14% of the respondents answered "I am moderately worried", 31% of the respondents answered "I am very worried" and the remaining 36% of the respondents answered "I am significantly worried". When asked on a scale of 1 to 5 how worried they are about the temporary unavailability of deposited financial resources that occur due to incidents in the bank's information systems, 1% of respondents answered with "absolutely not worried", 10% of respondents answered with "not worried" and, 15% of respondents answered "I am moderately worried", 35% of respondents answered "I am very worried" and the remaining 39% of respondents answered "I am significantly worried", which is shown in graph 4.

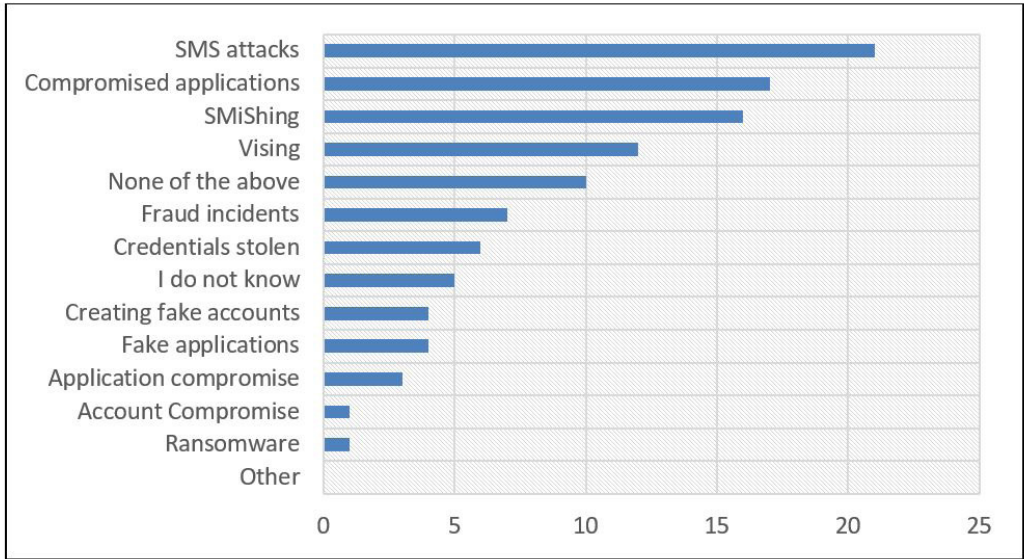
Graph 5: Respondents' Responses to the Question of How Concerned They Are About the Following Actions that Occur Due to Incidents in the Bank's Information Systems



Source: Author

When asked if in the past year they experienced any of the following fraud incidents specifically related to the mobile channel, 1% of respondents chose account compromise due to a lost/stolen mobile device, 3% of respondents chose application compromise due to using a rooted phone, 4 % of respondents chose creating fake accounts (user opt-in) via mobile channel, 4% of respondents answered downloading a cloned or modified version of an app from untrusted websites/stores, 7% of respondents chose fraud incidents via mobile channel, 1% of respondents answered with ransomware originating from the mobile channel, 16% of respondents chose an increase in fraud incidents as a result of compromised mobile applications, 15% of respondents chose SMiShing (text phishing), 20% of respondents answered with SMS attacks with a malicious link, 6% of respondents responded with stolen credentials via mobile phone malware (fake keyboards, SMS scraping, memory, etc.), 11% of respondents answered phishing (voice phishing), 5% of respondents answered I don't know, we lack visibility into the vulnerability of mobile channels and the remaining 9% of respondents answered none of the above, which is shown in graph 6.

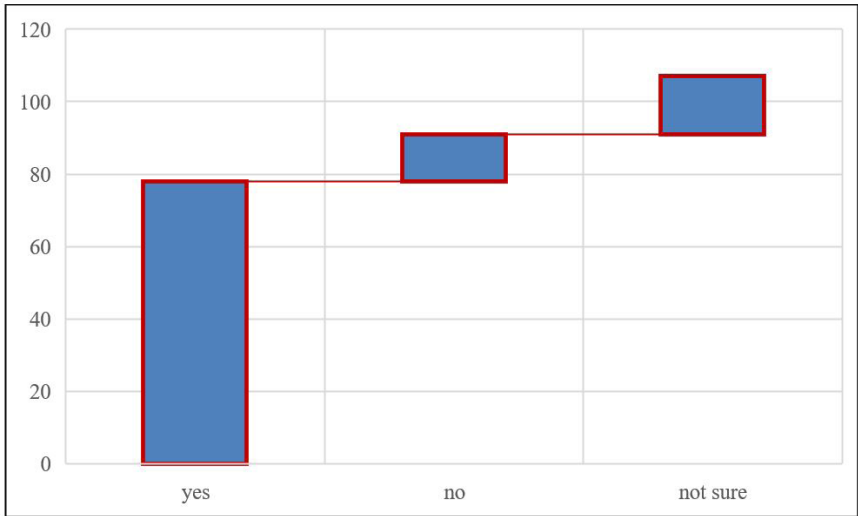
Graph 6: Respondents’ Answers to the Question of Whether They Have Experienced Any of the Following Fraud Incidents in the Past Year, Specifically Related to the Mobile Channel



Source: Author

When asked whether they think that their bank understands the data that passes through your mobile applications well, 73% of respondents answered yes, 12% of respondents answered no and the remaining 15% of respondents answered I am not sure, which is shown in graph 7.

Graph 7: Respondents’ Answers to the Question of Whether They Think Their Bank Understands Well the Data Passing Through Their Mobile Applications



Source: Author

The largest number of respondents, even 70% of them, are not concerned or not very concerned about security in the banking services sector. This indicates the existence of a high degree of trust of respondents in the security of banking services and the activities that banks undertake to protect data and deposited financial assets. Respondents place greater importance on security threats arising from compromised credentials, phishing attacks, and insider threats. On the other hand, the greatest concern stems from the possibility of permanent and temporary loss of deposited financial assets, while the least concern is the loss of the bank's image and reputation. Most respondents rate the increase in fraud incidents as a result of compromised mobile applications, SMiShing (phishing via text) and SMS attacks with a malicious link as incidents they experienced in the previous year, but these results should be taken with particular caution because despite the provided instructions for filling of the questionnaire, the respondents may not have sufficiently understood the question and the offered answers to the question.

Discussion

All the above refutes the assumptions of the initial hypothesis and testifies in favor of the alternative hypothesis, which states that less than 50% of the total number of respondents are concerned or very concerned about security in the banking services sector. This is a clear indication that banks in the Republic of Serbia have achieved remarkable results in the field of information security of users and their data, in all three main directions of attack that they should have considered. The first is the personal security of individual users of banking services who access their accounts, the second is the security of tools for accessing accounts, and the third is bank employees who access back-end servers and confidential data on the internal network. People generally tend to install locks on doors and windows in their homes to protect their possessions and to prevent thieves from stealing cash, jewelry, electronics, or other valuable forms of property. The same treatment should exist in the case of electronic, digital assets that include bank accounts and other information on computers on a home network or in the cloud. Access points to personal computers, such as Internet connections, email accounts, and wireless networks, should be considered (Dupont, 2019). Taking extra precautions for logging into bank and other financial accounts can be beneficial (Jakovljević & Jakovljević, 2021). These measures can include using strong usernames and passwords by choosing combinations of upper- and lower-case letters, numbers and symbols that are difficult for a hostile attacker to guess (Rahman & Arif, 2021). You should not use your personal date of birth, address, or other words or numbers that can be easily known or guessed by attackers. You should not use the same password for different accounts because a hostile attacker who obtains one password can log into your other accounts. Logging parameters should be kept secret and updated regularly. Logging out of a bank account when a transaction is completed or when temporarily away from the computer may be considered necessary. In some cases, using a separate computer, mobile phone or tablet exclusively for online banking or online transactions through a bank account can be beneficial (Belevetz, 2018). An increasing number of people buy basic computers and use them only for online banking and not for reading news, sending e-mails, social networking, playing games or other activities that are more vulnerable to hostile attacks (Raičević, et al., 2014). Alternatively, bank customers can use old devices for this limited purpose, but software that is no longer needed should be uninstalled first and the entire computer should be scanned for malware before accessing a personal banking account (Vasić, 2020).

If it is a higher-risk transaction, you should thoroughly investigate the company behind the website, including making sure that you are dealing with a legitimate entity and not a fake site (Jakovljević, 2021a). At the same time, you should examine what kind of firewall the website offers if there is a data breach or data loss (Andrović, et al., 2017). Bank accounts should be checked periodically in the context of answering the question whether there are any signs of fraud. One should check one's own deposit accounts and lines of credit at regular intervals in order to detect and report an error or fraudulent transaction, in the same way one would review a paper bank statement (Xu, et al., 2021). Internet banking facilitates and offers numerous opportunities for faster account monitoring, and the sooner a problem with a transaction is discovered, the easier it should be to resolve (Đorić, 2020). Countries around the world generally have laws limiting the user's liability for unauthorized use of credit, debit and prepaid cards, especially if the problem is reported to the bank in charge within certain time periods, which vary depending on the circumstances. A good rule of thumb is to check your online accounts once or twice a week (Chernobai, et al., 2020). Many banks make it easy for customers to monitor their accounts by offering email or text message notifications when the balance drops below a certain level or when there is a transaction above a certain amount (Allodi & Massaci, 2017). A complete operating system on the device from which the bank account is accessed should be checked and updated as recommended by the manufacturer or when flaws are found and this applies to everything from the operating system to word processing software, Internet browsers, spreadsheet software and even and a digital photography application. Some software manufacturers may issue "patches" that must be installed as part of the program update process. Others simply provide a completely new version of the software. Criminals are known to limit software vendors who provide a security patch when distributing a virus (Jeremić, et al., 2021). Once the update is confirmed to be legitimate, the software should be installed as soon as possible to correct any security flaws that may exist. Hostile attackers are always developing a new virus that can access computers and steal information, such as account passwords or credit or debit card numbers. These programs can destroy data from an infected computer's hard drive (Frank & Greenman, 2020). A virus can enter a computer in a variety of ways, perhaps as an email attachment, a downloaded file from an infected website or from a contaminated USB drive, or others (Brown, 2021). You should always install antivirus software that periodically runs in the background of your computer to scan for and remove viruses. Also, the software should be set to automatically update to protect against the latest viruses (Falzon & Vella, 2020).

Limitations of this research may include sample selection using probability sampling methods, but that sample is representative of the general population or the appropriate population, in the case of banking service users, and sample bias. The sample size may not be sufficient to draw valid conclusions. In the review of the literature, there is a noticeable lack of previous research studies of a similar nature, with identical content, on a defined population of users of banking services in the Republic of Serbia. Further research can be focused on new trends in cyber security with the inclusion of new types of incidents and threats in the financial services sector and with an expanded scope of respondents and expanded content of investigated claims through survey questions. Researchers can examine the professional and professional capacities of persons engaged in internal audit work in the Republic of Serbia, both in the private and public sectors, to understand the information security of users of banking services. Such research can be conducted using the standardized questionnaire of the Association of Information Systems Auditors ISACA, which tests the knowledge of candidates for professional certification.

Conclusion

As the use of information technology has become a large part of everyday life, and even more so during the Covid19 virus pandemic, the potential downsides of increasing dependence on technology have become even more apparent. Protecting critical services such as electricity supply and access to the financial system from attacks and disruptions is crucial. Banks are responsible for managing their IT risks and maintaining the operation of their IT systems without significant interruptions or declines in service quality caused by malicious intent or accidents. During the crisis caused by the Covid19 virus, banks had to deal with lockdowns, temporary branch closures and increased demand for on-line banking services, all while accepting their staff to work remotely on a large scale. This proves that the banking sector is becoming more and more dependent on information technologies. There is no doubt that the increased use of information technology provides added value, but the associated risks must be properly managed. Awareness of the importance of proper IT risk management, especially in the financial sector, has grown significantly and great progress has been made. But this is only the first segment, because the IT landscape of banks and the threats to them are constantly evolving, so banks cannot afford to stand still. All stakeholders, and especially the banks themselves, should continue to work to ensure that the use of technology is safe and predictable. Although all banks are potential targets for hostile attacks in cyberspace, cyber threat actors typically choose their victims based on two criteria, current state and financial benefit. Financial institutions, such as banks and insurance companies, are prime targets for attackers precisely because they meet the two criteria. Organizations in the banking sector store sensitive, confidential and valuable data electronically, from credit card and deposit information to real estate and other sensitive data, and simply put, they routinely handle billions of euros and dollars daily. In addition, their continued digital transformation efforts, complex supply chain ecosystem, complicated regulatory environment, and hybrid workspace practices accelerated by Covid19 increase the opportunity for hostile cyber attackers to get hold of confidential data and monetize it. It is noticeable among bank management that they have been concerned about cyber security breaches for a long time, and this concern is even greater now, because cyber threats now pose even greater operational and reputational risks, especially in a pandemic and post-pandemic environment. Therefore, bank management should first and foremost understand the most significant threat vectors, which allows them to prioritize cyber security initiatives with the highest return on investment and create a successful cyber security plan. Ransomware, phishing, web application exploit and vulnerability attacks, denial of service attacks, DDoS attacks and insider threats are the most common challenges faced by banks in the past three years.

Banks must improve their security mechanisms to mitigate these ever-evolving threats. Although they have spent millions of dollars and put multiple layers of defense into their infrastructure, the generally missing component is the effective use of security controls. It is critical to continuously measure the effectiveness of their overall IT security infrastructure against real-world cyber-attacks to stay one step ahead of threat actors. Bank management should adopt a security control validation approach that allows banks to assess and verify their cybersecurity posture and overall cyber resilience and confirm that security controls are successfully mitigating cyber-attacks. Cyber security threats represent both operational and reputational risk. A cyber-attack can damage or completely disrupt a financial institution's ability to do business, and this can be classified as an operational risk. On the other hand, the existing clients of the bank may lose confidence and move their business to another place due to a cyber-attack, and this can be classified as a reputational risk.

Understanding the challenges that increase the cyber risks facing the banking sector is critical to resilience against cyber threats. These challenges are interrelated and need to be managed with a holistic approach. Banks are adopting new technologies, such as cloud computing, artificial intelligence, and digital services. Most banks are increasingly using cloud-based software to enhance information processing, fraud detection and financial analytics capabilities. Meanwhile, the Covid-19 pandemic has accelerated the digital transformation of financial institutions and the emergence of virtual banks and digital financial services, such as cash loan approvals and more. As a result of digital transformation, many individuals and business organizations are now using more and more new applications, devices, digital banking services and infrastructure components that increase the scope of hostile attacks on banks. All these factors contribute to the rise of cyber security risks for banks. While the growth of new technologies in the banking sector has a significant impact on cyber threat profiles, it can also have a positive impact on risk management, such as improving cyber security and compliance controls. Banks rely more on technology and data to deliver products and services to customers, so they are increasingly faced with an evolving regulatory environment. State, federal, and international regulators have responded to the increase in cyber threats to banking services by establishing new rules. The banking sector is increasingly regulated in many countries, with constantly changing data protection and privacy standards, as well as cyber security requirements. Although regulations are useful, compliance can be costly and time-consuming.

Most banks have deployed multiple layers of defense in their infrastructure, including solutions to prevent and detect cyber-attacks. However, these security layers are often isolated. The missing component is the effective use of security controls and visibility across the network and endpoints to identify and fix gaps. While it is critical to have an adequate budget for cyber security, it is equally critical to use the security devices purchased effectively. Although it is great to see that banks are striving for high levels of cyber maturity, it is recommended that the assumptions be objectively assessed, and that bank management be engaged in closing any gaps between expectations and assessment results. To stay one step ahead of threat actors, banks and other financial organizations must continuously test the effectiveness of their security controls against real-world cyber-attacks. Security control validation is a threat-centric approach that enables organizations to assess and analyze their cybersecurity posture and overall cyber resilience and verify that security controls are working effectively against cyber-attacks. Cyber risks for banks will become more and more significant. IT and security leaders in this sector must continue to invest in the right mix of technology and expertise to improve security. While there is no one-size-fits-all cybersecurity strategy, a continuous approach to validating security controls can significantly and quickly improve a company's security posture. Combined with the shift from reactive to proactive security, financial institutions will feel better equipped with this approach to deal with emerging threats. The main conclusion is that banks should emphasize preventive activities to reduce risks based on cyber threats to an acceptably low level, and among preventive activities, the primary focus should be on the education of internal auditors and increasing the effectiveness of information security audits.

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ODLOŽENI POREZ NA DOBITAK U MULTINACIONALNIM BANKAMA: SLUČAJ HRVATSKE, SRBIJE I SLOVENIJE

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Rezime: Odloženi porez na dobitak predstavlja važnu poziciju u finansijskim izveštajima banaka. On je primarno posledica privremenih razlika između knjigovodstvenih i poreskih vrednosti imovine i obaveza. Filijale multinacionalnih bankarskih grupa koje posluju u Hrvatskoj, Srbiji i Sloveniji moraju izveštavati o odloženom porezu u skladu sa Međunarodnim računovodstvenim standardom 12 – Porezi na dobitak. U ovom radu su ispitane prakse u vezi sa odloženim porezom na dobitak u takvim bankama. S tim u vezi, uzorkovane su četiri bankarske grupe (dve austrijske i dve italijanske) koju posluju u tri pomenute države. Rezultati istraživanja su pokazali da neto odložena poreska sredstva/obaveze obično nemaju materijalno značajno učešće u ukupnoj imovini banaka, premda postoji statistički značajna razlika u materijalnosti između država. Generalno, banke priznaju manje odloženih poreskih sredstava nakon pandemije Covid-19, usled rastuće neizvesnosti u pogledu ostvarenja budućih oporezivih dobitaka, premda njihovo smanjenje nije statistički značajno. Takođe, izvori odloženog poreza na dobitak se značajno razlikuju između uzorkovanih država, premda je vrednovanje finansijske imovine, generalno, najčešći izvor odloženog poreza.

Ključne reči: porez na dobitak, odloženi porez, materijalnost, banke, multinacionalne banke.

JEL klasifikacija: G21, H25

Uvod

Deregulacija i internacionalizacija bankarskog sektora obeležili su početak XXI veka u tranzicionim i post-tranzicionim državama (Zaklan, 2014). Najveći deo domaćih banaka je privatizovan od strane multinacionalnih bankarskih grupa, primarno iz razvijenih zapadnoevropskih država (Mešić, 2018). Ubrzo su filijale multinacionalnih banaka postale znatno profitabilnije i efikasnije od banaka u domaćem vlasništvu (Fries i Taci, 2005).

Sa uplivom stranog kapitala i početkom primene Međunarodnih računovodstvenih standarda (MRS) i Međunarodnih standarda finansijskog izveštavanja (MSFI), odloženom porezu na dobitak je u bankarskom sektoru tranzicionih i post-tranzicionih država posvećena značajna pažnja. Uprkos višedecenijskoj primeni u zapadnoevropskoj računovodstvenoj praksi, odloženi porez na dobitak je i dalje predmet značajnih akademskih rasprava (Brouwer i Naarding, 2018). S tim u vezi, Flagmeier (2022) smatra da odloženi porez na dobitak, prezentovan u finansijskim izveštajima, sadrži značajne informacije za korisnike izveštaja i donosiocima odluka. Na drugoj strani, i dalje je prisutan značajan broj argumenata, kako za, tako i protiv priznavanja odloženog poreza na dobitak u finansijskim izveštajima banaka (Guia i Dantas, 2020).

Predmet rada jesu filijale multinacionalnih bankarskih grupa u Hrvatskoj, Srbiji i Sloveniji. Osim geografske povezanosti, ove tri države su izabrane usled činjenice da su bile deo bivše Socijalističke Federativne Republike Jugoslavije, da imaju relativno sličan nivo ekonomskog razvoja, odnosno da imaju bankocentrični finansijski sistem. Porez na dobitak (tekući i odloženi) u Hrvatskoj, Srbiji i Sloveniji je bio predmet nekih ranijih istraživanja (Gabršek, 2017).

Rad ima tri osnovna cilja. Prvi cilj rada jeste ispitivanje materijalnosti odloženog poreza na dobitak u posmatranim bankama i njegovo poređenje u cilju ispitivanja eventualnih razlika između država. Drugi cilj rada jeste sagledavanje uticaja pandemije Covid-19 na odloženi porez na dobitak u uzorkovanim bankama, dok je treći cilj rada ispitivanje najčešćih izvora odloženog poreza na dobitak u posmatranim bankama.

Na globalnom nivou, odloženi porez na dobitak u multinacionalnim bankarskim grupama je relativno slabo istražen, s obzirom na to da se značajno veća pažnja pridaje tekućem porezu na dobitak, a posebno seljenju dobitka multinacionalnih banaka u države sa preferencijalnim poreskim sistemom u cilju umanjenja tekućeg rashoda za porez na dobitak (Merz i Overesch, 2016; Fatica i Gregori, 2020; Reiter i saradnici, 2021). Takođe, radovi o odloženom porezu na dobitak u bankarskom sektoru tranzicionih i post-tranzicionih država su relativno retki. Originalnost rada se ogleda u činjenici da je ovo, prema najboljim saznanjima autora, prvo empirijsko istraživanje o odloženom porezu na dobitak koje obuhvata banke iz Hrvatske, Srbije i Slovenije. Autor veruje da rezultati istraživanja mogu biti od koristi brojnim interesnim grupama, a posebno menadžerima multinacionalnih bankarskih grupa, revizorima finansijskih izveštaja i donosiocima računovodstvenih standarda.

Izuzev uvoda i zaključka, rad je sačinjen iz tri celine. U prvom delu rada je prikazan pregled literature i postavljene su istraživačke hipoteze. U drugom delu rada je predstavljena metodologija istraživanja, dok su u trećem delu rada predstavljeni rezultati istraživanja.

1. Pregled literature i razvoj istraživačkih hipoteza

1.1 Koncept odloženog poreza na dobitak

Odloženi porez na dobitak primarno je posledica privremenih razlika između knjigovodstvenih i poreskih vrednosti sredstava i obaveza. U savremenoj praksi se, u skladu sa MRS 12 – Porezi na dobitak, dominantno koristi metod obaveza (Zarova, 2010), prema kojem kompanija iskazuje odložena poreska sredstva kada je poreska vrednost imovine veća od njene knjigovodstvene vrednosti, odnosno kada je poreska vrednost obaveza manja od njene knjigovodstvene vrednosti. U suprotnim slučajevima, kompanija iskazuje odložene poreske obaveze.

Saglasno MRS 12, kompanije obično prebijaju iznos odloženih poreskih sredstava i odloženih poreskih obaveza, te u bilansu stanja iskazuju neto odložena poreska sredstva/obaveze. Iako su dugoročne pozicije bilansa stanja, neto odložena poreska sredstva/obaveze se ne diskontuju, premda su ovakvi stavovi računovodstvenih standarda predmet značajnih akademskih diskusija (Brouwer i Naarding, 2018).

Generalno, u literaturi se kao najčešći izvor odloženog poreza na dobitak ističe amortizacija stalne imovine (Alexander i Nobes, 2007, 245), s obzirom na to da se u većini država razlikuju računovodstveni i poreski propisi za njeno utvrđivanje. Pod ostalim nepromenjenim pretpostavkama, viši iznos računovodstvene amortizacije u odnosu na poresku amortizaciju dovodi do niže knjigovodstvene vrednosti stalne imovine u odnosu na njenu poresku vrednost, što dovodi do pojave odloženih poreskih sredstava. U suprotnom, dolazi do pojave odloženih poreskih obaveza.

Značajni deo odloženog poreza na dobitak kompanije mogu iskazati i po osnovu dugoročnih rezervisanja (Trklja i saradnici, 2020). Brojne države dozvoljavaju umanjenje oporezive osnovice po osnovu rashoda za neka dugoročna rezervisanja (najčešće ona povezana sa primanjima zaposlenih) tek u momentu isplate, a ne u momentu knjiženja rezervisanja. To znači da kompanija u periodu knjiženja rezervisanja ima, pod ostalim nepromenjenim okolnostima, veći oporezivi dobitak u odnosu na knjigovodstveni dobitak pre oporezivanja. Stoga, kompanija iskazuje odložena poreska sredstva, jer će u periodu isplate doći do obrnutog procesa u kojem će oporezivi dobitak biti niži u odnosu na knjigovodstveni dobitak.

S obzirom na to da su finansijske institucije jedan od najznačajnijih investitora u hartije od vrednosti, vrednovanje finansijskih instrumenata po fer vrednosti može biti važan izvor odloženog poreza na dobitak. Povećanje fer vrednosti određene hartije od vrednosti, ukoliko se vrši kroz izveštaj o ostalom rezultatu, imaće za posledicu nerealizovane dobitke po osnovu hartija od vrednosti, ali i odložene poreske obaveze. Sličnu situaciju kompanije mogu imati po osnovu svođenja knjigovodstvene vrednosti stalne imovine na višu fer vrednost, kada dolazi do povećanja revalorizacionih rezervi i odloženih poreskih obaveza.

Mnoge kompanije priznaju odložena poreska sredstva kako bi stejkholderima prikazale drugačiji neto dobitak (Christensen i saradnici, 2008; Moniz i saradnici, 2022). Naime, odložena poreska sredstva se mogu priznati samo do iznosa u kojem je verovatno da će postojati oporezivi dobitci u budućnosti za njihovu realizaciju. Procena budućih oporezivih dobitaka je neretko područje za manipulaciju u cilju prezentovanja precenjene profitabilnosti kompanije (Christensen i saradnici, 2008).

1.2 Pregled nalaza u vezi sa odloženim porezom na dobitak

Više radova (Junqueira i Nakao, 2013; Gee i Mano, 2016) je ukazalo na značaj odloženog poreza na dobitak u cilju održavanja regulatornog kapitala, odnosno adekvatnosti kapitala banke, posebno u uslovima krize, premda Ladas i saradnici (2017) smatraju da banke ne treba u velikoj meri da koriste odložena poreska sredstva za rešavanje problema strukture kapitala i regulatornog kapitala.

Jedan od najskorijih primera jeste Italija, koja je tokom pandemije virusa Covid-19 omogućila bankama konvertovanje određenih kategorija odloženih poreskih sredstava u poreski kredit za umanjeње poreskog opterećenja, pri čemu su odložena poreska sredstva, takođe, posmatrana kao deo regulatornog kapitala (Nieddu i Scampuddu, 2020).

Neki autori (Badenhorst i Ferreira, 2016; Gorlitz i Dobler, 2021) ukazuju na to da kompanije mogu priznati manje odloženih poreskih sredstava u svojim finansijskim izveštajima u doba krize. Uslove krize obično karakteriše neizvesnost u pogledu ostvarenja budućih oporezivih dobitaka, koji su neophodni za realizaciju odloženih poreskih sredstava. Stoga je moguće da kompanije u uslovima krize opreznije percipiraju buduće finansijske performanse i, posledično, priznaju manje odloženih poreskih sredstava.

Chytis i saradnici (2013) su posmatrali grčke kompanije kotirane na Atinskoj berzi i primetili da se izvori odloženog poreza na dobitak značajno razlikuju u finansijskim institucijama i kompanijama iz realnog sektora. Nekretnine, postrojenja i oprema predstavljaju poziciju koja je glavni izvor odloženog poreza u kompanijama iz realnog sektora, dok su neiskorišćeni poreski gubici glavni izvor u finansijskim institucijama.

Sozibilir i saradnici (2015) su analizirali odloženi porez na dobitak u bankama kotiranim na Istanbulskoj berzi. Oni ukazuju na to da su rezervisanja za otpremnine glavni izvor odloženih poreskih sredstava, dok je vrednovanje hartija od vrednosti glavni izvor odloženih poreskih obaveza. Više radova (Chytis i saradnici, 2013; Vučković-Milutinović i Lukić, 2013; Sozibilir i saradnici, 2015) je ukazalo na to da banke pre iskazuju neto odložena poreska sredstva, nego neto odložene poreske obaveze.

Jansky (2020) ukazuje na potrebu obelodanjivanja više informacija od strane multinacionalnih bankarskih grupa. Kolar i Falež (2018) nalaze da banke u Sloveniji obelodanjuju manje informacija u odnosu na banke iz podjednako razvijenih država. Vržina i saradnici (2020) nalaze da postoji značajan prostor za povećanje kvaliteta obelodanjivanja o porezu na dobitak u kotiranim kompanijama u Hrvatskoj i Srbiji. Takođe, oni pokazuju da su dugoročna rezervisanja i revalorizacija stalne imovine glavni izvori odloženog poreza na dobitak u Hrvatskoj, dok je amortizacija stalne imovine glavni izvor odloženog poreza u Srbiji.

Vučković-Milutinović i Lukić (2013) pokazuju da su nekretnine, postrojenja i oprema i vrednovanje hartija od vrednosti glavni izvori odloženog poreza na dobitak u bankama u Srbiji. Vržina (2022) je pokazao da neto odložena poreska sredstva/obaveze ne predstavljaju materijalno značajnu poziciju bilansa stanja u prosečnom osiguravajućem društvu u Srbiji. Takođe, odloženi porez na dobitak ne ostvaruje značajan uticaj na profitabilnost osiguravajućih društava.

Imajući u vidu rezultate prethodnih istraživanja, postavljene su sledeće istraživačke hipoteze:

H1: Postoji statistički značajna razlika u materijalnosti neto odloženih poreskih sredstava/obaveza između filijala multinacionalnih bankarskih grupa u različitim državama.

H2: Filijale multinacionalnih bankarskih grupa su statistički značajno smanjile nivo odloženih poreskih sredstava nakon pandemije Covid-19.

H3: Postoji značajna razlika u izvorima odloženog poreza na dobitak između filijala multinacionalnih bankarskih grupa u različitim državama.

2. Metodologija istraživanja

Hrvatska, Srbija i Slovenija imaju relativno sličnu regulativu poreza na dobitak, premda svaka država ima zaseban zakon kojim se propisuje oporezivanje dobitka kompanija. Hrvatska i Slovenija su punopravne članice, dok je Srbija kandidat za članstvo u Evropskoj uniji, pa je poreska regulativa ovih država uskladen sa smernicama Evropske unije. Sve tri države nameću porez na dobitak isključivo na republičkom nivou, što znači da nema regionalnih ili lokalnih poreza na dobitak.

Posmatrane države nameću umerene propisane stope poreza na dobitak. Tokom uzorkovanog perioda, stope su bile konstantne i iznosile su 18% u Hrvatskoj, 15% u Srbiji i 19% u Sloveniji. Ove države dominantno primenjuju proporcionalni metod oporezivanja, premda je u Hrvatskoj uvedena umanjena propisana stopa za preduzeća sa relativno malim iznosom godišnjih prihoda.

S druge strane, svaka država ima zasebna pravila za utvrđivanje oporezive osnovice, kao i zasebne poreske podsticaje. Takođe, Hrvatska i Srbija omogućavaju prenošenje neiskorišćenih poreskih gubitaka u periodu od pet godina, dok je u Sloveniji taj period neograničen, premda se pravila za korišćenje poreskih gubitaka razlikuju između država. Nijedna posmatrana država ne omogućava korišćenje poreskih gubitaka za povraćaj poreza plaćenog u prethodnim godinama.

U procesu uzorkovanja, prvo je pristupljeno spiskovima banaka sa dozvolom za rad, na zvaničnim internet prezentacijama centralnih banaka Hrvatske (www.hnb.hr), Srbije (www.nbs.rs) i Slovenije (www.bsi.si). Zatim je analizirana vlasnička struktura banaka u cilju pronalaženja filijala multinacionalnih bankarskih grupa. Zanimarene su bankarske grupe čiji se matični entitet nalazi u nekoj od tri uzorkovane države, kako bi uzorak obuhvatio samo filijale, a ne i matične entitete.

Uzorkovane su četiri bankarske grupe koje posluju u sve tri posmatrane države. Na taj način je uzorkovano 12 banaka. Korišćeni su podaci za period od 2018. do 2021. godine, usled ograničene dostupnosti podataka, što daje inicijalni uzorak od 48 opservacija. Podaci o bankama su preuzeti sa zvaničnih internet prezentacija banaka i to iz pojedinačnih finansijskih izveštaja, kako bi se ublažio uticaj nebankarskih i nerezidentnih povezanih kompanija. Sve banke su primenjivale MRS 12, a svi korišćeni finansijski izveštaji su revidirani, što povećava pouzdanost podataka.

Četiri bankarske grupe su inicijalno osnovane u razvijenim zapadnoevropskim državama i imaju višedecenijsko iskustvo u bankarskom sektoru. Bankarska grupa 1 i bankarska grupa 3 su osnovane u Italiji, dok su bankarska grupa 2 i bankarska grupa 4 osnovane u Austriji. Takođe, sve bankarske grupe posluju u značajnom broju država izvan uzorkovanih država.

S druge strane, u literaturi je razvijen veći broj načina merenja materijalnosti. Tako se obično koristi određeni procenat (na primer 0,5% ili 1%) od neke pozicije iz finansijskih izveštaja (na primer ukupna imovina, sopstveni kapital, prihodi od prodaje). Po uzoru na ranije istraživanje (Eilifsen i Messier, 2015), u ovom radu je smatrano da su neto odložena poreska sredstva/obaveze materijalni ukoliko je njihovo učešće u ukupnoj imovini bar 1%. Stoga je materijalnost neto odloženog poreza na dobitak merena kao odnos apsolutne vrednosti neto odloženih poreskih sredstava/obaveza i ukupne imovine. Prethodno se može zapisati i matematički:

$$\begin{aligned} & \text{neto odložena poreska sredstva/obaveze} \\ = & \text{odložena poreska sredstva} - \text{odložene poreske obaveze} \end{aligned} \quad (1)$$

$$\text{materijalnost} = \frac{|\text{neto odložena poreska sredstva/obaveze}|}{\text{ukupna imovina}} \quad (2)$$

Prva istraživačka hipoteza je testirana poređenjem materijalnosti neto odloženih poreskih sredstava/obaveza između tri države. S tim u vezi, korišćeni su testovi za testiranje značajnosti razlike za više grupa – parametarska Jednofaktorska analiza varijanse različitih grupa ili neparametarski Kruskal-Volis test (u zavisnosti od normalnosti distribucije materijalnosti). Druga istraživačka hipoteza je testirana poređenjem materijalnosti neto odloženih poreskih sredstava/obaveza pre (2018. i 2019. godina) i posle (2020. i 2021. godina) početka pandemije Covid-19. S tim u vezi, korišćeni su testovi za testiranje značajnosti razlike između dve nezavisne grupe – parametarski t-test za nezavisne uzorke ili neparametarski Man-Vitni test (u zavisnosti od normalnosti distribucije materijalnosti). Treća istraživačka hipoteza je testirana poređenjem najvažnijih izvora odloženog poreza na dobitak između tri države. Izvori odloženog poreza ne mogu biti kvantificirani, pa je stoga njihova analiza primarno kvalitativnog karaktera.

3. Rezultati istraživanja

3.1 Materijalnost odloženog poreza na dobitak

U Tabeli 1 je prikazana deskriptivna statistika za materijalnost neto odloženih poreskih sredstava/obaveza u uzorkovanim bankarskim grupama. Generalno, 37 opservacija iskazalo je neto odložena poreska sredstva, dok je samo 11 opservacija iskazalo neto odložene poreske obaveze. Osam banaka je tokom čitavog uzorkovanog perioda iskazalo neto odložena poreska sredstva, dve banke su konstantno iskazivale neto odložene poreske obaveze, dok su preostale dve banke (obe u Srbiji) započele uzorkovani period sa neto odloženim poreskim sredstvima, potom iskazale neto odložene poreske obaveze, da bi uzorkovani period završile sa neto odloženim poreskim sredstvima.

Tabela 1: Deskriptivna statistika za materijalnost neto odloženih poreskih sredstava/obaveza

	Ukupno	Hrvatska	Srbija	Slovenija
Aritmetička sredina	0,174%	0,218%	0,065%	0,240%
Medijana	0,083%	0,177%	0,059%	0,079%
Minimum	0,003%	0,041%	0,003%	0,007%
Maksimum	0,890%	0,553%	0,125%	0,890%
Standardna devijacija	0,217%	0,152%	0,035%	0,323%
Opservacija	48	16	16	16

Primetno je da je materijalnost neto odloženih poreskih sredstava/obaveza u uzorkovanim bankarskim grupama značajno niža u odnosu na uobičajeni prag materijalnosti od 1%. Zapravo, nijedna banka nije iskazala neto odložena poreska sredstva/obaveze u iznosu većem od jednog procenta ukupne imovine. Dodatno, samo pet opservacija (četiri u Sloveniji i jedna u Hrvatskoj) je imalo materijalnost veću od 0,5%. Čak 27 opservacija je imalo materijalnost neto odloženih poreskih sredstava/obaveza ispod 0,1%.

Interesantno je primetiti da 10 opservacija nije iskazalo u bilansu stanja odložena poreska sredstva i odložene poreske obaveze u neto iznosu. Takođe, za 30 opservacija je, na osnovu obelodanjivanja u napomenama uz finansijske izveštaje, moguće utvrditi zasebne iznose odloženih poreskih sredstava i odloženih poreskih obaveza, dok je za preostalih 18 opservacija poznat samo neto iznos.

Iako pripadaju renomiranim multinacionalnim bankarskim grupama, neke banke su pravile značajne greške u pogledu prezentovanja podataka o porezu na dobitak. To se posebno odnosi na banke u Hrvatskoj. Jedna banka iz Hrvatske je u 2019. godini, u bilansu stanja, tekuće poreske obaveze predstavila kao odložene poreske obaveze. Tek je uvidom u napomene uz finansijske izveštaje moguće primetiti da je zapravo reč o tekućim poreskim obavezama. Takođe, druga banka iz Hrvatske je u svakoj uzorkovanoj godini na jednom mestu u napomenama uz finansijske izveštaje navela propisanu stopu poreza na dobitak od 20%, a na drugom mestu tačnu propisanu stopu od 18%.

Na Slici 1 je prikazana materijalnost neto odloženih poreskih sredstava/obaveza u uzorkovanim bankarskim grupama. Primetno je da u dve bankarske grupe materijalnost ne prelazi 0,2% ni u jednoj državi, ni u jednoj godini. Generalno, dve bankarske grupe iskazuju najveću materijalnost neto odloženih poreskih sredstava/obaveza u Sloveniji, dok preostale dve grupe iskazuju najveću materijalnost u Hrvatskoj. Nijedna grupa ne iskazuje najveću materijalnost neto odloženog poreza u Srbiji.

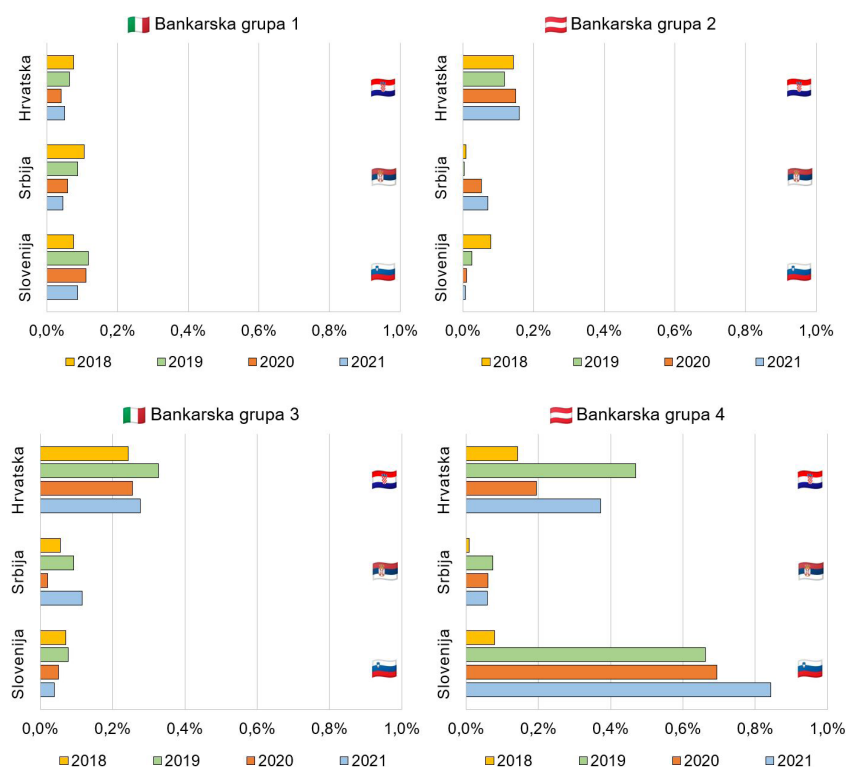
Pre sprovođenja glavnih statističkih testova, ispitana je normalnost distribucije materijalnosti neto odloženih poreskih sredstava/obaveza. S tim u vezi, sprovedeni su Šapiro-Vilk i Kolmogorov-Smirnov testovi, koji su pokazali da materijalnost neto odloženih poreskih sredstava/obaveza ne sledi normalnu distribuciju, pri čemu su rezultati značajni na nivou od 1%. Rezultati ovih testova su predstavljani u Tabeli 2. Stoga je korišćen neparametarski Kruskal-Volts test umesto parametarske Jednofaktorske analize varijanse različitih grupa.

Tabela 2: Ispitivanje normalnosti distribucije za materijalnost neto odloženih poreskih sredstava/obaveza

	Šapiro-Vilk test			Kolmogorov-Smirnov test		
	Statistika	Stepeni slobode	p-vrednost	Statistika	Stepeni slobode	p-vrednost
Materijalnost	0,277	48	***0,000	0,690	48	***0,000

Napomena: rezultati su statistički značajni na nivou od 10% (*), 5% (**) i 1% (***).

Slika 1: Materijalnost neto odloženih poreskih sredstava/obaveza u uzorkovanim bankarskim grupama



U Tabeli 3 su prikazani rezultati Kruskal-Volisa testa, koji su pokazali da između posmatranih država postoji statistički značajna razlika u materijalnosti neto odloženih poreskih sredstava/obaveza, pri čemu je razlika značajna na nivou od 1%. *Stoga se prva istraživačka hipoteza ne može odbaciti.* Banke u Sloveniji imaju najvišu aritmetičku sredinu materijalnosti, dok banke u Hrvatskoj imaju najvišu medijanu materijalnosti. Banke u Srbiji imaju najmanju aritmetičku sredinu i medijanu materijalnosti neto odloženih poreskih sredstava/obaveza.

Tabela 3: Rezultati Kruskal-Volisa testa

Panel A. Analiza ranga		
Varijabla	Opservacija	Prosečni rang
Materijalnost (Hrvatska)	16	32,28
Materijalnost (Srbija)	16	16,91
Materijalnost (Slovenija)	16	24,31
Panel B. Analiza testa		
Hi-kvadrat statistika		9,654
Stepeni slobode		2
p-vrednost		***0,008

Napomena: rezultati su statistički značajni na nivou od 10% (*), 5% (**) i 1% (***).

Dodatno, sprovedena je i parametarska analiza, korišćenjem Jednofaktorskog ANOVA testa za različite grupe. I ovaj test je pokazao da postoji statistički značajna razlika u materijalnosti neto odloženih poreskih sredstava/obaveza između bankarskih grupa u tri države, s tim da su, prema ovom testu, rezultati značajni na nivou od 5% (p-vrednost = 0,042). Ipak, iz razloga obimnosti, rezultati ovog testa nisu tabelarno prikazani.

Sprovedeni su i dodatni neparametarski Man-Vitni testovi, kako bi se utvrdilo između kojih država postoji statistički značajna razlika u materijalnosti neto odloženih poreskih sredstava/obaveza. Rezultati ovih testova su prikazani u Tabeli 4. Rezultati ukazuju na to da jedino između banaka u Hrvatskoj i Srbiji postoji statistički značajna razlika, značajna na nivou od 1%. Ovakvi rezultati nisu iznenađujući, s obzirom na to da se neparametarski testovi oslanjaju na medijanu, pre nego na aritmetičku sredinu, a da banke u Hrvatskoj (Srbiji) imaju najveću (najmanju) medijanu materijalnosti neto odloženih poreskih sredstava/obaveza.

Tabela 4: Rezultati Man-Vitni testova

Varijabla 1	Varijabla 2	Man-Vitni U	Z-statistika	p-vrednost
Materijalnost (Hrvatska)	Materijalnost (Srbija)	38,000	-3,392	***0,001
Materijalnost (Hrvatska)	Materijalnost (Slovenija)	93,500	-1,300	0,193
Materijalnost (Srbija)	Materijalnost (Slovenija)	96,500	-1,187	0,235

Napomena: rezultati su statistički značajni na nivou od 10% (*), 5% (**) i 1% (***).

Iako primenjuju iste računovodstvene standarde (posebno MRS 12), obavljaju gotovo identične poslovne aktivnosti i, vrlo verovatno, primenjuju iste računovodstvene politike dobijene od strane matične kompanije, filijale multinacionalnih bankarskih grupa imaju različitu materijalnost neto odloženih poreskih sredstava/obaveza u različitim državama. Glavni razlog za ovakav nalaz se može naći u značajnim razlikama u nacionalnim sistemima poreza na dobitak.

Prvo, posmatrane države primenjuju različite propisane stope poreza na dobitak. Imajući u vidu da se odložena poreska sredstva/obaveze obično dobijaju multiplikovanjem privremene razlike i propisane stope, jasno je da propisana stopa može značajno uticati na iznos odloženog poreza. Drugo, posmatrane države propisuju različita pravila za utvrđivanje oporezive osnovice, odnosno različita pravila za utvrđivanje prihoda i rashoda za poreske svrhe. Ove razlike mogu biti posebno značajne u pogledu vremena i iznosa u kojem se priznaju određene kategorije rashoda. Treće, posmatrane države pružaju kompanijama različite poreske podsticaje, različite vrste i ročnosti, što može imati značajne reperkusije na odloženi porez na dobitak. Četvrto, iako sve posmatrane države omogućavaju prenošenje neiskorišćenih poreskih gubitaka, rok važenja poreskih gubitaka je različit.

3.2 Uticaj pandemije Covid-19 na odloženi porez na dobitak

U Tabeli 5 su prikazane prosečne vrednosti materijalnosti neto odloženih poreskih sredstava/obaveza, dok su u Tabeli 6 prikazani rezultati neparametarskog Man-Vitni testa u kojem su poredene materijalnosti pre i posle pandemije Covid-19. U skladu sa teorijskim pretpostavkama, može se očekivati da se materijalnost neto odloženih poreskih sredstava smanji ili da se materijalnost neto odloženih poreskih obaveza uveća, usled reduciranog priznavanja odloženih poreskih sredstava.

Tabela 5: Poređenje materijalnosti neto odloženih poreskih sredstava pre i posle pandemije Covid-19

	Period	Ukupno	Hrvatska	Srbija	Slovenija
Aritmetička sredina	2018-2019.	0,153%	0,249%	0,045%	0,164%
	2020-2021.	0,134%	0,187%	0,055%	0,159%
Medijana	2018-2019.	0,077%	0,193%	0,064%	-0,023%
	2020-2021.	0,059%	0,177%	0,059%	-0,015%

Napomena: negativna vrednost označava neto odložene poreske obaveze.

Tabela 6: Rezultati Man-Vitni testova

Država	Man-Vitni U	Z-statistika	p-vrednost
Ukupno	273,000	-0,309	0,757
Hrvatska	28,000	-0,420	0,674
Srbija	30,000	-0,210	0,834
Slovenija	32,000	0,000	1,000

Napomena: rezultati su statistički značajni na nivou od 10% (*), 5% (**) i 1% (***).

Prosečne vrednosti iz Tabele 5 pokazuju da se materijalnost neto odloženih poreskih sredstava/obaveza smanjila nakon pandemije Covid-19 i to posebno u Hrvatskoj. Za preostale dve države rezultati nisu dovoljno jasni. U Srbiji je jedino medijalna vrednost materijalnosti neto odloženih poreskih sredstava/obaveza smanjena, dok je u Sloveniji jedino aritmetička sredina smanjena. Ipak, rezultati Man-Vitni testova su pokazali da te promene nisu statistički značajne, pa se *druga istraživačka hipoteza može odbaciti*.

Rezultati istraživanja o uticaju pandemije Covid-19 na priznavanje odloženih poreskih sredstava su robustni na značajnu promenu istraživačkog uzorka. Tako, uzorak može činiti samo 30 opservacija koje su jasno obelodanile zasebne iznose (a ne samo neto iznos) odloženih poreskih sredstava i obaveza, i može se koristiti samo materijalnost odloženih poreskih sredstava. Rezultati Man-Vitni testa i u ovakvom slučaju potvrđuju da je, generalno, došlo do smanjenja priznatih odloženih poreskih sredstava, ali da to smanjenje nije statistički značajno.

Objašnjenje za odsustvo statistički značajnog uticaja pandemije Covid-19 na odložena poreska sredstva uzorkovanih banaka se može pronaći u nekoliko činjenica. Uzorkovane banke i multinacionalne bankarske grupe kojima pripadaju, mahom predstavljaju sistemski značajne i izuzetno stabilne banke, sa značajnim rezervama likvidnosti. Takođe, ove banke beleže pozitivne finansijske rezultate (poslovni dobitak, dobitak pre oporezivanja, neto dobitak) u skoro svakoj godini. Uzorkovane banke pripadaju multinacionalnim bankarskim grupama sa sedištem u razvijenim zapadnoevropskim državama, sa relativno razvijenim finansijskim sistemom. Konačno, filijale multinacionalnih banaka imaju skorija iskustva sa neizvesnošću u pogledu ostvarenja budućih oporezivih dobitaka nakon globalne ekonomske krize iz 2008. godine.

3.3 Izvori odloženog poreza na dobitak

Tabela 7 pokazuje najčešće izvore odloženog poreza na dobitak u uzorkovanim bankama. Generalno, primetno je da su finansijska imovina i dugoročna rezervisanja najčešći izvori odloženog poreza. Ipak, glavni izvor odloženog poreza se razlikuje između država. Takođe, prisutna je značajna razlika u ostalim izvorima odloženog poreza među državama. Stoga se *treća istraživačka hipoteza ne može odbaciti*. Ovakav nalaz nije iznenađujući, imajući u vidu različitu regulativu poreza na dobitak u uzorkovanim državama i specifična zakonska (na primer Zakon o konverziji kredita) i profesionalna rešenja (na primer prva primena MSFI 9 – Finansijski instrumenti).

Tabela 7: Najčešći izvori odloženog poreza na dobitak u uzorkovanim bankama

R.b.	Izvor odloženog poreza	Broj opservacija
<i>Panel A. Hrvatska</i>		
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Odloženi porez na dobitak po osnovu finansijske imovine u uzorkovanim bankama nastaje po različitim osnovama. S tim u vezi, primarno se misli na hartije od vrednosti koje se vrednuju po fer vrednosti, pri čemu se one mogu držati do dospeća ili mogu biti raspoložive za prodaju. Efekti svodenja na fer vrednost se mogu evidentirati preko bilansa uspeha ili direktno preko računa sopstvenog kapitala. Takođe, u manjem broju banaka se odloženi porez na dobitak javlja po osnovu ugovorenih finansijskih derivata.

Odloženi porez na dobitak po osnovu dugoročnih rezervisanja, takođe, nastaje po različitim osnovama u uzorkovanim bankama. Primarno je reč o rezervisanjima za bonuse, otpremnine i ostala primanja zaposlenih, za troškove reorganizacije, za sudske sporove ili za očekivane gubitke na dužničkim hartijama od vrednosti.

Glavni izvor odloženog poreza na dobitak u uzorkovanim bankama u Hrvatskoj je finansijska imovina, pri čemu je svaka banka u svakoj godini iskazala odloženi porez po ovom osnovu. Nakon toga slede dugoročna rezervisanja i odložene naknade. Odložene naknade se, pri tome, primarno odnose na naknade koje su banke naplaćivale za odobrenje kredita.

Glavni izvor odloženog poreza na dobitak u uzorkovanim bankama u Srbiji jesu efekti prve primene MSFI 9 i ovaj izvor je svaka banaka u svakoj godini iskazala. Nakon toga slede finansijska imovina i dugoročna rezervisanja. Specifičan izvor predstavlja Zakon o konverziji stambenih kredita indeksiranih u švajcarskim francima, s obzirom na to da banke imaju pravo na poreski kredit u skladu sa ovim zakonom. S druge strane, glavni izvori odloženog poreza u Sloveniji jesu dugoročna rezervisanja i finansijska imovina, nakon čega sledi stalna imovina.

Moguće je primetiti da neki uobičajeni izvori odloženog poreza na dobitak nemaju značajniju ulogu u bankarskom sektoru. Tako, relativno mali broj opservacija iskazuje odložena poreska sredstva po osnovu neiskorišćenih poreskih gubitaka. Dodatno, poreski gubici nisu ni među pet najčešćih izvora odloženog poreza u bankama u Srbiji.

Za razliku od kompanija iz realnog sektora, u kojima je stalna imovina obično glavni izvor odloženog poreza, njen značaj u bankama je znatno manji. Iako odloženi porez po osnovu stalne imovine nastaje po različitim osnovama (amortizacija, revalorizacija, obezvređenje stalne imovine), njeno učešće u ukupnoj imovini banaka je obično relativno malo, što objašnjava manji značaj stalne imovine kao izvora odloženog poreza.

Takođe, odloženi porez na dobitak po osnovu podsticaja kod investiranja u stalnu imovinu ima mali značaj. Usled specifične prirode delatnosti, banke retko dostignu iznos ovakvih investicija dovoljan za ostvarenje prava na poreski podsticaj. Dodatno, značajan deo stalne imovine banke uzimaju u operativni ili finansijski lizing.

Zaključak

Istraživanje u ovom radu obuhvatilo je 12 banaka iz Hrvatske, Srbije i Slovenije, koje su deo tri multinacionalne bankarske grupe sa sedištem u zapadnoevropskim državama. S tim u vezi, ispitano je u kojoj meri se prakse u vezi sa odloženim porezom na dobitak razlikuju u bankama koje pripadaju istoj bankarskoj grupi, ali posluju u različitim državama.

Rezultati istraživanja su pokazali da neto odložena poreska sredstva/obaveze nemaju materijalno značajno učešće u ukupnoj imovini uzorkovanih banaka. Nijedna banka nema učešće neto odloženih poreskih sredstava/obaveza u ukupnoj imovini veće od 1%. Ipak, ovakav nalaz treba pripisati i činjenici da se odložena poreska sredstva i obaveze, saglasno MRS 12, prebijaju i u bilansu stanja prikazuju u neto iznosu.

Pokazano je da između banaka u različitim državama postoji statistički značajna razlika u materijalnosti neto odloženih poreskih sredstava/obaveza. Pri tome je značajno veći broj banaka koje iskazuju neto odložena poreska sredstva nego neto odložene poreske obaveze. Takođe, pokazano je da uzorkovane banke jesu smanjile stepen u kojem priznaju odložena poreska sredstva nakon pandemije Covid-19, usled povećane neizvesnosti u pogledu ostvarenja budućih oporezivih dobitaka. Ipak, pomenuto smanjenje priznatih odloženih poreskih sredstava nije statistički značajno.

Glavni izvori odloženog poreza na dobitak se, takođe, značajno razlikuju između banaka u različitim državama. Generalno, glavni izvor odloženog poreza predstavljaju finansijski instrumenti (primarno vrednovanje hartija od vrednosti). Ipak, iako koriste iste računovodstvene standarde i računovodstvene politike na nivou bankarske grupe, banke u različitim državama iskazuju različite izvore odloženog poreza usled specifičnosti nacionalnih sistema poreza na dobitak.

Rezultati istraživanja mogu biti od koristi brojnim interesnim grupama. Prvo, menadžeri multinacionalnih banaka mogu imati posebne koristi od nalaza o glavnim izvorima odloženog poreza na dobitak u različitim državama. Oni moraju biti svesni različitosti nacionalnih sistema poreza na dobitak, te ne smeju određene izvore odloženog poreza univerzalno primenjivati u svim državama u kojima posluju. Drugo, revizori finansijskih izveštaja mogu imati koristi od informacija o materijalnosti odloženog poreza na dobitak prilikom planiranja revizorskih procedura. Treće, rezultati istraživanja mogu koristiti donosiocima računovodstvenih standarda, koji moraju biti svesni razlika između računovodstvenih i poreskih propisa za utvrđivanje dobitka u različitim državama. Uprkos naporima ka harmonizaciji računovodstvenih standarda na globalnom nivou, nacionalni sistemi poreza na dobitak se i dalje značajno razlikuju, pa je gep između računovodstvenih i poreskih propisa različit između različitih država.

Prezentovane rezultate treba posmatrati u svetlu određenih ograničenja. Istraživanje pokriva ograničen vremenski period, samo tri bankarske grupe, samo tri države i koristi primarno neparametarske testove. Moguće je da bi se rezultati istraživanja razlikovali ukoliko bi se vremenski period, broj multinacionalnih banaka ili broj država promenili, odnosno ukoliko bi bila primenjena drugačija metodologija istraživanja.

Buduća istraživanja trebaju težiti uključivanju većeg broja multinacionalnih bankarskih grupa i većeg broja država u istraživanje u cilju kompariranja rezultata istraživanja. Takođe, interesantno bi bilo uključiti i filijale multinacionalnih kompanija iz realnog sektora, u cilju kompariranja rezultata.

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DEFERRED INCOME TAX IN MULTINATIONAL BANKS: A CASE OF CROATIA, SERBIA AND SLOVENIA

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Summary: Deferred income tax is an important position in financial statements of banks. It is primarily a result of temporary differences between book and tax values of assets and liabilities. Subsidiaries of multinational banking groups that operate in Croatia, Serbia and Slovenia have to report on deferred tax in accordance with International Accounting Standard 12 – Income Taxes. This paper examined the practices related to deferred income tax in such banks. In this regard, there four banking groups were sampled (two Austrian and two Italian) that operate in three observed countries. Research results showed that net deferred tax assets/liabilities do not usually have materially significant share in total assets of banks, though there is statistically significant difference in the materiality between countries. In general, banks recognize deferred tax assets less after the Covid-19 pandemic, due to the growing uncertainty over achieving the future taxable income, though such reduction is not statistically significant. In addition, the sources of deferred income tax significantly vary between countries, though the valuation of financial assets is, in general, the most common source of deferred tax.

Keywords: income tax, deferred tax, materiality, banks, multinational banks.

JEL classification: G21, H25

Introduction

Deregulation and internationalization of the banking sector marked the beginning of the XXI century in transition and post-transition countries (Zaklan, 2014). Vast majority of domestic banks are privatized by the multinational banking groups, primarily from the developed Western European countries (Mešić, 2018). Subsidiaries of the multinational banks have soon become significantly more profitable and efficient than the domestic-owned banks (Fries & Taci, 2005).

After the arrival of the foreign capital and beginning of the implementation of International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS), significant attention is paid to the deferred income tax in the banking sector of transition and post-transition countries. Despite being implemented in the Western European accounting practice for many decades, deferred income tax is still the subject of many important academic discussions (Brouwer & Naarding, 2018). In this regard, Flagmeier (2022) argues that deferred income tax, presented in the financial statements, contains important information for report users and decision makers. On the other hand, there is still a significant number of arguments, both for and against the recognition of deferred income tax in the financial statements of banks (Guia & Dantas, 2020).

The subject of the paper are subsidiaries of multinational banking groups in Croatia, Serbia and Slovenia. Besides geographical links, these three countries are chosen as they were part of the former Socialist Federal Republic of Yugoslavia, have relatively comparable level of economic development and bank-centric financial system. Income tax (current and deferred) in Croatia, Serbia and Slovenia was the subject of some prior research (Gabršek, 2017).

The paper has three main objectives. The first objective of the paper is to examine the materiality of deferred income tax in studied banks and to compare it in order to examine possible differences between countries. The second objective of the paper is to consider the impact of the Covid-19 pandemic on deferred income tax in sampled banks, while the third objective of the paper is to examine the most common sources of deferred income tax in studied banks.

Deferred income tax in multinational banking groups is relatively less studied globally, as significantly more attention is paid to the current income tax, in particular to the profit shifting of the multinational banks to the countries with preferential tax system with the aim of reducing the current income tax expense (Merz & Oversesch, 2016; Fatica & Gregory, 2020; Reiter et al., 2020). In addition, the papers on deferred income tax in the banking sectors of transitioning and post-transition countries are relatively scarce. What makes the paper original may be found in the fact that this is, to the author's knowledge, the first empirical research on the deferred tax to capture banks from Croatia, Serbia and Slovenia. The author believes that research results may be of interest to many interest groups, in particular to the managers of the multinational banking groups, auditors of financial statements and the governing bodies of the accounting standards.

Besides the introduction and conclusion, the paper consists of three parts. The first part of the paper features a literature review and the research hypotheses. The second part of the paper shows the research methodology, while the research results are presented in the third part of the paper.

1. Literature Review and Research Hypotheses Development

1.1 The Concept of Deferred Income Tax

Deferred income tax is primarily the result of temporary differences between book and tax values of the assets and liabilities. In modern practice, in line with the IAS 12 – Income Taxes, the liability method is dominantly used (Zarova, 2010), prescribing that a company recognizes deferred tax assets if the tax value of an asset is bigger than its book value and if the tax value of a liability is smaller than its book value. In cases where the opposite is true, the company recognizes deferred tax liabilities.

In line with IAS 12, a company usually nets the amounts of deferred tax assets and deferred tax liabilities and reports net deferred tax assets/liabilities in the balance sheet. Although they are long-term balance sheet positions, net deferred tax assets/liabilities should not be discounted, though such provisions of the accounting standard are a subject of important academic discussion (Brouwer & Naarding, 2018).

In general, the literature lists depreciation of fixed assets as the most common source of the deferred income tax (Alexander & Nobes, 2007, 245), as the rules for the calculation of the book and tax depreciation are usually different in most countries. Bigger amount of book depreciation than the tax depreciation, *ceteris paribus*, leads to the smaller book value of fixed assets than its tax value, furtherly leading to the recognized deferred tax assets. On the contrary, there are recognized deferred tax liabilities.

Companies may recognize the important portion of the deferred income tax due to the long-run provisions (Trklja et al., 2020). Many countries allow the reduction of the taxable base for the expenses for long-run provisions (usually those related to the employee benefits) only when the expenses are paid, not when they are recorded in books. It implies that a company has, *ceteris paribus*, bigger taxable income than the pre-tax book income in the period of book recording. Therefore, a company recognizes deferred tax assets, as the reverse process would occur in the period of expenses payment as taxable income would be smaller than the book income.

Since financial institutions are some of the most important investors in securities, the valuation of financial assets at the fair value may be the important source of deferred income tax. An increase in fair value of certain securities (if recognized in the statement of other comprehensive income) results in unrealized gains from the securities, but also in the deferred tax liabilities. Nearly similar situation may occur to the companies that adjust the book value of fixed assets to the bigger fair value, which results in an increase of revaluation reserves and deferred tax liabilities.

Many companies recognize deferred tax assets in order to present different net income to the stakeholders (Christensen et al., 2008; Moniz et al., 2022), as deferred tax assets should be recognized only in the amount in which is probable that future taxable income for its realization will be achieved. The assessment of the future taxable income is often an area for manipulation with the aim to present the overestimated company profitability (Christensen et al., 2008).

1.2 Review of the Findings on the Deferred Income Tax

Many papers (Junqueira & Nakao, 2013; Gee & Mano, 2016) pointed out at the importance of deferred income tax for maintenance of the regulatory capital and capital adequacy of banks, particularly in the crisis times, though Ladas et al. (2017) argue that banks should not largely use deferred tax assets to overcome the problems of capital structure and regulatory capital.

One of the most recent examples is Italy that enabled banks to convert certain categories of deferred tax assets in the tax credit to reduce their tax burden during the Covid-19 virus pandemic, with the deferred tax assets also considered as a part of the regulatory capital (Nieddu & Scampuddu, 2020).

Some authors (Badenhorst & Ferreira, 2016; Gorlitz & Dobler, 2021) point out that companies may recognize less deferred tax assets in their financial statements in the crisis times. Crisis circumstances usually lead to the uncertainty over achieving the future taxable income that is needed for the realization of the deferred tax assets. Therefore, it is possible that companies more carefully perceive future financial performance in the crisis times and, as a result, recognize less deferred tax assets.

Chytis et al. (2013) studied Greek companies quoted on the Athens stock exchange and noted that sources of deferred income tax are considerably different in financial institutions and companies from the real sector. Property, plant and equipment are the position that appears to be the main source of deferred income tax in the real sector, while the carryforward of the unused tax losses is the main source in financial institutions.

Sozbilir et al. (2015) analyzed deferred income tax in banks quoted on the Istanbul stock exchange. They point out that long-term provisions for severance payments are the main source of deferred tax assets, while the valuation of financial assets is the main source of deferred tax liabilities. Many papers (Chytis et al., 2013; Vučković-Milutinović & Lukić, 2013; Sozbilir et al., 2015) pointed out that banks recognize net deferred tax assets rather than the net deferred tax liabilities.

Jansky (2020) points out at the need to disclose more information by the multinational banking groups. Kolar & Falež (2018) find that banks in Slovenia disclose less information than the banks from countries with comparable development. Vržina et al. (2020) find that there is a significant room for the improvement of the quality of the disclosures on income tax of companies quoted in Croatia and Serbia. In addition, they show that long-term provisions and revaluation of fixed assets are the most important sources of deferred income tax in Croatia, while depreciation of fixed assets is the most important source of deferred tax in Serbia.

Vučković-Milutinović & Lukić (2013) show that property, plant and equipment and the valuation of securities are the main sources of deferred income tax in Serbian banks. Vržina (2022) showed that net deferred tax assets/liabilities are not materially significant balance sheet position in average insurance company in Serbia. In addition, deferred income tax does not appear to have significant impact on the profitability of insurance companies.

Considering results of the prior research, there are developed following research hypotheses:

H1: There is statistically significant difference in materiality of net deferred tax assets/liabilities between the subsidiaries of the multinational banking groups in different countries.

H2: Subsidiaries of the multinational banking groups statistically significantly reduced the level of deferred tax assets after the Covid-19 pandemic.

H3: There is significant difference in sources of deferred income tax between subsidiaries of the multinational banking groups in different countries.

2. Research Methodology

Croatia, Serbia and Slovenia have relatively similar regulation on income tax, though each country has the separate law to prescribe the taxation of the company income. Croatia and Slovenia are full members, while Serbia is recognized as a candidate for the European Union membership, so the tax regulation of these countries is harmonized with the European Union directions. All three countries impose income tax only at the republic level, implying that regional and local income taxes are not imposed.

Studied countries impose moderate statutory income tax rates. During the sampling period, these rates were constant at the 18% in Croatia, 15% in Serbia and 19% in Slovenia. These countries dominantly implement flat taxation method, though Croatia introduced the reduced statutory rate for companies with a relatively low amount of annual revenue.

On the other hand, each country has separate rules for the taxable base calculation and separate tax incentives. In addition, Croatia and Serbia enable carryforward of the unused tax losses in the five-year period, while such a period in Slovenia is unlimited, though the rules for the use of tax losses differ among countries. No studied country enables carryback of the tax losses to refund the tax paid in the previous years.

Regarding the sampling process, firstly the list of banks with a working permit was accessed, on the websites of the central banks of Croatia (www.hnb.hr), Serbia (www.nbs.rs) and Slovenia (www.bsi.si). Then, the ownership structure of the banks was analyzed in order to identify the subsidiaries of the multinational banking groups. Banking groups whose parent entity is headquartered in any of three studied countries were not considered, in order to sample only subsidiaries, not parent entities.

Four banking groups that operate in all three studied countries were sampled. In this way, 12 banks are sampled. The data from 2018 to 2021 was used, due to the limited data availability, implying the initial sample size of 48 observations. Data on the banks was retrieved from the official websites of banks, from the individual financial statements in order to mitigate the impact of non-banking and non-resident related-party entities. Each bank followed the IAS 12 and each financial report was audited, which increases the data reliability.

$$\text{net deferred tax assets/liabilities} = \text{deferred tax assets} - \text{deferred tax liabilities} \quad (1)$$

$$\text{materiality} = \frac{|\text{net deferred tax assets/liabilities}|}{\text{total assets}} \quad (2)$$

The first research hypothesis was tested by comparing the materiality of net deferred tax assets/liabilities between countries. In this regard, tests were used to examine the significance of the difference between more groups – parametric One-way between-groups ANOVA test or nonparametric Kruskal-Wallis test (depending on the normality of materiality distribution). The second research hypothesis was tested by comparing the materiality of net deferred tax assets/liabilities before (years 2018 and 2019) and after (years 2020 and 2021) the Covid-19 pandemic. In this regard, tests were used to examine the significance of the difference between two groups – parametric t-test for independent samples or nonparametric Mann-Whitney test (depending on the normality of materiality distribution). The third research hypothesis was tested by comparing the most important sources of deferred income tax between three countries. Sources of deferred tax cannot be quantified, so such analysis is primarily qualitative.

3. Research Results

3.1 Materiality of Deferred Income Tax

Table 1 features the descriptive statistics for the materiality of net deferred tax assets/liabilities in sampled banking groups. In general, 37 observations reported net deferred tax assets, while only 11 observations reported net deferred tax liabilities. Eight banks reported net deferred tax assets during the whole sampling period, two banks constantly reported net deferred tax liabilities, while other two banks (both in Serbia) began the reporting period with net deferred tax assets, then reported net deferred tax liabilities and ended the sampling period with net deferred tax liabilities

Table 1: Descriptive Statistics for the Materiality of Net Deferred Tax Assets/Liabilities

	Pooled	Croatia	Serbia	Slovenia
Arithmetic mean	0,174%	0,218%	0,065%	0,240%
Median	0,083%	0,177%	0,059%	0,079%
Minimum	0,003%	0,041%	0,003%	0,007%
Maximum	0,890%	0,553%	0,125%	0,890%
Standard deviation	0,217%	0,152%	0,035%	0,323%
Observations	48	16	16	16

It may be noticed that the materiality of net deferred tax assets/liabilities in sampled banking groups is significantly lower than the usual materiality threshold of 1%. In fact, no bank reported net deferred tax assets/liabilities in the amount bigger than one percent of total assets. In addition, only five observations (four in Slovenia and one in Croatia) had materiality bigger than 0.5%. As much as 27 observations had materiality of net deferred tax assets/liabilities lower than 0.1%.

It is interesting to note that 10 observations have not disclosed the deferred tax assets and deferred tax liabilities in the net amount in the balance sheet. In addition, for 30 observations, it is possible to determine separate amounts of deferred tax assets and deferred tax liabilities due to their disclosures in the notes to the financial statements, while for another 18 observations, it is possible to find out only the net amount.

Although they belong to the reputable multinational banking groups, some banks made important mistakes regarding the presentation of the data on the income tax. In particular, this refers to the banks in Croatia. In 2019, one bank in Croatia presented the current tax liabilities in the balance sheet as the deferred tax liabilities. Only after the inspection of the notes to the financial statements, it was possible to conclude that they are indeed current tax liabilities. In addition, another bank in Croatia stated in one part of the notes to the financial statements the statutory income tax rate of 20%, while in another part stated the actual statutory rate of 18%.

Figure 1 shows the materiality of net deferred tax assets/liabilities in sampled banking groups. It may be noticed that in two banking groups, the materiality is not bigger than 0.2% in any country, in any year. In general, two banking groups report the biggest materiality of net deferred tax assets/liabilities in Slovenia, while other two groups report the biggest materiality in Croatia. No group reports the largest materiality of net deferred tax in Serbia.

Before conducting the main statistical tests, the normality of distribution of the materiality of net deferred tax assets/liabilities was examined. In this regard, Shapiro-Wilk and Kolmogorov-Smirnov tests were conducted, which showed that materiality of net deferred tax assets/liabilities does not follow the normal distribution, with the results significant at the 1% level. The results of these tests are presented in Table 2. Therefore, the nonparametric Kruskal-Wallis test was used instead of the parametric One-way between-groups ANOVA test.

Table 2: Testing the Normality of Distribution of the Materiality of Net Deferred Tax Assets/Liabilities

	Shapiro-Wilk test			Kolmogorov-Smirnov test		
	Statistic	Degrees of freedom	p-value	Statistics	Degrees of freedom	p-value
Materiality	0,277	48	***0,000	0,690	48	***0,000

Note: results are statistically significant at the 10% (*), 5% (**) and 1% (***) level.

Figure 1: Materiality of Net Deferred Tax Assets/Liabilities in Sampled Banking Groups

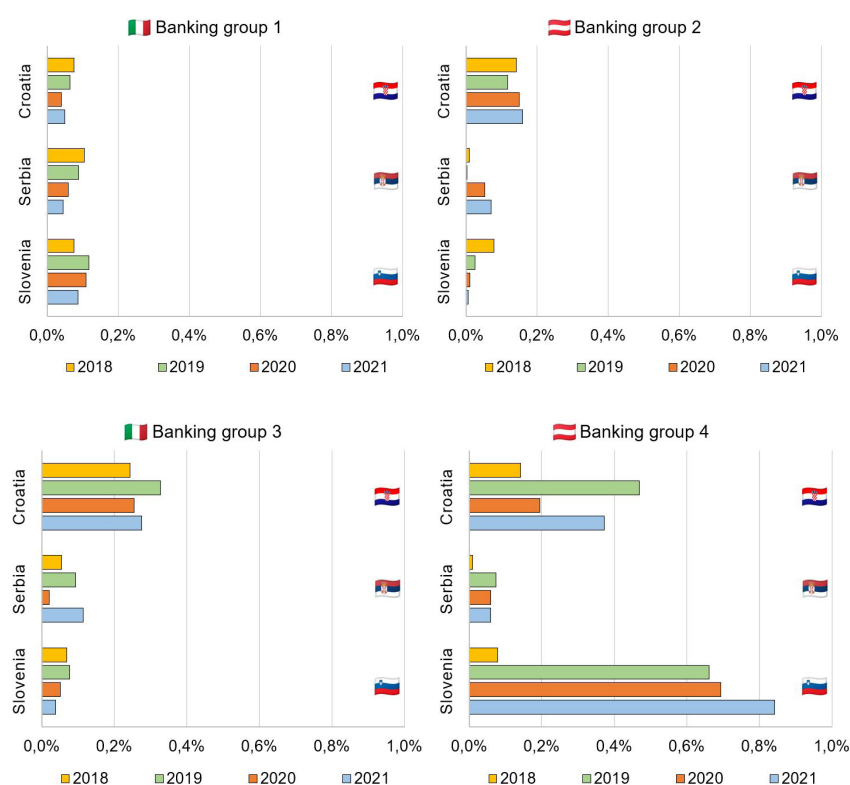


Table 3 shows the results of the Kruskal-Wallis test, showing that there is statistically significant difference in materiality of net deferred tax *assets/liabilities* between studied countries, with the difference significant at the 1% level. Therefore, *the first research hypothesis cannot be rejected*. Banks in Slovenia had the biggest arithmetic mean of materiality, while banks in Croatia have the biggest median materiality. Banks in Serbia have the smallest both arithmetic mean and median materiality of net deferred tax assets/liabilities.

Table 3: Results of Kruskal-Wallis Test

Panel A. Rank analysis		
Variable	Observations	Mean rank
Materiality (Croatia)	16	32,28
Materiality (Serbia)	16	16,91
Materiality (Slovenia)	16	24,31
Panel B. Test analysis		
Chi-square statistics	9,654	
Degree of freedom	2	
p-value	***0,008	

Note: results are statistically significant at the 10% (*), 5% (**) and 1% (***) level.

In addition, the parametric analysis is also conducted using the One-way between-groups ANOVA test. This test also showed that there is the statistically significant difference in the materiality of net deferred tax assets/liabilities between banking groups in three countries, though the results of this test are significant at the 5% level (p-value = 0.042). However, for the reasons of space, the results of this test are not tabulated.

Additional Mann-Whitney tests were also concluded, in order to examine which countries exhibited statistically significant difference in materiality of net deferred tax assets/liabilities exists. The results of these tests are presented in Table 4. Results indicate that only statistically significant difference exists only between banks in Croatia and Serbia, significant at the 1% level. Such results are not surprising, given the fact that nonparametric tests rely on the median, rather on the arithmetic mean, while banks in Croatia (Serbia) have biggest (smallest) median materiality of net deferred tax assets/liabilities.

Table 4: Results of Mann-Whitney Tests

Variable 1	Variable 2	Mann-Whitney U	Z-statistics	p-value
Materiality (Croatia)	Materiality (Serbia)	38,000	-3,392	***0,001
Materiality (Croatia)	Materiality (Slovenia)	93,500	-1,300	0,193
Materiality (Serbia)	Materiality (Slovenia)	96,500	-1,187	0,235

Note: results are statistically significant at the 10% (*), 5% (**) and 1% (***) level.

Although they apply the same accounting standards (in particular IAS 12), have almost identical business activities and, most likely, apply the same accounting policies imposed by the parent entity, subsidiaries of multinational banking groups have different materiality of net deferred tax assets/liabilities in different countries. The main reason for such findings may be found in important differences in national income tax systems.

First, studied countries impose different statutory income tax rates. Since deferred tax assets/liabilities are usually calculated after the multiplication of temporary difference and statutory rate, it is clear that statutory rate may significantly impact the amount of deferred tax. Second, studied countries prescribe different rules for the taxable base calculation, i.e., different rules for the calculation of revenue and expenses for tax purposes. Such differences are particularly important when it comes to time and amount of certain expenses recognition for tax purposes. Third, studied countries offer companies different tax incentives, with different type and maturity, which may have important repercussions on deferred income tax. Fourth, although each studied country enables carryforward of the unused tax losses, the period of its validity varies.

3.2 The Impact of Covid-19 Pandemic on Deferred Income Tax

Table 5 shows the average values of materiality of net deferred tax assets/liabilities, while Table 6 presents the results of nonparametric Mann-Whitney tests comparing materiality before and after the Covid-19 pandemic. In line with theoretical assumptions, it may be expected that the materiality of net deferred tax assets is reduced or the materiality of net deferred tax liabilities is increased, due to the reduced recognition of deferred tax assets.

Table 5: Comparison of Materiality of Net Deferred Tax Assets/Liabilities Before and After the Covid-19 Pandemic

	Period	Pooled	Croatia	Serbia	Slovenia
Arithmetic mean	2018-2019.	0,153%	0,249%	0,045%	0,164%
	2020-2021.	0,134%	0,187%	0,055%	0,159%
Median	2018-2019.	0,077%	0,193%	0,064%	-0,023%
	2020-2021.	0,059%	0,177%	0,059%	-0,015%

Note: negative value denotes net deferred tax liabilities.

Table 6: Results of Mann-Whitney Tests

Country	Mann-Whitney U	Z-statistic	p-value
Pooled	273,000	-0,309	0,757
Croatia	28,000	-0,420	0,674
Serbia	30,000	-0,210	0,834
Slovenia	32,000	0,000	1,000

Note: results are statistically significant at the 10% (*), 5% (**) and 1% (***) level.

Average values from Table 5 indicate that the materiality of net deferred tax assets/liabilities reduced after the Covid-19 pandemic, particularly in Croatia. Results are not clear enough for the other two countries. In Serbia only median value of the materiality of net deferred tax assets/liabilities was reduced, while in Slovenia only the arithmetic mean was reduced. However, the results of Mann-Whitney tests showed that such changes are not statistically significant, so *the second research hypothesis can be rejected*.

Research results about the impact of Covid-19 pandemic on the recognition of deferred tax assets are robust to the important change in research sample. Thus, the sample may contain only 30 observations which clearly disclosed separate amounts (not only the net amount) of deferred tax assets and deferred tax liabilities, and only the materiality of deferred tax assets may be used. Results of Mann-Whitney test confirm even in this case that, in general, the reduction of recognized deferred tax assets occurred, though such reduction is not statistically significant.

The explanation for the absence of the significant impact of the Covid-19 pandemic on deferred tax assets of sampled banks may be found in several facts. Sampled banks and multinational banking groups to which they belong are dominantly systemically important and highly stable banks, with important liquidity reserves. In addition, these banks report positive financial results (operating income, pre-tax income, net income) in almost each year. Sampled banks belong to the multinational banking groups headquartered in developed Western Europe countries with relatively developed financial systems. Eventually, subsidiaries of multinational banks have recent experiences regarding the uncertainty over achieving future taxable income after the global economic crisis in 2008.

3.3 Sources of Deferred Income Tax

Table 7 shows the most common sources of deferred income tax in sampled banks. In general, it may be noticed that financial assets and long-term provisions are the most common sources of deferred tax. However, the main source of deferred tax differs among countries. In addition, there are important cross-country differences in other sources of deferred tax. Therefore, *the third research hypothesis cannot be rejected*. Such finding is not surprising given the different regulation of income tax in sampled countries and specific law (for instance Law on the conversion of loans) and professional regulation (for instance the first implementation of IFRS 9 – Financial instruments).

Table 7: Most Common Sources of Deferred Income Tax in Sampled Banks

No.	Source of deferred tax	Observations
<i>Panel A. Croatia</i>		
1.	Financial assets	16
2.	Long-term provisions	13
3.	Deferred fees	12
4.	Fixed assets	8
5.	Tax loss carryforward	3
<i>Panel B. Serbia</i>		
1.	IFRS 9 first implementation	16
2.	Financial assets	13
3.	Long-term provisions	12
4.	Fixed assets	12
5.	Law on the conversion of loans	4
<i>Panel C. Slovenia</i>		
1.	Long-term provisions	15
2.	Financial assets	15
3.	Fixed assets	14
4.	Tax loss carryforward	7
5.	Cash flow hedging	4

Deferred income tax from the financial assets in sampled banks arises from various aspects. In this regard, it primarily refers to securities that are valued at their fair value and such securities may be held until the maturity or be available for sale. Effects of the adjustment to the fair value may be recorded in income statement or directly in equity accounts. In addition, in a smaller number of banks, deferred income tax arises from the contracted financial derivatives.

Deferred income tax from long-term provisions also arises in various ways in sampled banks. It primarily refers to the provisions for bonuses, severance payments and other employee benefits, for reorganization costs, for lawsuits or for expected loss on debt securities.

The main source of deferred income tax in sampled banks in Croatia are financial assets as each bank in each year recognized deferred tax from this source. Then, long-term provisions are deferred fees are the most common sources. In this regard, deferred fees primarily regard loan origination fees (fees that banks charged for the loan approval).

The main source of deferred income tax in sampled banks in Serbia are effects of the IFRS 9 first implementation as each bank in each year recognized this source. Then, financial assets and long-term provisions are the most common sources. The specific source is Law on the Conversion of Housing Loans Indexed to Swiss Francs, since banks have a right to use tax credit in line with this regulation. On the other hand, the main sources of deferred tax in Slovenia are long-term provisions and financial assets, followed by fixed assets.

It may be noticed that some usual sources of deferred income tax do not have an important role in the banking sector. For instance, a relatively small number of observations recognize deferred tax assets from the unused tax losses. In addition, tax losses are not even among the five most common sources of deferred tax in banks in Serbia.

Unlike companies from the real sector, in which fixed assets are usually the main source of deferred tax, its importance in banks is quite smaller. Although deferred tax from the fixed assets arises from different aspects (depreciation, revaluation, impairment of fixed assets), the share of fixed assets in total assets of banks is usually relatively small, thus explaining the little importance of fixed assets as a source of deferred tax.

In addition, deferred income tax from the investment tax incentives has little importance. Due to the specific nature of their industry, banks rarely reach the amount of such investments, necessary for using the tax incentive. Further, banks acquire the important portion of fixed assets through operational or financial leasing.

Conclusion

Research in this paper observed 12 banks from Croatia, Serbia and Slovenia that are part of multinational banking groups headquartered in Western European countries. In this regard examining the extent to which the deferred income tax practices differ in banks that belong to the same banking group, but operate in different countries.

Research results showed that net deferred tax assets/liabilities do not have a significant share in total assets of sampled banks. No bank has the share of net deferred tax assets/liabilities in total assets bigger than 1%. However, such findings may be also attributed to the fact that deferred tax assets and liabilities are, in line with IAS 12, netted and presented in balance sheet in the net amount.

There is significant difference in the materiality of net deferred tax assets/liabilities between banks in different countries. In this regard, significantly more banks report net deferred tax assets than net deferred tax liabilities. In addition, sampled banks reduced the recognition of deferred tax assets after the Covid-19 pandemic due to the increased uncertainty over achieving future taxable income. However, such reduction of recognized deferred tax assets is not materially significant.

The main sources of deferred income tax are also different among banks in different countries. In general, the most common source of deferred tax are financial instruments (primarily valuation of securities). However, although they employ the same accounting standards and accounting policies at the banking group level, banks in different countries recognize different sources of deferred tax due to the specific features of national income tax systems.

Research results may be of interest to many interest groups. First, managers of multinational banks may have specific benefits from the findings on the most common sources of deferred income tax in different countries. They have to be aware of differences in national income tax systems, so they should not universally recognize certain deferred tax sources in all countries in which they operate.

Second, the auditors of financial statements may benefit from the information on the materiality of deferred income tax when planning audit procedures. Third, research results may be of interest to the accounting standards governing bodies as they should be aware of cross-country differences between accounting and tax regulation for the calculation of income. Despite the efforts towards global harmonization of the accounting standards, national income tax systems still significantly vary, so the gap between accounting and tax regulation is different in different countries.

Presented results should be considered in the light of certain limitations. Research captures a limited time period, only three banking groups, only three countries and primarily employs nonparametric tests. It is possible that research results would be different if the time period, number of multinational banks or number of countries were changed or if some other research methodology is employed. Future research should strive to include a bigger number of multinational banking groups and bigger number of countries in order to compare research results. In addition, it would be also interesting to include subsidiaries of multinational companies from the real sector in order to compare results.

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DETERMINANTE USPEHA POSLOVANJA BANAKA: STUDIJA IZABRANIH SLUČAJA ZEMALJA BIVŠE JUGOSLAVIJE

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Rezime: U radu se ispituju determinante uspeha poslovanja banaka na uzorku zemalja bivše Jugoslavije, primenom panel analize. Istraživanje pokriva period od 2010. do 2020. godine. Osnovni cilj ovog rada jeste da se primenom odgovarajućeg ekonometrijskog modela panel analize odgovori na pitanje koja determinanta uspeha poslovanja banaka u zemljama bivše Jugoslavije jeste najvažnija za uspeh poslovanja banka. Rezultati analiza ukazuju da makroekonomski faktori nemaju statistički značajan uticaj na uspeh poslovanja banka, odnosno da problematični krediti predstavljaju mikroekonomski faktor koji ima najveći uticaj na performanse poslovanja banaka.

Ključne reči: uspeh poslovanja banaka; determinante poslovanja; makroekonomski faktori; mikroekonomski faktori; panel analiza; metoda fiksnih efekata; metoda slučajnih efekata

JEL klasifikacija: G21, C22, C52, C53

Uvod

Značaj banaka za bitisanje nacionalnih ekonomija, pa i šire, stabilnost međunarodnog finansijskog sistema, uticala je da poslovanje banaka bude predmet istraživanja brojnih radova i studija. Opšte je poznato da zdrav bankarski sistem predstavlja neophodan uslov za ekonomski rast jer obezbeđuje makroekonomsku stabilnost, a da su likvidne i profitabilne banke osnova te stabilnosti (Ayadurai & Eskandari, 2018). Iz tog razloga permanentni fokus stručne i akademske javnosti jeste na determinantama poslovanja banaka, pre svega onih koje utiču na stopu nenaplativih kredita, povećanje moralnog hazarda, makroekonomske uslove i sl. Međutim, uprkos velikom interesovanju za proučavanje ovih faktora relativno je mali broj radova koji se istovremeno fokusiraju na proučavanje uticaja svih najznačajnijih makroekonomskih i mikroekonomskih faktora uspeha poslovanja banaka. Naročito je ovo evidentno za mala finansijska tržišta u razvoju. Zbog kompleksnosti bankarskog sistema i poslovanja banaka skoro je nemoguće uzeti u obzir sve faktore. Naime, složenost bankarskog poslovanja dovodi do toga, da je lista faktora koji utiču na uspeh njihovog poslovanja, skoro neiscrpna i slobodno se može reći da je svakog dana sve veća i veća. Strukturalne promene koje su se desile na međunarodnom finansijskom tržištu tokom poslednjih godina XX veka, praćene deregulacijom i internacionalizacijom poslovanja banaka, kao i rapidnim rastom tržišta derivata, uticale su da banke prošire svoju ponudu finansijskih usluga i trgovačkih aktivnosti (Radivojević, 2014), sa jedne strane, ali i na intenziviranje dužničko-poverilačkih aranžmana sa klijentima koji imaju niski kreditni rejting, sa druge strane. Istovremeno, tehnološki razvoj praćen redukovanjem zakonske regulative u oblasti poslovanja banaka uticao je na pojavu novih finansijskih instrumenata, tehnika, strategija i finansijskog inženjeringa. Posledica svega ovoga jeste konstantno proširivanje liste determinanti koji utiču na uspeh poslovanja banaka.

S obzirom na to da je sve prethodno rečeno primarno uticalo da banke svoje poslovne aktivnosti prošire ulazeći u poslove koji nisu bili tradicionalno bankarski ili nisu bili dominantni u njihovom poslovanju, sa jedne strane, ali i na povećanje kreditnog rizika banaka usled ublažavanja kriterijuma i procedura skrininga loših kredita, primarni fokus akademske javnosti, po pitanju proučavanja faktora uspeha poslovanja banaka bio je na determinantama nenaplativih kredita. Takva istraživanja sprovedi su Makri & Papadatos (2012), Makri et al. (2014), Moinescu (2012), Louzis et al. (2012), Stakic (2014). Radivojević & Jovović (2017). Iako među ovim autorima postoje čak i oprečni nalazi u pogledu uticaja pojedinih makroekonomskih ili mikroekonomskih faktora na stopu nenaplativih kredita, ipak su saglasna da je stopa prinosa problematičnih kredita značajan faktor uspeha poslovanja banaka jer utiče na nelikvidnost i profitabilnost banaka, a time u krajnjoj instanci na makroekonomsku stabilnost (Hassan et al. 2011).

Makroekonomske determinante uspeha poslovanja banaka bile su predmet istraživanja kod autora Athanasoglou *et al.* (2006; 2008), Pasiourias & Kosmidou (2007), Albertazzi & Gambacorta (2009), Sufian & Habibullah (2009), Vong & Chan (2009), Rekik & Kalai (2018), Rupeika-Apoga *et al.* (2018), Borges & Tavares (2020) i dr. U okviru ovih istraživanja moguće je izdiferencirati dve grupe istraživanja. Prvu grupu istraživanja čine one studije koje su ispitivale uticaj tzv. opštih makroekonomskih determinanti, kao što su bruto domaći proizvod (BDP), inflacija, nezaposlenost, cene, devizni kurs, nivo privredne aktivnosti, obim uvoza i izvoza i sl.

Takva istraživanja sprovedi su Demirgüç-Kunt & Huizinga (1999), Athanasoglou *et al.* (2006; 2008), Anbar & Alper (2011) i dr. Athanasoglou *et al.* (2006; 2008) pronašli su da bruto domaći proizvod (BDP) ima značajan i pozitivan uticaj na poslovanje banaka. Suprotno njima, nalazi Demirgüç-Kunt & Huizinga (1999), Pasiourias & Kosmidou (2007), Sufian & Habibullah (2009) i Vong & Chan (2009) impliciraju nepostojanje statistički značajne veze između uspeha poslovanja banaka i ekonomskog rasta. Ovo opravdavaju činjenicom da u uslovima jačanja privrednih aktivnosti, investitori investiciona sredstva nabavljaju iz drugih izvora, kao što su zadržane dobiti ili emitovanjem hartija od vrednosti, tako da im banke nisu primarni izvori svežeg kapitala. Važnost izučavanja ove determinante poslovanja banaka ogleda se i u nalazima istraživanja Beltratti & Stulz (2012), Erkens *et al.* (2012), Serrano-Cinca *et al.* (2014), Adebambo *et al.* (2015), Cox *et al.* (2017), kao i Avkiran *et al.* (2018), koji su proučavali performanse banaka tokom svetske ekonomske krize. Nalazi ovih istraživanja ukazuju da nisu sve banke podjednako bile pogođene krizom i opadanjem BDP-a, što implicira da neki drugi faktori imaju značajan uticaj na uspeh poslovanja.

Značajan broj radova posvećen je inflaciji. Kada je u pitanju ova makroekonomska determinanta poslovanja banaka, takođe postoje oprečni nalazi; od toga da ima pozitivan uticaj (Pan & Pan (2014), Tan & Floros (2012), Andries *et al.* (2016)), odnosno negativan uticaj (Abreu & Mendes (2002) Sufian & Habibullah (2009), Sufian (2010), Moyo & Tursoy (2020)), pa do onih koji ističu da uticaj ove determinante zavisi od toga koliko su banke sposobne ispravno da predvide kretanje stope inflacije. Tako, Perry (1992) ističe da ukoliko banke budu uspešne u predviđanju stope rasta inflacije, onda će moći da prilagode kamatne stope i na taj način će uspeti da poboljšaju svoje poslovne rezultate. Za razliku od Cetin (2019) koji je pronašao pozitivan uticaj inflacije na ROA banke u zemljama u razvoju, Hamadi & Awdeh (2012) nisu pronašli da postoji bilo kakva veza između ove determinante i uspeha poslovanja banaka.

Ispitujući opšte makroekonomske determinante uspeha poslovanja banaka u Centralnoj i Istočnoj Evropi, Horobet *et al.* (2021) su otkrili da stopa nezaposlenosti ima negativan uticaj na uspeh poslovanja banaka.

Drugu (pod) grupu istraživanja čine studije koje su za predmet istraživanja imale specifične makroekonomske faktore kao što su politički rizik zemlje, državne intervencije i institucionalne podrške razvoju bankarskog sektora i sl. Uticaj vladinih mera i deregulacije na uspeh poslovanja banaka bili su predmet istraživanja kod Beck *et al.* (2010), Boustanifar (2014), Zakaria *et al.* (2015) i dr. Oni su utvrdili da deregulacija u oblasti bankarstva otvara prostor za ulazak stranih banaka, kao i da povoljno utiče na druge sektore privrede u smislu smanjenja stopa nezaposlenosti, bolje alokacije kapitala i sl. Međutim, na osnovu njihovih istraživanja teško se može izvesti direktan i precizan zaključak u pogledu njihovog uticaja na performanse banaka. Slične nalaze predstavili su i Isfaq & Khan (2015). Za razliku od njih Daly & Frikha (2017) su utvrdili da makroekonomski faktori povezani sa vladinim intervencijama negativno utiču na rezultate poslovanja banaka. Onofrei *et al.* (2018) posebno navode nevladine kredite kao značajnu determinantu uspeha poslovanja banaka. Borges & Tavares (2020) otkrili su da koncentracija banaka na tržištu ima pozitivan uticaj na performanse poslovanja.

Njihovi nalazi u skladu su sa rezultatima istraživanja Goddard *et al.* (2004), Bikker & Bos (2005), Kosmidou *et al.* (2005), Pasiourias & Kosmidou (2007) i Trujillo-Ponce (2013). Pastor *et al.* (2000) i Hermes & Lensink (2004) ovo opravdavaju činjenicom da veća koncentracija banaka, generisana pre svega, ulaskom velikih inostranih banaka na mala i nerazvijena tržišta utiče na to da domaće banke unaprede svoje poslovanje. Rezultati njihovog istraživanja ukazuju da su na tržištima u razvoju domaće banke po ulasku inostranih banaka imale značajno niže stope ne problematičnih kredita. Hermes & Lensink (2004) ističu da povećanje koncentracije banaka implicira i uvođenje novih usluga čime se podstiče konkurencija među bankama da razvijaju nove usluge i unaprede svoje poslovanje. Međutim, sa druge strane istraživanja Barajas *et al.* (2000) i Clarke *et al.* (2000) ukazuju na negativne posledice. Ovo opravdavaju nalazima da su banke primorane da ulažu veća sredstva u unapređenje poslovanja, čime se povećavaju operativni troškovi, koji ne mogu da budu adekvatno pokriveni. Clarke *et al.* (2000) posebno ovo navodi u situaciji kada na tržište ulaze strane banke koje imaju određene komparativne prednosti u odnosu na domaće.

Drugu veliku grupu istraživanja čine studije koje su proučavale mikroekonomske determinante poslovanja banaka. Takve studije uglavnom su se fokusirale na proučavanje uticaja problematičnih kredita, operativne troškove, stopu adekvatnosti kapitala, kvalitet aktive banke, kvalitet menadžmenta i njihov stav prema riziku i sl. Autori poput Barros *et al.* (2007), Chiorazzo *et al.* (2008), García-Herrero *et al.* (2009) i sl. navode da uprkos većim operativnim troškovima upravljanja velikim portfoliom kredita, profitabilnost banaka bi trebalo da se poveća zbog davanja većeg broja kredita. Međutim, najnovija istraživanja Christaria & Kurnia (2016), Anastasiou *et al.* (2016), Akter & Roy (2017), Kingu *et al.* (2018), Petkovski *et al.* (2018), Khan & Ahmad (2017) i Horobet *et al.* (2021) jasno ukazuju da povećanje nekvalitetnih kredita negativno utiče na profitabilnost banaka. Horobet *et al.* (2021) ukazuju da su problematični krediti najvažnija determinanta uspeha poslovanja banka. Sa druge strane, rezultati istraživanja Psaila *et al.* (2019) ukazuju da je to stopa solventnosti banke. Slične nalaze predstavili su i Staikouras & Wood (2004), Capraru & Ihnatov (2014) i Curak *et al.* (2012).

Poslednjih godina sve veći je fokus ne samo na kvalitet menadžmenta, već i na ceo bord direktora (King *et al.* (2016), Fernandes *et al.* (2017), Pereira & Filipe (2018)). Tako su Pereira & Filipe (2018) pronašli da nivo obrazovanja menadžmenta banke predstavlja značajnu determinantu uspeha poslovanja. Wyród-Wróbel & Biesok (2017), kao i Tailab (2020) otkrili su da uspeh poslovanja banke u vreme krize zavisi dominantno od sposobnosti menadžmenta da odredi prioritete na strateškom i operativnom nivou ključna determinanta uspeha. Proučavajući determinante nenaplativih kredita, Salas & Saurina (2002) i Espinoza & Prasad (2010) kvalitet menadžmenta banke izučavali su preko neto kamatne marže, ističući da ona predstavlja dobar indikator koliko optimalno banka donosi investicione odluke. Pozitivan uticaj neto kamatne marže na performanse banke predstavili su i KuKaj *et al.* (2020). Radivojević & Jovović (2017) ističu da stopa adekvatnosti kapitala, takođe, predstavlja važan indikator kvaliteta menadžmenta banke jer odražava stav menadžmenta prema riziku, dok Stakić (2014) ističe da su to rezervisanja za potencijalne gubitke. Izdvajanjem većih rezervisanja redukuje se profitabilnost, ali sa druge strane se jača likvidnost banke u srednjem roku, tako da je teško proceniti pravi uticaj ovog faktora na uspeh poslovanja banke.

Značaj istovremenog proučavanja makroekonomskih i mikroekonomskih faktora poslovanja banaka najbolje oslikavaju rezultati istraživanja Sufian *et al.* (2012) koji impliciraju da makroekonomski faktori kao što su kreditni rizik, veličina marže, operativni troškovi, veličina banke i sl. imaju različit značaj u zavisnosti od makroekonomskog konteksta u kome banke posluju. Slično navode i Horobet *et al.* (2021). Analizirajući studije koje su za predmet istraživanja imale makroekonomske i mikroekonomske determinante poslovanja banaka, utvrdili su da uticaj determinanti ne zavisi od perioda istraživanja, već od razvijenosti finansijskog sektora. Uticaj determinanti poslovanja se razlikuje između razvijenih i nerazvijenih finansijskih tržišta. Saznanja da se uticaji pojedinih determinanti poslovanja banaka, poput stope inflacije i stope koncentracije, razlikuju u evropskim zemljama u razvoju u odnosu na druga tržišta u razvoju (Mirzaei *et al.* (2013), García-Herrero *et al.* (2009), Demirgüç-Kunt & Huizinga (1999), Sufian (2009), Horobet *et al.* (2021)) ukazuju na potrebu da se njihov uticaj ispituje posebno za grupe zemalja koje imaju slične karakteristike.

Imajući u vidu prethodno rečeno, cilj ovog rada jeste da ispita uticaj determinanti poslovanja na uspeh poslovanja banaka koje posluju u zemljama republikama bivše Jugoslavije, a koje, prema brojnim autorima, su identifikovane kao ključne makroekonomske determinante poslovanja, kao što su BDP, inflacije, nezaposlenosti, koncentracija banaka na tržištu i (ne) stabilnost političkog okruženja. Predmet istraživanja su i mikroekonomske determinante, identifikovane kao ključne od strane brojnih autora, kao što su nenaplativi krediti, solventnost i kvalitet menadžmenta banke. Istraživanje je sprovedeno na primeru četiri bivše republike Jugoslavije: Republika Srbija, Crna Gora, Bosna i Hercegovina i Republika Hrvatska.

Podaci i metodologija istraživanja

Kako je već istaknuto, osnovni cilj rada jeste da se ispita uticaj ključnih makroekonomskih i mikroekonomskih determinanti na uspeh poslovanja banaka, koje posluju u zemljama bivše Jugoslavije: Republici Srbiji, Crnoj Gori, Bosni i Hercegovini i Hrvatskoj. Istraživanje obuhvata period od 2010. do 2020. godine. Podaci potrebni za istraživanje prikupljeni su iz baze podataka *Eurostata*. Za ispitivanje uticaja ključnih determinanti na uspeh poslovanja banaka koristi se panel analiza i to nebalansiranih panel podataka. Ova vrsta analiza izabrana je jer omogućava da se kooptiraju obrasci u ponašanju banaka, kao jedinica posmatranja, tokom perioda istraživanja.

Uzimajući u obzir navode Chandler-a & Hanks-a (1996) i Curcic *et al.* (2020), ne čudi činjenica zašto najveći broj istraživanja koja se bave izučavanjem determinanti uspeha poslovanja organizacija, uspeh poslovanja iskazuju kroz profitabilnost. Kada je reč o poslovanju banaka, u akademskim krugovima postoji neslaganje oko toga da li je ROA ili ROE najbolja mera uspeha poslovanja banke. Autori poput Krakah & Ameyaw (2010) ističu da je to ROA jer je oslobođena od uticaja kapitalnih multiplikatora. Sa druge strane, u prilog ROE navode se argumenti da vanbilansna aktiva predstavlja značajan izvor profita. Naročito se ovo apostrofira u poslovanju evropskih banaka. Međutim, uprkos svojim ograničenjima za potrebe ovog rada, uspeh poslovanja banaka izražava se kroz ROA. Ovakav izbor u skladu je sa radovima Demirgüç-Kunt & Huizinga (1999), Athanasoglou *et al.* (2006), kao i Capraru & Ihnatov (2014), Borgesa & Taverna (2020) i dr.

Imajući u vidu u uvodnom delu rada citirane autore, za potrebe ovog rada BDP se izražava kroz stopu BDP-a, koja je transformisana u logaritamsku funkciju i kao takva predstavlja rast BDP-a tokom godina. Očekuje se da stopa rasta BDP-a ima pozitivan uticaj na uspeh poslovanja banka. Inflacija se izražava kroz stopu inflacije. Očekuje se da stopa inflacije bude negativno korelisana sa uspehom poslovanja banaka. Nezaposlenost se iskazuje kroz stopu rasta nezaposlenosti i takođe se očekuje da ima negativan uticaj na uspeh poslovanja banaka, dok se koncentracija banaka na tržištu iskazuje primenom indeksa koncentracije, koji se kreće u rasponu od 0 do 100.

Iako je uobičajeno da se (ne)stabilnost političkog okruženja, kao sveobuhvatnog ambijenta koji utiče na sve aktere privrednog života u jednoj ekonomiji, iskazuje kroz indikatore makroekonomske stabilnosti, za potrebe ovog rada iskazana je kroz indeks političkog rizika. Naime, zaključci Papovića *et al.* (2020), da strani investitori često usled povoljnih institucionalnih podrški, kao izraza volja kreatora političkog okruženja vrše određena ulaganja, uprkos lošim vrednostima indikatora makroekonomske stabilnosti. To ukazuje na potrebu da bi kod ove determinante poslovanja banaka trebalo uključiti i druge indikatore, koji predstavljaju izraz političkog rizika. Iz tog razloga za potrebe ovog rada izabran je *Indeks političke stabilnosti*.

Kao indikator problematičnih kredita, u ovom radu koristi se stopa problematičnih kredita u odnosu na ukupne kredite banke. Budući da stopa adekvatnosti kapitala predstavlja dobar indikator solventnosti banke, koji je istovremeno u visokoj korelaciji sa leveridžom, te se ona koristi za izražavanje ove determinante uspeha poslovanja. Pored ove dve varijable u istraživanje su uključene i stopa neto marže i stopa rezervi za pokriće potencijalnih gubitaka, kao izraz kvaliteta menadžmenta banke i njihovog stava prema riziku. Očekivano je da veća stopa neto marže pozitivno utiče na uspeh poslovanja banke, odnosno da viša stopa rezervi za pokriće potencijalnih gubitaka utiče negativno. Za potrebe ovog istraživanja razvijen je ekonometrijski model koji se može prikazati na sledeći način:

$$ROA_{i,t} = \beta_1 + \beta_2 gdp_{i,t} + \beta_3 unr_{i,t} + \beta_4 inf_{i,t} + \beta_5 HHI_{i,t} + \beta_6 IPR_{i,t} + \beta_7 npl + \beta_8 nimr + \beta_9 cap + \beta_7 llp + \varepsilon_{i,t} \quad (1)$$

pri čemu su:

- ROA* - stopa prinosa na aktivu za i-tu zemlju u (t) vremenskom periodu
- gdp_{i,t}* - stopa bruto domaćeg proizvoda za i-tu zemlju u (t) vremenskom periodu
- unr_{i,t}* - stopa nezaposlenosti za i-tu zemlju u (t) vremenskom periodu
- inf_{i,t}* - stopa inflacije za i-tu zemlju u (t) vremenskom periodu
- HHI_{i,t}* - Indeks koncentracije za i-tu zemlju u (t) vremenskom periodu
- IPS_{i,t}* - Indeks političke stabilnosti za i-tu zemlju u (t) vremenskom periodu
- npl_{i,t}* - stopa neto nenaplativih kredita za i-tu zemlju u (t) vremenskom periodu
- nimr_{i,t}* - stopa neto kamatne marže za i-tu zemlju u (t) vremenskom periodu
- cap_{i,t}* - stopa adekvatnosti kapitala između kapitala za i-tu zemlju u (t) vremenskom periodu
- llp_{i,t}* - stopa rezervi za pokriće potencijalnih gubitaka
- ε_{i,t}* - slučajna greška modela

Empirijska analiza i diskusija dobijenih rezultata

U tabeli 1 prikazani su rezultati deskriptivne statistike skupa podataka. ROA se kreće od -4.342 do 2.308, što ukazuje na veoma visok disparitet između minimalne i maksimalne vrednosti profitabilnosti među bankama. U prilog ovome svedoči i veoma visoka vrednost standardne devijacije ROA. Negativna vrednost koeficijenta asimetrije u kombinaciji sa veoma visokom vrednošću koeficijenta spljoštenosti ukazuje na veću verovatnoću ostvarivanja negativnih rezultata poslovanja u budućnosti u odnosu na pozitivne. Međutim, pozitivna vrednost ove varijable ukazuje da su banke u proseku u ovim zemljama tokom posmatranog perioda bile uspešne u svom poslovanju. Velika razlika između maksimalne i minimalne vrednosti *gdp-a*, kao i velika vrednost standardne devijacije ove varijable jasan je znak razlika u ekonomskom razvoju među ovim zemljama u posmatranom periodu. Uprkos činjenici da su u posmatranom periodu sve zemlje ostvarile rast *gdp-a*, negativna vrednost koeficijenta asimetrije upućuje na oprez. Visoke vrednosti stope nezaposlenosti ukazuju da se ove zemlje suočavaju sa problemom nezaposlenosti, dok uprkos velikom rasponu između minimalne i maksimalne vrednosti stope inflacije, relativno niska prosečna vrednost *inf* varijable ukazuje da ove zemlje nisu imale značajnijih problema sa inflacijom. Međutim, visoke vrednosti deskriptivne statistike indeksa koncentracije, ukazuju na visoku koncentraciju, odnosno relativno nisku konkurenciju među bankama, što s aspekata klijenata nije dobro, ali s aspekta poslovanja banaka može da predstavlja determinantu koja će da ima pozitivan predznak, jer relativno mali broj banaka ostvaruje velika tržišna učešća. Relativno niske, pa i negativne vrednosti indeksa političke stabilnosti ukazuje na nestabilno makroekonomsko okruženje, što može da ima negativan uticaj na poslovanje banaka. Relativno visoke vrednosti deskriptivne statistike problematičnih kredita ukazuje na veliki potencijal u nenaplativim kreditima, što će se negativno odraziti na uspeh poslovanja. Otuda, očekuje se da ova determinanta ima negativan uticaj na uspeh poslovanja banaka, uprkos tvrdnjama Barros *et al.* (2007), Chiorazzo *et al.* (2008), García-Herrero *et al.* (2009) da će usled povećanja kreditnog portfolija banke da ostvare veće prihode. Relativno visoke vrednosti *llp* i *cap* ukazuju na relativnu averziju menadžmenta prema riziku i vođenje oprezne poslovne politike. Očekivano je da veća vrednost *llp* negativno utiču na uspeh poslovanja banaka iz razloga što je veći deo sredstava *zamrznut*, a da *cap* kao indikator solventnosti ima pozitivan uticaj. Iznenaduje negativna vrednost stope neto kamatnih marži, kao i negativna vrednost koeficijenta asimetrije kod ove varijable, što upućuje na mogućnost da aktivne kamatne stope budu niže u odnosu na pasivne.

Tabela 1 - Deskriptivna statistika izabranih varijabli

	$ROA_{i,t}$	$gdp_{i,t}$	$unr_{i,t}$	$inf_{i,t}$	$HHI_{i,t}$	$IPS_{i,t}$	$nlp_{i,t}$
Sredina	0,465	1,198	17,792	1,774	67,925	0,105	12,808
Stand. devijacija	1,063	3,629	5,704	2,515	11,172	0,446	5,128
Koef. spljoštenosti	9,430	9,660	-0,432	4,008	-1,325	-0,727	-0,959
Koef. asimetrije	-2,359	-2,661	0,165	1,714	-0,046	-0,104	0,045
Minimum	-4,342	-15,307	6,620	-1,584	49,435	-0,900	3,700
Maksimum	2,308	5,078	28,010	11,137	90,964	0,800	21,600
Br. obs.	44	44	44	44	44	32	44
	$nimr_{i,t}$	$cap_{i,t}$	$llp_{i,t}$				
Sredina	4,710	14,227	75,172				
Stand. devijacija	2,413	4,108	27,170				
Koef. spljoštenosti	9,663	-0,949	-0,755				
Koef. asimetrije	-2,125	0,355	0,621				
Minimum	-6,444	8,231	38,799				
Maksimum	8,619	20,890	133,600				
Br. obs.	44	44	44				

Izvor: Autor

Kako bi se identifikovao potencijalni problem multikolinearnosti, sprovedena je analiza korelacije između varijabli. U tabeli 2 prikaza je matrica korelacije. Budući da postoji jaka korelacija između varijable IPS i HHI , iz dalje analize je izostavljena varijabla IPS .

Tabela 2 - Matrica korelacije

	$ROA_{i,t}$	$gdp_{i,t}$	$unr_{i,t}$	$inf_{i,t}$	$HHI_{i,t}$	$IPS_{i,t}$	$nlp_{i,t}$	$nimr_{i,t}$	$cap_{i,t}$	$llp_{i,t}$
$ROA_{i,t}$	1,000									
$gdp_{i,t}$	0,195	1,000								
$unr_{i,t}$	-0,071	0,031	1,000							
$inf_{i,t}$	0,012	0,050	0,165	1,000						
$HHI_{i,t}$	-0,254	-0,134	-0,408	-0,246	1,000					
$IPS_{i,t}$	-0,249	0,010	-0,403	0,046	0,815	1,000				
$nlp_{i,t}$	-0,288	0,096	0,466	0,340	0,106	0,329	1,000			
$nimr_{i,t}$	-0,376	-0,051	0,016	-0,034	0,498	0,268	0,163	1,000		
$cap_{i,t}$	0,137	0,039	-0,057	0,423	-0,584	-0,185	0,122	-0,360	1,000	
$llp_{i,t}$	0,306	0,097	-0,031	-0,301	0,482	0,009	-0,093	0,246	-0,722	1,000

Izvor: Autor

Validna primena panel analize podrazumeva da serije podataka pokazuju osobine stacionarnosti. Iz tog razloga u radu je izvršeno testiranje prisustva jediničnog korena u panel podacima primenom Levin–Lin–Chu (LLC) testa. Rezultati predstavljeni u tabeli 3 ukazuju da varijable *HHI*, *cap* i *llp* nisu stacionarne na osnovnom nivou. Dobijeni rezultati sugerišu na potrebu da se primenom tehnike diferencijacije serije ovih varijabli transformišu stacionarne. Iako je uobičajena praksa da se ova vrsta testa koristi u međunarodnim finansijama i makroekonomiji (Choi, 2001), pretpostavka na kojoj počiva LLC test, da sve komponente imaju isti autoregresioni koeficijent, ograničava njegovu primenu u analizi vremenskih serija. Iz tog razloga u radu je izvršeno dodatno testiranje stacionarnosti primenom KPSS testa, metodologije koju je predložio (Choi, 2001), a koja počiva na tvz. meta analizi. Rezultati su prikazani u tabeli 1A u prilogu rada. Imajući u vidu rezultate, varijable su transformisane u stacionarne.

Tabela 3 - Rezultati LLC testa

Varijable		LLC test
$ROA_{i,t}$	Nivo	0,0240
	1. Diferencijala	-
$gdp_{i,t}$	Nivo	0,0101
	1. Diferencijala	-
$unr_{i,t}$	Nivo	0,0001
	1. Diferencijala	-
$inf_{i,t}$	Nivo	0,0003
	1. Diferencijala	-
$HHI_{i,t}$	Nivo	0,621
	1. Diferencijala	0,000***
$nlp_{i,t}$	Nivo	0,018
	1. Diferencijala	-
$nimr_{i,t}$	Nivo	0,002
	1. Diferencijala	
$cap_{i,t}$	Nivo	0,141
	1. Diferencijala	0,000***
$llp_{i,t}$	Nivo	0,844
	1. Diferencijala	0,000***

Izvor: Autor

Primenom dva ocenjivača panel podataka, metodom fiksnih efekata (FE) i slučajnih efekata (RE) ocenjeni su parametri modela (1). Rezultati ocene parametara modela prikazani su u tabeli 4.

Tabela 4 - Ocene parametara modela (1)

FE metod					
Varijable	Koeficijenti	St. greške	t-racio	p-vrednost	
konstanta	3,022	3,893	0,776	0,447	
$gdp_{i,t}$	0,001	0,024	0,034	0,974	
$unr_{i,t}$	-0,013	0,049	-0,256	0,801	
$inf_{i,t}$	-0,041	0,068	-0,600	0,556	
$HHI_{i,t}$	-0,053	0,035	-1,526	0,143	
$nlp_{i,t}$	-0,094	0,034	-2,785	0,012	**
$nimr_{i,t}$	0,168	0,112	1,497	0,151	
$cap_{i,t}$	-0,048	0,167	-0,290	0,775	
$llp_{i,t}$	0,031	0,028	1,115	0,279	
Zajednički test izabranih regresora $P(F(9, 19) > 6,388) = 0,000$					
Test različitih odsečka $P(F(3, 19) > 0,427) = 0,735$					
LSDV $R^2 = 0,773$					
Within $R^2 = 0,751$					
Test normalnosti distribucije reziduala: $\chi^2(2) = 1,312 (0,518)$					
Durbin-Watson = 2,513					
RE metod					
Varijable	Koeficijenti	St. greške	t-racio	p-vrednost	
konstanta	3,040	3,446	0,882	0,37	
$gdp_{i,t}$	0,006	0,021	0,265	0,791	
$unr_{i,t}$	-0,030	0,038	-0,799	0,425	
$inf_{i,t}$	-0,054	0,061	-0,879	0,380	
$HHI_{i,t}$	-0,052	0,030	-1,742	0,081	**
$nlp_{i,t}$	-0,091	0,030	-2,980	0,003	***
$nimr_{i,t}$	0,142	0,098	1,451	0,147	
$cap_{i,t}$	0,034	0,116	0,294	0,769	
$llp_{i,t}$	0,020	0,020	0,995	0,320	
Zajednički test izabranih regresora: $\chi^2(9) = 63,632 (0,000)$					
Breusch-Pagan-ov test: $\chi^2(1) = 2,250 (0,133)$					
Hausman-ov test: $\chi^2(3) = 1,134 (0,768)$					
$R^2 = 0,510$					
Test normalnosti distribucije reziduala $\chi^2(2) = 3,317 (0,190)$					
Durbin-Watson = 2,513					

Napomena: ***, **, * označavaju nivo značajnosti od 1%, 5% i 10% redom.

Izvor: Autor

Zajednički test izabranih regresora ukazuje da su oba modela ispravno specificirana, odnosno da su izabrani pravi regresori. Budući da ne postoji jedinstveno tačan način izračunavanja koeficijenta determinacije kada je u pitanju model FE u radu je izračunat LSDV koeficijent determinacije, kao i tzv. „within“ koeficijent determinacije. Vrednosti oba koeficijenta pokazuju da model preko 70% varijacija u zavisnoj varijabli se može objasniti izabranim varijablama. Test normalnosti distribucije reziduala i autokorelacije reziduala FE modela, ukazuju na adekvatnost modela. Međutim, vrednost Hausman-ovog testa implicira da je za ocenu parametara modela bolji RE metod u odnosu na FE. Sa druge strane, RE model ima značajno niži koeficijent determinacije ($R^2 = 0,510$). Test normalnosti distribucije reziduala i autokorelacije reziduala RE modela, ukazuju da je model adekvatan.

Ocene parametara modela (1) koje su dobijene primenom obe metode ukazuju da je stopa problematičnih kredita ključni faktor uspeha poslovanja. Svako povećanje ove stope od 1% imaće za posledicu pogoršanje profitabilnosti banaka od oko 0,09%. Ovakav nalaz u skladu je sa nalazima Christaria & Kurnia (2016), Anastasiou *et al.* (2016), Akter & Roy (2017) Kingu *et al.* (2018), Petkovski *et al.* (2018) i Khan & Ahmad (2017). Budući da ocene parametara modela (1) pokazuju da *cap* nije statistički značajna varijabla, što implicira da solventnost, za koju Psaila *et al.* (2019) ističu da je značajnija determinanta u odnosu na stopu problematičnih kredita, nalaz iz ovog rada podržava stav Horobet *et al.* (2021) da su problematični krediti najvažnija determinanta uspeha poslovanja banka. Analiza ocene parametara modela (1) takođe ukazuje da je koncentracija značajna determinanta uspeha poslovanja banaka. Negativna vrednost koeficijenta varijable *HHI* implicira da svako povećanje konkurencije između banaka, odnosno smanjenje koncentracije, pozitivno utiče na poslovanje banaka. Ovo se može opravdati time da pojava novih konkurenata zahteva od banaka na tržištu da više ulažu u unapređenje efikasnosti poslovanja. Ovakav nalaz u skladu je sa nalazima Clarke *et al.* (2000), mada oni razloge negativnog uticaja povećanja koncentracije pronalaze u činjenici da ulaskom velikih i stranih banaka na domaće tržište primoravaju domaće banke da više ulažu u unapređenje svojih usluga, čime im se značajno povećavaju operativni troškovi.

Što se tiče ostalih determinanti, istraživanje je pokazalo da one nemaju značajan uticaj na uspeh poslovanja banaka. U kontekstu makroekonomskih determinanti ovakav nalaz i nije iznenađujući, budući da postoje studije koje su otkrile da određene makroekonomske determinante, uprkos očekivanjima, nisu imale statistički značajan uticaj. Naročito je ovo evidentno u slučaju uticaja inflacije, nezaposlenosti, ali i ekonomskog rasta privrede. Međutim, iznenađujući je podatak da je istraživanje pokazalo da neto kamatna marža nema statistički značajan uticaj na uspeh poslovanja banaka. Ovo može da implicira da su banke u prethodnom periodu sprovodile loše investicione politike, odnosno da su značajnije prihode ostvarivali kroz aktivnosti koje nisu tradicionalno bankarski dominantne. Uzrok ovakvom rezultatu može se naći i u nesavršenosti modela. Naime, uprkos očekivanju da zemlje imaju svoje specifičnosti, koje utiču na uspeh poslovanja banaka (heterogenosti između jedinica posmatranja) koje pomoću metode FE, odnosno metode RE mogu biti kooptirane, vrednost testa o zajedničkom odsečku, odnosno Breusch-Pagan-ovog testa impliciraju da je za ocenu parametara modela najbolji ocenjivač tzv. Pooled OLS. Iz tog razloga u radu su napravljene ocene primenom tog ocenjivača. Rezultati ocene modela (1) primenom Pooled OLS prikazane su u tabeli 5.

Tabela 5 - Ocene parametara modela (1) dobijene primenom Pooled OLS metoda

Pooled OLS metod					
Varijable	Koeficijenti	St. greške	t-ratio	p-vrednost	
konstanta	3,568	1.691	2.109	0.047	**
$gdp_{i,t}$	0,007	0.020	0.339	0.738	
$unr_{i,t}$	-0,033	0.029	-1.148	0.263	
$inf_{i,t}$	-0,067	0.053	-1.268	0.218	
$HHI_{i,t}$	-0,062	0.020	-3.172	0.004	***
$nlp_{i,t}$	-0,087	0.026	-3.291	0.003	***
$nimr_{i,t}$	0,104	0.067	1.559	0.133	
$cap_{i,t}$	0,081	0.036	2.243	0.035	**
$llp_{i,t}$	0,015	0.006	2.397	0.025	**
$R^2 = 0.757$					
Test normalnosti distribucije reziduala $\chi^2(2) = 0.717 (0.698)$					
Durbin-Watson = 0.698					

Napomena: ***, **, * označavaju nivo značajnosti od 1%, 5% i 10% redom.

Izvor: Autor

Analiza ocene parametara modela (1) prikazanih u tabeli 5 pokazuje da neto kamatna marža nema statistički značajan uticaj na uspeh poslovanja, što je suprotno očekivanjima. Analiza dalje implicira da uspeh poslovanja banaka u ispitanim zemljama zavisi od problematičnih kredita, stepena konkurencije na tržištu, ali i od stope adekvatnosti kapitala i stope rezervi za pokriće potencijalnih gubitaka. Dobi-jeni rezultati u skladu su sa nalazima brojnih autora. Za ostale determinante nije utvrđeno da imaju statistički značajan uticaj. Međutim, relativno niski koeficijent determinacija (R^2) upućuje na oprez prilikom prihvatanja rezultata. Naime, vrednost ovog pokazatelja adekvatnosti modela otkriva da nezavisne varijable koje su uključene u model samo oko 70% varijacija u ROA uspevaju da objasne. Ovo implicira da broj uključenih varijabli nije dovoljan, odnosno da postoje i ostale makroekonomske i mikroekonomske determinante koje utiču na uspeh poslovanja ovih banaka. Nažalost, dostupnost podataka predstavljalo je ozbiljno ograničenje ovog istraživanja, te iz tog razloga nije bilo moguće u model uključiti veći broj determinanti.

Zaključak

U radu se ispituje uticaj, u literaturi identifikovanih kao ključne makroekonomske i mikroekonomske determinante uspeha poslovanja banka. Istraživanje je sprovedeno na primeru banaka koje posluju u izabranim zemljama republikama bivše Jugoslavije: Republici Srbiji, Crnoj Gori, Bosni i Hercegovini i Republici Hrvatskoj. Period istraživanja pokriva od 2010. do 2020. godine. Pored uslova da su makroe-konomske i mikroekonomske determinante identifikovane kao ključne u literaturi, kao i da po pitanju njihovog uticaja na uspeh poslovanja banka postoje oprečni nalazi, dostupnost podatka bila je ključna odrednica prilikom izbora determinanti koje su ušle u model.

Nalazi ovog istraživanja su delimično u skladu sa apostrofiranim studijama. Posebno iznenađujući nalaz jeste otkriće da neto kamatna marža nema statistički značajan uticaj na uspeh poslovanja banaka, što je u suprotnosti sa očekivanjima i dominantnim nalazima velikog broja istraživanja.

Ključni nalaz ovog istraživanja jeste da stopa problematičnih kredita predstavlja najvažniju determinantu poslovanja banka u izabranim zemljama, kao i činjenica da pored analiziranih determinanti, uspeh poslovanja banaka u ovim zemljama određen je i ostalim faktorima poslovanja. Budućim istraživačima ostaje da otkriju koji su to faktori i ispituju njihov uticaj.

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Tabela A1 - Choi meta test

Variable	Choi meta test		
	Test	Vrednost	p-value
$ROA_{i,t}$	Inverse $\chi^2(8)$	19.736	0.011
	Inverse normal test	-2.740	0.003
	Logit test: t(24)	-2.736	0.005
$gdp_{i,t}$	Inverse $\chi^2(8)$	18.420	0.018
	Inverse normal test	-2.563	0.005
	Logit test: t(24)	-2.530	0.009
$unr_{i,t}$	Inverse $\chi^2(8)$	20.007	0.010
	Inverse normal test	-2.781	0.002
	Logit test: t(24)	-2.780	0.005
$inf_{i,t}$	Inverse $\chi^2(8)$	18.420	0.018
	Inverse normal test	-2.563	0.005
	Logit test: t(24)	-2.530	0.009
$HHI_{i,t}$	Inverse $\chi^2(8)$	18.622	0.017
	Inverse normal test	-2.591	0.004
	Logit test: t(24)	-2.562	0.008
$nlp_{i,t}$	Inverse $\chi^2(8)$	19.319	0.013
	Inverse normal test	-2.684	0.003
	Logit test: t(24)	-2.671	0.006
$nimr_{i,t}$	Inverse $\chi^2(8)$	19.319	0.013
	Inverse normal test	-2.865	0.002
	Logit test: t(24)	2.886	0.004
$cap_{i,t}$	Inverse $\chi^2(8)$	18.420	0.018
	Inverse normal test	-2.563	0.005
	Logit test: t(24)	-2.530	0.009
$llp_{i,t}$	Inverse $\chi^2(8)$	20.962	0.007
	Inverse normal test	-2.900	0.001
	Logit test: t(24)	-2.926	0.003

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DETERMINANTS OF BANK BUSINESS SUCCESS: A STUDY OF SELECTED CASES FROM FORMER YUGOSLAV COUNTRIES

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Abstract: The paper examines the determinants of bank business success by applying panel analysis to a sample of former Yugoslavia countries. The study spans the 2010-2020 period. This paper's primary goal is to find the most important factor influencing bank business success in former Yugoslavia using the proper panel analysis econometric model. The analysis's findings suggest that non-performing loans are the microeconomic component that has the biggest influence on bank business performance and that macroeconomic factors do not have a statistically significant impact on bank business success.

Keywords: bank business success; business determinants; macroeconomic factors; microeconomic factors; panel analysis; fixed effects method; random effects method

JEL classification: G21, C22, C52, C53

Introduction

Because of the importance of banks to the functioning of national economies and, more broadly, the stability of the international financial system, bank operations have been the subject of numerous papers and studies. A healthy banking system is widely recognized as a prerequisite for economic growth because it ensures macroeconomic stability, and liquid and profitable banks are the foundation of that stability (Ayadurai & Eskandari, 2018). As a result, the determinants of bank operations, particularly those affecting the rate of non-performing loans, the rise in moral hazard, and macroeconomic conditions, among other things, have remained a constant focus of the professional and academic public. However, despite the great interest in studying these factors, there is a dearth of works simultaneously focusing on exploring the influence of all the most significant macroeconomic and microeconomic factors determining the success of banks' operations. This is particularly evident in small developing financial markets. Due to the complexity of the banking system and bank operations, it is almost impossible to take all factors into account. Namely, the complexity of the banking industry makes the list of variables that affect their ability to succeed nearly endless, and it is reasonable to say that it grows greater every day. The international financial market underwent structural changes in the final years of the 20th century, which led to the deregulation and internationalization of bank operations, as well as the explosive growth of the derivatives market. As a result, banks have increased their offerings of financial services and trading activities, but they have also intensified debt-creditor agreements with customers who have poor credit ratings (Radivojević, 2014). New financial instruments, techniques, strategies and financial engineering have also emerged as a result of technological advancements and regulatory liberalization in the banking industry. These have all led to an ongoing expansion of the factors influencing bank business success.

Considering that all of the aforementioned factors have essentially encouraged banks to expand their business operations by entering industries that were either not traditionally considered banking or were not dominant in their operations, on the one hand, but have also resulted in the increase of banks' credit risk due to the easing of screening criteria and procedures for bad loans, the primary focus of the academic public, in terms of studying the bank success factors, was on the non-performing loans' determinants. Such research was conducted by Makri & Papadatos (2012), Makri *et al.* (2014), Moinescu (2012), Louzis *et al.* (2012), Stakic (2014), Radivojević & Jovović (2017). They concur that the yield rate of bad loans is an important factor in the success of bank operations because it affects the illiquidity and profitability of banks, which in turn affects macroeconomic stability, even though they have reached different conclusions about the impact of specific macroeconomic or microeconomic factors on the rate of non-performing loans (Hassan *et al.* 2011). Macroeconomic determinants of bank business success were the subject of research conducted by Athanasoglou *et al.* (2006; 2008), Pasiourias & Kosmidou (2007), Albertazzi & Gambacorta (2009), Sufian & Habibullah (2009), Vong & Chan (2009), Rekik & Kalai (2018), Rupeika-Apoga *et al.* (2018), Borges & Tavares (2020), and others. Within this paradigm, we are able to distinguish between two research groups. Studies that have investigated the effects of so-called broad macroeconomic factors, such as gross domestic product (GDP), inflation, unemployment, prices, exchange rates, levels of economic activity, volume of imports and exports, etc., make up the first group. Demirgüç-Kunt & Huizinga (1999), Athanasoglou *et al.* (2006; 2008), Anbar & Alper (2011), and others conducted this type of study. Dr. Athanasoglou *et al.* (2006; 2008) have found that the gross domestic product (GDP) has a significant and positive impact on bank operations.

Contrary to them, the findings of Demirgüç-Kunt & Huizinga (1999), Pasiourias & Kosmidou (2007), Sufian & Habibullah (2009) and Vong & Chan (2009) imply the absence of a statistically significant relationship between bank business success and economic growth. This is explained by the fact that in circumstances when economic activities strengthen, investors acquire investment funds from other sources, such as retained earnings or by issuing securities so that banks are not their primary sources of fresh capital. The importance of studying this determinant of bank operations is reflected in the research findings of Beltratti & Stulz (2012), Erkens *et al.* (2012), Serrano-Cinca *et al.* (2014), Adebambo *et al.* (2015), Cox *et al.* (2017), as well as Avkiran *et al.* (2018), who studied the performance of banks during the global economic crisis. The findings of these studies indicate that not all banks were equally affected by the crisis and the decline in GDP, which implies that some other factors may have a significant impact on business success.

Macroeconomic determinants of bank business success were the subject of research conducted by Athanasoglou *et al.* (2006; 2008), Pasiourias & Kosmidou (2007), Albertazzi & Gambacorta (2009), Sufian & Habibullah (2009), Vong & Chan (2009), Rekik & Kalai (2018), Rupeika-Apoga *et al.* (2018), Borges & Tavares (2020) and others. We may differentiate two groups of research within this framework. The first group comprises studies that have explored the impact of the so-called general macroeconomic determinants, such as gross domestic product (GDP), inflation, unemployment, prices, exchange rate, level of economic activity, the volume of imports and exports, etc. Such research was carried out by Demirgüç-Kunt & Huizinga (1999), Athanasoglou *et al.* (2006; 2008), Anbar & Alper (2011), and others. Dr. Athanasoglou *et al.* (2006; 2008) have found that the gross domestic product (GDP) has a significant and positive impact on bank operations. Contrary to them, the findings of Demirgüç-Kunt & Huizinga (1999), Pasiourias & Kosmidou (2007), Sufian & Habibullah (2009), and Vong & Chan (2009) imply the absence of a statistically significant relationship between bank business success and economic growth. This is explained by the fact that in circumstances when economic activities strengthen, investors acquire investment funds from other sources, such as retained earnings or by issuing securities, so banks are not their primary sources of fresh capital. The importance of studying this determinant of bank operations is reflected in the research findings of Beltratti & Stulz (2012), Erkens *et al.* (2012), Serrano-Cinca *et al.* (2014), Adebambo *et al.* (2015), Cox *et al.* (2017), as well as Avkiran *et al.* (2018), who studied the performance of banks during the global economic crisis. The findings of these studies indicate that not all banks were equally affected by the crisis and the decline in GDP, which implies that some other factors may have a significant impact on business success.

There are numerous academic articles about inflation. We also come across contradictory findings regarding this macroeconomic determinant of bank operations, ranging from its having a positive influence (Pan & Pan (2014), Tan & Floros (2012), Andries *et al.* (2016)) or a negative influence (Abreu & Mendes (2002) Sufian & Habibullah (2009), Sufian (2010)), Moyo & Tursoy (2020), to those who point out that the impact of this determinant depends on how correctly banks are able to predict the movement of the inflation rate. Thus, according to Perry (1992), if banks are effective in forecasting the rate of inflation, they will be able to alter interest rates and thereby improve their financial results. Contrary to Cetin (2019), who discovered a positive impact of inflation on the ROA of banks in developing countries, Hamadi & Awdeh (2012) did not identify any relationship between this determinant and bank business success.

According to Horobet *et al.* (2021), who studied the general macroeconomic factors that influence the success of banks in Central and Eastern Europe, the unemployment rate has a detrimental effect on bank business success.

The second (sub)group consists of research studies that focus on particular macroeconomic elements, such as the country's political risk, government interventions, institutional support for the growth of the banking sector, etc. The impact of government measures and deregulation on bank business success was the subject of research by Beck *et al.* (2010), Boustanifar (2014), Zakaria *et al.* (2015), and others. They have found that banking deregulation makes room for the entry of foreign banks and also benefits other areas of the economy by lowering unemployment rates, improving capital allocation, etc. However, it is challenging to make a direct and precise inference about their influence on bank performance based on their research. Similar findings were presented by Isfaq & Khan (2015). In contrast, Daly & Frikha (2017) found that macroeconomic factors associated with government interventions negatively affect the results of bank operations. Onofrei *et al.* (2018) specifically mention non-governmental loans as a significant determinant of the success of bank operations. According to Borges and Tavares (2020), a market's bank concentration has a favorable effect on how well businesses function. Their findings are consistent with the results of the research conducted by Goddard *et al.* (2004), Bikker & Bos (2005), Kosmidou *et al.* (2005), Pasiourias & Kosmidou (2007), and Trujillo-Ponce (2013). Pastor *et al.* (2000) and Hermes & Lensink (2004) explain this by the fact that the increased bank concentration, which is mostly the result of large foreign banks entering minor and developing markets, motivates domestic banks to enhance their operations. According to the findings of their study, domestic banks had much lower rates of non-performing loans in developing markets after the introduction of foreign banks. Hermes & Lensink (2004) point out that the increase in the concentration of banks also implies the introduction of new services, which fosters competition among banks to create new services and enhance their business operations. However, on the other hand, Barajas *et al.* (2000) and Clarke *et al.* (2000) draw attention to the drawbacks. The findings that banks are compelled to invest more money in business improvement, leading to an increase in operating costs that cannot be adequately covered, explain this. According to Clarke *et al.* (2000), this situation arises when foreign banks have special comparative advantages over domestic ones.

Studies that examined the microeconomic factors that influence bank operations make up a sizable portion of another enormous body of study. Such research mostly concentrated on the effects of sub-prime loans, operating expenses, capital adequacy rate, quality of bank assets, management quality, and attitude toward risk, among other things. Authors such as Barros *et al.* (2007), Chiorazzo *et al.* (2008), García-Herrero *et al.* (2009) and others state that in spite of the higher operational costs of managing a large loan portfolio, bank profitability should increase due to the granting of more loans. However, the latest research by Christaria & Kurnia (2016), Anastasiou *et al.* (2016), Akter & Roy (2017), Kingu *et al.* (2018), Petkovski *et al.* (2018), Khan & Ahmad (2017) and Horobet *et al.* (2021) clearly indicates that the increase in non-performing loans negatively affects bank profitability. Horobet *et al.* (2021) indicate that bad loans are the most important determinant of bank business success. On the other hand, Psaila *et al.* (2019) research results show that it is the bank's solvency rate. Similar findings were presented by Staikouras & Wood (2004), Capraru & Ihnatov (2014), and Curak *et al.* (2012).

Recent years have witnessed an increasing focus not only on management quality but also on the quality of the entire board of directors (King *et al.* (2016), Fernandes *et al.* (2017), Pereira & Filipe (2018)). Accordingly, Pereira & Filipe (2018) discovered that the level of education in bank management plays a major role in predicting business performance. Wyród-Wróbel & Biesok (2017), as well as Tailab (2020), have discovered that bank business success in a crisis depends dominantly on the management's ability to set priorities at the strategic and operational level, a key determinant of success. Salas & Saurina (2002) and Espinoza & Prasad (2010) examined the quality of bank management through the net interest margin in their research on the factors that influence non-performing loans, highlighting that it serves as an excellent gauge of how well the bank chooses to make investments. The positive impact of the net interest margin on bank performance was also shown by KuKaj *et al.* (2020). Radivojević & Jovović (2017) point out that the capital adequacy rate is also an important indicator of the quality of bank management because it reflects the management's attitude towards risk, while Stakić (2014) indicates that these are provisions for potential losses. The allocation of larger reserves reduces profitability, but on the other hand, the liquidity of the bank is strengthened in the medium term, so it is difficult to assess the true impact of this factor on bank business success.

The importance of the concurrent study of macroeconomic and microeconomic factors in bank operations is best illustrated by the results of the research by Sufian *et al.* (2012) who imply that macroeconomic factors such as credit risk, margin size, operating costs, bank size, etc. have different significance depending on the macroeconomic context in which banks operate. Similar findings have been reported by Horobet *et al.* (2021). They discovered that the impact of the determinants depends more on the rate of development of the financial sector than it does on the research period by examining studies that investigated the macroeconomic and microeconomic drivers of bank operations. The impact of business determinants differs between developed and underdeveloped financial markets. Awareness that the effects of certain bank operations' determinants, such as the inflation rate and the concentration rate, differ in European developing countries compared to other developing markets (Mirzaei *et al.* (2013), García-Herrero *et al.* (2009), Demirgüç-Kunt & Huizinga (1999), Sufian (2009), Horobet *et al.* (2021)) emphasize the need to examine their impact, especially for groups of countries that have similar characteristics.

With the aforementioned information in mind, the objective of this paper is to investigate the effects of those macroeconomic business determinants, such as GDP, inflation, unemployment, the concentration of banks on the market, and the (in)stability of the political environment, on the success of banks operating in the former Yugoslav republics. Microeconomic factors that have been cited by several writers as being crucial include non-performing loans, solvency, and the caliber of bank management are also the focus of this study. The Republic of Serbia, Montenegro, Bosnia and Herzegovina, and the Republic of Croatia were the four former Yugoslav nations used as a sample for the study.

Data and Research Methodology

As already pointed out, the main objective of this study is to evaluate the impact of key macroeconomic and microeconomic determinants on the success of banks operating in the countries of former Yugoslavia: the Republic of Serbia, Montenegro, Bosnia and Herzegovina and Croatia. The study spans the years 2010 to 2020. The Federal Reserve Bank of Saint Louis, the World Bank, the Bank for International Settlements, and the Eurostat database's official websites were used to gather the data needed for the study. Panel analysis of unbalanced panel data is used to examine the impact of key determinants on bank business success. Key factors of bank business success are examined using panel analysis of unbalanced panel data. This method of analysis was used because it enables the co-optation of bank behaviour patterns as a unit of observation, over the course of the research period.

Taking into account the statements made by Chandler & Hanks (1996) and Curcic *et al.* (2020), it is not unexpected that most research studies on the factors influencing business performance define it in terms of profitability. Academic communities argue over which metric best represents a bank's performance when it comes to operations: ROA or ROE. It is ROA, according to authors like Krakah & Ameyaw (2010), because capital multipliers have no bearing on it. In contrast, proponents of ROE contend that off-balance sheet assets are a substantial source of profit. This is particularly clear in the way that European banks operate. Nevertheless, despite these drawbacks, ROA is used in this article to measure bank business success. However, despite its limitations, for the purpose of this paper, bank business success is expressed through ROA. This decision is consistent with the writings of Demirgüç-Kunt & Huizinga (1999), Athanasoglou *et al.* (2006), as well as Capraru & Ikhmatov (2014), Borgesa & Taverna (2020), and others.

According to the authors referenced in the introduction, the GDP rate, which has been turned into a logarithmic function and, as such, depicts GDP growth over time, is used in this research to express GDP for the purposes of this study. The success of the bank industry is anticipated to be positively impacted by the GDP growth rate. The inflation rate serves as a measure of inflation. It is anticipated that the inflation rate and bank business success will be negatively connected. While the concentration of banks in the market is indicated by the use of the concentration index, which varies from 0 to 100, unemployment is expressed through the unemployment growth rate and is also anticipated to negatively affect bank business success.

Indicators of macroeconomic stability are frequently used to indicate the (in)stability of the political environment, a complex setting that impacts all participants in economic activity. However, for the purposes of this article, the index of political risk is used instead. In other words, despite the low values of macroeconomic stability indicators, the findings of Papović *et al.* (2020) suggest that foreign investors frequently make specific investments because of favorable institutional backing, as an expression of the will of the people who created the political environment. This implies that additional signs of political risk must be considered when defining how banks operate. The *Political Stability Index* was chosen for the purposes of this article because of this.

The ratio of non-performing loans to the bank's total loans is used in this study as a measure of non-performing loans. The capital adequacy rate is used to convey this factor in determining business performance since it is a reliable indicator of the bank's solvency and has a strong correlation with leverage. The net margin rate and the rate of reserves to cover prospective losses were also included in the study along with these two variables as indicators of the management effectiveness and risk-taking mindset of the bank.

A higher rate of net margin is anticipated to have a favorable impact on bank business success, whereas a larger rate of reserves to cover probable losses is anticipated to have a negative impact.

An econometric model that can be presented as follows was created for this study's purposes:

$$ROA_{i,t} = \beta_1 + \beta_2gdp_{i,t} + \beta_3unr_{i,t} + \beta_4inf_{i,t} + \beta_5HHI_{i,t} + \beta_6IPR_{i,t} + \beta_7npl + \beta_8nimr + \beta_9cap + \beta_7llp + \varepsilon_{i,t} \quad (1)$$

In that case:

- $ROA_{i,t}$ - Return on assets for country i in (t) time period
- $gdp_{i,t}$ - Gross domestic product rate for country i in (t) time period
- $unr_{i,t}$ - Unemployment rate for country i in (t) time period
- $inf_{i,t}$ - Inflation rate for country i in (t) time period
- $HHI_{i,t}$ - Herfindahl–Hirschman Index for country i in (t) time period
- $IPR_{i,t}$ - Political stability index for country i in (t) time period
- $npl_{i,t}$ - Net non-performing loan rate for country i in (t) time period
- $npl_{i,t}$ - et interest margin rate for country i in (t) time period
- $nimr_{i,t}$ - Capital adequacy ratio for country i in (t) time period
- $cap_{i,t}$ - Rate of loan loss reserves
- $llp_{i,t}$ - error of model
- $\varepsilon_{i,t}$

Empirical Analysis and Discussion of the Results

The descriptive statistics results for the data set are displayed in Table 1. The ROA ranges from -4,342 to 2,308, which indicates a significant difference between banks' minimum and maximum profitability levels. The extremely high value of the ROA standard deviation further supports this. The negative value of the coefficient of asymmetry in combination with the very high value of the coefficient of kurtosis indicates a higher probability of getting negative business results in the future than positive ones. However, the variable's positive value shows that, on average, banks in these countries operated successfully during the observed period. A blatant indication of the disparities in economic development between these countries throughout the period observed is the big difference between the GDP's maximum and minimum values as well as its large standard deviation. Despite the fact that throughout the observed period all countries achieved GDP growth, the negative asymmetry coefficient value should raise some red flags. High unemployment rates indicate that these countries are facing a problem with unemployment, while, despite the wide variation between the minimum and maximum values of the inflation rate, the comparatively low average value of the *inf* variable shows that these countries did not experience severe inflation issues. However, the high values of the descriptive statistics for the concentration index indicate a high concentration, i.e. relatively low competition among banks, which is not good from the perspective of clients, but from the perspective of bank operations, it can represent a determinant that will have a positive sign, because a relatively small number of banks manage to achieve large market shares. Relatively low and even negative values of the political stability index imply an unstable macroeconomic environment, which can have a negative impact on banks' operations. The relatively high descriptive statistics values of problem loans point to a great potential in non-performing loans, which will have a negative impact on business success. Hence, this determinant is expected to have a detrimental impact on bank business success, despite the assertions made by Barros *et al.* (2007), Chiorazzo *et al.* (2008), and Garca-Herrero *et al.* (2009) that a rise in the loan portfolio will result in higher revenues for banks.

Relatively high values for llp and cap reveal the management's relative aversion to risk and tendencies towards a conservative business policy. A higher value of llp is expected to negatively affect bank business success due to the fact that a larger portion of the funds is frozen, and that the cap as a measure of solvency has a positive impact. Surprisingly, both the rate of net interest margins and the coefficient of asymmetry for this variable have negative values, suggesting that active interest rates may be lower than passive ones in the future.

Table 1 - Selected Variables' Descriptive Statistics

	$ROA_{i,t}$	$gdp_{i,t}$	$unr_{i,t}$	$inf_{i,t}$	$HHI_{i,t}$	$IPS_{i,t}$	$nlp_{i,t}$
mean	0.465	1.198	17.792	1.774	67.925	0.105	12.808
St. deviation	1.063	3.629	5.704	2.515	11.172	0.446	5.128
kurtosis	9.430	9.660	-0.432	4.008	-1.325	-0.727	-0.959
skewness	-2.359	-2.661	0.165	1.714	-0.046	-0.104	0.045
Minimum	-4.342	-15.307	6.620	-1.584	49.435	-0.900	3.700
Maximum	2.308	5.078	28.010	11.137	90.964	0.800	21.600
N. obs.	44	44	44	44	44	32	44
	$nimr_{i,t}$	$cap_{i,t}$	$llp_{i,t}$				
mean	4.710	14.227	75.172				
St. deviation	2.413	4.108	27.170				
kurtosis	9.663	-0.949	-0.755				
skewness	-2.125	0.355	0.621				
Minimum	-6.444	8.231	38.799				
Maximum	8.619	20.890	133.600				
N. obs.	44	44	44				

Source: Authors

A correlation study between the variables was conducted in order to find any potential multicollinearity issues. The correlation matrix is displayed in Table 2. Since there is a strong correlation between the IPS variable and the HHI , the IPS variable was left out of further analysis.

Table 2 - Correlation Matrix

	$ROA_{i,t}$	$gdp_{i,t}$	$unr_{i,t}$	$inf_{i,t}$	$HHI_{i,t}$	$IPS_{i,t}$	$nlp_{i,t}$	$nimr_{i,t}$	$cap_{i,t}$	$llp_{i,t}$
$ROA_{i,t}$	1.000									
$gdp_{i,t}$	0.195	1.000								
$unr_{i,t}$	-0.071	0.031	1.000							
$inf_{i,t}$	0.012	0.050	0.165	1.000						
$HHI_{i,t}$	-0.254	-0.134	-0.408	-0.246	1.000					
$IPS_{i,t}$	-0.249	0.010	-0.403	0.046	0.815	1.000				
$nlp_{i,t}$	-0.288	0.096	0.466	0.340	0.106	0.329	1.000			
$nimr_{i,t}$	-0.376	-0.051	0.016	-0.034	0.498	0.268	0.163	1.000		
$cap_{i,t}$	0.137	0.039	-0.057	0.423	-0.584	-0.185	0.122	-0.360	1.000	
$llp_{i,t}$	0.306	0.097	-0.031	-0.301	0.482	0.009	-0.093	0.246	-0.722	1.000

Source: Authors

A valid application of panel analysis implies that the data series exhibit the properties of stationarity. For this reason, the paper tested the presence of a unit root in panel data using the Levin–Lin–Chu (LLC) test. The findings in Table 3 show that the baseline levels of the *HHI*, *cap* and *llp* variables do not exhibit stationary behaviour. The results obtained suggest that the differentiation technique should be used to convert the series of these variables into stationary ones. Although it is usual practice to employ this type of test in macroeconomics and international finance (Choi, 2001), the LLC test's application in time series analysis is constrained by the assumption that all components have the same autoregression coefficient. For this reason, additional stationarity testing was carried out in this paper, using the KPSS test, a method that was suggested by Choi (2001) and is based on the so-called meta-analysis. The results are displayed in Table 1A of the paper's appendix. The variables were changed into stationary ones in light of these findings.

Table 3 - LLC Test Results

Variable		LLC test
<i>ROA_{i,t}</i>	Level	0,0240
	1. Differential	-
<i>gdp_{i,t}</i>	Level	0,0101
	1. Differential	-
<i>unr_{i,t}</i>	Level	0,0001
	1. Differential	-
<i>inf_{i,t}</i>	Level	0,0003
	1. Differential	-
<i>HHI_{i,t}</i>	Level	0,621
	1. Differential	0,000***
<i>nlp_{i,t}</i>	Level	0,018
	1. Differential	-
<i>nimr_{i,t}</i>	Level	0,002
	1. Differential	
<i>cap_{i,t}</i>	Level	0,141
	1. Differential	0,000***
<i>llp_{i,t}</i>	Level	0,844
	1. Differential	0,000***

Source: Authors

The fixed effects (FE) and random effects (RE) methods were employed to assess the model's parameters using two-panel data evaluators (1). Table 4 displays the outcomes of the model parameter evaluation.

Table 4 - Estimates of Model Parameters (1)

FE method					
Variable	Coefficient	St. error	t-ratio	p-value	
const.	3,022	3,893	0,776	0,447	
$gdp_{i,t}$	0,001	0,024	0,034	0,974	
$unr_{i,t}$	-0,013	0,049	-0,256	0,801	
$inf_{i,t}$	-0,041	0,068	-0,600	0,556	
$HHI_{i,t}$	-0,053	0,035	-1,526	0,143	
$nlp_{i,t}$	-0,094	0,034	-2,785	0,012	**
$nimr_{i,t}$	0,168	0,112	1,497	0,151	
$cap_{i,t}$	-0,048	0,167	-0,290	0,775	
$llp_{i,t}$	0,031	0,028	1,115	0,279	
Joint test on named regressors $P(F(9, 19) > 6.388) = 0.000$					
Test for differing group intercepts $P(F(3, 19) > 0.427) = 0.735$					
LSDV $R^2 = 0.773$					
Within $R^2 = 0,751$					
Test of normality distribution of residuals: $\chi^2(2) = 1.312 (0.518)$					
Durbin-Watson = 2.513					
RE method					
Variable	Coefficient	St. error	t-ratio	p-value	
konstanta	3,040	3,446	0,882	0,37	
$gdp_{i,t}$	0,006	0,021	0,265	0,791	
$unr_{i,t}$	-0,030	0,038	-0,799	0,425	
$inf_{i,t}$	-0,054	0,061	-0,879	0,380	
$HHI_{i,t}$	-0,052	0,030	-1,742	0,081	**
$nlp_{i,t}$	-0,091	0,030	-2,980	0,003	***
$nimr_{i,t}$	0,142	0,098	1,451	0,147	
$cap_{i,t}$	0,034	0,116	0,294	0,769	
$llp_{i,t}$	0,020	0,020	0,995	0,320	
Joint test on named regressors: $\chi^2(9) = 63.632 (0.000)$					
Breusch-Pagan test: $\chi^2(1) = 2.250 (0.133)$					
Hausman test: $\chi^2(3) = 1.134 (0.768)$					
$R^2 = 0.510$					
Test of normality distribution of residuals $\chi^2(2) = 3.317 (0.190)$					
Durbin-Watson = 2.513					

Note: ***, **, * indicate significance level of 1%, 5% and 10% respectively.

Source: Authors

The results of the joint test of the selected regressors indicate that both models are correctly specified, that is, the right regressors have been chosen. Since there is no uniquely accurate way of calculating the coefficient of determination when it comes to the FE model, the LSDV coefficient of determination was calculated in the paper, as well as the so-called “within” coefficient of determination. According to the values of the two coefficients, the model’s chosen variables may account for more than 70% of the variation in the dependent variable. The test of normality of the distribution of residuals and the autocorrelation of residuals of the FE model both indicate the adequacy of the model. The value of Hausman’s test, however, suggests that the RE approach is superior to the FE method for evaluating model parameters. On the other hand, the RE model has a significantly lower coefficient of determination ($R^2 = 0.510$). The test for normality in the residual distribution and the autocorrelation of the residuals in the RE model indicate that the model is adequate.

Estimates of model parameters (1) derived by applying both methodologies indicate that the rate of non-performing loans is a key factor in business success. With each 1% increase in this rate, bank profitability will decline by about 0.09%. This finding is consistent with the findings of Christaria & Kurnia (2016), Anastasiou *et al.* (2016), Akter & Roy (2017) Kingu *et al.* (2018), Petkovski *et al.* (2018) and Khan & Ahmad (2017). The findings from this paper support the view of Horobet *et al.* (2021) that problem loans are the most important determinant of bank business success since the estimates of model parameters (1) demonstrate that cap is not a statistically significant variable, implying that solvency, which Psaila *et al.* (2019) claim to be a more significant determinant in relation to the rate of non-performing loans is not so. According to the analysis of the model parameter estimate (1), concentration plays a significant role in predicting bank business success. The fact that the coefficient for the *HHI* variable is negative suggests that any rise in bank competition, or decrease in concentration, has a positive effect on bank operations. This can be explained by the fact that new competitors force banks to invest more in improving business efficiency. This finding is consistent with the findings of Clarke *et al.* (2000), even though they explain the reasons for the negative impact of increased concentration in the fact that the entry of large, foreign banks into the domestic market forces domestic banks to invest more in enhancing their services, which significantly increases their operating costs.

The analysis revealed that other determinants have little influence on how successfully banks operate. This result is not unexpected in the context of macroeconomic determinants, as studies have shown that certain macroeconomic determinants did not, despite predictions, have a statistically significant impact. This is particularly evident when considering how inflation, unemployment, and economic growth affect the economy. It is surprising, nonetheless, that the research showed that the net interest margin does not have a statistically significant impact on how well banks operate. This may imply that banks implemented bad investment policies in the previous period, that is, that they generated significant income through activities that are not traditionally banking-dominant. The reason for this result may also be attributed to the model’s flaws. Namely, despite the expectation that countries have their own specificities that affect bank business success (heterogeneity between observation units) that can be co-opted using the FE method, or the RE method, the value of the common segment test, i.e. the Breusch-Pagan test, implies that for evaluating the parameters of the model, the best evaluator is the so-called Pooled OLS. For this reason, the evaluations were made using that evaluator. Table 5 displays the results of the model estimation (1) using Pooled OLS.

Table 5 - Estimates of Model Parameters (1) Obtained by Applying the Pooled OLS Method

Pooled OLS method					
Variable	Coefficient	St. error	t-racio	p-value	
konstanta	3,568	1.691	2.109	0.047	**
$gdp_{i,t}$	0,007	0.020	0.339	0.738	
$unr_{i,t}$	-0,033	0.029	-1.148	0.263	
$inf_{i,t}$	-0,067	0.053	-1.268	0.218	
$HHI_{i,t}$	-0,062	0.020	-3.172	0.004	***
$nlp_{i,t}$	-0,087	0.026	-3.291	0.003	***
$nimr_{i,t}$	0,104	0.067	1.559	0.133	
$cap_{i,t}$	0,081	0.036	2.243	0.035	**
$llp_{i,t}$	0,015	0.006	2.397	0.025	**
$R^2 = 0.757$					
Test of normality distribution of residuals $\chi^2(2) = 0.717 (0.698)$					
Durbin-Watson = 0.698					

Note: ***, **, * indicate significance level of 1%, 5% and 10% respectively.

Source: Authors

Contrary to expectations, the study of the estimate of the model parameters (1) shown in table 5 indicates that the net interest margin does not have a statistically significant effect on business success. The analysis further implies that bank business success in the surveyed countries depends on problem loans, the level of market competition, as well as the capital adequacy rate, and the rate of reserves to cover potential losses. The results obtained are consistent with the findings of numerous authors. The other determinants were not found to have a statistically significant influence.

The relatively low coefficient of determination (R^2), however, suggests caution in terms of the findings. Namely, the value of this model adequacy indicator reveals that the independent variables included in the model manage to account for only about 70% of the variation in ROA. This suggests that there are additional macroeconomic and microeconomic factors that influence the success of these banks' operations and that the number of variables included is insufficient. Unfortunately, the availability of data was a serious limitation in this research, and for that reason, it was not possible to include a larger number of determinants in the model.

Conclusion

This paper examines the impact of those macroeconomic and microeconomic determinants of bank business success that were identified in literature as the key ones. The research was conducted on a sample of banks operating in the selected countries of the republics of former Yugoslavia: The Republic of Serbia, Montenegro, Bosnia and Herzegovina, and the Republic of Croatia. The study spans the period from 2010 to 2020. In addition to the requirement that macroeconomic and microeconomic determinants are identified as key in the literature and that there are conflicting findings regarding their influence on bank business success, the availability of data was a key factor when choosing the determinants that entered the model.

The findings of this research are partially consistent with the apostrophized studies. Contrary to expectations and the dominant findings of a large number of studies, a particularly surprising finding is the discovery that the net interest margin does not have a statistically significant effect on bank business success. The key finding of this study is that the rate of non-performing loans is the most important determinant of bank operations in the selected countries, as well as the fact that in addition to the determinants that were examined, there are other factors that also play a role in bank business success in these countries. It remains for future researchers to discover what these factors are and analyze their effects.

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Tabela A1 - Choi meta test

Varijable	Choi meta test		
	Test		p-value
$ROA_{i,t}$	Inverse $\chi^2(8)$	19.736	0.011
	Inverse normal test	-2.740	0.003
	Logit test: t(24)	-2.736	0.005
$gdp_{i,t}$	Inverse $\chi^2(8)$	18.420	0.018
	Inverse normal test	-2.563	0.005
	Logit test: t(24)	-2.530	0.009
$unr_{i,t}$	Inverse $\chi^2(8)$	20.007	0.010
	Inverse normal test	-2.781	0.002
	Logit test: t(24)	-2.780	0.005
$inf_{i,t}$	Inverse $\chi^2(8)$	18.420	0.018
	Inverse normal test	-2.563	0.005
	Logit test: t(24)	-2.530	0.009
$HHI_{i,t}$	Inverse $\chi^2(8)$	18.622	0.017
	Inverse normal test	-2.591	0.004
	Logit test: t(24)	-2.562	0.008
$nlp_{i,t}$	Inverse $\chi^2(8)$	19.319	0.013
	Inverse normal test	-2.684	0.003
	Logit test: t(24)	-2.671	0.006
$nimr_{i,t}$	Inverse $\chi^2(8)$	19.319	0.013
	Inverse normal test	-2.865	0.002
	Logit test: t(24)	2.886	0.004
$cap_{i,t}$	Inverse $\chi^2(8)$	18.420	0.018
	Inverse normal test	-2.563	0.005
	Logit test: t(24)	-2.530	0.009
$llp_{i,t}$	Inverse $\chi^2(8)$	20.962	0.007
	Inverse normal test	-2.900	0.001
	Logit test: t(24)	-2.926	0.003

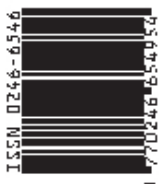
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ANALIZA FINANSIJSKIH PERFORMANSI I EFIKASNOSTI BANAKA U SRBIJI KORIŠĆENJEM FUZZY LMAW I MARCOS METODA

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Rezime: Vrlo je izazovno istraživanje faktora efikasnosti banaka. Imajući to u vidu, u ovom radu se analiziraju finansijske performanse i efikasnost banaka u Srbiji na bazi fuzzy LMAW-MARCOS metoda. Dobijeni empirijski rezultati pokazuju da u top pet banaka spadaju po redosledu: Banca Intesa, OTP Banka Srbija, Komercijalna banka, Mobi Banka i NLB banka. U loše pozicionirane banke spadaju po redosledu: Mirabank, API banka, Srpska banka, 3 Banka i Addiko Bank. Na efikasnost banaka u Srbiji u značajnoj meri je, pored ostalog, uticala pandemija korona virusa Covid-19. U cilju unapređenja finansijskih performansi i efikasnosti banaka u Srbiji u budućnosti, neophodno je što efikasnije upravljati faktorima procesa rada (ljudskim kapitalom, aktivom i kapitalom), prodajom bankarskih proizvoda i profitom. U tome značajnu ulogu ima i digitalizacija celokupnog bankarskog poslovanja.

Ključne reči: banka; FLMAW-MARCOS metoda; finansijske performanse; efikasnost; Srbija

JEL klasifikacija: D40, G21

Uvod

Istraživanje faktora finansijskih performansi i efikasnosti banaka vrlo je aktuelno, značajno i složeno. U ovom radu se, s obzirom na to, kao predmet istraživanja, analizira uticaj broja zaposlenih, aktive, kapitala, prihoda i profita na finansijske performanse efikasnosti banaka u Srbiji. Pri tome se primenjuju FLMAW-MARCOS metoda. Cilj i svrha toga je da se što bolje sagleda uticaj analiziranih faktora na finansijske performanse i efikasnost banaka u Srbiji u cilju unapređenja u budućnosti primenom adekvatnih mera.

Literatura posvećena razvoju i značaju primene DEA modela vrlo je bogata (Andersen, 1993; Banker, 1984; Chen, 2021; Chang, 2020; Guo, 2020; Lee, 2011; Lin, 2020; Pendharkar, 2021; Tone, 2002; Podinovski, 2021; Rostamzadeh, 2021; Fenyves, 2020; Tsai, 2021). Oni se vrlo uspešno primenjuju i u analizi efikasnosti banaka i osiguravajućih kompanija (Savić, 2012; Maletić, 2013; Radojičić, 2018; Cvetkoska, 2017, 2020, 2021; Lukic, 2017; 2018a,b, 2021; 2021). Isto tako, prilikom analize finansijskih performansi i efikasnosti banaka sve više se primenjuju, integralno ili pojedinačno, i različiti metodi višekriterijumskog odlučivanja (Ünlü, 2022; Ali, 2022). Sva relevantna literatura u ovom radu se koristi kao teorijsko-metodološka i empirijska osnova za analizu finansijskih performansi i efikasnosti banaka u Srbiji pomoću FLMAW-MARCOS metoda.

Samo kontinuirano praćenje finansijskih performansi i efikasnosti banaka u Srbiji omogućuje unapređenje u budućnosti primenom adekvatnih mera. U tome se manifestuje osnovna istraživačka hipoteza u ovom radu.

U metodološkom smislu te reči, značajnu ulogu u tome ima primena FLMAW-MARCOS metoda. U radu se u izvesnoj meri koristi i statistička analiza.

Potrebni empirijski podaci za istraživanje tretiranog problema u ovom radu su prikupljeni od Narodne banke Srbije. Oni su usklađeni sa relevantnim međunarodnim standardima, tako da u pogledu komparacije ne postoje nikakva ograničenja.

1. Metodologija

Logaritamska metodologija aditivnih težina koristi se za utvrđivanje težinskih koeficijenata i rangiranje alternativa. **Fuzzy logaritamska metodologija aditivnih težina** (Fuzzy Logarithm Methodology of Additive Weights – FLMAW) je zasnovana na primeni trouglastih fuzzy brojeva (Božanić et al., 2022; Pamučar, 2021; Puška, 2022). FLMAW metoda odvija se kroz šest koraka (Božanić et al., 2022).

Korak1. Formiranje inicijalne (ekspertske) matrice odlučivanja ($\tilde{X}^e$)

U ovom koraku svaki ekspert (e) iz grupe k eksperata ($1 \leq e \leq k$) definiše jednu matricu odlučivanja evaluacijom m alternativa $A = \{A_1, A_2, \dots, A_m\}$ u odnosu na n kriterijuma $C = \{C_1, C_2, \dots, C_n\}$. Dakle, za svakog eksperta dobijena je matrica $\tilde{X}^e = [\tilde{\vartheta}_{ij}^e]_{m \times n}$, gde $\tilde{\vartheta}_{ij}^e$ predstavlja fuzzy vrednost zasnovana na ekspertskoj e vrednosti i -te alternative u odnosu na j -ti kriterijum. Evaluacija je bazirana na kvantitativnim indikatorima ili fuzzy lingvističkih deskriptora u zavisnosti od vrste kriterijuma.

Korak 2. Formiranje inicijalne (agregatne) matrice odlučivanja ($\tilde{x}$)

Agregacija početnih (ekspertskih) matrica u jednu agregiranu matricu se vrši primenom Bonferroni agregatora na sledeći način:

$$\tilde{\vartheta}_{ij} = \left(\frac{1}{k(k-1)} \right) \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\vartheta}_i^{(e)p} \tilde{\vartheta}_j^{(e)q}$$

$$= \left\{ \left(\frac{k}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \vartheta_i^{(l_e)p} \vartheta_j^{(l_e)q} \right)^{\frac{1}{p+q}}, \left(\frac{k}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \vartheta_i^{(m_e)p} \vartheta_j^{(m_e)q} \right)^{\frac{1}{p+q}}, \left(\frac{k}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \vartheta_i^{(r_e)p} \vartheta_j^{(r_e)q} \right)^{\frac{1}{p+q}} \right\} \quad (1)$$

gde $\tilde{\vartheta}_{ij}$ predstavlja agregiranu vrednost dobijenu primenom Bonferroni agregatora; $p, q \geq 0$ stabilizacione parametre Bonferroni agregatora, e - e -toga eksperta $1 \leq e \leq k$, l - leva distribucija fuzzy broja, r - desna distribucija fuzzy broja, i m - vrednost pri kojoj je funkcija pripadnosti fuzzy broju jednaka jedan. Pre agregacije vrši se kvantifikacija lingvističkih kriterijuma.

Korak 3. Normalizacija elemenata inicijalne matrice

Normalizovana matrica $\sim = [\tilde{\vartheta}_{ij}]_{m \times n}$ dobija se na sledeći način:

$$\tilde{\vartheta}_{ij} = \begin{cases} 1 + \frac{\tilde{\vartheta}_{ij}}{\tilde{\vartheta}_j^{(+)}} = \left(1 + \frac{\vartheta_{ij}^{(l)}}{\vartheta_j^{(+)}} , 1 + \frac{\vartheta_{ij}^{(m)}}{\vartheta_j^{(+)}} , 1 + \frac{\vartheta_{ij}^{(r)}}{\vartheta_j^{(+)}} \right) & \text{if } i \in B, \\ 1 + \frac{\tilde{\vartheta}_{ij}^-}{\tilde{\vartheta}_{ij}} = \left(1 + \frac{\vartheta_j^-}{\vartheta_{ij}^{(r)}} , 1 + \frac{\vartheta_j^-}{\vartheta_{ij}^{(m)}} , 1 + \frac{\vartheta_j^-}{\vartheta_{ij}^{(l)}} \right) & \text{if } i \in C \end{cases} \quad (2)$$

gde $\tilde{\vartheta}_{ij}$ predstavlja normalizovanu vrednost inicijalne matrice odlučivanja, pri čemu je $\vartheta_j^+ = \max(\tilde{\vartheta}_j^{(r)})$, i $\vartheta_j^- = \min(\tilde{\vartheta}_j^{(l)})$, l - levu distribuciju fuzzy broja, r - desnu distribuciju fuzzy broja, i m - vrednost pri kojoj je funkcija pripadnosti fuzzy broja jednaka jedan.

Korak 4. Determinisanje težinskih koeficijenata kriterijuma

U cilju određivanja težinskih koeficijenata kriterijumima treba da budu angažovani određeni eksperti $E = \{E_1, E_2, \dots, E_k\}$.

Korak 4.1 Određivanje prioriteta kriterijuma

Na osnovu vrednosti unapred definisanoj fuzzy lingvističkoj skali eksperti određuju prioritete kriterijumima $C=\{C_1, C_2, \dots, C_n\}$. Pri tom se kriterijumu visokog značaja pripisuje veća vrednost iz fuzzy lingvističke skale, i obrnuto. Na ovaj način definisani su vektori prioriteta $\tilde{P}^e = (\tilde{\gamma}_{C_1}^e, \tilde{\gamma}_{C_2}^e, \dots, \tilde{\gamma}_{C_n}^e)$, posebno za svakog ekspeta, gde $\tilde{\gamma}_{C_n}^e$ predstavlja vrednost iz fuzzy lingvističke skale koju ekspert e ($1 \leq e \leq k$) označi za kriterijum n .

Korak 4.2 Definisanje apsolutne fuzzy anti-idealne tačke (γ_{AIP})

Ovu vrednost definiše donosilac odluke, i predstavlja fuzzy broj koji je manji od najmanje vrednosti iz skupa svih vektora prioriteta.

Korak 4.3 Definisanje fuzzy relacionog vektora $\tilde{R}^e$

Relacija između elemenata vektora prioriteta i apsolutne anti-idealne tačke (γ_{AIP}) determiniše primenom sledeće jednačine:

$$\tilde{n}_{C_n}^e = \left(\frac{\tilde{\gamma}_{C_n}^e}{\tilde{\gamma}_{AIP}} \right) = \left(\frac{\gamma_{C_n}^{(l)e}}{\gamma_{AIP}^{(r)}} , \frac{\gamma_{C_n}^{(m)e}}{\gamma_{AIP}^{(m)}} , \frac{\gamma_{C_n}^{(r)e}}{\gamma_{AIP}^{(l)}} \right) \quad (3)$$

Primenom ove jednačine, relacioni vektor eksperta e ($1 \leq e \leq k$) dobijen je: $\omega_j^e = (\tilde{\omega}_1^e, \tilde{\omega}_2^e, \dots, \tilde{\omega}_n^e)^T$,

Korak 4.4 Determinisanje težinskih koeficijenata vektora $\omega_j^e = (\tilde{\omega}_1^e, \tilde{\omega}_2^e, \dots, \tilde{\omega}_n^e)^T$, posebno za svakog eksperta.

Fuzzy vrednost težinskih koeficijenata kriterijuma za e ($1 \leq e \leq k$) dobija se primenom sledeće jednačine:

$$\tilde{\omega}_j^e = \left(\frac{\ln(\tilde{n}_{C_n}^e)}{\ln(\prod_{j=1}^n \tilde{n}_{C_n}^e)} \right) = \left(\frac{\ln(n_{C_n}^{(l)e})}{\ln(\prod_{j=1}^n n_{C_n}^{(r)e})} , \frac{\ln(n_{C_n}^{(m)e})}{\ln(\prod_{j=1}^n n_{C_n}^{(m)e})} , \frac{\ln(n_{C_n}^{(r)e})}{\ln(\prod_{j=1}^n n_{C_n}^{(l)e})} \right) \quad (4)$$

gde $\tilde{n}_{C_n}^e$ predstavlja element relacionog vektora R^e , $n_{C_n}^{(l)e}$ levu distribuciju fuzzy vektora prioriteta, $n_{C_n}^{(r)e}$ desnu distribuciju fuzzy vektora prioriteta, i $n_{C_n}^{(m)e}$ vrednost pri kojoj je funkcija pripadnosti fuzzy vektora prioriteta jednaka jedan.

Korak 4.5 Izračunavanje težinskih koeficijenata agregiranih fuzzy vektora $\omega_j = (\tilde{\omega}_1, \tilde{\omega}_2, \dots, \tilde{\omega}_n)^T$

Težinski koeficijenti agregiranih fuzzy vektora $\omega_j = (\tilde{\omega}_1, \tilde{\omega}_2, \dots, \tilde{\omega}_n)^T$ određuju se primenom Boneferoni agregatora (Yager, 2009) kao

$$\tilde{\omega}_j = \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(e)p} \tilde{\omega}_j^{(e)q} \right)^{\frac{1}{p+q}}$$

$$= \left\{ \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(le)p} \tilde{\omega}_j^{(le)q} \right)^{\frac{1}{p+q}}, \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(me)p} \tilde{\omega}_j^{(me)q} \right)^{\frac{1}{p+q}}, \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(re)p} \tilde{\omega}_j^{(re)q} \right)^{\frac{1}{p+q}} \right\} \quad (5)$$

gde $p, q \geq 0$ predstavlja stabiliozacione parametre Bonoferroni agregatora, $\tilde{\omega}_j^e$ težinske koeficijente dobijene na bazi pocene e-tog eksperta $1 \leq e \leq k$, $\omega_j^{(le)}$ levu distribuciju fuzzy težinskih koeficijenata $\tilde{\omega}_j^e$, $\omega_j^{(re)}$ desnu distribuciju fuzzy težinskih koeficijenata $\tilde{\omega}_j^e$, i $\omega_j^{(me)}$ i pravu vrednost pri kojoj je funkcija fuzzy težinskog koeficijenta $\tilde{\omega}_j^e$ jednaka jedan.

Korak 4.6 Izračunavanje konačnih vrednosti težinskih koeficijenata $\omega_j = (\omega_1, \omega_2, \dots, \omega_3)^T$

Izračunavanje finalne vrednosti težinskih koeficijenata kriterijuma vrši se defuzifikacijom na sledeći način:

$$\omega_j = \frac{l+4m+r}{6} \quad (6)$$

Korak 5. Izračunavanje težinske matrice (N)

Elementi težinske matrice $N = [\xi_{ij}]_{m \times n}$ dobijeni su na sledeći način:

$$\xi_{ij} = \frac{2\tilde{\varphi}_{ij}^{\omega_j}}{(2 - \tilde{\varphi}_{ij})^{\omega_j} + \tilde{\varphi}_{ij}^{\omega_j}} = \left(\frac{2\varphi_j^{(l)\omega_j}}{(2 - \varphi_j^{(r)})^{\omega_j} + \varphi_j^{(r)\omega_j}}, \frac{2\varphi_j^{(m)\omega_j}}{(2 - \varphi_j^{(m)})^{\omega_j} + \varphi_j^{(m)\omega_j}}, \frac{2\varphi_j^{(r)\omega_j}}{(2 - \varphi_j^{(l)})^{\omega_j} + \varphi_j^{(l)\omega_j}} \right) \quad (7)$$

gde je

$$\tilde{\varphi}_{ij} = \frac{\ln(\tilde{\vartheta}_{ij})}{\ln(\prod_{i=1}^m \tilde{\vartheta}_{ij})} = \left(\frac{\ln(\vartheta_{ij}^{(l)})}{\ln(\prod_{i=1}^m \vartheta_{ij}^{(r)})}, \frac{\ln(\vartheta_{ij}^{(m)})}{\ln(\prod_{i=1}^m \vartheta_{ij}^{(m)})}, \frac{\ln(\vartheta_{ij}^{(r)})}{\ln(\prod_{i=1}^m \vartheta_{ij}^{(l)})} \right) \quad (8)$$

pri čemu $\tilde{\vartheta}_j$, predstavlja elemente normalizovane matrice $\sim = [\vartheta_{ij}]_{m \times n}$, ω_j težinske elemente kriterijuma, l - levu distribuciju fuzzy broja, r - r esnu distribuciju fuzzy broja, i m - vrednost pri kojoj je funkcija pripadnosti fuzzy broja jednaka jedan.

Korak 6. Izračunavanje finalnog indeksa rangiranosti alternativa (Q_i)

Finalni rang alternativa se definiše na bazi vrednosti, Q_i , pri čemu je bolje rangirana alternativa sa većom vrednošću Q_i . Vrednost Q_i dobijena je sa defuzikacijom vrednosti $\tilde{Q}_i$, pomoću jednačine(6). Vrednost $\tilde{Q}_i$ izračunava se primenom sledeće jednačine:

$$\tilde{Q}_i = \sum_{j=1}^n \tilde{\xi}_{ij} = \left(\sum_{j=1}^n \xi_{ij}^{(l)}, \sum_{j=1}^n \xi_{ij}^{(m)}, \sum_{j=1}^n \xi_{ij}^{(r)} \right) \quad (9)$$

gde $\tilde{\xi}_{ij}$ predstavlja elemente težinske matrice $\tilde{N} = [\tilde{\xi}_{ij}]_{m \times n}$, l - levu distribuciju fuzzy broja, r desnu distribuciju fuzzy broja, i m vrednost pri kojoj je vrednost pripadnosti fuzzy broju jednaka jedan.

MARCOS (measurement alternatives and ranking according to compromise solution) **metoda** je bazirana na definisanju odnosa između alternativa i referentnih vrednosti (idealna i anti-idealna alternativa). Na osnovu definisanih odnosa, funkcije korisnosti alternativa se određuju i vrši se kompromisno rangiranje u odnosu na idealne i anti-idealne solucije. Preferencije odlučivanja se definišu na osnovu funkcije korisnosti. Funkcije korisnosti predstavljaju poziciju alternative u odnosu na idealne i anti-idealne solucije. Najbolja alternativa je ona koja je najbliža idealnoj i istovremeno najdalja anti-idealnoj referentnoj tački. MARCOS metoda se procesno odvija kroz sledeće korake (Stević, 2020a, b):

Korak 1: Formiranje inicijalne matrice za donošenje odluka. Multi-kriterijumski model uključuje definisanje skupa n kriterijuma i m alternativa. U slučaju grupnog odlučivanja, formira se skup r eksperata koji procenjuju alternative u odnosu na kriterijume. U tom slučaju, matrice ekspertske evaluacije su agregirane u inicijalne matrice grupnog odlučivanja.

Korak 2: Formiranje proširene inicijalne matrice. U ovom koraku, proširenja inicijalna matrica je definisana sa idealnim (AI) i anti-idealnim (AAI) solucijama.

$$X = \begin{matrix} & C_1 & C_2 & \cdots & C_n \\ \begin{matrix} AAI \\ A_1 \\ A_2 \\ \dots \\ A_m \\ AI \end{matrix} & \begin{bmatrix} x_{aa1} & x_{aa2} & \cdots & x_{aan} \\ x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \\ x_{ai1} & x_{ai2} & \cdots & x_{ain} \end{bmatrix} \end{matrix} \quad (10)$$

Anti-idealna solucija (AAI) je najgora alternativa. Idealna solucija (AI) je, suprotno tome, alternativa sa najboljim karakteristikama. U zavisnosti od prirode kriterijuma, AAI i AI se definišu primenom sledećih jednačina:

$$AAI = \min_i x_{ij} \text{ if } j \in B \text{ and } \max_i x_{ij} \text{ if } j \in C \quad (11)$$

$$AI = \max_i x_{ij} \text{ if } j \in B \text{ and } \min_i x_{ij} \text{ if } j \in C \quad (12)$$

gde B predstavlja benefitnu, a C troškovnu grupu kriterijuma.

Korak 3: Normalizacija proširene inicijalne matrice (X). Elementi normalizovane matrice $N = [n_{ij}]_{m \times n}$ su dobijeni primenom sledećih jednačina:

$$n_{ij} = \frac{x_{ai}}{x_{ij}} \text{ if } j \in C \quad (13)$$

$$n_{ij} = \frac{x_{ij}}{x_{ai}} \text{ if } j \in B \quad (14)$$

gde elementi x_{ij} i x_{ai} predstavljaju elemente matrice X.

Korak 4: Definisanje težinske matrice $V = [v_{ij}]_{m \times n}$. Težinska matrica V se dobija množenjem normalizovane matrice N sa težinskim koeficijentima kriterijuma w_j primenom sledeće jednačine:

$$v_{ij} = n_{ij} x w_j \quad (15)$$

Korak 5: Utvrđivanje stepena korisnosti alternati K_i . Ki. Stepen korisnosti alternativa u odnosu na anti-idealne i idealne solucije se utvrđuje sa primenom sledećih jednačina:

$$K_i^- = \frac{S_i}{S_{ai}} \quad (16)$$

$$K_i^+ = \frac{S_i}{S_{ai}} \quad (17)$$

gde $S_i (i=1,2,...,m)$ predstavlja sumu elemenata težinske matrice V, prikazano u sledećoj jednačini:

$$S_i = \sum_{j=1}^n v_{ij} \quad (18)$$

Korak 6: Utvrđivanje funkcije korisnosti alternativa $f(K_i)$. Funkcija korisnosti je kompromis posmatrane alternative u odnosu na idealne i anti-idealne solucije. Funkcija korisnosti alternativa se definiše sa sledećom jednačinom:

$$f(K_i) = \frac{K_i^+ + K_i^-}{1 + \frac{1-f(K_i^+)}{f(K_i^+)} + \frac{1-f(K_i^-)}{f(K_i^-)}}; \quad (19)$$

gde $f(K_i^-)$ reprezentuje funkciju korisnosti u odnosu na anti-idealnu soluciju a $f(K_i^+)$ reprezentuje funkciju korisnosti u odnosu na idealnu soluciju.

Funkcije korisnosti u odnosu na idealne i anti-idealne solucije se utvrđuju sa primenom sledećih jednačina:

$$f(K_i^-) = \frac{K_i^+}{K_i^+ + K_i^-} \quad (20)$$

$$f(K_i^+) = \frac{K_i^-}{K_i^+ + K_i^-} \quad (21)$$

Korak 7: Rangiranje alternativa. Rangiranje alternativa bazirano je na konačnoj vrednosti funkcije korisnosti. Poželjna je ona alternativa koja ima najveću moguću vrednost funkcije korisnosti.

2. Rezultati i diskusija

Korišćeni kriterijumi u ovom radu su varijable strategijskog profitnog modela. Alternative su posmatrane banke u Srbiji. Oni su prikazani u Tabeli 1 - Inicijalni podaci su dati za 2021. god.

Tabela 1 - Inicijalni podaci

		(I) Broj zaposlenih	(I) Aktiva	(I) Kapital	(O) Ukupan neto poslovni prihod	(O) Rezultat perioda – dobitak/gubitak
		C1	C2	C3	C4	C5
A1	API banka	83	12.343	1.740	418	-198
A2	Addiko Bank	544	102.681	23.336	5.143	243
A3	AIK banka	623	256.962	55.053	10.525	5.944
A4	Banca Intesa	3050	742.407	119.924	30.182	10.371
A5	Bank of China Srbija	28	33.863	1.985	549	82
A6	Banka Poštanska štedionica	2591	348.119	28.736	12.600	2.203

A7	Crédit Agricole banka Srbija	870	166.767	15.386	6.579	1.708
A8	Erste Bank	1237	319.597	37.300	10.528	2.409
A9	Eurobank Direktna	1757	290.311	37.574	7.225	414
A10	Expobank	130	16.771	3.383	634	29
A11	Halkbank	606	99.797	16.127	3.652	889
A12	ALTA banka	160	33.242	4.059	751	11
A13	Komercijalna banaka	2906	485.440	75.642	18.365	3.645
A14	MIRABANK	41	6.285	2.050	131	-204
A15	NLB banka	2725	84.082	9.214	3.791	506
A16	OTP Banka Srbija	2732	665.598	91.013	21.081	5.756
A17	3Banka	527	21.703	4.253	2.396	400
A18	ProCredit Bank	387	155.339	17.725	3.927	469
A19	Raiffeisen banka	1508	432.656	58.471	16.981	6.857
A20	Naša AIK banka	699	194.157	26.723	5.772	1.768
A21	Srpska banka	73	19.940	3.353	542	16
A22	Mobi Banka	535	24.491	3.634	1.531	-412
A23	UniCredit Bank Srbija	1337	538.78	83.991	17.615	5.875
	Statistics					
	Mean	1093,4348	219,6231	189,1756	205,7549	99,6320
	Std. Error of Mean	215,95378	46,47602	156,73666	78,60113	57,74495
	Median	623,0000	155,3390	23,3360	16,9810	6,8570
	Std. Deviation	1035,67794	222,89116	751,68262	376,95775	276,93503
	Skewness	,833	1,020	4,780	2,358	1,106
	Std. Error of Skewness	,481	,481	,481	,481	,481
	Kurtosis	-,760	,063	22,897	6,184	2,010
	Std. Error of Kurtosis	,935	,935	,935	,935	,935
	Std. Error of Kurtosis	,935	,935	,935	,935	,935
	Minimum	28,00	6,29	1,74	2,40	-412,00
	Maximum	3050,00	742,41	3634,00	1531,00	889,00
	Mean	1093,4348	219,6231	189,1756	205,7549	99,6320

	NPar Tests					
	Friedman Test					
	Test Statistics^a					
	N	23				
	Chi-Square	32,313				
	df	4				
	Asymp. Sig .	,000				
	a. Friedman Test					

Napomena: Podaci su iskazani u milionima dinara. Broj zaposlenih u celom broju. I – input. O – output. Autorova izračunata statistika

Izvor: Narodna banka Srbije

Težinski koeficijenti kriterijuma su utvrđeni korišćenjem FLMAW metode. U Tabeli 2, za te svrhe, prikazana je fuzzy skala prioritizacije kriterijuma.

Table 2 - Fuzzy skala prioritizacije kriterijuma

Fuzzy skala prioritizacije kriterijuma				
Fuzzy opis	Skraćenica	Fuzzy broj		
Apsolutno nizak	AL	1	1	1
Vrlo nizak	VL	1	1,5	2
Nizak	L	1,5	2	2,5
Srednje nizak	ML	2	2,5	3
Jednak	E	2,5	3	3,5
Srednje visok	MH	3	3,5	4
Visok	H	3,5	4	4,5
Veoma visok	VH	4	4,5	5
Apsolutno visok	AH	4,5	5	5

Tabela 3 pokazuje evaluaciju od strane eksperata kriterijuma.

Tabela 3 - Evaluacija kriterijuma

KIND	1	1	1	1	1
	C1	C2	C3	C4	C5
P1	AH	L	VL	E	VL
P2	AH	ML	AL	H	AL

P3	AH	ML	AL	MH	VL
P4	AH	E	AL	VH	AL

YAIP	0.5	0.5	0.5
------	-----	-----	-----

	C1			C2			C3			C4			C5		
P1	9	10	10	3	4	5	2	3	4	5	6	7	2	3	4
P2	9	10	10	4	5	6	2	2	2	7	8	9	2	2	2
P3	9	10	10	4	5	6	2	2	2	6	7	8	2	3	4
P4	9	10	10	5	6	7	2	2	2	8	9	10	2	2	2

Napomena: Autorovo izračunavanje

U Tabeli 4 prikazani su težinski koeficijenti vektora.

Tabela 4 -Težinski koeficijenti vektora

Weight Coefficients Vector	C1			C2			C3			C4			C5		
W1j	0,255	0,300	0,366	0,127	0,181	0,256	0,080	0,143	0,220	0,186	0,233	0,309	0,080	0,143	0,220
W2j	0,286	0,312	0,333	0,181	0,218	0,259	0,090	0,094	0,100	0,253	0,282	0,318	0,090	0,094	0,100
W3j	0,266	0,301	0,341	0,168	0,210	0,265	0,084	0,091	0,103	0,217	0,254	0,308	0,084	0,144	0,205
W4j	0,277	0,300	0,317	0,203	0,233	0,268	0,087	0,090	0,095	0,262	0,286	0,317	0,087	0,090	0,095

Napomena: Autorovo izračunavanje

Tabela 5 pokazuje agregirani fuzzy vektor, agregirani fuzzy težinski koeficijenti vektora i finalnu vrednost težinskih koeficijenata.

Tabela 5 - Agregirani fuzzy vektor, agregirani fuzzy težinski koeficijenti vektora i finalna vrednost težinskih koeficijenata

Aggregated Fuzzy Vectors	C1			C2			C3			C4			C5		
W1j	0,018	0,023	0,030	0,006	0,010	0,017	0,002	0,003	0,005	0,011	0,016	0,024	0,002	0,004	0,007
W2j	0,019	0,023	0,028	0,007	0,011	0,017	0,002	0,003	0,003	0,014	0,018	0,025	0,002	0,003	0,004
W3j	0,018	0,023	0,029	0,007	0,011	0,017	0,002	0,002	0,004	0,013	0,017	0,024	0,002	0,004	0,007
W4j	0,019	0,023	0,027	0,008	0,012	0,017	0,002	0,002	0,003	0,014	0,018	0,025	0,002	0,003	0,004
SUM	0,073	0,092	0,115	0,029	0,044	0,069	0,007	0,011	0,016	0,052	0,070	0,098	0,007	0,014	0,023

Aggregated Fuzzy Weight Coefficient Vectors	0,271	0,303	0,339	0,169	0,210	0,262	0,085	0,104	0,126	0,229	0,264	0,313	0,085	0,117	0,152
Final Values Of The Weight Coefficients	0,304			0,212			0,104			0,266			0,117		

Napomena: Autorovo izračunavanje

U Tabeli 6 je prikazana inicijalna matrica.

Tabela 6 - Inicijalna matrica

Initial Matrix					
weights of criteria	0,304	0,212	0,104	0,266	0,117
kind of criteria	1	1	1	1	1
	C1	C2	C3	C4	C5
A1	83	12,343	1,74	418	-198
A2	544	102,681	23,336	5,143	243
A3	623	256,962	55,053	10,525	5,944
A4	3050	742,407	119,924	30,182	10,371
A5	28	33,863	1,985	549	82
A6	2591	348,119	28,736	12,6	2,203
A7	870	166,767	15,386	6,579	1,708
A8	1237	319,597	37,3	10,528	2,409
A9	1757	290,311	37,574	7,225	414
A10	130	16,771	3,383	634	29
A11	606	99,797	16,127	3,652	889
A12	160	33,242	4,059	751	11
A13	2906	485,44	75,642	18,365	3,645
A14	41	6,285	2,05	131	-204
A15	2725	84,082	9,214	3,791	506
A16	2732	665,598	91,013	21,081	5,756

A17	527	21,703	4,253	2,396	400
A18	387	155,339	17,725	3,927	469
A19	1508	432,656	58,471	16,981	6,85
A20	699	194,157	26,723	5,772	1,768
A21	73	19,94	3,353	542	16
A22	535	24,491	3,634	1,531	-412
A23	1337	538,78	83,991	17,615	5,875
MAX	3050	742,407	3634	1531	889
MIN	28	6,285	1,74	2,396	-412

Napomena: Autorovo izračunavanje

Tabela 7 pokazuje proširenu inicijalnu matricu.

Tabela 7 - Proširena inicijalna matrica

Extended Initial Matrix					
weights of criteria	0,304	0,212	0,104	0,266	0,117
kind of criteria	1	1	1	1	1
	C1	C2	C3	C4	C5
AAI	28	6,285	1,74	2,396	-412
A1	83	12,343	1,74	418	-198
A2	544	102,681	23,336	5,143	243
A3	623	256,962	55,053	10,525	5,944
A4	3050	742,407	119,924	30,182	10,371
A5	28	33,863	1,985	549	82
A6	2591	348,119	28,736	12,6	2,203
A7	870	166,767	15,386	6,579	1,708
A8	1237	319,597	37,3	10,528	2,409
A9	1757	290,311	37,574	7,225	414
A10	130	16,771	3,383	634	29
A11	606	99,797	16,127	3,652	889
A12	160	33,242	4,059	751	11

A13	2906	485,44	75,642	18,365	3,645
A14	41	6,285	2,05	131	-204
A15	2725	84,082	9,214	3,791	506
A16	2732	665,598	91,013	21,081	5,756
A17	527	21,703	4,253	2,396	400
A18	387	155,339	17,725	3,927	469
A19	1508	432,656	58,471	16,981	6,857
A20	699	194,157	26,723	5,772	1,768
A21	73	19,94	3,353	542	16
A22	535	24,491	3,634	1,531	-412
A23	1337	538,78	83,991	17,615	5,875
AI	3050	742,407	3634	1531	889

Napomena: Autorovo izračunavanje

U Tabeli 8 je prikazana normalizovana matrica.

Tabela 8 - Normalizovana matrica

Extended Initial Matrix					
weights of criteria	0,304	0,212	0,104	0,266	0,117
kind of criteria	1	1	1	1	1
	C1	C2	C3	C4	C5
AAI	0,00918	0,008466	0,000479	0,001565	-0,46344
A1	0,0272	0,0166	0,0005	0,2730	0,0000
A2	0,1784	0,1383	0,0064	0,0034	0,2733
A3	0,2043	0,3461	0,0151	0,0069	0,0067
A4	1,0000	1,0000	0,0330	0,0197	0,0117
A5	0,0092	0,0456	0,0005	0,3586	0,0922
A6	0,8495	0,4689	0,0079	0,0082	0,0025
A7	0,2852	0,2246	0,0042	0,0043	0,0019
A8	0,4056	0,4305	0,0103	0,0069	0,0027
A9	0,5761	0,3910	0,0103	0,0047	0,4657
A10	0,0426	0,0226	0,0009	0,4141	0,0326
A11	0,1987	0,1344	0,0044	0,0024	1,0000
A12	0,0525	0,0448	0,0011	0,4905	0,0124

A13	0,9528	0,6539	0,0208	0,0120	0,0041
A14	0,0134	0,0085	0,0006	0,0856	0,0000
A15	0,8934	0,1133	0,0025	0,0025	0,5692
A16	0,8957	0,8965	0,0250	0,0138	0,0065
A17	0,1728	0,0292	0,0012	0,0016	0,4499
A18	0,1269	0,2092	0,0049	0,0026	0,5276
A19	0,4944	0,5828	0,0161	0,0111	0,0077
A20	0,2292	0,2615	0,0074	0,0038	0,0020
A21	0,0239	0,0269	0,0009	0,3540	0,0180
A22	0,1754	0,0330	1,0000	1,0000	0,0000
A23	0,4384	0,7257	0,0231	0,0115	0,0066
AI	1	1	1	1	1

Napomena: Autorovo izračunavanje

Tabela 9 pokazuje težinski normalizovanu matricu.

Tabela 9 - Težinski normalizovana matrica

Težinski normalizovana matrica					
	C1	C2	C3	C4	C5
AAI	0,002791	0,001795	4,98E-05	0,000416	0
A1	0,0083	0,0035	0,0000	0,0726	0,0000
A2	0,0542	0,0293	0,0007	0,0009	0,0320
A3	0,0621	0,0734	0,0016	0,0018	0,0008
A4	0,3040	0,2120	0,0034	0,0052	0,0014
A5	0,0028	0,0097	0,0001	0,0954	0,0108
A6	0,2583	0,0994	0,0008	0,0022	0,0003
A7	0,0867	0,0476	0,0004	0,0011	0,0002
A8	0,1233	0,0913	0,0011	0,0018	0,0003
A9	0,1751	0,0829	0,0011	0,0013	0,0545
A10	0,0130	0,0048	0,0001	0,1102	0,0038
A11	0,0604	0,0285	0,0005	0,0006	0,1170
A12	0,0159	0,0095	0,0001	0,1305	0,0014
A13	0,2896	0,1386	0,0022	0,0032	0,0005

A14	0,0041	0,0018	0,0001	0,0228	0,0000
A15	0,2716	0,0240	0,0003	0,0007	0,0666
A16	0,2723	0,1901	0,0026	0,0037	0,0008
A17	0,0525	0,0062	0,0001	0,0004	0,0526
A18	0,0386	0,0444	0,0005	0,0007	0,0617
A19	0,1503	0,1235	0,0017	0,0030	0,0009
A20	0,0697	0,0554	0,0008	0,0010	0,0002
A21	0,0073	0,0057	0,0001	0,0942	0,0021
A22	0,0533	0,0070	0,1040	0,2660	0,0000
A23	0,1333	0,1539	0,0024	0,0031	0,0008
AI	0,304	0,212	0,104	0,266	0,117

Napomena: Autorovo izračunavanje

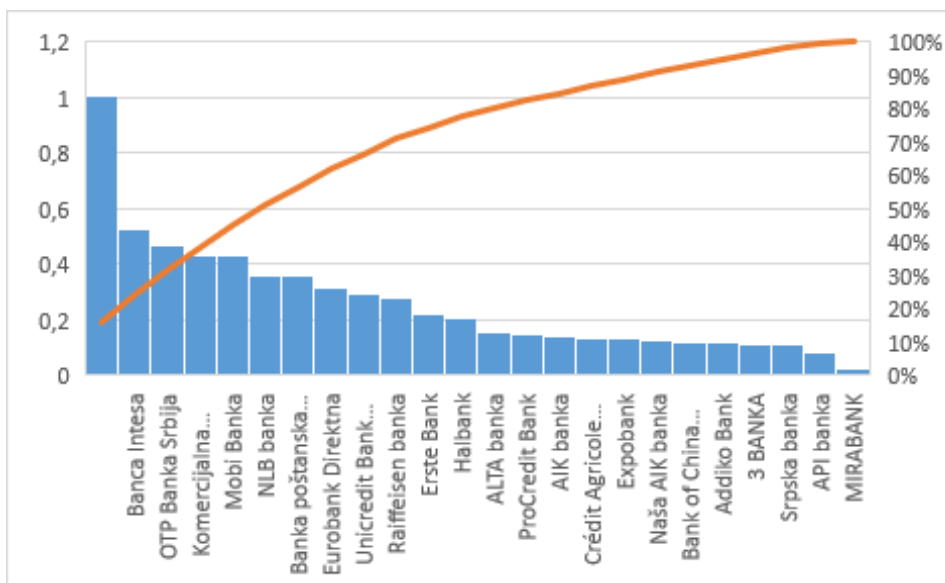
U Tabeli 10 i na Slici 1 su prikazani rezultati MARCOS metode

Tabela 10 - Rezultati MARCOS metode

	Rezultati MARCOS metode								
		Si	Ki-	Ki+	f(K-)	f(K+)	f(K)		Rangiranje
	AAI	0,0051							
API banka	A1	0,0845	16,7217	0,0842	0,0050	0,9950	0,0842	0,0842	22
Addiko Bank	A2	0,1171	23,1777	0,1167	0,0050	0,9950	0,1167	0,1167	19
AIK banka	A3	0,1397	27,6464	0,1392	0,0050	0,9950	0,1392	0,1392	14
Banca Intesa	A4	0,5260	104,1328	0,5245	0,0050	0,9950	0,5245	0,5245	1
Bank of China Srbija	A5	0,1187	23,4962	0,1183	0,0050	0,9950	0,1183	0,1183	18
Banka Poštanska štedionica	A6	0,3610	71,4541	0,3599	0,0050	0,9950	0,3599	0,3599	6
Crédit Agricole banka Srbija	A7	0,1361	26,9506	0,1357	0,0050	0,9950	0,1357	0,1357	15
Erste Bank	A8	0,2178	43,1091	0,2171	0,0050	0,9950	0,2171	0,2171	10
Eurobank Direktna	A9	0,3148	62,3246	0,3139	0,0050	0,9950	0,3139	0,3139	7

Expobank	A10	0,1318	26,0931	0,1314	0,0050	0,9950	0,1314	0,1314	16
Halkbank	A11	0,2070	40,9759	0,2064	0,0050	0,9950	0,2064	0,2064	11
ALTA banka	A12	0,1575	31,1750	0,1570	0,0050	0,9950	0,1570	0,1570	12
Komercijalna banaka	A13	0,4341	85,9333	0,4328	0,0050	0,9950	0,4328	0,4328	3
MIRABANK	A14	0,0287	5,6814	0,0286	0,0050	0,9950	0,0286	0,0286	23
NLB banka	A15	0,3631	71,8843	0,3620	0,0050	0,9950	0,3620	0,3620	5
OTP Banka Srbija	A16	0,4694	92,9196	0,4680	0,0050	0,9950	0,4680	0,4680	2
3Bank	A17	0,1119	22,1525	0,1116	0,0050	0,9950	0,1116	0,1116	20
ProCredit Bank	A18	0,1458	28,8709	0,1454	0,0050	0,9950	0,1454	0,1454	13
Raiffeisen banka	A19	0,2794	55,3049	0,2785	0,0050	0,9950	0,2785	0,2785	9
Naša AIK banka	A20	0,1271	25,1630	0,1267	0,0050	0,9950	0,1267	0,1267	17
Srpska banka	A21	0,1093	21,6445	0,1090	0,0050	0,9950	0,1090	0,1090	21
Mobi Banka	A22	0,4303	85,1840	0,4290	0,0050	0,9950	0,4290	0,4290	4
Unicredit Bank Srbija	A23	0,2934	58,0707	0,2925	0,0050	0,9950	0,2925	0,2925	8
	AI	1,0030							

Napomena: Autorovo izračunavanje



Slika 1. Rangiranje alternativa
Izvor: Autorova slika

Dakle, prema rezultatima MARCOS metode u top pet banaka spadaju po redosledu: Banca Intesa, OTP Banka Srbija, Komercijalna banka, Mobi Banka i NLB banka. Banke koje su loše pozicionirane su: Mirabank, API banka, Srpska banka, 3Banka i Addiko Bank. U izvesnoj meri na pozicioniranje banaka u Srbiji uticala je, pored ostalog, i pandemija korona virusa Covid-19. Pod uticajem nje smanjena je kreditna aktivnost u privredi.

U cilju unapređenja finansijskih performansi i efikasnosti banaka u Srbiji u budućnosti neophodno je što efikasnije upravljati ljudskim resursima, aktivom, kapitalom, prodajom bankarskog proizvoda i profitom. Značajnu ulogu u tome ima i digitalizacija celokupnog bankarskog poslovanja. Elektronsko bankarstvo je, pored ostalog, u izvesnoj meri ublažila uticaj pandemije korona virusa Covid-19 na finansijske performanse i efikasnost banaka u Srbiji.

U budućnosti neophodno je vršiti kontinuirano slična istraživanja. To omogućuje sagledavanje dinamike finansijskih performansi i efikasnosti banaka u Srbiji, i pruža osnovu za unapređenje primenom relevantnih mera.

Zaključak

Na osnovu dobijenih rezultata MARCOS metod2102e može se zaključiti sledeće: U top pet banaka u Srbiji spadaju po redosledu: Banca Intesa, OTP Banka Srbija, Komercijalna banka, Mobi Banka i NLB banka. Loše pozicionirane banke u Srbiji su: MIRABANK, API banka, Srpska banka, 3Banka i Addiko Bank. Faktori pozicioniranja banaka u Srbiji su: ekonomska klima, kamatna stopa, inflacija, devizni kurs, strane direktne investicije, stopa zaposlenosti, životni standard stanovništva, privredna aktivnost, konkurencija i drugi. Njihovom adekvatnom kontrolom može se uticati na ostvarenje ciljnog profita banaka u Srbiji. U cilju unapređenja finansijskih performansi i efikasnosti banaka u Srbiji u budućnosti neophodno je što efikasnije upravljati ljudskim resursima, aktivom, kapitalom, prodajom bankarskog proizvoda i profitom.

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ANALYSIS OF FINANCIAL PERFORMANCE AND EFFICIENCY OF BANKS IN SERBIA USING FUZZY LMAW AND MARCOS METHODS

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Summary: Researching bank efficiency factors is very challenging. Bearing that in mind, this paper analyzes the financial performance and efficiency of banks in Serbia based on the fuzzy LMAW-MARCOS method. The obtained empirical results show that the top five banks are, in order: Banca Intesa, OTP Banka Srbija, Komercijalna banka, Mobi Banka and NLB banka. Badly positioned banks include, in order: MIRABANK, API banka, Srpska banka, 3 BANKA and Addiko Bank. Among other things, the efficiency of banks in Serbia was significantly affected by the Covid-19 pandemic. In order to improve the financial performance and efficiency of banks in Serbia in the future, it is necessary to manage resources (human capital, assets and capital), sales of banking products and profits as efficiently as possible. The digitization of the entire banking business also plays a significant role in this.

Keywords: bank; FLMAW-MARCOS method; financial performance; efficiency; Serbia

JEL classification: D40, G21

Introduction

Research into the factors of financial performance and efficiency of banks is very current, significant and complex. Thus, this paper analyzes the influence of the number of employees, assets, capital, income and profit on the financial performance and efficiency of banks in Serbia. In doing so, the FLMAW-MARCOS method is applied. The aim and purpose of this is to better understand the impact of the analyzed factors on the financial performance and efficiency of banks in Serbia with the aim of improving them in the future by applying adequate measures.

The literature devoted to the development and importance of the application of the DEA model is abundant (Andersen, 1993; Banker, 1984; Chen, 2021; Chang, 2020; Guo, 2020; Lee, 2011; Lin, 2020; Pendharkar, 2021; Tone, 2002; Podinovski, 2021; Rostamzadeh, 2021; Fenyves, 2020; Tsai, 2021). They are also very successfully applied in the analysis of the efficiency of banks and insurance companies (Savic, 2012; Maletić, 2013; Radojicic, 2018; Cvetkoska, 2017, 2020, 2021; Lukic, 2017; 2018a,b, 2021). Likewise, when analyzing the financial performance and efficiency of banks, integrally or individually, different methods of multi-criteria decision-making are often applied (Ünlü, 2022; Ali, 2022). All relevant literature in this paper is used as a theoretical-methodological and empirical basis for the analysis of financial performance and efficiency of banks in Serbia using the FLMAW-MARCOS method.

Only continuous monitoring of the financial performance and efficiency of banks in Serbia enables improvement in the future by applying adequate measures. This shows the basic research hypothesis in this work.

In the methodological sense of the word, the application of the FLMAW-MARCOS method plays a significant role in this. Statistical analysis is also used to some extent in the work.

The necessary empirical data for the research of the treated problem in this work were collected from the National Bank of Serbia. They are harmonized with the relevant international standards, so there are no restrictions in terms of comparability.

1. Methodology

The logarithmic methodology of additive weights is used to determine weight coefficients and rank alternatives. **Fuzzy Logarithm Methodology of Additive Weights (FLMAW)** is based on the application of triangular fuzzy numbers (Božanić et al., 2022; Pamučar, 2021; Puška, 2022). The FLMAW method takes place through six steps (Božanić et al., 2022).

Step 1. Formation of the initial (expert) decision-making matrix ($\tilde{X}^e$)

In this step, each expert (e) from the group of k experts ($1 \leq e \leq k$) defines a decision matrix by evaluating m alternatives $A = \{A_1, A_2, \dots, A_m\}$ in relation to n criteria $C = \{C_1, C_2, \dots, C_n\}$. So, for each expert, a matrix was obtained $\tilde{X}^e = [\tilde{\vartheta}_{ij}^e]_{m \times n}$, where $\tilde{\vartheta}_{ij}^e$ is a fuzzy value based on the expert e value of the i -th alternative i in relation to the j -th criterion. The j evaluation is based on quantitative indicators or fuzzy linguistic descriptors, depending on the type of criteria.

Step 2. Formation of the initial (aggregate) decision-making matrix ($\tilde{X}$)

Aggregation of the initial (expert) matrices into one aggregated matrix is performed using the Bonferroni aggregator as follows:

$$\tilde{\vartheta}_{ij} = \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\vartheta}_i^{(e)p} \tilde{\vartheta}_j^{(e)q} \right)^{\frac{1}{p+q}} = \left\{ \left(\frac{k}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \vartheta_i^{(l_e)p} \vartheta_j^{(l_e)q} \right)^{\frac{1}{p+q}}, \left(\frac{k}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \vartheta_i^{(m_e)p} \vartheta_j^{(m_e)q} \right)^{\frac{1}{p+q}}, \left(\frac{k}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \vartheta_i^{(r_e)p} \vartheta_j^{(r_e)q} \right)^{\frac{1}{p+q}} \right\} \quad (1)$$

where $\tilde{\vartheta}_{ij}$ is the aggregated value obtained by applying the Bonferroni aggregator; $p, q \geq 0$ stabilization parameters of the Bonferroni aggregator, e - e -th expert $1 \leq e \leq k$, l - left distribution of fuzzy number, r - right distribution of fuzzy number, and m - value at which the membership function of the fuzzy number is equal to one. Linguistic criteria are quantified before aggregation.

Step 3. Normalization of elements of the initial matrix

normalized matrix $\tilde{\sim} = [\tilde{\vartheta}_{ij}]_{m \times n}$ obtained as follows:

$$\tilde{\vartheta}_{ij} = \begin{cases} 1 + \frac{\tilde{\vartheta}_{ij}}{\vartheta_j^{(+)}} = \left(1 + \frac{\vartheta_{ij}^{(l)}}{\vartheta_j^{(+)}} , 1 + \frac{\vartheta_{ij}^{(m)}}{\vartheta_j^{(+)}} , 1 + \frac{\vartheta_{ij}^{(r)}}{\vartheta_j^{(+)}} \right) & \text{if } \in B, \\ 1 + \frac{\tilde{\vartheta}_{ij}^-}{\vartheta_{ij}^-} = \left(1 + \frac{\vartheta_{ij}^-}{\vartheta_{ij}^{(r)}} , 1 + \frac{\vartheta_{ij}^-}{\vartheta_{ij}^{(m)}} , 1 + \frac{\vartheta_{ij}^-}{\vartheta_{ij}^{(l)}} \right) & \text{if } \in C \end{cases} \quad (2)$$

where $\tilde{\vartheta}_{ij}$ is the normalized value of the initial decision matrix, where $\vartheta_j^+ = \max(\tilde{\vartheta}_j^{(r)})$, $\vartheta_j^- = \min(\tilde{\vartheta}_j^{(l)})$, l is the left distribution of the fuzzy number, r is the right distribution of the fuzzy number, and m is the value at which the membership function of the fuzzy number is equal to one.

Step 4. Determining the weighting coefficients of the criteria

In order to determine the weighting coefficients of the criteria, certain experts should be engaged $E=\{E_1, E_2, \dots, E_k\}$.

Step 4.1 Prioritization of criteria

Based on the value of the predefined fuzzy linguistic scale, the experts determine the priorities of the criteria $C=\{C1, C2, \dots, Cn\}$. In that criterion of high importance, a higher value from the fuzzy linguistic scale is assigned, and vice versa. In this way, the priority vectors are defined $\tilde{P}^e = (\tilde{\gamma}_{C1}^e, \tilde{\gamma}_{C2}^e, \dots, \tilde{\gamma}_{Cn}^e)$, especially for each expert, where $\tilde{\gamma}_{Cn}^e$ is the value from the fuzzy linguistic scale that the expert e ($1 \leq e \leq k$) mark for criterion n .

Step 4.2 Defining the absolute fuzzy anti-ideal point (γAIP)

This value is defined by the decision maker, and is a fuzzy number that is smaller than the smallest value from the set of all priority vectors.

Step 4.3 Defining the fuzzy relational vector $\tilde{R}^e$

The relationship between the elements of the priority vector and the absolute anti-ideal point (γAIP) is determined by applying the following equation:

$$\tilde{n}_{Cn}^e = \left(\frac{\tilde{\gamma}_{Cn}^e}{\tilde{\gamma}_{AIP}} \right) = \left(\frac{\gamma_{Cn}^{(l)e}}{\gamma_{AIP}^{(r)}}, \frac{\gamma_{Cn}^{(m)e}}{\gamma_{AIP}^{(m)}}, \frac{\gamma_{Cn}^{(r)e}}{\gamma_{AIP}^{(l)}} \right) \quad (3)$$

By applying this equation, the expert's relational vector e ($1 \leq e \leq k$) is obtained: $\omega_j^e = (\tilde{\omega}_1^e, \tilde{\omega}_2^e, \dots, \tilde{\omega}_n^e)^T$.

Step 4.4 Determining vector weight coefficients $\omega_j^e = (\tilde{\omega}_1^e, \tilde{\omega}_2^e, \dots, \tilde{\omega}_n^e)^T$, especially for each expert.

Fuzzy value of weighting coefficients criteria for e ($1 \leq e \leq k$) is obtained by applying the following equation:

$$\tilde{\omega}_j^e = \left(\frac{\ln(\tilde{n}_{Cn}^e)}{\ln(\prod_{j=1}^n \tilde{n}_{Cn}^e)} \right) = \left(\frac{\ln(n_{Cn}^{(l)e})}{\ln(\prod_{j=1}^n n_{Cn}^{(r)e})}, \frac{\ln(n_{Cn}^{(m)e})}{\ln(\prod_{j=1}^n n_{Cn}^{(m)e})}, \frac{\ln(n_{Cn}^{(r)e})}{\ln(\prod_{j=1}^n n_{Cn}^{(l)e})} \right) \quad (4)$$

where $\tilde{n}_{Cn}^e$ is the element of the relational vector R^e , the $n_{Cn}^{(l)e}$ left distribution of the fuzzy priority vector, the $n_{Cn}^{(r)e}$ right distribution of the fuzzy priority vector, and $n_{Cn}^{(m)e}$ the value at which the membership function of the fuzzy priority vector is equal to one.

Step 4.5 Calculation of weight coefficients of aggregated fuzzy vectors $\omega_j = (\tilde{\omega}_1, \tilde{\omega}_2, \dots, \tilde{\omega}_n)^T$

Weight coefficients of the aggregated fuzzy vectors $\omega_j = (\tilde{\omega}_1, \tilde{\omega}_2, \dots, \tilde{\omega}_n)^T$ are determined using the Boneferroni aggregator (Yager, 2009) as follows:

$$\tilde{\omega}_j = \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(e)p} \tilde{\omega}_j^{(e)q} \right)^{\frac{1}{p+q}}$$

$$= \left\{ \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(l_e)p} \tilde{\omega}_j^{(l_e)q} \right)^{\frac{1}{p+q}}, \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(m_e)p} \tilde{\omega}_j^{(m_e)q} \right)^{\frac{1}{p+q}}, \left(\frac{1}{k(k-1)} \sum_{\substack{i,j=1 \\ i \neq j}}^k \tilde{\omega}_i^{(r_e)p} \tilde{\omega}_j^{(r_e)q} \right)^{\frac{1}{p+q}} \right\} \quad (5)$$

where $p, q \geq 0$ is the stabilization parameters of the Boneferroni aggregator, the weighting $\tilde{\omega}_j^e$ eco-efficients obtained on the basis of the evaluation of the e -th expert $1 \leq e \leq k$, the $\omega_j^{(l_e)}$ left distribution of fuzzy weighting coefficients $\tilde{\omega}_j^e$, the $\omega_j^{(r_e)}$ right distribution of fuzzy weighting coefficients $\tilde{\omega}_j^e$, and $\omega_j^{(m_e)}$ the right value at which the fuzzy weighting coefficient function is $\tilde{\omega}_j^e$ equal to one.

Step 4.6 Calculation of final values of weighting coefficients $\omega_j = (\omega_1, \omega_2, \dots, \omega_3)^T$

The calculation of the final value of the weight coefficients of the criteria is performed by defuzzification as follows:

$$\omega_j = \frac{l+4m+r}{6} \quad (6)$$

Step 5. Calculation of the weight matrix (N)

The elements of the weight matrix $N = [\xi_{ij}]_{m \times n}$ obtained as follows:

$$\xi_{ij} = \frac{2\tilde{\varphi}_{ij}^{\omega_j}}{(2 - \tilde{\varphi}_{ij})^{\omega_j} + \tilde{\varphi}_{ij}^{\omega_j}} = \left(\frac{2\varphi_j^{(l)\omega_j}}{(2 - \varphi_j^{(r)})^{\omega_j} + \phi_j^{(r)\omega_j}}, \frac{2\varphi_j^{(m)\omega_j}}{(2 - \varphi_j^{(m)})^{\omega_j} + \phi_j^{(m)\omega_j}}, \frac{2\varphi_j^{(r)\omega_j}}{(2 - \varphi_j^{(l)})^{\omega_j} + \phi_j^{(l)\omega_j}} \right) \quad (7)$$

$$\tilde{\varphi}_{ij} = \frac{\ln(\tilde{\vartheta}_{ij})}{\ln(\prod_{i=1}^m \tilde{\vartheta}_{ij})} = \left(\frac{\ln(\vartheta_{ij}^{(l)})}{\ln(\prod_{i=1}^m \vartheta_{ij}^{(r)})}, \frac{\ln(\vartheta_{ij}^{(m)})}{\ln(\prod_{i=1}^m \vartheta_{ij}^{(m)})}, \frac{\ln(\vartheta_{ij}^{(r)})}{\ln(\prod_{i=1}^m \vartheta_{ij}^{(l)})} \right) \quad (8)$$

where it $\tilde{\vartheta}_j$, represents the elements of the normalized matrix $\sim = [\vartheta_{ij}]_{m \times n}$, the ω_j weight elements of the criteria, l - the left distribution of the fuzzy number, r - the right distribution of the fuzzy number, and m is the value at which the membership function of the fuzzy number is equal to one.

Step 6. Calculation of the final ranking index of alternatives (Q_i)

The final ranking of the alternatives is defined on the basis of value Q_i , whereby the alternative with a higher value is ranked better Q_i . The value Q_i was obtained with the defuzzification of the value $\tilde{Q}_i$ using equation (6). The value $\tilde{Q}_i$ is calculated using the following equation:

$$\tilde{Q}_i = \sum_{j=1}^n \tilde{\xi}_{ij} = \left(\sum_{j=1}^n \xi_{ij}^{(l)}, \sum_{j=1}^n \xi_{ij}^{(m)}, \sum_{j=1}^n \xi_{ij}^{(r)} \right) \quad (9)$$

where $\tilde{\xi}_{ij}$ is the elements of the weight matrix $\tilde{N} = [\tilde{\xi}_{ij}]_{m \times n}$, l - the left distribution of the fuzzy number, r - the right distribution of the fuzzy number, m the value at which the value of belonging to the fuzzy number is equal to one.

The MARCOS (measurement alternatives and ranking according to compromise solution) **method** is based on defining the relationship between alternatives and reference values (ideal and anti-ideal alternatives). Based on the defined relationships, the utility functions of the alternatives are determined, and a compromise ranking is made in relation to ideal and anti-ideal solutions. Decision preferences are defined based on a utility function. Utility functions are the position of alternatives in relation to ideal and anti-ideal solutions. The best alternative is the one that is closest to the ideal and at the same time furthest from the anti-deal reference point. The MARCOS method proceeds procedurally through the following steps (Stević, 2020a, b):

Step 1: Formation of the initial decision-making matrix

A multi-criteria model involves defining a set of n criteria and m alternatives. In the case of group decision-making, a set of r experts is formed who evaluate the alternatives in relation to the criteria. In that case, the expert evaluation matrices are aggregated into the initial group decision matrices.

Step 2: Forming the expanded initial matrix

In this step, the expansion initial matrix is defined with ideal (AI) and anti-ideal (AAI) solutions.

$$X = \begin{matrix} & C_1 & C_2 & \cdots & C_n \\ \begin{matrix} AAI \\ A_1 \\ A_2 \\ \dots \\ A_m \\ AI \end{matrix} & \begin{bmatrix} x_{aa1} & x_{aa2} & \cdots & x_{aan} \\ x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \\ x_{ai1} & x_{ai2} & \cdots & x_{ain} \end{bmatrix} \end{matrix} \quad (10)$$

Anti-ideal solution (AAI) is the worst alternative. The ideal solution (AI) is, on the contrary, the alternative with the best characteristics. Depending on the nature of the criteria, AAI and AI are defined by applying the following equations:

$$AAI = \min_i x_{ij} \text{ if } j \in B \text{ and } \max_i x_{ij} \text{ if } j \in C \quad (11)$$

$$AI = \max_i x_{ij} \text{ if } j \in B \text{ and } \min_i x_{ij} \text{ if } j \in C \quad (12)$$

where B represents a benefit and C a cost group of criteria.

Step 3: Normalization of the expanded initial matrix (X)

The elements of the normalized matrix $N = [n_{ij}]_{m \times n}$ obtained by applying the following equations:

$$n_{ij} = \frac{x_{ai}}{x_{ij}} \text{ if } j \in C \quad (13)$$

$$n_{ij} = \frac{x_{ij}}{x_{ai}} \text{ if } j \in B \quad (14)$$

where the elements x_{ij} and x_{ai} are the elements of the matrix X.

Step 4: Defining the weighting matrix The $V = [v_{ij}]_{m \times n}$

Weighting matrix V is obtained by multiplying the normalized matrix N with the weighting coefficients of the criterion w_j using the following equation:

$$v_{ij} = n_{ij} x w_j \quad (15)$$

Korak 5: Utvrđivanje stepena korisnosti alternativa K_i .

Stepen korisnosti alternativa u odnosu na anti-idealne i idealne solucije se utvrđuje sa primenom sledećih jednačina:

$$K_i^- = \frac{S_i}{S_{aai}} \quad (16)$$

$$K_i^+ = \frac{S_i}{S_{ai}} \quad (17)$$

where $S_i (i=1,2,...,m)$ represents the sum of the elements of the weight matrix V, shown in the following equation:

$$S_i = \sum_{j=1}^n v_{ij} \quad (18)$$

Step 6: Determining the utility function of alternatives $f(K_i)$

The utility function is the compromise of the observed alternative in relation to ideal and anti-ideal solutions. The utility function of alternatives is defined by the following equation:

$$f(K_i) = \frac{K_i^+ + K_i^-}{1 + \frac{1 - f(K_i^+)}{f(K_i^+)} + \frac{1 - f(K_i^-)}{f(K_i^-)}}; \quad (19)$$

where $f(K_i^-)$ is the utility function in relation to the anti-ideal solution and $f(K_i^+)$ is the utility function in relation to the ideal solution.

Utility functions in relation to ideal and anti-ideal solutions are determined using the following equations:

$$f(K_i^-) = \frac{K_i^+}{K_i^+ + K_i^-} \quad (20)$$

$$f(K_i^+) = \frac{K_i^-}{K_i^+ + K_i^-} \quad (21)$$

Step 7: Ranking of alternatives

The ranking of alternatives is based on the final value of the utility function. The alternative that has the highest possible value of the utility function is preferred.

2. Results and discussion

Criteria used in this paper are variables of the strategic profit model. Alternatives are the observed banks in Serbia. They are shown in Table 1. Initial data are given for 2021.

Table 1 - Initial data

		(I) Number of employees	(I) Assets	(I) Capital	(O) Total net operating income	(O) Result of the period - profit / loss
		C1	C2	C3	C4	C5
A1	API bank	83	12.343	1.740	418	-198
A2	Addiko Bank	544	102.681	23.336	5.143	243
A3	AIK Bank	623	256.962	55.053	10.525	5.944
A4	Banca Intesa	3050	742.407	119.924	30.182	10.371
A5	Bank of China Serbia	28	33.863	1.985	549	82
A6	Postal Savings Bank	2591	348.119	28.736	12.600	2.203

A7	Crédit Agricole Bank Serbia	870	166.767	15.386	6.579	1.708
A8	Erste Bank	1237	319.597	37.300	10.528	2.409
A9	Eurobank Direct	1757	290.311	37.574	7.225	414
A10	Expobank	130	16.771	3.383	634	29
A11	Halkbank	606	99.797	16.127	3.652	889
A12	ALTA Bank	160	33.242	4.059	751	11
A13	Commercial Bank	2906	485.440	75.642	18.365	3.645
A14	MIRABANK	41	6.285	2.050	131	-204
A15	NLB Bank	2725	84.082	9.214	3.791	506
A16	OTP Bank Serbia	2732	665.598	91.013	21.081	5.756
A17	3 BANK	527	21.703	4.253	2.396	400
A18	ProCredit Bank	387	155.339	17.725	3.927	469
A19	Raiffeisen Bank	1508	432.656	58.471	16.981	6.857
A20	Our AIK Bank	699	194.157	26.723	5.772	1.768
A21	Serbian Bank	73	19.940	3.353	542	16
A22	Mobi Bank	535	24.491	3.634	1.531	-412
A23	UniCredit Bank Serbia	1337	538.78	83.991	17.615	5.875
	Statistics					
	Mean	1093,4348	219,6231	189,1756	205,7549	99,6320
	Std. Error of Mean	215,95378	46,47602	156,73666	78,60113	57,74495
	Median	623,0000	155,3390	23,3360	16,9810	6,8570
	Std. Deviation	1035,67794	222,89116	751,68262	376,95775	276,93503
	Skewness	,833	1,020	4,780	2,358	1,106
	Std. Error of Skewness	,481	,481	,481	,481	,481
	Kurtosis	-,760	,063	22,897	6,184	2,010
	Std. Error of Kurtosis	,935	,935	,935	,935	,935
	Std. Error of Kurtosis	,935	,935	,935	,935	,935
	Minimum	28,00	6,29	1,74	2,40	-412,00
	Maximum	3050,00	742,41	3634,00	1531,00	889,00
	Mean	1093,4348	219,6231	189,1756	205,7549	99,6320

	NPar Tests					
	Friedman Test					
	Test Statisticsa					
	N	23				
	Chi-Square	32,313				
	df	4				
	Asymp. Sig .	,000				
	a. Friedman Test					

Note: Data are expressed in millions of dinars. The number of employees in whole numbers. I - input. O – output. Author's calculated statistics

Source: National Bank of Serbia

The weight coefficients of the criteria were determined using the FLMAW method. In Table 2, for these purposes, the fuzzy scale of criteria prioritization is presented.

Table 2 - Fuzzy Scale for Criteria Prioritization

Fuzzy Linguistic Descriptor	Abbreviation	Fuzzy Number		
Absolutely Low	AL	1	1	1
Very Low	VL	1	1,5	2
Low	L	1,5	2	2,5
Medium Low	ML	2	2,5	3
Equal	E	2,5	3	3,5
Medium High	MH	3	3,5	4
High	H	3,5	4	4,5
Very High	VH	4	4,5	5
Absolutely High	AH	4,5	5	5

Table 3 shows the evaluation by experts of the criteria.

Table 3 - Evaluation of Criteria

KIND	1	1	1	1	1
	C1	C2	C3	C4	C5
P1	AH	L	VL	E	VL
P2	AH	ML	AL	H	AL

P3	AH	ML	AL	MH	VL
P4	AH	E	AL	VH	AL

YAIP	0.5	0.5	0.5
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	C1			C2			C3			C4			C5		
P1	9	10	10	3	4	5	2	3	4	5	6	7	2	3	4
P2	9	10	10	4	5	6	2	2	2	7	8	9	2	2	2
P3	9	10	10	4	5	6	2	2	2	6	7	8	2	3	4
P4	9	10	10	5	6	7	2	2	2	8	9	10	2	2	2

Note: Author's calculation

Table 4 shows the vector weight coefficients

Table 4 - Weight Coefficients Vector

Weight Coefficients Vector	C1			C2			C3			C4			C5		
W1j	0,255	0,300	0,366	0,127	0,181	0,256	0,080	0,143	0,220	0,186	0,233	0,309	0,080	0,143	0,220
W2j	0,286	0,312	0,333	0,181	0,218	0,259	0,090	0,094	0,100	0,253	0,282	0,318	0,090	0,094	0,100
W3j	0,266	0,301	0,341	0,168	0,210	0,265	0,084	0,091	0,103	0,217	0,254	0,308	0,084	0,144	0,205
W4j	0,277	0,300	0,317	0,203	0,233	0,268	0,087	0,090	0,095	0,262	0,286	0,317	0,087	0,090	0,095

Note: Author's calculation

Table 5 shows the aggregated fuzzy vector, the aggregated fuzzy weighting coefficients of the vector and the final value of the weighting coefficients.

Table 5 - Aggregated Fuzzy Vectors, Aggregated Fuzzy Weight Coefficient Vectors and Final Values of the Weight Coefficients

Aggregated Fuzzy Vectors	C1			C2			C3			C4			C5		
W1j	0,018	0,023	0,030	0,006	0,010	0,017	0,002	0,003	0,005	0,011	0,016	0,024	0,002	0,004	0,007
W2j	0,019	0,023	0,028	0,007	0,011	0,017	0,002	0,003	0,003	0,014	0,018	0,025	0,002	0,003	0,004
W3j	0,018	0,023	0,029	0,007	0,011	0,017	0,002	0,002	0,004	0,013	0,017	0,024	0,002	0,004	0,007
W4j	0,019	0,023	0,027	0,008	0,012	0,017	0,002	0,002	0,003	0,014	0,018	0,025	0,002	0,003	0,004
SUM	0,073	0,092	0,115	0,029	0,044	0,069	0,007	0,011	0,016	0,052	0,070	0,098	0,007	0,014	0,023

Aggregated Fuzzy Weight Coefficient Vectors	0,271	0,303	0,339	0,169	0,210	0,262	0,085	0,104	0,126	0,229	0,264	0,313	0,085	0,117	0,152
Final Values Of The Weight Coefficients	0,304			0,212			0,104			0,266			0,117		

Note: Author's calculation

Table 6 shows the initial matrix

Table 6 - Initial Matrix

Initial Matrix					
weights of criteria	0,304	0,212	0,104	0,266	0,117
kind of criteria	1	1	1	1	1
	C1	C2	C3	C4	C5
A1	83	12,343	1,74	418	-198
A2	544	102,681	23,336	5,143	243
A3	623	256,962	55,053	10,525	5,944
A4	3050	742,407	119,924	30,182	10,371
A5	28	33,863	1,985	549	82
A6	2591	348,119	28,736	12,6	2,203
A7	870	166,767	15,386	6,579	1,708
A8	1237	319,597	37,3	10,528	2,409
A9	1757	290,311	37,574	7,225	414
A10	130	16,771	3,383	634	29
A11	606	99,797	16,127	3,652	889
A12	160	33,242	4,059	751	11
A13	2906	485,44	75,642	18,365	3,645
A14	41	6,285	2,05	131	-204
A15	2725	84,082	9,214	3,791	506
A16	2732	665,598	91,013	21,081	5,756

A17	527	21,703	4,253	2,396	400
A18	387	155,339	17,725	3,927	469
A19	1508	432,656	58,471	16,981	6,857
A20	699	194,157	26,723	5,772	1,768
A21	73	19,94	3,353	542	16
A22	535	24,491	3,634	1,531	-412
A23	1337	538,78	83,991	17,615	5,875
MAX	3050	742,407	3634	1531	889
MIN	28	6,285	1,74	2,396	-412

Note: Author's calculation

Table 7 shows the expanded initial matrix.

Table 7- Extended Initial Matrix

Extended Initial Matrix					
weights of criteria	0,304	0,212	0,104	0,266	0,117
kind of criteria	1	1	1	1	1
	C1	C2	C3	C4	C5
AAI	28	6,285	1,74	2,396	-412
A1	83	12,343	1,74	418	-198
A2	544	102,681	23,336	5,143	243
A3	623	256,962	55,053	10,525	5,944
A4	3050	742,407	119,924	30,182	10,371
A5	28	33,863	1,985	549	82
A6	2591	348,119	28,736	12,6	2,203
A7	870	166,767	15,386	6,579	1,708
A8	1237	319,597	37,3	10,528	2,409
A9	1757	290,311	37,574	7,225	414
A10	130	16,771	3,383	634	29
A11	606	99,797	16,127	3,652	889
A12	160	33,242	4,059	751	11

A13	2906	485,44	75,642	18,365	3,645
A14	41	6,285	2,05	131	-204
A15	2725	84,082	9,214	3,791	506
A16	2732	665,598	91,013	21,081	5,756
A17	527	21,703	4,253	2,396	400
A18	387	155,339	17,725	3,927	469
A19	1508	432,656	58,471	16,981	6,857
A20	699	194,157	26,723	5,772	1,768
A21	73	19,94	3,353	542	16
A22	535	24,491	3,634	1,531	-412
A23	1337	538,78	83,991	17,615	5,875
AI	3050	742,407	3634	1531	889

Note: Author's calculation

Table 8 shows the normalized matrix

Table 8 - Normalized Matrix

Extended Initial Matrix					
weights of criteria	0,304	0,212	0,104	0,266	0,117
kind of criteria	1	1	1	1	1
	C1	C2	C3	C4	C5
AAI	0,00918	0,008466	0,000479	0,001565	-0,46344
A1	0,0272	0,0166	0,0005	0,2730	0,0000
A2	0,1784	0,1383	0,0064	0,0034	0,2733
A3	0,2043	0,3461	0,0151	0,0069	0,0067
A4	1,0000	1,0000	0,0330	0,0197	0,0117
A5	0,0092	0,0456	0,0005	0,3586	0,0922
A6	0,8495	0,4689	0,0079	0,0082	0,0025
A7	0,2852	0,2246	0,0042	0,0043	0,0019
A8	0,4056	0,4305	0,0103	0,0069	0,0027
A9	0,5761	0,3910	0,0103	0,0047	0,4657
A10	0,0426	0,0226	0,0009	0,4141	0,0326
A11	0,1987	0,1344	0,0044	0,0024	1,0000
A12	0,0525	0,0448	0,0011	0,4905	0,0124

A13	0,9528	0,6539	0,0208	0,0120	0,0041
A14	0,0134	0,0085	0,0006	0,0856	0,0000
A15	0,8934	0,1133	0,0025	0,0025	0,5692
A16	0,8957	0,8965	0,0250	0,0138	0,0065
A17	0,1728	0,0292	0,0012	0,0016	0,4499
A18	0,1269	0,2092	0,0049	0,0026	0,5276
A19	0,4944	0,5828	0,0161	0,0111	0,0077
A20	0,2292	0,2615	0,0074	0,0038	0,0020
A21	0,0239	0,0269	0,0009	0,3540	0,0180
A22	0,1754	0,0330	1,0000	1,0000	0,0000
A23	0,4384	0,7257	0,0231	0,0115	0,0066
AI	1	1	1	1	1

Note: Author's calculation

Table 9 shows the weight-normalized matrix

Table 9 - Weighted Normalized Matrix

Weighted Normalized Matrix					
	C1	C2	C3	C4	C5
AAI	0,002791	0,001795	4,98E-05	0,000416	0
A1	0,0083	0,0035	0,0000	0,0726	0,0000
A2	0,0542	0,0293	0,0007	0,0009	0,0320
A3	0,0621	0,0734	0,0016	0,0018	0,0008
A4	0,3040	0,2120	0,0034	0,0052	0,0014
A5	0,0028	0,0097	0,0001	0,0954	0,0108
A6	0,2583	0,0994	0,0008	0,0022	0,0003
A7	0,0867	0,0476	0,0004	0,0011	0,0002
A8	0,1233	0,0913	0,0011	0,0018	0,0003
A9	0,1751	0,0829	0,0011	0,0013	0,0545
A10	0,0130	0,0048	0,0001	0,1102	0,0038
A11	0,0604	0,0285	0,0005	0,0006	0,1170
A12	0,0159	0,0095	0,0001	0,1305	0,0014
A13	0,2896	0,1386	0,0022	0,0032	0,0005

A14	0,0041	0,0018	0,0001	0,0228	0,0000
A15	0,2716	0,0240	0,0003	0,0007	0,0666
A16	0,2723	0,1901	0,0026	0,0037	0,0008
A17	0,0525	0,0062	0,0001	0,0004	0,0526
A18	0,0386	0,0444	0,0005	0,0007	0,0617
A19	0,1503	0,1235	0,0017	0,0030	0,0009
A20	0,0697	0,0554	0,0008	0,0010	0,0002
A21	0,0073	0,0057	0,0001	0,0942	0,0021
A22	0,0533	0,0070	0,1040	0,2660	0,0000
A23	0,1333	0,1539	0,0024	0,0031	0,0008
AI	0,304	0,212	0,104	0,266	0,117

Note: Author's calculation

Table 10 and Figure 1 show the results of the MARCOS method

Table 10 - Results of the MARCOS Method

	Results of the MARCOS Method								
		Si	Ki-	Ki+	f(K-)	f(K+)	f(K)		Rangiranje
	AAI	0,0051							
API Bank	A1	0,0845	16,7217	0,0842	0,0050	0,9950	0,0842	0,0842	22
Addiko Bank	A2	0,1171	23,1777	0,1167	0,0050	0,9950	0,1167	0,1167	19
AIK Bank	A3	0,1397	27,6464	0,1392	0,0050	0,9950	0,1392	0,1392	14
Banca Intesa	A4	0,5260	104,1328	0,5245	0,0050	0,9950	0,5245	0,5245	1
Bank of China Serbia	A5	0,1187	23,4962	0,1183	0,0050	0,9950	0,1183	0,1183	18
Postal Savings Bank	A6	0,3610	71,4541	0,3599	0,0050	0,9950	0,3599	0,3599	6
Crédit Agricole Bank Serbia	A7	0,1361	26,9506	0,1357	0,0050	0,9950	0,1357	0,1357	15
Erste Bank	A8	0,2178	43,1091	0,2171	0,0050	0,9950	0,2171	0,2171	10
Eurobank Direct	A9	0,3148	62,3246	0,3139	0,0050	0,9950	0,3139	0,3139	7
Expobank	A10	0,1318	26,0931	0,1314	0,0050	0,9950	0,1314	0,1314	16

Halkbank	A11	0,2070	40,9759	0,2064	0,0050	0,9950	0,2064	0,2064	11
ALTA Bank	A12	0,1575	31,1750	0,1570	0,0050	0,9950	0,1570	0,1570	12
Commercial Banks	A13	0,4341	85,9333	0,4328	0,0050	0,9950	0,4328	0,4328	3
MIRABANK	A14	0,0287	5,6814	0,0286	0,0050	0,9950	0,0286	0,0286	23
NLB Bank	A15	0,3631	71,8843	0,3620	0,0050	0,9950	0,3620	0,3620	5
OTP Bank Serbia	A16	0,4694	92,9196	0,4680	0,0050	0,9950	0,4680	0,4680	2
3 BANK	A17	0,1119	22,1525	0,1116	0,0050	0,9950	0,1116	0,1116	20
ProCredit Bank	A18	0,1458	28,8709	0,1454	0,0050	0,9950	0,1454	0,1454	13
Raiffeisen Bank	A19	0,2794	55,3049	0,2785	0,0050	0,9950	0,2785	0,2785	9
Our AIK Bank	A20	0,1271	25,1630	0,1267	0,0050	0,9950	0,1267	0,1267	17
Serbian Bank	A21	0,1093	21,6445	0,1090	0,0050	0,9950	0,1090	0,1090	21
Mobi Bank	A22	0,4303	85,1840	0,4290	0,0050	0,9950	0,4290	0,4290	4
Unicredit Bank Serbia	A23	0,2934	58,0707	0,2925	0,0050	0,9950	0,2925	0,2925	8
	AI	1,0030							

Note: Author's calculation

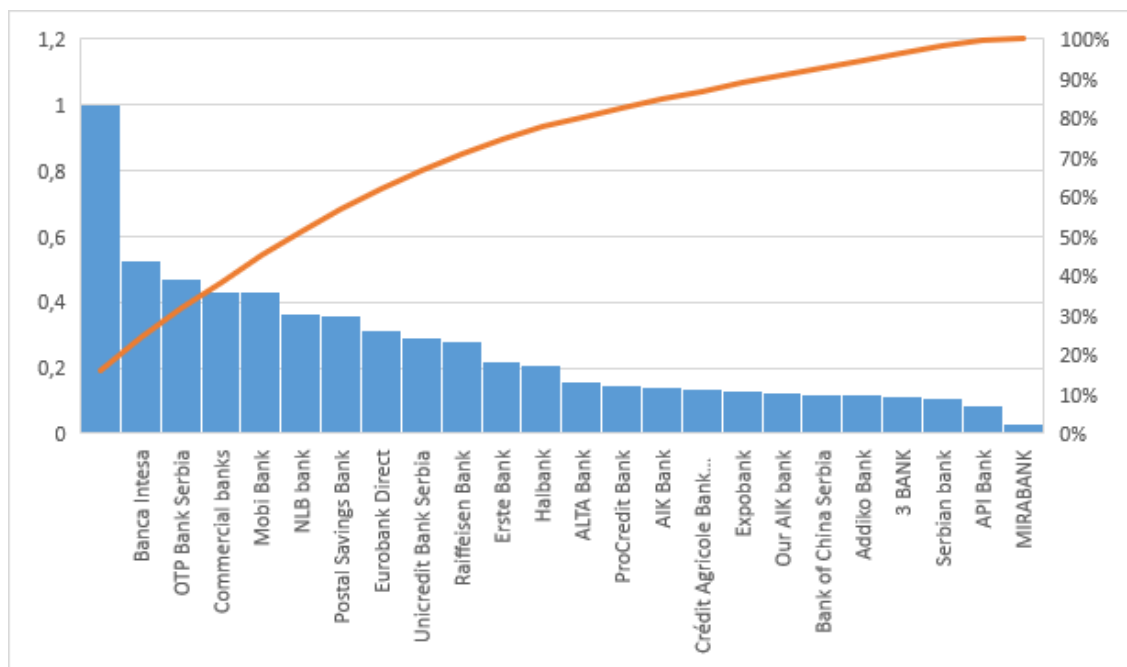


Figure 1 - Ranking of alternatives
Source: Author's picture

Therefore, according to the results of the MARCOS method, the top five banks are in order: Banca Intesa, OTP Banka Srbija, Komercijalna banka, Mobi Banka and NLB banka. Banks that are poorly positioned are: MIRABANK, API banka, Srpska banka, 3 BANKA and Addiko Bank. To some extent, the positioning of banks in Serbia was influenced, among other things, by the Covid-19 pandemic. Under its influence, credit activity in the economy decreased.

In order to improve the financial performance and efficiency of banks in Serbia in the future, it is necessary to manage human resources, assets, capital, sales of banking products and profits as efficiently as possible. The digitization of the entire banking business also plays a significant role in this. Among other things, electronic banking has mitigated to some extent the impact of the Covid-19 corona virus pandemic on the financial performance and efficiency of banks in Serbia.

In the future, it is necessary to continuously carry out similar research. This enables an overview of the dynamics of financial performance and efficiency of banks in Serbia and provides a basis for improvement through the application of relevant measures.

Conclusion

Based on the results of the MARCOS method, the following can be concluded: The top five banks in Serbia are, in order: Banca Intesa, OTP Banka Srbija, Komercijalna banka, Mobi Banka and NLB banka. Badly positioned banks in Serbia are: MIRABANK, API banka, Srpska banka, 3 BANKA and Addiko Bank.

The factors of positioning of banks in Serbia are: economic climate, interest rate, inflation, exchange rate, foreign direct investments, employment rate, living standard of the population, economic activity, competition and others. Their adequate control can affect the achievement of the target profit of banks in Serbia.

In order to improve the financial performance and efficiency of banks in Serbia in the future, it is necessary to manage human resources, assets, capital, sales of banking products and profits as efficiently as possible.

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DETERMINANTE I KONSEKVENCE POVERENJA KORISNIKA MOBILNOG BANKARSTVA

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Rezime: Razvoj aplikacija mobilnog bankarstva je omogućio bankama da na mnogo brži i lakši način opslužuju svoje klijente. Imajući u vidu da se finansijske institucije u zemljama u razvoju susreću sa mnogim problemima u vezi sa implementacijom mobilnog bankarstva i da ono nije toliko rasprostranjeno koliko se očekuje, veoma je bitno da se razumeju faktori koji utiču na usvajanje mobilnog bankarstva, kao i na poverenje korisnika u ove usluge. Stoga, cilj ovog rada jeste da se kroz empirijsko istraživanje utvrde efekti sigurnosti, percipirane korisnosti i percipirane lakoće upotrebe na poverenje, kao i kako poverenje korisnika mobilnog bankarstva utiče na njihovu satisfakciju, afektivnu privrženost i nameru upotrebe. Utvrđeno je da sigurnost i percipirana lakoća upotrebe imaju statistički značajne pozitivne efekte na poverenje, zatim da poverenje pozitivno utiče na satisfakciju, a satisfakcija na afektivnu privrženost i nameru upotrebe. Na kraju, pokazano je i da afektivna privrženost statistički značajno pozitivno utiče na nameru upotrebe.

Ključne reči: mobilno bankarstvo; poverenje; sigurnost; TAM model; satisfakcija; afektivna privrženost; namera upotrebe

JEL klasifikacija: G21, J28, G41

Uvod

Razvoj tehnologije je u velikoj meri uvećao upotrebu mobilnih aplikacija za obavljanje svakodnevnih aktivnosti. Prateći savremene trendove svakodnevnog višesatnog korišćenja mobilnih telefona, banke se sve više fokusiraju na online pružanje usluga i razvijaju mobilne aplikacije, kako bi lakše i brže opslužile korisnike. Mobilno bankarstvo je funkcija mobilne trgovine koja služi kao moćno sredstvo za razvijanje odnosa između klijenata i finansijskih institucija (Jun & Palacios, 2016). Ponuda mobilnog bankarstva predstavlja veoma bitan faktor prilikom izbora banke (Chawla & Joshi, 2017). Mobilna tehnologija je omogućila bankama da pružaju pogodnije, pristupačnije, interaktivnije, kao i bankarske usluge velike vrednosti bez prostornih ili vremenskih ograničenja (Shankar et al., 2019). Mobilno bankarstvo korisnicima pruža puno mogućnosti, kao što su uvid u stanje na računu i najnovije transakcije, zatim transfer sredstava između računa, realizaciju naloga za kupovinu i prodaju na berzama i slično (Laukkanen, 2007). Bitna karakteristika mobilnog bankarstva jeste i mobilnost koja se nudi korisnicima (Suoranta&Mattila, 2004).

Liébana-Cabanillas i saradnici (2013) ukazuju na značaj istraživanja u ovoj oblasti, imajući u vidu da usluge mobilnog bankarstva povećavaju zadovoljstvo klijenata, njihovo zadržavanje, a dovode i do povećanja profita banaka, zbog čega povećanje stope usvajanja mobilnog bankarstva treba da bude veliki prioritet. Ali Raza i saradnici (2017) ističu da postoji veliki broj studija o usvajanju mobilnog bankarstva u razvijenim zemljama, a da je broj ovakvih istraživanja u zemljama u razvoju ograničen. Oni u svom radu navode da se finansijske institucije u zemljama u razvoju susreću sa mnogim problemima u vezi sa implementacijom mobilnog bankarstva i da ono nije toliko rasprostranjeno koliko se očekuje. Stoga je veoma bitno da se razumeju faktori koji utiču na usvajanje mobilnog bankarstva, kao i na poverenje korisnika u ove usluge.

Imajući u vidu navedeno, predmet istraživanja jeste poverenje korisnika mobilnog bankarstva u Republici Srbiji, zatim njegove bitne determinante (sigurnost, percipirana korisnost i percipirana lakoća upotrebe), kao i ključne konsekvence (satisfakcija, afektivna privrženost i namera upotrebe). Cilj ove studije jeste da se utvrde efekti sigurnosti, percipirane korisnosti i percipirane lakoće upotrebe na poverenje, kao i kako poverenje korisnika mobilnog bankarstva utiče na njihovu satisfakciju, afektivnu privrženost i nameru upotrebe. Rezultati istraživanja i na osnovu njih izvedene implikacije mogu biti od pomoći bankama prilikom razvoja strategija za privlačenje, zadržavanje i povećanje poverenja, satisfakcije i lojalnosti klijenata.

Rad je strukturiran iz četiri dela. Prvi deo rada će obuhvatiti pregled literature u kom su dati teorijski i empirijski nalazi o dimenzijama usluga mobilnog bankarstva i izvedene su hipoteze. Drugi deo rada će se odnositi na metodologiju istraživanja, treći na rezultate sprovedenog empirijskog istraživanja, a u četvrtom će biti prikazana diskusija dobijenih rezultata, teorijske i praktične implikacije, ograničenja i budući pravci istraživanja.

Pregled literature

Mobilno bankarstvo se definiše kao kanal kojim klijent komunicira sa bankom preko mobilnog uređaja (Laukkanen&Pasanen, 2008). Ovaj oblik bankarstva se smatra revolucionarnim napretkom koji kombinuje mobilni tehnološki napredak sa finansijskim i komercijalnim uslugama (Bharti, 2016). Mobilno bankarstvo se smatra veoma važnim za bankarske institucije, jer im omogućava da prošire svoje usluge, povećava njihovu konkurentsku prednost, klijentima nudi usluge sa dodatnom vrednošću i omogućava moderan i interaktivan kanal komunikacije sa njima (Amin et al., 2008). Veoma važnu ulogu u odnosima između banaka i njihovih klijenata, posebno u dugoročnim odnosima, ima poverenje imajući u vidu da se ne mogu svi aspekti utvrditi ugovorom (Caménet al., 2011). Prilikom prve interakcije korisnika sa mobilnim bankarstvom javlja se inicijalno poverenje (McKnight et al., 2002). Stoga, od ključne je važnosti da se uspostavi inicijalno poverenje korisnika, imajući u vidu da poverenje može dovesti do satisfakcije, kao i da može dodatno poboljšati nameru korišćenja (Sharma&Sharma, 2019). U vezi sa tim, u osnovi ove studije jeste poverenje korisnika mobilnog bankarstva.

Analizirani su faktori koji na njega utiču, odnosno dve TAM dimenzije (percipirana korisnost i percipirana lakoća upotrebe), koje su predložili Davis i saradnici (1989) u svom Modelu prihvatanja tehnologije (TAM - technology acceptance model). Ovaj model predstavlja najkorišćeniji okvir u istraživanjima faktora koji utiču na korišćenje i usvajanje najnovije tehnologije. S obzirom da TAM ne uključuje ekonomske, demografske i egzogene varijable, što ograničava upotrebu ovog modela u određivanju stavova i namera pojedinaca da usvoje mobilno bankarstvo, istraživanja iz ove oblasti obično modifikuju TAM tako što uključuju varijable kao što su inovativnost, percipirani trošak upotrebe, percipirani rizik i percipirana sigurnost (Ali Raza et al., 2017). Imajući u vidu navedeno, u ovoj studiji je pored TAM dimenzija uključena i sigurnost kao bitan prediktor poverenja korisnika mobilnog bankarstva. Pored toga, ispitano je i do kojih bihevioralnih reakcija dovodi poverenje, odnosno kako poverenje utiče na satisfakciju, afektivnu privrženost i nameru upotrebe.

Sigurnost

Jedna od osnovnih dimenzija usvajanja mobilnog bankarstva jeste sigurnost (Sreejesh et al., 2016), tj. pre nego što korisnici usvoje usluge mobilnog bankarstva, moraju da ih vide kao bezbedne za korišćenje (Arcand et al., 2017). Damghanian i saradnici (2016) definišu sigurnost kao sposobnost zaštite informacija od potencijalnih pretnji, odnosno obezbeđivanje da sistem bude u stanju da spreči napade koji mogu ugroziti podatke i usluge. Singh&Srivastava (2019) ističu da se u mobilnom okruženju sigurnost može kategorisati kao bezbednost aplikacija koje omogućavaju mobilno plaćanje, bezbednost mreže i bezbednost uređaja. Banke moraju da se pozabave pitanjima sigurnosti i privatnosti u internet bankarstvu, jer su oni glavni faktori koji dovode do toga da veliki broj ljudi još uvek ne želi da koristi usluge internet bankarstva i da radije koriste usluge ne-internet bankarstva, kao što su bankomati (Susanto et al., 2016). Uprkos mnogim tehničkim napretcima u bezbednosti na Internetu, kao što su kriptografija, autentifikacija, digitalni potpisi i sertifikati, klijenti su i dalje zabrinuti za bezbednost monetarnih transakcija kada koriste Internet (Yoon, 2010). Pitanja sigurnosti i privatnosti su veoma važna, imajući u vidu da korisnici šalju svoje lične i finansijske podatke u onlajn transakcijama, što za njih predstavlja rizik (Akhter, 2014). Shankar&Jebarajakirthy (2019) navode da ako provajderi onlajn bankarskih usluga omogućavaju bezbedne transakcije i čuvaju privatnost ličnih podataka, korisnici će biti skloniji da im veruju.

Bitno je da banke imaju transparentnu politiku privatnosti, jer ukoliko su korisnici obavešteni o tome da se njihovi podaci koriste na pravičan način, biće im lakše da otkrivaju svoje lične podatke i manje će biti zabrinuti za privatnost istih (Sreejesh et al., 2016). Nedostatak sigurnosti može da utiče na smanjenje poverenja korisnika u usluge mobilnog bankarstva (Chen, 2012). Mnoge studije su došle do zaključka o statistički značajnom pozitivnom uticaju sigurnosti na poverenje korisnika mobilnog bankarstva (Arcand et al., 2017; Damghanian et al., 2016; Singh&Srivastava, 2019; Susanto et al., 2016). Imajući u vidu navedeno, formulisana je sledeća hipoteza:

H1: Sigurnost ima statistički značajan pozitivan uticaj na poverenje korisnika mobilnog bankarstva.

Percipirana korisnost i percipirana lakoća upotrebe

Jedan od najprimenjivanih instrumenata koji se koriste u istraživanjima iz oblasti mobilnog bankarstva jeste model prihvatanja tehnologije (TAM - technology acceptance model), koji su razvili i Davis saradnici (1989). Njegove dve ključne dimenzije jesu percipirana korisnost i percipirana lakoća upotrebe. Percipirana korisnost se definiše kao subjektivni osećaj potencijalnog korisnika da će korišćenje određenog aplikativnog sistema povećati njegove/njene radne performanse (Davis et al., 1989). Ako korisnik smatra da će mu neka tehnologija omogućiti da brže i jednostavnije realizuje aktivnosti, onda će verovati da će njena upotreba doprineti uštedi napora i vremena, što će motivisati korisnika da je koristi (Kalinić et al., 2019). S druge strane, jedan od razloga za sporo usvajanje aplikacije mobilnog bankarstva od strane potencijalnih korisnika jeste to što oni često ne vide jasne prednosti ovih usluga (Kalinić&Marinković, 2016). Nova tehnologija će biti prihvaćena samo ako potencijalnim korisnicima ponudi neku jedinstvenu prednost u odnosu na postojeća rešenja (Chong, 2013). Klijenti će koristiti sisteme mobilnog plaćanja ukoliko smatraju da je sistem koristan za njihova finansijska pitanja ili transakcione potrebe (Kim et al., 2010). Percipirana korisnost značajno utiče na stavove i namere korisnika da koriste usluge mobilnog bankarstva (Ali Raza et al., 2017). Susanto i saradnici (2016) su u svom istraživanju dokazali postojanje statistički značajnih efekata percipirane korisnosti na poverenje korisnika mobilnog bankarstva. U vezi sa tim, biće testirana sledeća hipoteza:

H2: Percipirana korisnost ima statistički značajan pozitivan uticaj na poverenje korisnika mobilnog bankarstva.

Percipirana lakoća upotrebe se odnosi na stepen u kome korisnik veruje da će određeni sistem koristiti bez napora (Davis et al., 1989). AlSoufi&Ali (2014) navode da će klijenti koristiti mobilno bankarstvo ukoliko veruju da je ono lako za korišćenje. Sreejesh i saradnici (2016) su došli do zaključka da jednostavnost korišćenja ima značajne efekte na stavove korisnika mobilnog bankarstva i da su portali mobilnog bankarstva generalno jednostavni za upotrebu i pomažu korisnicima da sa malo napora i komplikacija dođu do potrebnih informacija. Neki nedostaci mobilnih uređaja, kao što su mala veličina ekrana i otežan unos podataka, mogu da dovedu do nezadovoljstva i neprihvatanja od strane korisnika, naročito neiskusnih, te se zato lakoća upotrebe smatra bitnim faktorom (Kalinić&Marinković, 2016). Liao&Cheung (2008) su predložili i empirijski testirali lakoću upotrebe kao meru zadovoljstva korisnika onlajn bankarstvom. Mobilno bankarstvo mora da bude lako za učenje i lako za korišćenje kako bi se sprečio problem nedovoljnog korišćenja (Luarn&Lin, 2005).

Dakle, uspeh sistema mobilnog bankarstva zavisi od nivoa lakoće upotrebe sistema. Liébana-Cabanillas i saradnici (2013) ukazuju na postojanje značajnog uticaja percipirane lakoće upotrebe na poverenje korisnika elektronskog bankarstva. Na osnovu navedenog, pretpostavlja se da:

H3: Percipirana lakoća upotrebe ima statistički značajan pozitivan uticaj na poverenje korisnika mobilnog bankarstva.

Poverenje

Poverenje u onlajn okruženju dobija veliku pažnju mnogih istraživača zbog sve većeg značaja elektronske trgovine i elektronskog bankarstva. Onlajn poverenje se može definisati kao skup pozitivnih uverenja ili očekivanja u pogledu kompetentnosti, integriteta i dobronamernosti neke organizacije u onlajn okruženju (McKnight et al., 2002). Poverenje je nivo na kome neko veruje da je nova tehnologija pouzdana i validna (Ha & Stoel, 2009). Zampou i saradnici (2012) pod poverenjem podrazumevaju bezbednost u mobilnom plaćanju, poverljivost ličnih podataka, poverenje u rezultate sprovođenja mobilne usluge, kao i integritet uslova korišćenja mobilnih usluga. Ukoliko korisnici imaju visok stepen poverenja, spremni su čak i da podnesu određene kratkoročne žrtve zbog procene da im saradnja sa datom organizacijom može doneti brojne koristi na dugi rok (Marinković&Obradović, 2015). Važnost poverenja se ogleda u činjenici da je u virtuelnom okruženju stepen nepouzdanosti u ekonomskim razmenama mnogo veći od onog u tradicionalnom okruženju (Grabner-Kräuter&Faulant, 2008). Brun i saradnici (2014) ističu da se onlajn poverenje razlikuje od tradicionalnog poverenja po tome što se, pored procene poverenja u organizaciju, mora uzeti u obzir i poverenje u sam veb sajt. Ukoliko pojedinci percipiraju mobilno bankarstvo kao rizičnije u odnosu na obično bankarstvo, njihovo poverenje u usluge predstavlja neophodan faktor za korišćenje mobilnog bankarstva (Kim et al., 2009). Na Internetu postoji povećan nedostatak poverenja u pogledu ekonomskih transakcija, te stoga finansijske institucije moraju da posvete pažnju ovom pitanju ako žele da smanje nesigurnost korisnika (Liebana-Cabanillas et al., 2013). Potencijalni korisnici mobilnog bankarstva procenjuju uslugu u zavisnosti od poverenja koje osećaju (Lazarević, 2022). Poverenje pojedinaca u aplikaciju mobilnog bankarstva povećava njihov osećaj percipirane sigurnosti, što se smatra jednim od glavnih pokretača onlajn satisfakcije korisnika (Sahoo&Pillai, 2017). Marinković&Kalinić (2017) navode da je poverenje kritičan faktor uspeha u usvajanju mobilnog veb sajta i da razvoj poverenja zavisi kako od karakteristika korisnika, tako i od pouzdanosti i karakteristika provajdera mobilnih usluga. U marketinškom kontekstu je gotovo nemoguće potpuno odvojiti poverenje od satisfakcije, odnosno poverenje i satisfakcija predstavljaju dve veoma povezane dimenzije (Chung&Shin, 2010). U mobilnim finansijskim uslugama, poverenje predstavlja jedan od najvažnijih i najuticajnijih prediktora prihvatanja tehnologije i satisfakcije korisnika (Kalinić et al., 2020). Mnoge studije su dokazale da poverenje ima snažne statistički značajne efekte na satisfakciju korisnika (Alain, 2013; Arcand et al., 2017; Lee&Chung, 2009; Liebana-Cabanillas et al., 2013). U vezi sa tim, formulisana je sledeća hipoteza:

H4: Poverenje ima statistički značajan pozitivan uticaj na satisfakciju korisnika mobilnog bankarstva.

Satisfakcija

Satisfakcija je rezultat poređenja stvarnih performansi i očekivanja u vezi sa organizacijom i odnosi se na stepen u kome stvarno ostvarene koristi zadovoljavaju ili premašuju očekivani pravičan nivo koristi (Gruen, 1995). Pod satisfakcijom se podrazumeva ispunjenje očekivanja potrošača o performansama proizvoda i usluga (Oliver, 1980). Ukoliko performanse proizvoda/usluga prevazilaze očekivanja potrošača javlja se visok stepen satisfakcije. U onlajn okruženju je satisfakcija često povezana sa veb sajtom i njegovim karakteristikama (Brun, et al., 2014). Liébana-Cabanillas i saradnici (2016) su utvrdili da satisfakcija predstavlja ključan prethodnik lojalnosti korisnika mobilnog bankarstva, kao i veoma bitan faktor dalje upotrebe ovih usluga. Pored toga, satisfakcija korisnika mobilnog bankarstva ima bitan uticaj i na širenje pozitivne usmene propagande (Sampaio et al., 2017). Zadovoljstvo ili nezadovoljstvo klijenata je usko povezano sa njihovim namerama ponašanja, koje na kraju utiču na profitabilnost banaka zbog efekata na stope zadržavanja klijenata, prosečan iznos depozita, kao i troškove pružanja usluga (Marinković&Obradović, 2015). Dakle, pozitivniji stav prema mobilnom bankarstvu dovodi do jače namere za njegovo korišćenje (Aboelmaged&Gebba, 2013). Imajući u vidu istraživanja koja su utvrdila da satisfakcija ima statistički značajan uticaj na afektivnu privrženost (Chung&Shin, 2010; Kalinić et al., 2020; Lai, 2004), kao i na nameru upotrebe (Sharma&Sharma, 2019; Susanto et al., 2016; Marinković&Obradović, 2015; Lin et al., 2013; Rejman Petrović et al., 2022), formulisane su sledeće hipoteze:

H5: Satisfakcija korisnika mobilnog bankarstva ima statistički značajan pozitivan uticaj na afektivnu privrženost.

H6: Satisfakcija korisnika mobilnog bankarstva ima statistički značajan pozitivan uticaj na nameru upotrebe.

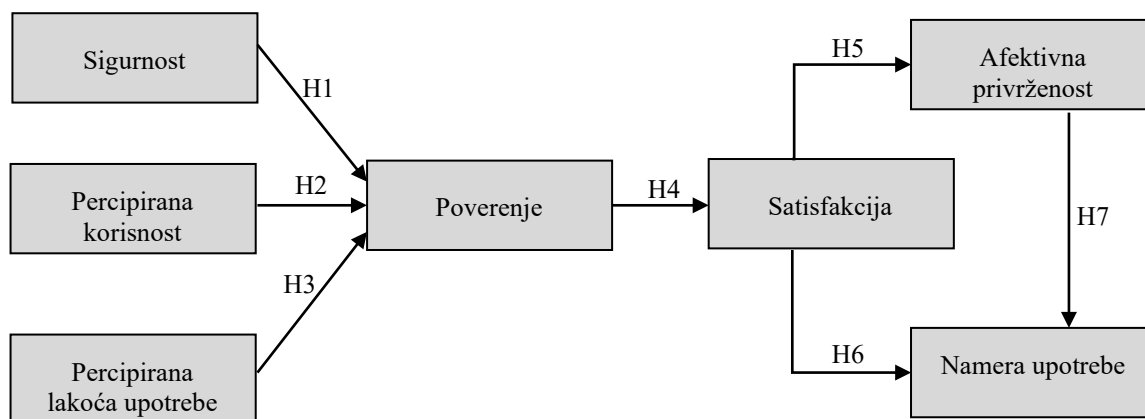
Afektivna privrženost

Privrženost predstavlja „psihološku povezanost potrošača za pružaoca onlajn usluga, zajedno sa njegovom/njenom spremnošću da održi odnos klijent-firma“ (Liang & Chen, 2009, str. 222). Privrženost potrošača vodi ka namerama ponovne kupovine (Keh&Xie, 2009). Jedna od dimenzija privrženosti jeste afektivna privrženost, koja se odnosi na psihološku vezu koja nastaje iz povoljnih osećanja prema organizaciji i razvija se jer se potrošač identifikuje sa organizacijom i voli njen veb sajt (Brun et al., 2014). Afektivna privrženost je ukorenjena u pozitivnim osećanjima i preferencijama i često vodi do dugoročnih partnerstava (Wu et al., 2009). Marinković&Obradović (2015) navode da koncept afektivne privrženosti predstavlja specifičnu mešavinu lojalnosti, uključenosti i povezanosti i ukazuju na to kako bi bilo korisno utvrditi da li afektivna privrženost implicira bihevioralne reakcije kod klijenata banke. U vezi sa tim, biće testirana sledeća hipoteza:

H7: Afektivna privrženost korisnika mobilnog bankarstva ima statistički značajan pozitivan uticaj na nameru upotrebe.

Na Slici 1 je prikazan istraživački model.

Slika 1: Model istraživanja



Izvor: Autor

Metodologija istraživanja

Struktura uzorka i upitnik

U istraživanju je korišćen metod ankete za prikupljanje primarnih podataka. Upitnik je distribuiran ispitanicima na teritoriji Republike Srbije koji koriste usluge mobilnog bankarstva, a na njega je odgovorilo 316 ispitanika. Najveći deo uzorka čine ispitanici ženskog pola kojih je 209, odnosno 66,14%, a muškarci čine 33,86% uzorka (107 ispitanika). Ispitanici uzrasta između 18 i 35 godina starosti čine 78,80% uzorka, odnosno 249 ispitanika, dok preostalih 67 ispitanika (21,20%) ima više od 35 godina. Dosta veći udeo mladih ispitanika se može opravdati time što oni u većoj meri koriste usluge mobilnog bankarstva u odnosu na stariju populaciju. Veliki broj ispitanika (231, odnosno 73,10%) koristi mobilno bankarstvo bar godinu dana, a preostalih 26,9%, odnosno 85 ispitanika koriste ove usluge manje od godinu dana. Nešto više od polovine uzorka (165 ispitanika, odnosno 52,22%) često koriste mobilno bankarstvo, dok preostalih 151 ispitanika, odnosno 47,78% su se izjasnili kao povremeni korisnici. Inovatori (oni koji su među prvima u svom okruženju počeli da koriste mobilno bankarstvo) i sledbenici (ispitanici koji su počeli sa korišćenjem mobilnog bankarstva pod uticajem inovatora) imaju sličan udeo u uzorku, odnosno 166 ispitanika (52,53%) smatra da su među prvima u svom okruženju koju su počeli da koriste usluge mobilnog bankarstva, a preostalih 150 ispitanika (47,47%) je na ovo pitanje dalo negativan odgovor. Struktura ispitanika je prikazana u Tabeli 1.

Tabela 1: Struktura ispitanika u uzorku

		Broj ispitanika	Procenat
Pol	Žene	209	66,14%
	Muškarci	107	33,86%
Starost	18-35	249	78,80%
	>35	67	21,20%

Dužina korišćenja	Manje od godinu dana	85	26,90%
	Godinu dana ili duže	231	73,10%
Učestalost korišćenja	Povremeno	151	47,78%
	Često	165	52,22%
Inovatori/sledbenici	Inovatori	166	52,53%
	Sledbenici	150	47,47%

Izvor: Autor

Uz ovih pet demografskih pitanja, upitnik sadrži i 20 konstatacija skaliranih na sedmostepenoj Likertovoj skali, sa kojima su ispitanici iskazali svoj stepen slaganja (1 – apsolutno se ne slažem: 7 – apsolutno se slažem). Sigurnost je merena preko 3 konstatacije (Arcand et al., 2017; Sagib&Zapan, 2014), percipirana korisnost (Arcand et al., 2017; Kim&Lee, 2013), percipirana lakoća upotrebe (Sagib&Zapan, 2014; Arcand et al., 2017; Sreejesh et al., 2016), poverenje (Singh&Srivastava, 2014; Arcand et al., 2017), satisfakcija (Sagib&Zapan, 2014; Arcand et al., 2017) i afektivna privrženost (Fullerton, 2011) takođe obuhvataju po 3 konstatacije, dok 2 konstatacije čine varijablu namera upotrebe (Hanafizadeh et al., 2014).

Analiza podataka

Analiza podataka je sprovedena u statističkim paketima za društvene nauke IBM SPSS 20 i IBM AMOS 23. Program SPSS je korišćen u cilju sprovođenja analize pouzdanosti kako bi se utvrdila interna konzistentnost formiranih varijabli. Uz pomoću programa AMOS je testirana skladnost i validnost istraživačkog modela primenom konfirmativne faktorske analize (CFA – Confirmatory Factor Analysis), a za testiranje efekata nezavisnih na zavisne varijable je sproveden model strukturalnih jednačina.

Rezultati istraživanja

Analiza pouzdanosti i validnosti modela

Rezultati analize pouzdanosti i validnosti modela su prikazani u Tabeli 2. S obzirom da je vrednost koeficijenta CA (Cronbach's alpha) za svaku formiranu varijablu veća od najniže potrebne vrednosti od 0,7 (Nunnally, 1978), može se zaključiti da sve varijable imaju odgovarajuću internu konzistentnost konstatacija koje ih čine, odnosno da su sve varijable pouzdane. Vrednost AVE (average variance extracted) veća od 0,5 (Fornell & Larcker, 1981) ukazuje na konvergentnu validnost, a vrednost CR (composite reliability) veća od 0,6 ukazuje na kompozitnu validnost modela (Bagozzi&Yi, 1988). Diskriminativna validnost modela je potvrđena činjenicom da su kod svih varijabli vrednosti AVE veće u odnosu na MSV (maximum shared squared variance) i ASV (average variance extracted) vrednosti (Hair et al., 2010).

Tabela 2: Analiza pouzdanosti i validnosti modela

Varijabla	CA	CR	AVE	MSV	ASV
Sigurnost	0,811	0,820	0,606	0,319	0,221
Percipirana korisnost	0,850	0,858	0,668	0,572	0,303
Percipirana lakoća upotrebe	0,857	0,861	0,675	0,493	0,296
Poverenje	0,914	0,916	0,783	0,736	0,294
Satisfakcija	0,933	0,933	0,824	0,736	0,300
Namera upotrebe	0,917	0,918	0,848	0,572	0,305
Afektivna privrženost	0,945	0,946	0,854	0,134	0,078

Izvor: Autor

Konfirmativna faktorska analiza ukazuje i na skladnost istraživačkog modela (Tabela 3), imajući u vidu da su vrednosti GFI (goodness-of-fit index), CFI (comparative fit index), TLI (Tucker-Lewis index) i IFI (incremental fit index) indeksa veće od 0,9 (Byrne, 1998), vrednost RMSEA (root mean square error of approximation) indeksa manja od 0,08 (Hair et al., 2010), kao i da je vrednost χ^2/df racia manja od 3 (Carmines & McIver, 1981).

Tabela 3: Rezultati konfirmativne faktorske analize

Parametri	Dobijena vrednost parametra	Preporučena vrednost parametra
χ^2/df	1,98	<3
GFI	0,914	>0,9
CFI	0,971	>0,9
TLI	0,963	>0,9
IFI	0,971	>0,9
RMSEA	0,056	<0,08

Izvor: Autor

Model strukturalnih jednačina

Model strukturalnih jednačina je primenjen kako bi se testirale formulisane hipoteze (Tabela 4). Analiza je pokazala da je 6 od 7 testiranih uticaja statistički značajno. Utvrđeno je da sigurnost ($\beta=0,352$, $p<0,01$) i percipirana lakoća upotrebe ($\beta=0,479$, $p<0,01$) imaju statistički značajne pozitivne efekte na poverenje, što potvrđuje hipoteze H1 i H3. S druge strane, percipirana korisnost nema statistički značajne efekte na poverenje ($p>0,05$), te hipoteza H2 nije dokazana.

Analizom se dolazi do zaključka da poverenje ima veoma snažne pozitivne efekte na satisfakciju ($\beta=0,870$, $p<0,01$), kao i da satisfakcija statistički značajno pozitivno utiče na afektivnu privrženost ($\beta=0,327$, $p<0,01$) i nameru upotrebe ($\beta=0,427$, $p<0,01$), čime su dokazane hipoteze H4, H5 i H6. Na kraju, potvrđena je i hipoteza H7, imajući u vidu da afektivna privrženost statistički značajno pozitivno utiče na nameru upotrebe ($\beta=0,173$, $p<0,01$).

Tabela 4: Model strukturalnih jednačina

Hipoteze	β	p
H1: Sigurnost $\rightarrow$ Poverenje	0,352	0,000***
H2: Percipirana korisnost $\rightarrow$ Poverenje	-0,081	0,394
H3: Percipirana lakoća upotrebe $\rightarrow$ Poverenje	0,479	0,000***
H4: Poverenje $\rightarrow$ Satisfakcija	0,870	0,000***
H5: Satisfakcija $\rightarrow$ Afektivna privrženost	0,327	0,000***
H6: Satisfakcija $\rightarrow$ Namera upotrebe	0,427	0,000***
H7: Afektivna privrženost $\rightarrow$ Namera upotrebe	0,173	0,003***

*** Vrednost je signifikantna na nivou $p < 0,01$

Izvor: Autor

Diskusija rezultata

Analiza je pokazala da sigurnost ima statistički značajne efekte na poverenje korisnika mobilnog bankarstva, što je konzistentno sa mnogim prethodnim istraživanjima (Arcand et al., 2017; Damghanian et al., 2016; Singh&Srivastava, 2019; Susanto et al., 2016). Briga o sigurnosti transakcija i ličnih podataka ima važan uticaj na stavove korisnika prema mobilnom bankarstvu. Korisnici se često plaše mogućnosti prevara, kao i zloupotrebe svojih ličnih i finansijskih podataka. Klijenti očekuju od banaka da ojačaju svoje bezbedonosne mehanizme, kako bi se obezbedila sigurnost transakcija i zaštita privatnosti. Samo kada korisnici imaju visoko poverenje u bezbednost i privatnost koje im pruža banka, oni će dovoljno verovati banci da koriste njene usluge mobilnog bankarstva.

Pored sigurnosti, utvrđeno je i da percipirana lakoća upotrebe ima jak uticaj na poverenje korisnika, na šta su ukazali i Liebana-Cabanillas (2013). Ukoliko korisnici sa malo uloženog truda, vremena i napore izvrše transakcije, odnosno ukoliko im je jednostavno da koriste aplikaciju mobilnog bankarstva, ostvariće se viši stepen poverenja. Navedeno posebno može doći do izražaja kod korisnika koji nisu vešti u korišćenju tehnologija. Ukoliko je korisnicima teško da koriste aplikaciju mobilnog bankarstva, oni će biti nezadovoljniji, smanjiće se poverenje u banku i njenu aplikaciju i mogu prestati sa njenom upotrebom, bez obzira na brojne benefite koje aplikacija pruža.

S druge strane, percipirana korisnost nema značajne efekte na poverenje korisnika mobilnog bankarstva. Dakle, ukoliko korisnici aplikaciju mobilnog bankarstva percipiraju kao korisnu neće doći do većeg poverenja, jer je korisnost aplikacije nešto što podrazumevaju. Međutim, izostanak korisnosti aplikacije može da dovede do pada poverenja korisnika.

U istraživanju se dolazi do zaključka da poverenje predstavlja izuzetno jak prediktor satisfakcije korisnika mobilnog bankarstva, što je u skladu sa velikim brojem prethodnih studija (Susanto et al., 2016; Sharma&Sharma, 2019; San-Martin&Lopez-Catalain, 2013; Marinković&Obradović, 2015; Alain, 2013; Arcand et al., 2017; Lee&Chung, 2009; Liebana-Cabanillas et al., 2013). Pozitivna uverenja o banci, kao i verovanje u pouzdanost i validnost tehnologije mobilnog bankarstva, dovodi do visokog zadovoljstva njenih korisnika.

Kao i u prethodnom istraživanjima (Chung&Shin, 2010; Kalinić et al., 2020; Lai, 2004), dokazani su pozitivni efekti satisfakcije na afektivnu privrženost. Zatim, utvrđeno je da satisfakcija ima pozitivne efekte i na nameru upotrebe mobilnog bankarstva, na šta su uputile i druge studije (Sharma&Sharma, 2019; Susanto et al., 2016; Marinković&Obradović, 2015; Lin et al., 2013; Rejman Petrović et al., 2022). Dakle, ukoliko performanse mobilne aplikacije ispunjavaju ili prevazilaze očekivanja korisnika i ostvari se visok stepen satisfakcije, ostvariće se osećaj povezanosti i identifikacije sa mobilnim bankarstvom i oni će biti spremni da ponovo koriste ove usluge. S druge strane, ukoliko korisnici nisu zadovoljni, imaće nepovoljna osećanja prema banci i njenoj aplikaciji, pa postoji šansa da će prekinuti korišćenje usluga i preći kod konkurenata.

Na kraju, dokazano je i da afektivna privrženost predstavlja prediktor namere upotrebe, što su zaključili i Keh&Xie (2009). Dakle, pozitivna osećanja i psihološka povezanost klijenata sa bankom i njenom mobilnom aplikacijom dovode do toga da klijenti rado koriste mobilno bankarstvo i do stvaranja dugoročnih partnerskih odnosa sa bankom.

Zaključak i implikacije

Trendovi u razvoju informaciono komunikacionih tehnologija su doveli do značajnih promena u bankarskom poslovanju. Banke su sve više usmerene na onlajn pružanje usluga i svakodnevno dolazi do porasta broja korisnika mobilnog bankarstva. U vezi sa tim, u ovom istraživanju je ispitano poverenje korisnika mobilnog bankarstva, faktori koji na njega utiču, kao i njegove ključne konsekvence. Utvrđeno je da sigurnost i percipirana lakoća upotrebe imaju statistički značajne pozitivne efekte na poverenje, zatim da poverenje pozitivno utiče na satisfakciju, a satisfakcija na afektivnu privrženost i nameru upotrebe. Na kraju, pokazano je i da afektivna privrženost statistički značajno pozitivno utiče na nameru upotrebe. Ovime su potvrđene hipoteze H1 i H3-H7.

Očekuje se da ovo istraživanje doprinese literaturi iz bankarske oblasti, proširujući postojeća znanja o poverenju korisnika, kao i o njegovim ključnim determinantama i rezultatima. Na taj način će se bolje razumeti koji su to ključni faktori koji dovode do poverenja korisnika, kao i kako stečeno poverenje dalje utiče na bihevioralne reakcije korisnika. Iako se veliki broj inostranih studija bavio proučavanjem poverenja korisnika mobilnog bankarstva, u domaćoj literaturi se mali broj autora bavio navedenim, pa će stečena znanja predstavljati dobru osnovu za buduća istraživanja ovakve vrste na teritoriji Republike Srbije, kao i drugih zemalja u razvoju.

Na osnovu rezultata istraživanja su formulisane implikacije koje mogu biti od pomoći bankama prilikom razvoja strategija za privlačenje, zadržavanje klijenata, kao i povećanje poverenja, satisfakcije i privrženosti klijenata. Za sticanje poverenja u banku i njenu mobilnu aplikaciju, bitno je da se posebna pažnja obrati na sigurnost.

Važno je da banke koriste pouzdane i sigurne sisteme, kako bi na taj način sprečile prevare i zloupotrebe poverljivih ličnih i finansijskih podataka. Preporuka bankarskim institucijama jeste da se kod transakcija velikih vrednosti korisnicima, pored lozinke, zatraži dodatna autentifikacija u vidu otiska prsta ili prepoznavanja lica. Pored toga, preporučuje se da se za korisnike obezbede edukativne brošure i uputstva u kojima je objašnjen način na koji banke štite osetljive i poverljive podatke i informacije. Poželjno je da se tom prilikom istakne značaj toga da korisnici u svojim mobilnim uređajima ne čuvaju osetljive podatke, kao što su lozinke, brojevi bankovnih računa i sl. Imajući u vidu efekte percipirane lakoće upotrebe na poverenje korisnika, neophodno je prilikom kreiranja aplikacije, pored sigurnosti, voditi računa da ona ne bude previše kompleksna za korišćenje, da ima odgovarajuću stukturu, kao i navigaciju koja neće biti komplikovana korisnicima. U vezi sa tim, preporuka je da u brošurama bude uključeno i uputstvo sa detaljnim načinom korišćenja aplikacije, imajući u vidu da postoje korisnici koji nisu vični sa korišćenjem novih tehnologija. Na taj način se može umanjiti njihov otpor u usvajanju mobilnog bankarstva i pored toga što je ono jednostavno za korišćenje.

Za usvajanje mobilnog bankarstva značajno je sprovesti odgovarajuće promotivne kampanje, gde će se korisnicima ukazati na sve prednosti koje im se pružaju. Prilikom promovisanja ne treba zaboraviti na moć društvenih mreža i raznih internet foruma. Preporuka je da se identifikuju lideri mišljenja, poznate ličnosti i influenseri, koji imaju veliki broj pratilaca. Njihovim angažovanjem i pružanjem raznih pogodnosti, postaće zadovoljni korisnici koji će rado preporučiti drugima usluge mobilnog bankarstva. Za promovisanje na društvenim mrežama se mogu koristiti i sponzorisanе objave, koje omogućavaju da se brzo dopre do velikog broja ciljnog segmenta korisnika. Na kraju, promovisanje mobilnog bankarstva kao sastavnog dela dinamičnog stila života punog obaveza, može dovesti do porasta broja korisnika.

Sprovedeno istraživanje ima nekoliko ograničenja. Prvo, nedovoljno adekvatna struktura uzorka, koju pretežno čine mlađi pripadnici populacije. Drugo, istraživanje je sprovedeno na teritoriji Republike Srbije, pa se rezultati ne mogu generalizovati. Treće ograničenje se odnosi na davanje pristrasnih odgovora od strane ispitanika.

Predlog za buduća istraživanja jeste da se u model uključi još varijabli, kao na primer percipirani rizik, troškovi, imidž i ispita njihov uticaj na poverenje. Predlog za dalja istraživanja jeste da se uradi analiza po segmentima (po polu, starosti, učestalosti korišćenja mobilnog bankarstva i sl.), kako bi se razvile posebne strategije za svaki segment.

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DETERMINANTS AND CONSEQUENCES OF USER TRUST IN MOBILE BANKING

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Summary: the development of mobile banking applications has enabled banks to serve their customers much faster and more easily. Bearing in mind that financial institutions in developing countries face many problems related to the implementation of mobile banking and that it is not as widespread as expected, it is very important to understand the factors that influence the adoption of mobile banking, as well as the trust of users in these services. Therefore, this paper aims to determine through empirical research the effects of security, perceived usefulness, and perceived ease of use on trust and how the trust of mobile banking users affects their satisfaction, affective attachment, and intention to use. It was found that security and perceived ease of use have statistically significant positive effects on trust, then that trust has a positive effect on satisfaction, and satisfaction on affective commitment and intention to use. Finally, it was shown that affective commitment has a statistically significant positive effect on the intention to use.

Keywords: mobile banking; trust; security; TAM model; satisfaction; affective commitment; intention of use

JEL classification: G21, J28, G41

Introduction

The development of technology has greatly increased the use of mobile applications to perform daily activities. Following the modern trends of daily multiple uses of mobile phones, banks increasingly focus on online service provision and develop mobile applications to serve users more easily and quickly. Mobile banking is a mobile commerce function that serves as a powerful tool for developing relationships between customers and financial institutions (Jun & Palacios, 2016). The offer of mobile banking is a very important factor when choosing a bank (Chawla & Joshi, 2017). Mobile technology has enabled banks to provide more convenient, accessible, interactive, and high-value banking services without spatial or temporal constraints (Shankar et al., 2019). Mobile banking provides users with many opportunities, such as insight into the account balance and the latest transactions, then the transfer of funds between accounts, the execution of purchase and sale orders on stock exchanges, and the like (Laukkanen, 2007). An important feature of mobile banking is the mobility offered to users (Suoranta & Mattila, 2004).

Liébana-Cabanillas et al. (2013) indicate the importance of research in this area, bearing in mind that mobile banking services increase customer satisfaction, their retention, and lead to an increase in bank profits, which is why increasing the adoption rate of mobile banking should be a high priority. But Raza et al. (2017) point out that there are a large number of studies on the adoption of mobile banking in developed countries, while the number of such studies in developing countries is limited. In their paper, they state that financial institutions in developing countries face many problems related to the implementation of mobile banking and that it is not as widespread as expected. Therefore, it is very important to understand the factors that influence the adoption of mobile banking, as well as the trust of users in these services.

Bearing in mind the above, the subject of the research is the trust of mobile banking users in the Republic of Serbia, then its important determinants (security, perceived usefulness, and perceived ease of use) as well as key consequences (satisfaction, affective commitment, and intention to use). This study aims to determine the effects of security, perceived usefulness, and perceived ease of use on trust and how the trust of mobile banking users affects their satisfaction, affective commitment, and intention to use. The results of the research and the implications derived from them can be of help to banks when developing strategies to attract, retain and increase the trust, satisfaction, and loyalty of clients.

The paper is structured in four parts. The first part of the paper will include a review of the literature in which theoretical and empirical findings are given on the dimensions of mobile banking services and hypotheses are derived. The second part of the paper will refer to the research methodology, the third to the results of the conducted empirical research, and the fourth will present a discussion of the obtained results, theoretical and practical implications, limitations, and future research directions.

Literature Review

Mobile banking is defined as a channel through which the client communicates with the bank through a mobile device (Laukkanen & Pasanen, 2008). This form of banking is considered a revolutionary advancement that combines mobile technological advances with financial and commercial services (Bharti, 2016). Mobile banking is considered very important for banking institutions, because it allows them to expand their services, increases their competitive advantage, offers customers services with added value, and provides a modern and interactive channel of communication with them (Amin et al., 2008). Trust plays a very important role in relations between banks and their clients, especially in long-term relations, bearing in mind that not all aspects can be determined by contract (Caménet al., 2011). During the user's first interaction with mobile banking, initial trust occurs (McKnight et al., 2002). Therefore, it is crucial to establish initial user trust, considering that trust can lead to satisfaction, as well as can further enhance usage intention (Sharma & Sharma, 2019). In this regard, the basis of this study is the trust of mobile banking users.

Factors influencing trust were analyzed, namely two TAM dimensions (perceived usefulness and perceived ease of use) proposed by Davis et al. (1989) in their Technology Acceptance Model. This model is the most widely used framework in research into the factors that influence the use and adoption of the latest technology. Given that TAM does not include economic, demographic, and exogenous variables, which limits the use of this model in determining individuals' attitudes and intentions to adopt mobile banking, research in this field usually modifies TAM by including variables such as innovativeness, perceived cost of use, perceived risk and perceived security (Ali Raza et al., 2017). Bearing in mind the above, in this study, in addition to the TAM dimensions, security is also included as an important predictor of the trust of mobile banking users. In addition, it examined which behavioral reactions trust leads to, that is, how trust affects satisfaction, affective commitment, and intention to use.

Security

One of the basic dimensions of mobile banking adoption is the security (Sreejesh et al., 2016), i.e., before customers adopt mobile banking services, they must perceive them as safe to use (Arcand et al., 2017). Damghanian et al. (2016) define security as the ability to protect information from potential threats, i.e., ensuring that the system can prevent attacks that can compromise data and services. Singh & Srivastava (2019) point out that in the mobile environment, security can be categorized as security of applications that enable mobile payments, network security, and device security. Banks need to address security and privacy issues in online banking, as they are the main factors that lead to a large number of people still not wanting to use online banking services and preferring to use non-internet banking services such as ATMs (Susanto et al., 2016). Despite many technical advances in Internet security, such as cryptography, authentication, digital signatures, and certificates, customers are still concerned about the security of monetary transactions when using the Internet (Yoon, 2010). Security and privacy issues are very important, considering that users send their personal and financial information in online transactions, which is a risk for them (Akhter, 2014). Shankar & Jebarajakirthy (2019) state that if online banking service providers enable secure transactions and protect the privacy of personal information, users will be more inclined to trust them. Banks must have a transparent privacy policy because if users are informed that their data is used fairly, it will be easier for them to disclose their personal data and they will be less concerned about their privacy (Sreejesh et al., 2016).

The lack of security can affect decrease users' trust in mobile banking services (Chen, 2012). Many studies have concluded a statistically significant positive impact of security on the trust of mobile banking users (Arcand et al., 2017; Damghanian et al., 2016; Singh & Srivastava, 2019; Susanto et al., 2016). Bearing in mind the above, the following hypothesis was formulated:

H1: Security has a statistically significant positive effect on the trust of mobile banking users.

Perceived Usefulness and Perceived Ease of Use

One of the most widely used instruments used in research in the field of mobile banking is the Technology Acceptance Model (TAM), developed by Davis et al. (1989). Its two key dimensions are perceived usefulness and perceived ease of use. Perceived usefulness is defined as a potential user's subjective feeling that using a particular application system will increase his/her work performance (Davis et al., 1989). If the user believes that some technology will enable them to realize activities faster and more easily, then they will believe that its use will contribute to saving effort and time, which will motivate the user to use it (Kalinic et al., 2019). On the other hand, one of the reasons for the slow adoption of mobile banking applications by potential users is that they often do not see any clear advantages of these services (Kalinic & Marinkovic, 2016). New technology will only be accepted if it offers potential users some unique advantage over existing solutions (Chong, 2013). Customers will use mobile payment systems if they find the system useful for their financial issues or transactional needs (Kim et al., 2010). Perceived usefulness significantly affects users' attitudes and intentions to use mobile banking services (Ali Raza et al., 2017). In their research, Susanto et al. (2016) proved the existence of statistically significant effects of perceived usefulness on the trust of mobile banking users. In this regard, the following hypothesis will be tested:

H2: Perceived usefulness has a statistically significant positive effect on the trust of mobile banking users.

Perceived ease of use refers to the degree to which a user believes that a particular system will be used without effort (Davis et al., 1989). AlSoufi & Ali (2014) state that customers will use mobile banking if they believe it is easy to use. Sreejesh et al. (2016) concluded that ease of use has significant effects on the attitudes of mobile banking users and that mobile banking portals are generally easy to use and help users get the information they need with little effort and complication. Some disadvantages of mobile devices, such as small screen size and difficult data entry, can lead to dissatisfaction and non-acceptance by users, especially inexperienced ones, and therefore ease of use is considered an important factor (Kalinic & Marinkovic, 2016). Liao & Cheung (2008) proposed and empirically tested ease of use as a measure of user satisfaction with online banking. Mobile banking must be easy to learn and easy to use to prevent the problem of underutilization (Luarn & Lin, 2005). Therefore, the success of the mobile banking system depends on the level of ease of use of the system. Liébana-Cabanillas et al. (2013) indicate the existence of a significant influence of perceived ease of use on the trust of electronic banking users. Based on the above, it is assumed that:

H3: Perceived ease of use has a statistically significant positive effect on the trust of mobile banking users.

Trust

Trust in the online environment is receiving a lot of attention from many researchers due to the increasing importance of electronic commerce and electronic banking. Online trust can be defined as a set of positive beliefs or expectations regarding the competence, integrity, and benevolence of an organization in the online environment (McKnight et al., 2002). Trust is the level at which one believes that new technology is reliable and valid (Ha & Stoel, 2009). Zampou et al. (2012) define trust as security in mobile payment, the confidentiality of personal data, trust in the results of the implementation of the mobile service, as well as the integrity of the terms of use of mobile services. If users have a high degree of trust, they are even ready to make certain short-term sacrifices due to the assessment that cooperation with a given organization can bring them numerous benefits in the long term (Marinkovic & Obradovic, 2015). The importance of trust is reflected in the fact that in a virtual environment the degree of unreliability in economic exchanges is much higher than in a traditional environment (Grabner-Kräuter & Faullant, 2008). Brun et al. (2014) point out that online trust differs from traditional trust in that, in addition to assessing trust in the organization, trust in the website itself must also be considered. If individuals perceive mobile banking as riskier than regular banking, their trust in services is a necessary factor for using mobile banking (Kim et al., 2009). There is an increased lack of trust in economic transactions on the Internet, and therefore financial institutions must pay attention to this issue if they want to reduce user insecurity (Liebana-Cabanillas et al., 2013). Potential users of mobile banking evaluate the service depending on the trust they feel (Lazarević, 2022). Individuals' trust in a mobile banking application increases their sense of perceived security, which is considered one of the main drivers of online customer satisfaction (Sahoo & Pillai, 2017). Marinkovic & Kalinic (2017) state that trust is a critical success factor in the adoption of a mobile website and that the development of trust depends on both user characteristics and the reliability and characteristics of mobile service providers. In the marketing context, it is almost impossible to completely separate trust from satisfaction, that is, trust and satisfaction represent two very related dimensions (Chung & Shin, 2010). In mobile financial services, trust represents one of the most important and influential predictors of technology acceptance and user satisfaction (Kalinic et al., 2020). Many studies have proven that trust has strong statistically significant effects on customer satisfaction (Alain, 2013; Arcand et al., 2017; Lee & Chung, 2009; Liebana-Cabanillas et al., 2013). In this regard, the following hypothesis was formulated:

H4: Trust has a statistically significant positive impact on mobile banking user satisfaction.

Satisfaction

Satisfaction is the result of a comparison of actual performance and expectations regarding the organization and refers to the degree to which the actual benefits achieved meet or exceed the expected fair level of benefits (Gruen, 1995). Satisfaction means the fulfillment of consumer expectations about the performance of products and services (Oliver, 1980). If the performance of products/services exceeds consumer expectations, a high degree of satisfaction occurs. In the online environment, satisfaction is often related to the website and its features (Brun, et al., 2014). Liébana-Cabanillas et al. (2016) found that satisfaction is a key antecedent of mobile banking user loyalty, as well as a very important factor in the continued use of these services. In addition, the satisfaction of mobile banking users has a significant impact on the spread of positive word of mouth (Sampaio et al., 2017).

Customer satisfaction or dissatisfaction is closely related to their behavioral intentions, which ultimately affect bank profitability due to effects on customer retention rates, average deposit amount, and service delivery costs (Marinkovic & Obradovic, 2015). Therefore, a more positive attitude towards mobile banking leads to a stronger intention to use it (Aboelmaged & Gebba, 2013). Bearing in mind research that found that satisfaction has a statistically significant effect on affective commitment (Chung & Shin, 2010; Kalinic et al., 2020; Lai, 2004), as well as on intention to use (Sharma & Sharma, 2019; Susanto et al., 2016; Marinkovic & Obradovic, 2015; Lin et al., 2013; Rejman Petrović et al., 2022), the following hypotheses were formulated:

H5: Mobile banking users' satisfaction has a statistically significant positive impact on affective commitment.

H6: Mobile banking users' satisfaction has a statistically significant positive effect on intention to use.

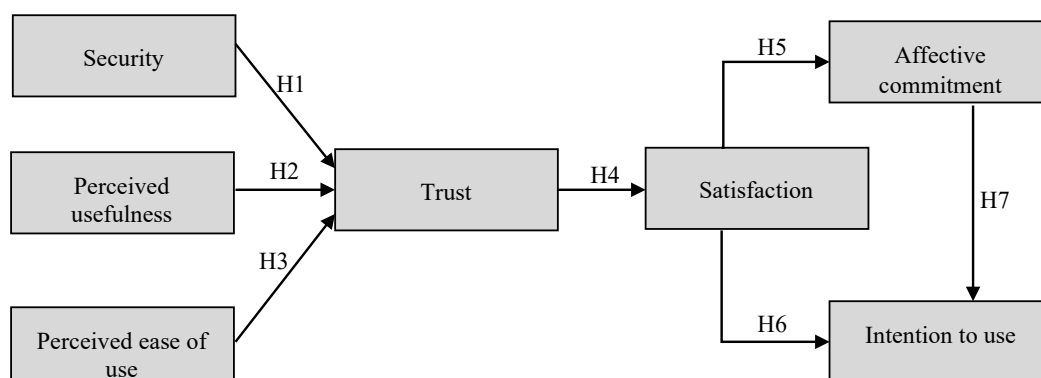
Affective Commitment

The commitment represents “a consumer’s psychological attachment to an online service provider, along with his/her willingness to maintain a client-firm relationship” (Liang & Chen, 2009, p. 222). Consumer commitment leads to repeat purchase intentions (Keh & Xie, 2009). One of the dimensions of commitment is affective commitment, which refers to the psychological bond that arises from favorable feelings toward the organization and develops because the consumer identifies with the organization and likes its website (Brun et al., 2014). Affective commitment is rooted in positive feelings and preferences and often leads to long-term partnerships (Wu et al., 2009). Marinkovic & Obradovic (2015) state that the concept of affective commitment represents a specific mixture of loyalty, involvement, and connection and indicate that it would be useful to determine whether affective commitment implies behavioral reactions among bank clients. In this regard, the following hypothesis will be tested:

H7: Affective commitment of mobile banking users has a statistically significant positive influence on intention to use.

Figure 1 shows the research model.

Figure 1: Research Model



Source: Author

Research Methodology

Sample Structure and Questionnaire

The survey method was used in the research to collect primary data. The questionnaire was distributed to respondents in the territory of the Republic of Serbia who use mobile banking services, and 316 respondents answered it. The majority of the sample consists of 209 female respondents, i.e., 66.14%, while males make up 33.86% of the sample (107 respondents). Respondents between the ages of 18 and 35 make up 78.80% of the sample, i.e., 249 respondents, while the remaining 67 respondents (21.20%) are over 35 years old. A much larger share of younger respondents can be justified by the fact that they use mobile banking services to a greater extent than the older population. A large number of respondents (231, or 73.10%) have been using mobile banking for at least a year, and the remaining 26.9%, or 85 respondents, have been using these services for less than a year. Slightly more than half of the sample (165 respondents, or 52.22%) often use mobile banking, while the remaining 151 respondents, or 47.78%, declared themselves occasional users. Innovators (those who started using mobile banking among the first in their environment) and followers (respondents who started using mobile banking under the influence of innovators) have a similar share in the sample, i.e. 166 respondents (52.53%) believe that they are among the first in their environment to start using mobile banking services, and the remaining 150 respondents (47.47%) gave a negative answer to this question. The structure of the respondents is shown in Table 1.

Table 1: Structure of Respondents in the Sample

		Number of respondents	Percentage
Gender	Female	209	66,14%
	Male	107	33,86%
Age	18-35	249	78,80%
	>35	67	21,20%
Length of use	Less than a year	85	26,90%
	A year or more	231	73,10%
Frequency of use	Occasionally	151	47,78%
	Often	165	52,22%
Innovators/ followers	Innovators	166	52,53%
	Followers	150	47,47%

Source: Author

In addition to these five demographic questions, the questionnaire also contains 20 statements scaled on a seven-point Likert scale, with which respondents expressed their degree of agreement (1 - absolutely disagree; 7 - absolutely agree). Security was measured through 3 statements (Arcand et al., 2017; Sagib & Zapan, 2014), perceived usefulness (Arcand et al., 2017; Kim & Lee, 2013), perceived ease of use (Sagib & Zapan, 2014; Arcand et al. al., 2017; Sreejesh et al., 2016), trust (Singh & Srivastava, 2014; Arcand et al., 2017), satisfaction (Sagib & Zapan, 2014; Arcand et al., 2017) and affective commitment (Fullerton, 2011) also include 3 statements each, while 2 statements make up the intention to use (Hanafizadeh et al., 2014).

Data Analysis

The data analysis was carried out in the statistical packages for social sciences IBM SPSS 20 and IBM AMOS 23. The SPSS program was used to conduct a reliability analysis to determine the internal consistency of the formed variables. With the help of the AMOS program, the consistency and validity of the research model were tested using confirmatory factor analysis (CFA), and a structural equation model was implemented to test the effects of independent on dependent variables.

Research Results

Model Reliability and Validity Analysis

The results of the reliability and validity analysis of the model are shown in Table 2. Given that the value of the CA coefficient (Cronbach's alpha) for each formed variable is greater than the lowest required value of 0.7 (Nunnally, 1978), it can be concluded that all variables have a corresponding internal consistency of the statements that make them up, that is, that all variables are reliable. An AVE (average variance extracted) value greater than 0.5 (Fornell & Larcker, 1981) indicates convergent validity, and a CR (composite reliability) value greater than 0.6 indicates composite model validity (Bagozzi & Yi, 1988). The discriminative validity of the model is confirmed by the fact that for all variables, AVE values are higher than MSV (maximum shared squared variance) and ASV (average variance extracted) values (Hair et al., 2010).

Table 2: Model Reliability and Validity Analysis

Variable	CA	CR	AVE	MSV	ASV
Security	0,811	0,820	0,606	0,319	0,221
Perceived ease of use	0,850	0,858	0,668	0,572	0,303
Percipirana lakoća upotrebe	0,857	0,861	0,675	0,493	0,296
Trust	0,914	0,916	0,783	0,736	0,294
Satisfaction	0,933	0,933	0,824	0,736	0,300
Intention to use	0,917	0,918	0,848	0,572	0,305
Affective commitment	0,945	0,946	0,854	0,134	0,078

Source: Author

Confirmatory factor analysis indicates that there is an acceptable model fit (Table 3), bearing in mind that the values of GFI (goodness-of-fit index), CFI (comparative fit index), TLI (Tucker-Lewis index) and IFI (incremental fit index) are higher than 0.9 (Byrne, 1998), the RMSEA (root mean square error of approximation) value of the index is less than 0.08 (Hair et al., 2010), as well as the value of χ^2/df ratio is less than 3 (Carmines & McIver, 1981).

Table 3: Results of Confirmatory Factor Analysis

Parameters	The obtained value of the parameter	Recommended parameter value
χ^2/df	1,98	<3
GFI	0,914	>0,9
CFI	0,971	>0,9
TLI	0,963	>0,9
IFI	0,971	>0,9
RMSEA	0,056	<0,08

Source: Author

Structural Equation Model

A structural equation model was applied to test the formulated hypotheses (Table 4). The analysis showed that 6 out of 7 tested impacts were statistically significant. Security ($\beta=0.352$, $p<0.01$) and perceived ease of use ($\beta=0.479$, $p<0.01$) were found to have statistically significant positive effects on trust, confirming hypotheses H1 and H3. On the other hand, perceived usefulness has no statistically significant effects on trust ($p>0.05$), so hypothesis H2 is not proven. The analysis leads to the conclusion that trust has a very strong positive effect on satisfaction ($\beta=0.870$, $p<0.01$), and that satisfaction has a statistically significant positive effect on affective commitment ($\beta=0.327$, $p<0.01$) and intention use ($\beta=0.427$, $p<0.01$), thus proving hypotheses H4, H5 and H6. Finally, hypothesis H7 was confirmed, bearing in mind that affective commitment has a statistically significant positive effect on the intention to use ($\beta=0.173$, $p<0.01$).

Table 4: Structural Equation Model

Hipoteze	β	p
H1: Security→Trust	0,352	0,000***
H2: Perceived usefulness→Trust	-0,081	0,394
H3: Perceived ease of use →Trust	0,479	0,000***
H4: Trust→Satisfaction	0,870	0,000***
H5: Satisfaction→Affective commitment	0,327	0,000***
H6: Satisfaction→Intention to use	0,427	0,000***
H7: Affective commitment→Intention to use	0,173	0,003***

*** The value is significant at the $p < 0.01$ level

Source: Author

Discussion of Results

The analysis showed that security has statistically significant effects on the trust of mobile banking users, which is consistent with many previous studies (Arcand et al., 2017; Damghanian et al., 2016; Singh & Srivastava, 2019; Susanto et al., 2016). Concern about the security of transactions and personal data has an important impact on users' attitudes toward mobile banking. Users are often afraid of the possibility of fraud, as well as the misuse of their personal and financial data. Clients expect banks to strengthen their security mechanisms to ensure transaction security and privacy protection. Only when customers have high confidence in the security and privacy provided by the bank will they trust the bank enough to use its mobile banking services.

In addition to security, it was also determined that perceived ease of use has a strong influence on user trust, as Liebana-Cabanillas (2013) pointed out. If users make transactions with little effort, time and effort, that is, if it is easy for them to use the mobile banking application, a higher degree of trust will be achieved. The above can be particularly pronounced with users who are not skilled in the use of technologies. If users find it difficult to use the mobile banking application, they will be more dissatisfied, their trust in the bank and its application will decrease and they may stop using it, regardless of the many benefits that the application provides.

On the other hand, perceived usefulness has no significant effect on the trust of mobile banking users. Therefore, if users perceive the mobile banking application as useful, there will be no greater trust, because the usefulness of the application is something they take for granted. However, the lack of app usefulness can lead to a drop in user trust.

The research concludes that trust is an extremely strong predictor of mobile banking user satisfaction, which is in line with a large number of previous studies (Susanto et al., 2016; Sharma & Sharma, 2019; San-Martin & Lopez-Catalain, 2013; Marinkovic & Obradovic, 2015; Alain, 2013; Arcand et al., 2017; Lee & Chung, 2009; Liebana-Cabanillas et al., 2013). Positive beliefs about the bank, as well as belief in the reliability and validity of mobile banking technology, lead to high satisfaction among its users.

As in previous research (Chung & Shin, 2010; Kalinic et al., 2020; Lai, 2004), positive effects of satisfaction on affective commitment were proven. Then, it was determined that satisfaction has positive effects on the intention to use mobile banking, as indicated by other studies (Sharma & Sharma, 2019; Susanto et al., 2016; Marinkovic & Obradovic, 2015; Lin et al., 2013; Rejman Petrović et al., 2022). Therefore, if the performance of the mobile application meets or exceeds the user's expectations and a high degree of satisfaction is achieved, a sense of connection and identification with mobile banking will be achieved and they will be ready to use these services again. On the other hand, if users are not satisfied, they will have unfavorable feelings toward the bank and its application, so there is a chance that they will stop using the services and switch to competitors.

Finally, it has been proven that affective commitment is a predictor of intention to use, which was also concluded by Keh & Xie (2009). Therefore, the positive feelings and psychological connection of clients with the bank and its mobile application led to the clients being happy to use mobile banking and to the creation of long-term partnership relations with the bank.

Conclusion and Implications

Trends in the development of information and communication technologies have led to significant changes in banking operations. Banks are increasingly focused on online service provision and the number of mobile banking users is increasing every day. In this regard, this research examined the trust of mobile banking users, the factors that influence it, as well as its key consequences. It was found that safety and perceived ease of use have statistically significant positive effects on trust, then that trust has a positive effect on satisfaction, and satisfaction on affective commitment and intention to use. Finally, it was shown that affective commitment has a statistically significant positive effect on the intention to use. This confirms hypotheses H1 and H3-H7.

It is expected that this research will contribute to the literature in the banking field, expanding existing knowledge about customer trust, as well as its key determinants and outcomes. In this way, it will be better to understand which are the key factors that lead to user trust, as well as how the acquired trust further affects the behavioral reactions of the user. Although a large number of foreign studies dealt with the study of the trust of mobile banking users, in domestic literature a small number of authors dealt with the aforementioned, so the acquired knowledge will represent a good basis for future research of this kind in the territory of the Republic of Serbia, as well as in other developing countries. Based on the results of the research, implications were formulated that can be helpful to banks when developing strategies for attracting and retaining clients, as well as increasing the trust, satisfaction, and loyalty of clients. To gain trust in the bank and its mobile application, it is important to pay special attention to security. Banks must use reliable and secure systems, to prevent fraud and misuse of confidential personal and financial data. The recommendation to banking institutions is to request additional authentication in the form of a fingerprint or facial recognition in addition to the password for transactions of large value. In addition, it is recommended that educational brochures and instructions be provided for users explaining how banks protect sensitive and confidential data and information. On this occasion, it is desirable to highlight the importance of users not storing sensitive data, such as passwords, bank account numbers, etc., in their mobile devices. Bearing in mind the effects of perceived ease of use on user trust, it is necessary when creating an application, in addition to security, to ensure that it is not too complex to use, that it has an appropriate structure, as well as navigation that will not be complicated for users. In this regard, it is recommended that brochures include instructions on how to use the application in detail, bearing in mind that there are users who are not skilled in using new technologies. In this way, their resistance to adopting mobile banking can be reduced even though it is easy to use.

For the adoption of mobile banking, it is important to implement appropriate promotional campaigns, where users will be shown all the advantages that are provided to them. When promoting, we should not forget about the power of social networks and various internet forums. It is recommended to identify opinion leaders, celebrities, and influencers who have a large number of followers. By engaging them and providing various benefits, users will become satisfied and will be happy to recommend mobile banking services to others. Sponsored posts can also be used for promotion on social networks, which allows them to quickly reach a large number of target user segments. Finally, promoting mobile banking as an integral part of a dynamic and busy lifestyle can lead to an increase in the number of users.

The research conducted has several limitations. First, the insufficiently adequate structure of the sample, which is predominantly made up of younger members of the population. Second, the research was conducted on the territory of the Republic of Serbia, so the results cannot be generalized. The third limitation refers to biased responses by respondents.

A suggestion for future research is to include more variables in the model, such as perceived risk, costs, and image, and examine their impact on trust. A suggestion for further research is to do an analysis by segment (by gender, age, frequency of mobile banking use, etc.) to develop special strategies for each segment.

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ISLAMSKO CENTRALNO BANKARSTVO U TEORIJI I PRAKSI

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Rezime: Zahvaljujući ulozi kreatora i implementatora monetarne politike, centralne banke u većini savremenih država imaju status ključnih finansijskih institucija i stožera stabilnosti finansijskog sistema. Tokom vekova evolucije centralnog bankarstva razvijani su brojni modeli i instrumenti monetarne politike, čija primena je umnogome zavisila od političkog okruženja i dominantnog ekonomskog modela u konkretnim državama. Za razliku od konvencionalnog centralnog bankarstva, islamsko centralno bankarstvo je u globalnoj ekonomskoj praksi prisutno svega nekoliko decenija. Autentičan i šerijatski usklađen model islamskog centralnog bankarstva je još uvek u povoju. Stoga, praksa islamskog centralnog bankarstva dobrim delom je bazirana na primeni instrumenata konvencionalnog centralnog bankarstva, koji se, shodno šerijatskoj usklađenosti, koriste u izvornoj ili modifikovanoj formi, ili su isključeni iz upotrebe. U ovom radu, predstavimo razvojni put islamskog centralnog bankarstva, ciljeve i obaveze islamskih centralnih banaka, set šerijatski usklađenih instrumenata monetarne politike, praksu islamskog centralnog bankarstva u pojedinim zemljama i ograničenja za efikasno funkcionisanje islamskih centralnih banaka u praksi.

Ključne reči: islamsko bankarstvo, centralna banka, monetarna politika, instrumenti monetarne politike, finansijski instrumenti

JEL klasifikacija: E58, E52, Z12

Uvod

Od svog nastanka do danas, sfera uticaja i nadležnosti centralnih banaka kontinuirano su se širili. One su od vladinih agencija za emitovanje novca i finansijsku podršku državnim projektima (slučaj švedske Riksbank i engleske Bank of England, detaljnije: Bordo, 2007, str. 1), postale ključne institucije u privrednom i finansijskom sistemu većine država (Bordo, 2008). U prilog tome govori lista ciljeva koje kroz implementaciju monetarne politike treba realizovati, poput: visoke stope privrednog rasta i zaposlenosti, s jedne strane, i cenovne, kamatne, finansijske i devizne stabilnosti, s druge strane (Miškin, 2006, str. 411). Iako između različitih država postoje izvesne razlike u statusu, nadležnostima, autonomiji u delovanju i primenjenim instrumentima monetarne politike, u procesu oblikovanja centralnih banaka u svim slučajevima se pošlo od sličnih premisa. Taj proces podrazumeva rešavanje sledećih pitanja (Reis, 2013, str. 18-36): definisanje mandata centralne banke i dugoročnih i kratkoročnih ciljeva monetarne politike, odabir rukovodstva i nivoa njihove diskrecije u odlučivanju, usklađivanje fiskalne i monetarne politike, određivanje oblika aktive kojima centralna banka može raspolagati, (ne)isplaćivanje kamate bankama za sredstva deponovana na računu obaveznih rezervi, poštovanje principa transparentnosti i odgovornosti u radu centralne banke.

Za razliku od prvobitnih centralnih banaka, savremene centralne banke, bar u demokratskim i prosperitetnim društvima, imaju daleko veći nivo samostalnosti u radu, koji vremenom pokazuje tendenciju rasta (Carlstrom, & Fuerst, 2009, str. 185). Jedan od aspekata nezavisnosti centralne banke je i njena moć da se odupre pritisku političkog establišmenta i zahtevu da se novac neracionalno štampa kako bi se pomoglo u ispunjenju obećanja datih biračkom telu, a na uštrb dugoročne monetarne i ekonomske stabilnosti (vidi Miller, 1998, str. 450). Istraživanja su pokazala da postoji stabilna povezanost nezavisnosti centralne banke i nivoa inflacije (Carlstrom, & Fuerst, 2009, str. 185-186). Održavanjem monetarne stabilnosti, centralne banke stiču kredibilitet u radu (Blinder, 2000, str. 1431), čime dolaze u poziciju da mogu savladati problem inflacije, a da pritom ne naškode ostvarenju drugih ciljeva, poput visoke stope zaposlenosti (Ibid, str. 1421). Proces integracija država u globalne tokove praćen je snažnim pritiskom međunarodnih multilateralnih institucija da se upliv države u monetarnu politiku minimalizuje (Polillo, & Guillén, 2005, str. 1794). Međutim, time se od demokratski izabranih političkih struktura oduzima kontrola nad ekonomskim tokovima i prepušta tehokratama, koji su pod snažnijim uticajem globalnih centara moći nego nacionalne vlade (Ibid). Centralne banke u pojedinim državama su stekle toliko moći da mogu obarati vlade koje pokušaju da uđu u sferu njihovog uticaja, vođenjem restriktivne monetarne politike i svesnim izazivanjem recesije.¹

Islamske banke su finansijske institucije čije je poslovanje šerijatski usklađeno, što podrazumeva da: njihovi poslovni aranžmani ne smeju uključivati kamatu (zabrana ribe, detaljnije: Chapra, 2000; Siddiqi, 2004; Chapra, 2006; Iqbal, & Mirakhor, 2009), ugovorne strane moraju biti potpuno informisane o svim elementima zaključenog aranžmana (zabrana garara, detaljnije: Al-Dhareer, 1997), zabranjene su špekulativne operacije koje nose neprimereno visok rizik (zabrana maysira, detaljnije: Ayub, 2007, str. 62) i svi ugovoreni poslovi moraju biti šerijatski dozvoljeni (halal, detaljnije: Ibid, str. 199).

¹O uticaju Bundesbanke na pad vlade kancelara Ludviga Erharda 60-tih XX veka, vidi: Varoufakis (2016).

Shodno potrebama šerijatski valjanog poslovanja, razvijeni su brojni oblici poslovnih aranžmana koji zadovoljavaju pomenute principe (detaljnije: Usmani, 2003; Hadžić, 2005; Ayub, 2007; Iqbal, & Mirakhor, 2009; Lekpek, 2013): partnerska ulaganja – mušareka (musharakah) i mudareba (mudarabah), prodaja sa odloženim plaćanjem – murabea (murabahah), termimske transakcije – selem (salam) i istisna', beskatna pozajmica – kard hasan (qard hassan), savetodavni, uslužni i drugi poslovi.

Polazeći od navedenih karakteristika centralnih banaka i principa islamskog bankarstva, u nastavku ćemo najpre analizirati teorijsku koncepciju islamske centralne banke, kojim su obuhvaćeni njena uloga u bankarskom sistemu, ciljevi koje treba da realizuje vođenjem monetarne politike, kao i šerijatski prihvatljivi instrumenti monetarne politike, a potom predstaviti islamsko centralno bankarstvo u praksi, na primeru pojedinih država koje su svoje bankarske sisteme delimično ili potpuno islamizovali.

Teorijska koncepcija islamske centralne banke

Islamske banke kao finansijske institucije relativno su nova pojava na globalnom finansijskom tržištu. Nastale su najpre kao neprofitne organizacije 60-tih XX veka, dok su se komercijalne islamske banke pojavile deceniju kasnije (detaljnije: El-Ashker, & Wilson, 2006, str. 335-336; Iqbal, & Mirakhor, 2009, str. 22-23). Multilateralne, regulatorne i razvojne islamske finansijske institucije se pojavljuju nakon toga u narednim decenijama (detaljnije: Van Greuning, & Iqbal, 2008, str. 58-61). To znači da su islamske banke svoju egzistenciju započele u pravnom vakuumu, bez odgovarajuće zakonske regulative i ekonomske infrastrukture. I danas je primetno nepostojanje opšteprihvaćenih standarda u mnogim oblastima, od računovodstvenih propisa do pitanja šerijatske prihvatljivosti pojedinih poslovnih aranžmana i finansijskih instrumenata. Pomenuti problemi opterećuju i islamsko centralno bankarstvo, u smislu kreiranja i vođenja monetarne politike prilagođene šerijatskim principima.

Pitanje islamskog centralnog bankarstva dugo je bilo van fokusa interesovanja islamske ekonomske i teološke zajednice. Jedan od prvih autora koji se bavio ovim pitanjem bio je Mohammad Uzair (1978), koji je svoj model islamske centralne banke predstavio krajem 70-tih XX veka. Uzairu su uzor pri koncipiranju ovog modela bile američke Federalne rezerve, pa je stoga on predložio da islamska centralna banka bude profitno orijentisana, da ostvaruje udeo u kapitalu poslovnih banaka i da ima ista zaduženja kao FED: emisija novca, očuvanje stabilnosti i stalno unapređenje bankarskog sistema, kroz nadzor nad sistemom i pomoć ugroženim bankama, očuvanje stabilnosti domaće valute i deviznog tržišta, kao i saradnja sa nacionalnom vladom na polju ekonomije i finansija (navedeno u: Ahmad, 2000, str. 15).

Zaduženjima islamske centralne banke navedenim u okviru pomenutog modela, neophodno je dodati i njenu „odgovornost da osigura verski legitimitet svih njenih operacija i poslovanja institucija koje posluju pod njenom jurisdikcijom“ (Al Sayed, 2005, str. 57-58). Pojedini autori idu i korak dalje, pa islamsku centralnu banku obavezuju da monetarnu politiku usmeri ka postizanju socio-ekonomske pravde, solidarnosti i bratstva među ljudima, kao osnovnim ciljevima društvenog i ekonomskog sistema uređenog po principima islama (Chapra, 1985, str. 33-34). To se može postići tako što će islamska centralna banka podsticati finansijske institucije i finansijska tržišta pod njenom jurisdikcijom da što efikasnije mobilišu trenutno neiskorišćena finansijska sredstva i da se prilikom ulaganja rukovode razvojnim ciljevima islamske ekonomije (Khan, & Mirakhor, 1994, str. 16). U razvojne ciljeve islamske ekonomije svakako spada i monetarna stabilnost.

Stoga upravljanje novčanom masom ne sme izazivati ni inflaciju ni deflaciju, što podrazumeva da aranžmani sa poslovnim bankama budu zasnovani na principu podele dobitka i gubitka² (Elhiraika, 2004, str. 16). Takođe, pomoć pri popunjavanju budžetskog deficita nacionalne vlade se može obavljati jedino kroz finansiranje šerijatski prihvatljivih državnih razvojnih projekata (Hanif, & Shaikh, 2010).

Implementacija monetarne politike podrazumeva korišćenje određenih instrumenata, čija lista nije duga i najčešće obuhvata obavezne rezerve, eskontnu kamatnu stopu, operacije na otvorenom tržištu i politiku deviznog kursa. Liberalizacija ekonomskih i finansijskih tokova u većini razvijenih zemalja, ali i u sve većem broju zemalja u razvoju, dovela je do potiskivanja direktnih instrumenata monetarne politike i favorizovanja indirektnih instrumenata, poput operacija na otvorenom tržištu. Ocenjeno je da je tržište objektivniji i precizniji procenitelj efikasnosti i finansijskih potreba tržišnih aktera od birokrata koji vode centralne banke. Većina navedenih instrumenata monetarne politike može biti korišćena i od strane islamske centralne banke, uz određene modifikacije. Polazeći od toga, stručnjaci za islamsko bankarstvo definisali su set instrumenata monetarne politike koje islamska centralna banka može koristiti, koji uključuje (interpretirano prema: Zangeneh, & Salam, 1993, str. 27-32; Ahmad, 2000, str. 18-30): obavezne rezerve, racio refinansiranja, selektivnu kontrolu kreditiranja, moralno ubeđivanje, finansiranje ugroženih banaka, racio podele dobitka, operacije na otvorenom tržištu i politiku deviznog kursa.

Korišćenje *obaveznih rezervi* kao instrumenta monetarne politike islamske centralne banke, među islamskim ekonomskim stručnjacima nije upitna. Neslaganja, pak, postoje o tome da li je optimalna stopa obaveznih rezervi 100%³. Zastupnici ovog stava tvrde da se primenom ove stope obaveznih rezervi osigurava zaštita deponenata i stabilnost bankarskog sistema, dok njihovi oponenti smatraju da se time ugrožava efikasnost poslovanja banaka. Šerijat, pak, daje potpunu slobodu u određivanju stope obaveznih rezervi i osnovice na koju se ona primenjuje, dok, s druge strane, isključuje mogućnost korišćenja kamate, bilo kao mehanizma nagrađivanja ili kažnjavanja.

Racio refinansiranja je instrument kojim se islamske banke podstiču na ulaganje u određene privredne sektore koje vlada i centralna banka smatraju prioritetnim. Islamskim bankama koje investiraju u te sektore, centralna banka obezbeđuje refinansiranje dela uloga, putem beskamratne pozajmice ili partnerskog ulaganja.

² Umesto da novac u bankarski sistem emituje kreditiranjem poslovnih banaka i povlači ga zaduživanjem kod poslovnih banaka, što je praksa konvencionalnih centralnih banaka, islamska centralna banka pomenute monetarne operacije treba da obavlja kroz partnerska ulaganja, u vidu mudarebe i mušareke, sa poslovnim bankama.

³ Depozitni izvori islamske banke se dele na transakcione, čijim vlasnicima banka garantuje vraćanje uloga, ali im ne isplaćuje prinosa na ulog, i investicione, čijim vlasnici stupaju u partnerski odnos s bankom i s njom dele dobitak i gubitak. Kada se primenjuje stopa obaveznih rezervi u visini 100%, ona tangira isključivo transakcione depozite, čijim vlasnicima se garantuje pravo na povlačenje kompletnog uloga u svakom trenutku. Samim tim, banka ima pravo da ulaže samo sredstva s investicionih računa (Iqbal, & Mirakhor, 2009, str. 102).

Selektivna kontrola kreditiranja je još jedan instrument za usmeravanje ulaganja islamskih banaka u prioritetne sektore. Primenom ovog instrumenta, centralna banka određuje maksimalne iznose kredita koji se mogu plasirati po pojedinim sektorima. Najviši kreditni limit određen je za prioritetne sektore, dok je iznos novca koji mogu pozajmiti ostalim sektorima znatno manji.⁴

Moralno ubeđivanje se tiče uspostavljanja aktivne komunikacije između centralne banke i islamskih banaka, kako bi se islamskim bankama na što jasniji način predstavili zahtevi centralne banke i razvojni ciljevi čiju realizaciju ona sprovodi.

Rezultat kojem se teži je usaglašavanje stavova među akterima na islamskom bankarskom tržištu oko načina funkcionisanja islamskog bankarskog sistema i pitanja njegovog daljeg razvoja.

Islamska centralna banka, kao i konvencionalne centralne banke, imaju ulogu *kreditora poslednjeg utočišta*. Ona *finansijski pomaže ugroženim islamskim bankama* putem beskatmatne pozajmice (*qard hassan*) ili partnerskim ulaganjem u vidu mudarebe. Da bi se izbegle zloupotrebe ovog vida jeftinog finansiranja, islamska centralna banka može demotivisati poslovne banke da traže beskatmatne pozajmice naplaćivanjem penala na ove pozajmice, nakon čega bi novac prikupljen ovim putem bio dat u humanitarne svrhe (o tretmanu naplaćenih penala u šerijatskom pravu, detaljnije: Usmani, 2003, str. 115-123).

Racio podele profita je instrument pomoću kojeg centralna banka određuje procenat ostvarenog profita koji islamske banke treba da isplate svojim investicionim deponentima i naplate od klijenata čije su poslovne projekte finansirali putem mudarebe i mušareke. Služi i za motivisanje privrednika da ulažu u prioritetne sektore, a da zauzvrat dobiju podršku od islamskih banaka u vidu partnerskih ulaganja i, pod pritiskom centralne banke, veći udeo u profitu u odnosu na finansirane privrednike iz drugih privrednih sektora.⁵

Operacije na otvorenom tržištu su najzastupljeniji instrument u praksi centralnih banaka razvijenih država. Njegovu efikasnu implementaciju omogućava im razvijeno finansijsko tržište i širok spektar kvalitetnih finansijskih instrumenata koji se u okviru ovih operacija mogu koristiti. Islamske finansijske institucije nemaju ovo preimućstvo, jer je većina konvencionalnih finansijskih instrumenata šerijatski neprihvatljiva, a ponuda šerijatski prihvatljivih finansijskih instrumenata je veoma limitirana. Ipak, shodno dostignućima islamskog finansijskog inženjeringa ostvarenim u poslednjih nekoliko decenija, Odbor za islamske finansijske usluge (Islamic Financial Services Board – IFSB, 2008) je izneo stav da će islamske centralne banke u doglednoj budućnosti biti u prilici da vrše operacije na otvorenom tržištu daleko aktivnije nego danas. Pritom, finansijski instrumenti koji se za tu svrhu koriste moraju biti (IFSB, 2008, str. 5): niskorizični i referentni za određivanje vrednosti ostalih islamskih finansijskih instrumenata, emitovani u adekvatnom obimu i adekvatnom dinamikom, kako se njihova dostupnost tržišnim akterima ne bi dovodila u pitanje i pravo na njihovu kupovinu bi bilo dato svima koji su za njih zainteresovani, bez obzira na to da li su u pitanju islamske ili konvencionalne, finansijske ili nefinansijske institucije. Pored toga, *conditio sine qua non* je odsustvo kamate, uz poželjnu dominaciju instrumenata baziranih na principu podele dobitka i gubitka (Sundararajan, Marston, & Shabsigh, 2004, str. 88).

⁴ *Pojedini autori smatraju da je primena ovog instrumenta monetarne politike korisna, naročito u zemljama sa nerazvijenim i neefikasnim tržištem (Uzair, 1978; Chapra, 1985), dok drugi ističu negativne posledice njegove primene po efikasnost poslovanja islamskih banaka (Zangeneh, & Salam, 1993).*

⁵ *Prema mišljenju islamskih ekonomskih stručnjaka, primenom ovog instrumenta neopravdano se limitira poslovna sloboda islamskih banaka (detaljnije: Chapra, 1985).*

Politiku deviznog kursa islamske centralne banke mogu voditi u skladu sa proklamovanim ciljevima razvoja privrede bez ovakvih ograničenja od strane Šerijata. Islamske centralne banke mogu birati između politike fiksnog ili fluktuirajućeg deviznog kursa, uz povremene intervencije na deviznom tržištu ili bez njih. S druge strane, šerijatskim propisima je zabranjena upotreba konvencionalnih hedžing instrumenata za zaštitu od deviznog rizika (detaljnije: Chapra, & Khan 2000, str. 81). Stoga, islamska centralna banka treba da onemogući njihovu upotrebu, ali istovremeno i podstiče razvoj šerijatski usklađenih hedžing tehnika.

Praksa islamskog centralnog bankarstva

Islamsko bankarstvo je jedan od najbrže rastućih segmenta globalnog finansijskog tržišta. U prilog tome govori podatak da je ukupna aktiva islamskog bankarskog sektora 2021. godine (2,104 biliona američkih dolara, izvor: IFSB, 2022) bila više nego dvostruko veća u odnosu na aktivu u 2011. godini (932,8 milijardi američkih dolara, izvor: The Banker, 2011). I pored toga, značajan broj država u kojima islamske banke aktivno posluju još uvek nisu stvorile stabilno i podsticajno pravno okruženje za islamske banke. To podrazumeva donošenje posebnih zakona koji bi tretirali poslovanje islamskih banaka, prepoznali njihove specifičnosti i pomogli u ispunjenju njihovih pravnih potreba. Među retkim zemljama koje su se potrudile da ovaj nedostatak prevaziđu i da posebnim zakonima urede islamsko bankarsko poslovanje su Malezija, Iran, Turska, Sudan, Jemen, Ujedinjeni Arapski Emirati i Pakistan (detaljnije: Karim, 2001, str. 182-183). Shodno tome, jasno je da se sa problemom nepostojanja pravne infrastrukture susreće i islamsko centralno bankarstvo, što ugrožava efikasno sprovođenje šerijatski prihvatljive monetarne politike. Da bi se stekao valjan uvid u ovu problematiku, analiziraćemo monetarnu politiku pojedinih država, na čijem bankarskom tržištu sektor islamskog bankarstva ostvaruje značajan tržišni udeo, i njen uticaj na poslovanje islamskih banaka u tim državama.

Saudijska Arabija poseduje najveći udeo u aktivu globalnog islamskog bankarskog tržišta, u iznosu od 30,6% (IFSB, 2022). Vođenje monetarne politike u ovoj zemlji povereno je Monetarnoj agenciji Saudijske Arabije (Saudi Arabian Monetary Agency – SAMA). Osnovana je po uzoru na američke Federalne rezerve, dijapazon njenih nadležnosti je definisan polazeći od iskustava zapadnih centralnih banaka i preporuka međunarodnih multilateralnih finansijskih institucija, ne ostvaruje direktnu kontrolu nad kretanjem kapitala, kamatnih stopa i deviznog kursa, ne koristi kamatnu stopu kao mehanizam kontrole finansijskih tokova i ne igra ulogu kreditora poslednjeg utočišta u kapacitetu karakterističnom za većinu centralnih banaka (navedeno prema: Ramady, 2009, str. 237-238). Monetarna politika Saudijske Arabije bazirana je na primeni sledećih instrumenata (Ibid, str. 240-241): obavezne rezerve, repo operacije, devizni svopovi i plasiranje javnih sredstava⁶. Islamski model finansiranja beleži kontinuiran rast zastupljenosti (Husin, 2013, str. 50) i uticaja (Amar, Hachicha, & Saadallah, 2015, str. 237) u poslovnoj praksi Saudijske Arabije. Ta činjenica ipak nije dovela do toga da saudijska centralna banka pri definisanju i sprovođenju monetarne politike pravi razliku između islamskih i konvencionalnih banaka (Basu, Prasad, & Rodriguez, 2018, str. 57). Ipak, islamskim bankama je dopušteno da kao osnovu za repo operacije koriste islamske bankarske ugovore (Ibid).

⁶Centralna banka ima pravo da ulaže državni novac koji se nalazi na njenom računu u odabrane poslovne banke (Ramady, 2009, str. 242).

Iran ostvaruje drugi po veličini udeo u aktivi globalnog islamskog bankarskog tržišta, u iznosu od 17% (IFSB, 2022). Bankarski sistem u Iranu je potpuno islamizovan. Proces islamizacije iranskog bankarskog sistema započeo je odmah nakon Islamske revolucije 1979. godine i okončan tokom 80-tih godina (Hassani, 2010, str. 430). Iranska centralna banka koristi sledeće instrumente monetarne politike (interpretirano prema: Kiaee, 2007, str. 11-13): *operacije na otvorenom tržištu*, koje se realizuju emisijom mušareka sertifikata, čijom se kupovinom stiče pravo na udeo u dobiti od investicionih projekata, *kontrolisanje profitne stope poslovnih banaka*, putem koga centralna banka određuje maksimalnu profitnu stopu koju poslovne banke mogu obezbediti svojim deponentima i čijim se povećanjem i smanjenjem, motiviše, odnosno demotiviše štednja u bankama, *obavezna rezerva*, čija se stopa u Iranu kreće u rasponu 10-30%, *specijalni depoziti*, višak sredstava poslovnih banaka koji one deponuju na svoj račun kod centralne banke, a zauzvrat ostvaruju određeni prinos na deponovana sredstva, i *plafoniranje kreditiranja*, u smislu određivanja maksimalne kreditne izloženosti poslovnih banaka pojedinim sektorima. Praksa pokazuje da poslovanje islamskih banaka često nije u skladu sa proklamovanom politikom iranske centralne banke, jer se značajan deo novca ne usmerava u investicije, već u potrošnju, putem određenih islamskih ugovora (Hassani, 2010, str. 442). Njihovu upotrebu, po mišljenju šerijatskih stručnjaka, treba ograničavati (detaljnije: Usmani, 2003, str. 23-80).

Po veličini udela u aktivi globalnog islamskog bankarskog tržišta (11,2%, izvor: IFSB, 2022), Malezija se nalazi na trećem mestu. Međutim, u pogledu razvijenosti pravne i ekonomske infrastrukture za islamske banke, islamskog finansijskog tržišta i raspoloživosti šerijatski prihvatljivih finansijskih instrumenata, Malezija se smatra liderom u sektoru islamskog bankarstva. U ovoj zemlji je razvijen efikasan dualni bankarski sistem, u kojem su pravno prepoznate specifičnosti i potrebe kako konvencionalnih, tako i islamskih banaka. Da bi se islamskim bankama omogućili uslovi za ravnopravno poslovanje, Bank Negara Malaysia, centralna banka Malezije je tokom 90-tih godina XX veka osnovala malezijsko islamsko međubankarsko tržište novca (Malaysian Islamic Inter-bank Money Market). Njegovim osnivanjem, islamske banke su dobile pristup stabilnim šerijatski usklađenim kratkoročnim izvorima finansiranja (Gan, & Kwek, 2010, str. 50). Oblasti koje su ovim tržištem pokrivene su (interpretirano prema: Ahmad, 1997, str. 54-55): *islamska međubankarska trgovina*, u okviru koje islamske banke međusobno trguju islamskim finansijskim instrumentima⁷, *islamski međubankarski kliring sistem*, u okviru koga centralna banka vrši saldiranje međubankarskih potraživanja i, uz dozvolu suficitarnih banaka (vidi: Bacha, 2008), preusmerava njihov višak deficitarnim bankama u vidu mudareba ulaganja, pokriva eventualni neto manjak i novčano kažnjava banke koje su konstantno u deficitu, i *islamsko međubankarsko investiranje*, koje omogućava suficitarnim bankama da svoje viškove ulože u banke kojima nedostaje novac za investiranje, na bazi mudareba aranžmana, pri čemu centralna banka određuje ratio podele profita⁸. Centralna banka Malezije realizuje svoju monetarnu politiku koristeći sledeće instrumente (Bank Negara Malaysia): neobezbeđeno direktno pozajmljivanje putem otvorenog tendera, repo transakcije, aukciona prodaja nota (Bank Negara Interbank Notes) i međubankarskih menica (Bank Negara Interbank Bills) centralne banke, kupovina i prodaja državnih hartija od vrednosti i devizni svop. Finansiranje islamskih banaka od strane centralne banke Malezije vrši na bazi partnerskog ulaganja (mudareba), povereništva (wadi'ah), zaloge (rahn) i reotkupa na bazi islamskih obveznica (sukuk) (Sarker, 2016, str. 7). I pored zavidnog nivoa razvijenosti islamskog bankarstva, konvencionalni pristup vođenju monetarne i fiskalne u dostizanju razvojnih ciljeva malezijske privrede dominira (Yusoff, & Wilson, 2005, str. 42), zbog čega su islamske finansijske institucije i dalje u podređenom položaju.

⁷ Za detaljniji prikaz finansijskih instrumenata zastupljenih na malezijskom islamskom međubankarskom tržištu novca, videti: Hakim, 2007, str. 166-168.

⁸ Za ulaganja u trajanju do 1 meseca, 70% profita pripada investitoru, 1-3 meseca 80% i preko 3 meseca 90% (Ahmad, 1997, str. 55).

Sudan ostvaruje minoran udeo u aktivni globalnog islamskog bankarskog tržišta (0,4 %, izvor: IFSB, 2022), ali je interesantan za analizu zbog činjenice da je, poput Irana, potpuno islamizovao svoj bankarski sistem tokom 90-tih godina 20. veka (Elhiraika, 2004, str. 7). Monetarna politika, koju vodi Banka Sudana (Bank of Sudan), zasniva se na primeni sledećih instrumenata (interpretirano prema: Ibid, str. 30-31): *racio podele profita i gubitka*, pomoću kojih centralna banka određuje udeo banke u profitu od finansiranog projekta i udeo deponenata u profitu banke⁹; *politika plafoniranja kredita*, koja se tiče maksimiranja kreditne izloženosti banke pojedinim sektorima¹⁰; *obavezne rezerve* i *instrumenti indirektnih kontrole*, u vidu operacija na finansijskom i deviznom tržištu. Cilj je da se u skoroj budućnosti ostvari veća zastupljenost indirektnih instrumenata monetarne politike (Ibid, str. 49). Banka Sudana, kao kreditor poslednjeg utočišta, pomaže poslovnim bankama da prevaziđu problem nelikvidnosti putem operacija reotkupa sukuk obveznica (Hanif, & Shaikh, 2010; Sarker, 2016, str. 7-8), kao i beskamatnim pozajmicama i ulaganjima koje daju pravo Banci Sudana na udeo u profitu poslovne banke¹¹ (Elhiraika, 2004, str. 31).

Praktični izazovi u funkcionisanju islamske centralne banke

U bankarskim sistemima u okviru kojih aktivno posluju i islamske i konvencionalne banke, formulisanje i implementacija monetarne politike praćeni su brojnim izazovima. Neophodno je težiti ostvarenju proklamovanih razvojnih ciljeva, a istovremeno biti svestan različitih posledica koje aktivnosti monetarne vlasti izazivaju kod različitih vrsta banaka. Posmatrajući strukturu instrumenata monetarne politike u analiziranim državama, uočava se da dominantnu ulogu preuzimaju indirektni instrumenti (Choudhry, & Mirakhor, 1997, str. 59), čija uspešna primena zahteva postojanje finansijskog tržišta s adekvatnim brojem aktera i finansijskih instrumenata kojima se trguje. Monetarna politika u pomenutim državama može biti efikasno implementirana jedino ukoliko je finansijsko tržište navedenih karakteristika dostupno i islamskim bankama. Razvoj islamskog finansijskog tržišta treba da bude partnerski poduhvat islamskih banaka, centralne banke i države. Osim regulatornih i nadzornih aktivnosti, centralna banka i država treba da podstiču razvoj islamskog finansijskog tržišta svojim aktivnim delovanjem u svojstvu kupaca, prodavaca i emitenata islamskih finansijskih instrumenata (interpretirano prema: Sarker, 2016, str. 4-5). Države se mogu finansirati emisijom i prodajom islamskih sukuk obveznica, koje se kasnije mogu aktivno koristiti u operacijama na otvorenom tržištu (Sarker, 2016, str. 4-5; Basu, Prasad, & Rodriguez, 2018, str. 59), dok centralne banke u set hartija od vrednosti koje emituju, mogu svrstati i islamske finansijske instrumente, poput mušareka sertifikata centralne banke, čijom kupovinom se ostvaruje pravo na udeo u dobiti centralne banke (Sundararajan, Marston, & Shabsigh, 2004, str. 96).

Praksa pokazuje da su nerazvijenost islamskog finansijskog tržišta i neadekvatan izbor islamskih finansijskih instrumenata stvarnost sa kojom se suočavaju islamske banke u skoro svim državama, što značajno ugrožava efikasnost njihovog poslovanja. Nedostupnost adekvatnog seta islamskih finansijskih instrumenata bitno otežava upravljanje likvidnošću u islamskim bankama (Basu, Prasad, & Rodriguez, 2018, str. 58).

⁹ *Primena ovog instrumenta se pokazala kompleksnom i neefikasnom, zbog čega nije preporučljiva* (Elhiraika, 2004, str. 30).

¹⁰ *Poljoprivredni sektor je u Sudanu proglašen prioritetnim, pa je stoga kreditni limit za ovaj sektor najveći i iznosi 50% plasiranih kredita* (detaljnije: Elhiraika, 2004, str. 30-31).

¹¹ *Najduži mogući rok dospeća beskamatnih pozajmica je dve sedmice, u ograničenom iznosu do 10% transakcionih depozita, dok za finansiranje na duži korak poslovna banka mora centralnoj banci dati udeo u dobitku poslovne banke* (Elhiraika, 2004, str. 31).

Umesto da, poput konvencionalnih banaka, svoju likvidnost održavaju posedovanjem visokokvalitetnih kratkoročnih hartija, islamske banke su prinuđene da raspolažu neprimereno velikim iznosima gotovine (Sundararajan, Marston, & Shabsigh, 2004, str. 89; Basu, Prasad, & Rodriguez, 2018, str. 58-59). Zbog toga su konvencionalne banke manje opterećene problemom oportunitetnih troškova nego islamske banke (Zaheer, Ongena, & Van Wijnbergen, 2012, str. 10). Prema podacima centralne banke Bahreina, Bahreinske monetarne agencije, konvencionalne banke u ovoj državi raspolažu sa 46,5% manje likvidnih sredstva u odnosu islamske banke slične veličine (Khan, & Ahmed, 2001, str. 147).

Nedostatak finansijskih instrumenata na kojima bi se bazirale operacije na otvorenom tržištu i niska potreba islamskih banaka za gotovinom, otežava i kontrolu centralne banke nad monetarnim tokovima u ovom sektoru (Sundararajan, Marston, & Shabsigh, 2004, str. 89). Ovaj problem se ne sme zanemarivati jer islamske banke mogu imati važnu „ulogu u prenošenju efekata monetarne politike na realnu ekonomiju“ (Sukmana, & Kassim, 2010, str. 18). Istraživanja pokazuju da se posredstvom islamskih banaka može ostvariti „čvršća povezanost monetarnog i realnog sektora“ (Ayuniyyah, Beik, & Arsyanti, 2013, str. 162). Islamske banke su se u periodu globalne finansijske krize pokazale i kao stabilizator finansijskih tokova. Deponenti su pokazali poverenje u njih, što je sprečilo odliv depozita iz islamskog bankarskog sistema i privuklo nove deponente, dok su se konvencionalne banke suočile sa problemom značajnog odliva depozita (Abduh, Omar, & Duasa, 2011, str. 1417). Shodno tome, razvoj islamskog finansijskog tržišta treba biti percipiran kao poduhvat od opšteg interesa. Pozitivne rezultate takvog pristupa ostvarila je Malezija, čije su islamske banke, nakon osnivanja islamskog međubankarskog tržišta novca, postale efikasan transmisioni kanal (interpretirano prema: Said, & Ismail, 2007, str. 175).

Ipak, rešenja koja su primenjena u Maleziji ne nailaze na opšte odobravanje islamske stručne javnosti. Razlog tome je što se instrumenti malezijskog islamskog međubankarskog tržišta novca zasnivaju na finansijskim aranžmanima koje većina šerijatskih stručnjaka ne smatra šerijatski valjanim, poput *bej al dejna* (*bay' al- dayn*), *bej al ine* (*bay' al- 'inah*) i *teveruka* (*tawarruq*) (Hanif, & Shaikh, 2010; Ismal, 2011, str. 52). *Bej an dejn* se odnosi prodaju potraživanja, *bej al ina* se tiče ugovorenog reotkupa (detaljnije: Rosly, & Sanusi, 1999), dok je *teveruk* kombinacija dve međusobno nezavisne transakcije, gde se u okviru prve vrši kupovina na odloženo plaćanje, a potom se u drugoj transakciji kupljena aktiva prodaje promptno po ceni nižoj od kupovne (vidi: Iqbal, & Mirakhor, 2009, str. 84-85). Razlika u cenama koja se postiže prodajom potraživanja (*bej al dejn*), aktive (*teveruk*) i reotkupom (*bej al ina*), većina šerijatskih stručnjaka smatra kamatom, uz izuzetak šafijske pravne škole, koja je dominantna u Maleziji i ne deli to mišljenje (detaljnije: Rosly, & Sanusi, 1999).

I ostala rešenja u vezi islamskih finansijskih instrumenata o kojima smo u radu govorili imaju izvesne nedostatke, bez čijeg eliminisanja je upitno njihovo aktivno korišćenje u operacijama na otvorenom tržištu. Državne *sukuk* obveznice mogu naći punu primenu u monetarnim operacijama tek nakon što im se dodeli odgovarajući rejting. To nije moguće bez postojanja rejting agencije koja bi prilikom procene ovih finansijskih instrumenata, pored faktora prinosa i rizika, u obzir uzela i njihovu šerijatsku usklađenost (Al-Amine, 2008, str. 14). Problematici su i mušareka sertifikati centralne banke jer poslovanje centralne banke nije profitno orijentisano, niti je u odgovarajućoj meri transparentno da bi investitori mogli da prate aktivnosti od kojih centralna banka zarađuje i formiraju profitna očekivanja (interpretirano prema: Sundararajan, Marston, & Shabsigh, 2004, str. 96).

Prilikom kreiranja monetarne politike koja treba da prepozna postojanje islamskih banaka kao specifičnih finansijskih institucija, potrebno je sagledati efekte primene pojedinih instrumenata monetarne politike na islamsko bankarsko poslovanje. To se posebno odnosi na referentnu kamatnu stopu, koju centralna banka koristi prilikom kreditiranja poslovnih banaka i operacija na otvorenom tržištu. Islamske banke u svom poslovanju ne koriste kamatu, na osnovu čega se može zaključiti da je njihovo poslovanje kamatno neosetljivo. U prilog toj tvrdnji govore i pojedina istraživanja koja dokazuju kamatnu neosetljivost islamskih banaka u Maleziji (Yusof, Al Wosabi, Majid, & Shabri, 2009, str. 21) i Indoneziji (Zulhibri, & Sukmana, 2017, str. 139). Međutim, činjenica je da je u većini muslimanskih država referentna kamatna stopa važan mehanizam uticaja na monetarna i ekonomska kretanja (Hanif, & Shaikh, 2010). Stoga je u datim okolnostima teško očekivati da islamske banke neće biti izložene dejstvu kamatnog rizika, bez obzira na prirodu njihovog poslovanja (interpretirano prema: Kassim, & Majid, 2010, str. 291; Husin, 2013, str. 49). Štaviše, pojedina istraživanja pokazuju da su islamske banke često osetljivije na dejstvo kamatnog rizika nego konvencionalne banke, jer, za razliku od njih, islamske banke nemaju široke mogućnosti finansiranja i prevazilaženja problema likvidnosti u situaciji kada centralna banka vodi restriktivnu monetarnu politiku (Kassim, Majid, & Yusof, 2009, str. 56). Kamatna osetljivost islamskih banaka svoje korene ima u njihovoj poslovnoj praksi. Naime, u strukturi plasmana islamskih banaka najveće učešće imaju murabeha ulaganja kod kojih najizraženiji rizik promene marže, po načinu delovanja vrlo sličan konvencionalnom kamatnom riziku (interpretirano prema: Khan, & Ahmed, 2001, str. 62; Bourakba, & Zerargui, 2015, str. 69)

Dejstvo kamatnog rizika se odražava i na finansiranje islamskih banaka, usled usklađenog kretanja njihovih troškova finansiranja i tržišnih kamatnih stopa (Yungucu, & Saiti, 2016, str. 225). To potvrđuju istraživanja, prema kojima postoji izražena pozitivna korelacija u kretanju stope prinosa na investicione depozite islamskih banaka i kamatne stope na depozite konvencionalnih banaka (Husin, 2013, str. 49). Rast kamatnih stopa može dovesti do smanjenja dostupnih izvora finansiranja islamskih banaka (Majid, & Hasin, 2014, str. 162). Zato islamske banke moraju svojim ulagačima ponuditi isti ili veći prinos (Siddiqui, 2008, str. 257). Shodno prirodi odnosa islamske banke i njenih investicionih deponenata, one nemaju obavezu da unapred odrede i garantuju prinos na ulog deponenata, pa je samim tim ovaj prinos neizvestan (Zulhibri, & Sukmana, 2017, str. 124). To može demotivisati ulagače da deponuju svoju ušteđevinu kod islamskih banaka, čega su islamske banke svesne, pa, odstupajući od svojih bazičnih principa, ulagačima saopštavaju¹² očekivani prinos na ulog, određujući ga na bazi kretanja tržišne kamatne stope (Ibid).

Zaključak

U prvim decenijama postojanja, u islamskom bankarstvu je vladao regulatorni vakuum. Nisu postojale adekvatne regulatorne institucije koje bi nadzirale islamski bankarski sistem i obezbeđivale njegovo nesmetano funkcionisanje. U prilog tome govori činjenica da se o potrebi postojanja islamske centralne banke i njenim nužnim prerogativima raspravljalo tek na nivou teorije pre manje od pet decenija. Rešenja koja su islamski bankarski stručnjaci po pitanju islamskog centralnog bankarstva u tom periodu nudili nisu bila naročita originalna.

¹²U praksi, „saopštavanje“ očekivanog prinosa na ulog je uglavnom jednako garantovanju, čemu u prilog govori poslovna praksa islamskih banaka da formiraju posebne rezerve kako bi se obezbedila isplata „saopštenih“ prinosa na ulog (detaljnije: Iqbal & Mirakhor, 2009, str. 224-226).

Suštinski su se svodila na podražavanje prakse najuspešnijih konvencionalnih centralnih banaka, uz predloge neophodnih modifikacija konvencionalnih instrumenata monetarne politike, neophodnih za usaglašavanje sa šerijatskim principima. Ipak, shodno predloženim instrumentima monetarne politike, može se zaključiti da su kreatori prvobitne koncepcije islamske centralne banke smatrali da se, za razliku od centralnih banaka u razvijenim zemljama, islamska centralna banka mora direktnije mešati u finansijska i privredna kretanja, što je i među islamskim ekonomskim stručnjacima izazivalo oprečne stavove.

Tokom pola veka postojanja islamskog komercijalnog bankarstva postignuti su značajni poslovni rezultati i natprosečno visoke stope rasta tržišnog učešća islamskih banaka. Međutim, značajniji uspeh u razvijanju islamskog centralnog bankarstva je, čini se, izostao. Analizom prakse centralnog bankarstva u zemljama sa visokom tržišnom zastupljenošću islamskih banaka, može se zaključiti da je jedino Iran istovremeno uspostavio islamsko centralno bankarstvo i ostvario značajne rezultate na polju razvoja islamskog bankarstva. U ostalim pomenutim državama, na snazi je konvencionalni model centralne banke i regulatorno okruženje koje u izvesnoj, često nedovoljnoj meri prepoznaje specifične odlike i potrebe islamskih banaka.

Praksa uspešnih centralnih banaka je da primenjuju indirektne instrumente monetarne politike. Razlog tome je njihova težnja da vršeći ulogu neutralnog kontrolora, omoguće uspešno funkcionisanje finansijskog sistema, neometano značajnijim uplitanjem tehnokrata i političara. Preduslovi uspešnosti sprovođenja monetarne politike na ovaj način su razvijeno finansijsko tržište i široka ponuda kvalitetnih finansijskih instrumenata. Ovi preduslovi u slučaju islamskih centralnih banaka nisu ispunjeni. Deficit šerijatski usklađenih finansijskih instrumenata je problem koji opterećuje islamsko bankarstvo od njegovog nastanka. Islamskim bankama su uskraćene značajne mogućnosti za upravljanje likvidnošću i profitabilnošću, kao i kreiranje optimalne strukture ulaganja i finansiranja, koje inače stoje na raspolaganju konvencionalnim bankama. Islamske centralne banke, pak, ne mogu valjano sprovesti operacije na otvorenom tržištu i time efikasno uticati na kretanje novčane mase i određivanje referentne stope prinosa.

Islamske banke ne mogu biti konkurentne bez adekvatne podrške islamske centralne banke. S druge strane, bez kvalitetnih islamskih finansijskih instrumenata, islamska centralna banka ne može adekvatno vršiti svoju funkciju. Stoga, visoke stope rasta koje je islamsko bankarstvo ostvarilo u prethodnim decenijama neće biti moguće održati ukoliko se ozbiljno ne pristupi procesu islamskog finansijskog inženjeringa i stvaranju podsticajnog regulatornog okruženja. Prilikom kreiranja islamskih finansijskih instrumenata strogo se treba pridržavati pravila da suština mora biti iznad forme, što je do sada neredovito zanemarivano u procesu islamskog finansijskog inženjeringa. Problematičan pristup islamskom finansijskom inženjeringu naročito je zastupljen u Maleziji, u kojoj su kreirani brojni, formalno islamski finansijski instrumenti, čija je suština šerijatski neprihvatljiva po mišljenju većine šerijatskih stručnjaka.

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ISLAMIC CENTRAL BANKING IN THEORY AND PRACTICE

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Abstract: Thanks to their role as creators and implementers of monetary policy, central banks in most modern countries have the status of key financial institutions and pivots of financial system stability. During the centuries of evolution of central banking, numerous models and instruments of monetary policy were developed, the application of which depended largely on the political environment and the dominant economic model in specific countries. Unlike conventional central banking, Islamic central banking has been in global economic practice for only a few decades. An authentic and Shariah-compliant model of Islamic central banking is still in its infancy. Therefore, the practice of Islamic central banking is largely based on the application of instruments of conventional central banking, which, according to Shariah compliance, are used in their original or modified form or are excluded from use. In this paper, we will present the development path of Islamic central banking, the goals and obligations of Islamic central banks, a set of Shariah-compliant monetary policy instruments, the practice of Islamic central banking in certain countries, and limitations for the efficient functioning of Islamic central banks in practice.

Keywords: Islamic banking, central bank, monetary policy, monetary policy instruments, financial instruments

JEL classification: E58, E52, Z12

Introduction

From its inception until today, central banks' sphere of influence and competence has continuously expanded. Starting as government agencies for issuing money and financial support for state projects (the case of the Swedish *Riksbank* and the *English Bank of England*, in more detail: Bordo, 2007, p. 1), they have become key institutions in the economic and financial system of most countries (Bordo, 2008). This is supported by the list of goals that should be realized through the implementation of monetary policy, such as: high rates of economic growth and employment, on the one hand, and price, interest rate, financial, and currency stability on the other hand (Mishkin, 2006, p. 411). Although there are certain differences between states in the status, competencies, autonomy in operation, and applied monetary policy instruments, in the process of forming central banks in all cases, they started from similar premises. That process involves solving the following issues (Reis, 2013, pp. 18-36): defining the mandate of the central bank and the long-term and short-term goals of monetary policy, selecting the leadership and the level of their discretion in decision-making, harmonizing fiscal and monetary policy, determining the form of assets that the central bank can dispose of, (non)payment of interest to banks for funds deposited in the mandatory reserve account, compliance with the principles of transparency and responsibility in the work of the central bank.

Unlike the original central banks, modern central banks, at least in democratic and prosperous societies, have a much greater level of independence in their work, which shows a tendency to grow over time (Carlstrom, & Fuerst, 2009, p. 185). One aspect of central bank independence is its power to resist pressure from the political establishment and the demand to print money irrationally to help fulfill promises made to the electorate at the expense of long-term monetary and economic stability (see Miller, 1998, p. 450). Research has shown a stable relationship between central bank independence and the level of inflation (Carlstrom, & Fuerst, 2009, pp. 185-186). By maintaining monetary stability, central banks gain credibility in their work (Blinder, 2000, p. 1431), which puts them in a position to overcome the inflation problem without harming the achievement of other goals, such as a high employment rate (Ibid, p. 1421). The process of integration of states into global flows is accompanied by strong pressure from international multilateral institutions to minimize the influence of the state in monetary policy (Polillo, & Guillén, 2005, p. 1794). However, this removes control over economic flows from democratically elected political structures and leaves it to technocrats, who are more strongly influenced by global power centers than national governments (Ibid). Central banks in certain countries have gained so much power that they can overthrow governments that try to enter their sphere of influence by conducting a restrictive monetary policy and deliberately causing recession.

Islamic banks are financial institutions whose operations are Shariah-compliant, which means that: their business arrangements must not include interest (*riba* ban, in detail: Chapra, 2000; Siddiqi, 2004; Chapra, 2006; Iqbal, & Mirakhor, 2009), contractual parties must be fully informed about all elements of the concluded arrangement (*garar* ban, more detailed: Al-Dhareer, 1997), speculative operations that carry an unreasonably high risk are prohibited (*maysir* ban, more detailed: Ayub, 2007, p. 62) and all contracted businesses must be permitted by Shariah (*halal*, more detailed: Ibid, p. 199).

¹ About the influence of the Bundesbank on the fall of Chancellor Ludwig Erhard's government in the 1960's, see: Varoufakis (2016).

In accordance with the needs of Shariah-valid business, numerous forms of business arrangements have been developed that meet the aforementioned principles (in more detail: Usmani, 2003; Hadžić, 2005; Ayub, 2007; Iqbal, & Mirakhor, 2009; Lekpek, 2013): partnership investments – *musharakah* and *mudarabah*, sale with deferred payment – *murabahah*, forward transactions – *salam* and *istisna'*, interest-free loan – *qard hassan*, advisory, service and other businesses.

Starting from the aforementioned characteristics of central banks and the principles of Islamic banking, in the following, we will first analyze the theoretical concept of the Islamic central bank, which includes its role in the banking system, the goals it should realize by conducting monetary policy, as well as Shariah-acceptable instruments of monetary policy, and then to present Islamic central banking in practice, on the example of certain countries that have partially or completely Islamized their banking systems.

Theoretical conception of the Islamic central bank

Islamic banks as financial institutions are a relatively new phenomenon in the global financial market. They first emerged as non-profit organizations in the 1960's, while Islamic commercial banks appeared a decade later (more details: El-Ashker, & Wilson, 2006, pp. 335-336; Iqbal, & Mirakhor, 2009, pp. 22-23). Multilateral, regulatory, and developmental Islamic financial institutions emerged in the following decades (more details: Van Greuning, & Iqbal, 2008, pp. 58-61). This means that Islamic banks began their existence in a legal vacuum, without appropriate legal regulations and economic infrastructure. Even today, the absence of generally accepted standards is noticeable in many areas, from accounting regulations to the Shariah acceptability of certain business arrangements and financial instruments. The aforementioned problems also burden Islamic central banking in terms of creating and conducting a monetary policy adapted to Shariah principles.

The issue of Islamic central banking has long been outside the focus of interest of the Islamic economic and theological community. One of the first authors who dealt with this issue was *Mohammad Uzair* (1978), who presented his model of the Islamic central bank at the end of the 70's of the 20th century. Uzair's role model was the American Federal Reserve, and therefore he proposed that the Islamic central bank be profit-oriented, that it realizes a share in the capital of commercial banks, and that it has the same responsibilities as the FED: issuing money, preserving stability and constantly improving the banking system, through monitoring the system and helping distressed banks, maintaining the stability of the domestic currency and the foreign exchange market, as well as cooperation with the national government in the field of economy and finance (cited in: Ahmad, 2000, p. 15).

To the duties of the Islamic central bank stated within the aforementioned model, it is necessary to add its „responsibility to ensure the religious legitimacy of all its operations and businesses of institutions operating under its jurisdiction“ (Al Sayed, 2005, pp. 57-58). Some authors go a step further, obliging the Islamic central bank to direct monetary policy towards the achievement of socio-economic justice, solidarity, and brotherhood among people, as the primary goals of a social and economic system governed by the principles of Islam (Chapra, 1985, pp. 33-34). This can be achieved by the Islamic central bank encouraging financial institutions and financial markets under its jurisdiction to mobilize currently unused financial resources as efficiently as possible and to be guided by the development goals of the Islamic economy when investing (Khan, & Mirakhor, 1994, p. 16).

The development goals of the Islamic economy certainly include monetary stability. Therefore, the management of the money supply must not cause either inflation or deflation, which implies that arrangements with commercial banks should be based on the principle of profit and loss sharing² (Elhiraika, 2004, p. 16). Also, assistance in filling the national government budget hole can only be done through the financing of Shariah-acceptable state development projects (Hanif, & Shaikh, 2010).

The implementation of monetary policy implies using certain instruments, the list of which is not long and most often includes mandatory reserves, discount interest rate, open market operations, and exchange rate policy. The liberalization of economic and financial flows in most developed countries, but also in an increasing number of developing countries, has led to the suppression of direct monetary policy instruments and the favoring of indirect instruments, such as open market operations. It was assessed that the market is a more objective and precise evaluator of market actors' efficiency and financial needs than the bureaucrats who run the central banks. Most of the mentioned monetary policy instruments can be used by the Islamic central bank, with certain modifications. Based on this, Islamic banking experts have defined a set of monetary policy instruments that an Islamic central bank can use, which includes (interpreted by: Zangeneh, & Salam, 1993, pp. 27-32; Ahmad, 2000, pp. 18-30): mandatory reserves, refinancing ratio, selective credit control, moral suasion, financing of distressed banks, profit sharing ratio, open market operations, and exchange rate policy.

The use of *mandatory reserves* as an instrument of Islamic central bank monetary policy is not in doubt among Islamic economic experts. However, there are disagreements about whether the optimal rate of mandatory reserves is 100%³. Advocates of this position claim that applying this rate of required reserves ensures the protection of depositors and the stability of the banking system, while their opponents believe that this threatens the efficiency of bank operations. Shariah, on the other hand, gives complete freedom in determining the rate of required reserves and the basis on which it is applied, while, on the other hand, it excludes the possibility of using interest, either as a reward or punishment mechanism.

The refinancing ratio is an instrument that encourages Islamic banks to invest in certain economic sectors that the government and the central bank consider to be a priority. For Islamic banks which invest in these sectors, the central bank ensures the refinancing of part of the stake through an interest-free loan or partnership investment.

²Instead of sending money into the banking system by crediting commercial banks and withdrawing it by borrowing from commercial banks, which is the practice of conventional central banks, the Islamic central bank should perform the aforementioned monetary operations through partnership investments, in the form of *mudarabah* and *musharakah*, with commercial banks.

³Deposit sources of Islamic banks are divided into transaction deposits, whose owners the bank guarantees the return of deposits but does not pay them a return on the stake, and investment deposits, whose owners enter into a partnership relationship with the bank and share profit and loss with it. When the reserve requirement rate of 100% is applied, it applies only to transaction deposits, whose owners are guaranteed the right to withdraw the entire deposit at any time. Therefore, the bank can only invest funds from investment accounts (Iqbal, & Mirakhor, 2009, p. 102).

Selective lending control is another instrument for directing the investment of Islamic banks in priority sectors. By applying this instrument, the central bank determines the maximum amount of loans that can be placed to individual sectors. The highest credit limit is set for priority sectors, while the amount of money they can lend to other sectors is significantly lower.⁴

Moral persuasion concerns the establishment of active communication between the central bank and Islamic banks to present the central bank's demands and development goals to the Islamic banks as clearly as possible. The desired result is the harmonization of views among actors in the Islamic banking market regarding the functioning of the Islamic banking system and the issue of its further development.

Like conventional central banks, the Islamic central bank has the role of *lender of last resort*. It *financially helps vulnerable Islamic banks* through an interest-free loan (*qard hassan*) or partnership investment in the form of *mudarabah*. In order to avoid abuses of this type of cheap financing, the Islamic central bank can demotivate commercial banks to ask for interest-free loans by charging penalties on these loans, after which the money collected in this way would be given to humanitarian purposes (about the treatment of collected penalties in Shariah law, in more detail: Usmani, 2003, pp. 115-123).

The profit-sharing ratio is an instrument by which the central bank determines the percentage of realized profit that Islamic banks should pay out to their investment depositors and collect from clients whose business projects they financed through *mudarabah* and *musharakah*. It also serves to motivate businessmen to invest in priority sectors and, in return, receive support from Islamic banks in the form of partnership investments and, under pressure from the central bank, a larger share of profits compared to those from other economic sectors.⁵

Open market operations are the most common instrument in the practice of central banks of developed countries. Its effective implementation is enabled by a developed financial market and a wide range of quality financial instruments that can be used within these operations. Islamic financial institutions do not have this advantage because the majority of conventional financial instruments are Shariah-unacceptable, and the offer of Shariah-acceptable financial instruments is very limited. However, following the achievements of Islamic financial engineering in the last few decades, the Islamic Financial Services Board (IFSB, 2008) stated that Islamic central banks would be able to conduct open market operations much more actively in the foreseeable future than today. At the same time, the financial instruments used for this purpose must be (IFSB, 2008, p. 5): low-risk and reference for determining the value of other Islamic financial instruments, issued in an adequate volume and dynamics, so that their availability to market actors would not be in question and the right to purchase them would be given to all who are interested in them, regardless of whether they are Islamic or conventional, financial or non-financial institutions. In addition, *conditio sine qua non* is the absence of interest, with the preferred dominance of instruments based on the principle of profit and loss sharing (Sundararajan, Marston, & Shabsigh, 2004, p. 88).

⁴ Some authors believe that the application of this instrument of monetary policy is useful, especially in countries with underdeveloped and inefficient markets (Uzair, 1978; Chapra, 1985), while others emphasize the negative consequences of its application for the efficiency of Islamic banks' operations (Zangeneh, & Salam, 1993).

⁵ According to the opinion of Islamic economic experts, the application of this instrument unjustifiably limits the business freedom of Islamic banks (more details: Chapra, 1985).

The exchange rate policy of Islamic central banks can be conducted following the proclaimed economic development goals without such restrictions from the Shariah. Islamic central banks can choose between a fixed or floating exchange rate policy, with or without occasional intervention in the foreign exchange market. On the other hand, Shariah regulations prohibit the use of conventional hedging instruments to protect against foreign exchange risk (more details: Chapra, & Khan 2000, p. 81). Therefore, the Islamic central bank should prevent their use but simultaneously encourage the development of Shariah-compliant hedging techniques.

The practice of Islamic central banking

Islamic banking is one of the fastest-growing segments of the global financial market. This is supported by the fact that the total assets of the Islamic banking sector in 2021 (US\$2.104 trillion, source: IFSB, 2022) were more than twice as high as in 2011 (US\$932.8 billion, source: The Banker, 2011). Despite this, a significant number of countries where Islamic banks are actively operating have not yet created a stable and supportive legal environment for Islamic banks. This implies the adoption of special laws that would treat the operations of Islamic banks, recognize their specificities and help fulfill their legal needs. Malaysia, Iran, Turkey, Sudan, Yemen, the United Arab Emirates, and Pakistan are among the few countries that have tried to overcome this deficiency and regulate Islamic banking with special laws (more details: Karim, 2001, pp. 182-183). Accordingly, it is clear that Islamic central banking also faces the problem of a lack of legal infrastructure, which threatens the effective implementation of Shariah-acceptable monetary policy. To gain a valid insight into this issue, we will analyze the monetary policy of certain countries in whose banking market the Islamic banking sector achieves a significant market share, and its impact on the operations of Islamic banks in those countries.

Saudi Arabia has the largest share in the global Islamic banking market assets, amounting to 30.6% (IFSB, 2022). This country's monetary policy management is entrusted to the Saudi Arabian Monetary Agency (SAMA). It was founded on the model of the American Federal Reserve, the range of its competencies is defined based on the experiences of Western central banks and the recommendations of international multilateral financial institutions, it does not exercise direct control over the movement of capital, interest rates, and exchange rates, it does not use the interest rate as a mechanism for controlling financial flows and does not play the role of lender of last resort in the capacity characteristic for most central banks (cited in: Ramady, 2009, pp. 237-238). The monetary policy of Saudi Arabia is based on the application of the following instruments (Ibid, p. 240-241): mandatory reserves, repo operations, foreign exchange swaps, and the public assets placement⁶. The Islamic financing model has seen continuous growth in representation (Hussin, 2013, p. 50) and influence (Amar, Hachicha, & Saadallah, 2015, p. 237) in Saudi Arabian business practices. This fact, however, did not lead to the Saudi central bank distinguishing between Islamic and conventional banks when defining and implementing monetary policy (Basu, Prasad, & Rodriguez, 2018, p. 57). However, Islamic banks are allowed to use Islamic banking contracts as a basis for repo operations (Ibid).

⁶ *The central bank has the right to invest the government money held in its account in selected commercial banks (Ramady, 2009, p. 242).*

Iran has the second largest share in the global Islamic banking market assets, amounting to 17% (IFSB, 2022). The banking system in Iran is completely Islamized. The Islamization of the Iranian banking system began immediately after the Islamic Revolution in 1979 and ended during the 1980's (Hassani, 2010, p. 430). The Central Bank of Iran uses the following instruments of monetary policy (interpreted according to: Kiaee, 2007, pp. 11-13): open market operations, which are realized by issuing certificates, the purchase of which gives the right to share in the profits from investment projects, controlling the profit rates of commercial banks, through which the central bank determines the maximum profit rate that commercial banks can provide to their depositors and whose increase or decrease motivates or demotivates savings in banks, mandatory reserve, the rate of which in Iran ranged from 10-30%, special deposits, surplus assets of commercial banks that they deposit in their account with the central bank, and in return they earn a certain return on the deposited funds, and lending ceilings, in the sense of determining the maximum credit exposure of commercial banks to certain sectors. Practice shows that the operations of Islamic banks are often not following the proclaimed policy of the Iranian central bank because a significant part of the money is not directed to investments, but to consumption, through certain Islamic contracts (Hassani, 2010, p. 442). According to Shariah experts, their use should be limited (more details: Usmani, 2003, pp. 23-80).

In terms of the size of the share in the global Islamic banking market assets (11.2%, source: IFSB, 2022), Malaysia ranks third. However, in terms of the development of the legal and economic infrastructure for Islamic banks, the Islamic financial market, and the availability of Shariah-compliant financial instruments, Malaysia is considered a leader in the Islamic banking sector. An efficient dual banking system has been developed in this country, in which the specificities and needs of both conventional and Islamic banks are legally recognized. To provide Islamic banks with conditions for equal business, Bank Negara Malaysia, the central bank of Malaysia, established the Malaysian Islamic Inter-bank Money Market during the 90's of the 20th century. With its establishment, Islamic banks gained access to stable Shariah-compliant short-term sources of financing (Gan, & Kwek, 2010, p. 50). The areas covered by this market are (interpreted according to: Ahmad, 1997, pp. 54-55): Islamic interbank trade, in which Islamic banks trade Islamic financial instruments with each other⁷, Islamic interbank clearing system, in which the central bank balances interbank receivables and, with the permission of the surplus banks (see: Bacha, 2008), redirects their surplus to the deficit banks in the form of *mudarabah* investments, covers any net shortfall and fines the banks that are constantly in deficit, and Islamic interbank investment, which allows the surplus banks to invest surpluses in banks that lack money for investment, based on *mudarabah* arrangements, whereby the central bank determines the profit sharing ratio⁸. The Central Bank of Malaysia implements its monetary policy using the following instruments (Bank Negara Malaysia): unsecured direct lending through open tender, repo transactions, auction sale of central bank notes (Bank Negara Interbank Notes) and interbank bills (Bank Negara Interbank Bills), purchase and sale government securities and foreign exchange swap. The financing of Islamic banks by the central bank of Malaysia is done based on partnership investment (*mudarabah*), trust (*wadi'ah*), pledge (*rahn*) and repurchase on the basis of Islamic bonds (*sukuk*) (Sarker, 2016, p. 7). Despite the enviable level of development of Islamic banking, the conventional approach to monetary and fiscal management in achieving the development goals of the Malaysian economy dominates (Yusoff, & Wilson, 2005, p. 42), which is why Islamic financial institutions are still in a subordinate position.

⁷ For a more detailed account of the financial instruments represented in the Malaysian Islamic interbank money market, see: Hakim, 2007, pp. 166-168.

⁸ For investments lasting up to 1 month, 70% of the profit belongs to the investor, 1-3 months 80% and over 3 months 90% (Ahmad, 1997, p. 55).

Sudan accounts for a minor share in the global Islamic banking market assets (0.4%, source: IFSB, 2022), but it is interesting for analysis since, like Iran, it completely Islamized its banking system during the 1990's (Elhiraika, 2004, p. 7). The monetary policy, led by the Bank of Sudan, is based on the application of the following instruments (interpreted according to: Ibid, pp. 30-31): *profit and loss sharing ratio*, with which the central bank determines the bank's share in the profit from the financed project and the share of depositors in the bank's profit⁹; *the policy of capping loans*, which concerns the maximization of the bank's credit exposure to certain sectors¹⁰; *mandatory reserves* and *instruments of indirect control*, in the form of operations on the financial and foreign exchange markets. The goal is to achieve a greater representation of indirect monetary policy instruments in the near future (Ibid, p. 49). The Bank of Sudan, as a lender of last resort, helps commercial banks overcome the problem of illiquidity through repurchase operations of sukuk bonds (Hanif, & Shaikh, 2010; Sarker, 2016, pp. 7-8), as well as interest-free loans and investments that entitle Bank of Sudan to the share in the profit of the commercial bank¹¹ (Elhiraika, 2004, p. 31).

Practical challenges in the functioning of the Islamic central bank

In banking systems in which both Islamic and conventional banks actively operate, the formulation and implementation of monetary policy are accompanied by numerous challenges. It is necessary to strive to realize the proclaimed development goals and, at the same time, be aware of the various consequences that the activities of the monetary authorities cause for different types of banks. Observing the structure of monetary policy instruments in the analyzed countries, it can be seen that indirect instruments assume the dominant role (Choudhry, & Mirakhor, 1997, p. 59). Still, their successful implementation requires the existence of a financial market with an adequate number of actors and traded financial instruments. Monetary policy in the mentioned countries can be effectively implemented if the financial market with the above characteristics is available to Islamic banks. The development of the Islamic financial market should be a partnership venture between Islamic banks, the central bank, and the government. In addition to regulatory and supervisory activities, the central bank and the government should encourage the development of the Islamic financial market by actively acting as buyers, sellers, and issuers of Islamic financial instruments (interpreted according to: Sarker, 2016, pp. 4-5). Governments can issue and sell Islamic sukuk bonds for their budget financing, which can later be actively used in open market operations (Sarker, 2016, pp. 4-5; Basu, Prasad, & Rodriguez, 2018, p. 59), while central banks can also include Islamic financial instruments in the set of securities they issue, such as musharakah certificates of the central bank, the purchase of which entitles them to a share in the profits of the central bank (Sundararajan, Marston, & Shabsigh, 2004, p. 96).

Practice shows that the underdevelopment of the Islamic financial market and the inadequate selection of Islamic financial instruments are the reality faced by Islamic banks in almost all countries, which significantly threatens the efficiency of their operations.

⁹The application of this instrument proved to be complex and ineffective, which is why it is not recommended (Elhiraika, 2004, p. 30).

¹⁰The agricultural sector is declared a priority in Sudan, and therefore the credit limit for this sector is the highest and amounts to 50% of the loans placed (more details: Elhiraika, 2004, pp. 30-31).

¹¹The longest possible maturity of interest-free loans is two weeks, in a limited amount of up to 10% of transaction deposits, while for longer-term financing, the commercial bank must give the central bank a share in the commercial bank's profit (Elhiraika, 2004, p. 31).

The unavailability of an adequate set of Islamic financial instruments significantly complicates liquidity management in Islamic banks (Basu, Prasad, & Rodriguez, 2018, p. 58). Instead of, like conventional banks, maintaining their liquidity by holding high-quality short-term securities, Islamic banks are forced to dispose of inappropriately large amounts of cash (Sundararajan, Marston, & Shabsigh, 2004, p. 89; Basu, Prasad, & Rodriguez, 2018, p. 58-59). Therefore, conventional banks are less burdened by the problem of opportunity costs than Islamic banks (Zaheer, Ongena, & Van Wijnbergen, 2012, p. 10). According to data from the central bank of Bahrain, the Bahrain Monetary Agency, conventional banks in this country have 46.5% less liquid assets than Islamic banks of similar size (Khan, & Ahmed, 2001, p. 147).

The lack of financial instruments on which to base the open market operations, and the low need of Islamic banks for cash, make it difficult for the central bank to control monetary flows in this sector (Sundararajan, Marston, & Shabsigh, 2004, p. 89). This problem must not be ignored because Islamic banks can play an important „role in transmitting the effects of monetary policy to the real economy“ (Sukmana, & Kassim, 2010, p. 18). Research shows that through Islamic banks, a „tighter connection between the monetary and real sectors“ can be achieved (Ayuniyyah, Beik, & Arsyianti, 2013, p. 162). During the global financial crisis, Islamic banks proved to be a stabilizer of financial flows. Depositors showed confidence in them, which prevented the outflow of deposits from the Islamic banking system and attracted new depositors, while conventional banks faced the problem of a significant outflow of deposits (Abduh, Omar, & Duasa, 2011, p. 1417). Accordingly, the development of the Islamic financial market should be perceived as an endeavor of general interest. The positive results of such an approach were achieved by Malaysia, whose Islamic banks, after the establishment of the Islamic inter-bank money market, became an efficient transmission channel (interpreted according to: Said, & Ismail, 2007, p. 175).

However, the solutions implemented in Malaysia do not meet the general approval of the Islamic professional public. The reason for this is that the instruments of the Malaysian Islamic inter-bank money market are based on financial arrangements that most Shariah experts do not consider Shariah valid, such as bay' al-dayn, bay' al-'inah, and tawarruq (Hanif, & Shaikh, 2010; Ismal, 2011, p. 52). Bay'al-dayn refers to the sale of receivables, bay' al-'inah concerns the agreed repurchase (more details: Rosly, & Sanusi, 1999), while tawarruq is a combination of two mutually independent transactions, wherein the first one, a purchase is made on deferred payment, and then in the second transaction, the purchased asset is promptly sold at a price lower than the purchase price (see: Iqbal, & Mirakhor, 2009, pp. 84-85). The price difference achieved by selling receivables (bay al-dayn), assets (tawarruq), and repurchasing (bay' al-'inah) is considered by most Shariah experts to be interest, except the Shafi school of law, which is dominant in Malaysia and does not share this opinion (more details: Rosly, & Sanusi, 1999).

The other solutions related to Islamic financial instruments that we talked about in the paper also have certain shortcomings, and without their elimination, active use of those solutions in the open market operations is questionable. Government sukuk bonds can only find full use in monetary operations after they have been assigned the appropriate rating. This is impossible without a rating agency that, in addition to the yield and risk factors, would take into account their Shariah compliance when evaluating these financial instruments (Al-Amine, 2008, p. 14).

The central bank's musharakah certificates are also problematic because the central bank's operations are not profit-oriented, nor are they sufficiently transparent for investors to monitor the activities from which the central bank makes money and form profit expectations (interpreted according to: Sundararajan, Marston, & Shabsigh, 2004, p. 96).

When creating a monetary policy that recognizes Islamic banks' existence as specific financial institutions, it is necessary to look at the effects of the application of certain monetary policy instruments on Islamic banking operations. This especially applies to the reference interest rate, which the central bank uses for lending to commercial banks and open market operations. Islamic banks do not use interest in their business, based on which it can be concluded that their business is insensitive to interest rates. This claim is supported by some research that proves the interest rate insensitivity of Islamic banks in Malaysia (Yusof, Al Wosabi, Majid, & Shabri, 2009, p. 21) and Indonesia (Zulkhibri, & Sukmana, 2017, p. 139). However, the fact is that in most Muslim countries, the reference interest rate is an important mechanism of influence on monetary and economic trends (Hanif, & Shaikh, 2010). Therefore, under the given circumstances, it is difficult to expect that Islamic banks will not be exposed to the effect of interest rate risk, regardless of the nature of their business (interpreted according to: Kassim, & Majid, 2010, p. 291; Husin, 2013, p. 49). Moreover, some studies show that Islamic banks are often more sensitive to the effect of interest rate risk than conventional banks because, unlike them, Islamic banks do not have vast possibilities for financing and overcoming liquidity problems in a situation when the central bank leads a restrictive monetary policy (Kassim, Majid, & Yusof, 2009, p. 56). Islamic banks' interest rate sensitivity is rooted in their business practices. Namely, in the placement structure of Islamic banks, the largest share is held by murabahah investments, in which the most pronounced risk of margin changes, very similar to conventional interest rate risk in terms of operation (interpreted according to: Khan, & Ahmed, 2001, p. 62; Bourakba, & Zerargui, 2015, p. 69).

The effect of interest rate risk is also reflected on the financing of Islamic banks due to the coordinated movement of their financing costs and market interest rates (Yungucu, & Saiti, 2016, p. 225). This is confirmed by research, according to which there is a pronounced positive correlation between the movement of the rate of return on investment deposits of Islamic banks and the interest rate on deposits of conventional banks (Husin, 2013, p. 49). A rise in interest rates may lead to a decrease in the available sources of financing for Islamic banks (Majid, & Hasin, 2014, p. 162). That is why Islamic banks must offer their investors the same or higher returns (Siddiqui, 2008, p. 257). According to the nature of the relationship between an Islamic bank and its investment depositors, they have no obligation to pre-determine and guarantee the return on the depositors' stake, therefore this return is uncertain (Zulkhibri, & Sukmana, 2017, p. 124). This can demotivate investors to deposit their savings with Islamic banks, which Islamic banks are aware of, so, deviating from their basic principles, they communicate investors¹² of the expected return on the stake, determining it based on the movement of the market interest rate (Ibid).

¹²In practice, „communicating“ the expected return on stake is generally equivalent to guaranteeing, which is supported by the business practice of Islamic banks to form special reserves to ensure the payment of „announced“ returns on stake (more details: Iqbal & Mirakhor, 2009, p. 224-226).

Conclusion

In the first decades of its existence, there was a regulatory vacuum in Islamic banking. There were no adequate regulatory institutions to supervise the Islamic banking system and ensure its smooth functioning. This is supported by the fact that the need for an Islamic central bank and its necessary prerogatives were only discussed at the level of theory less than five decades ago. The solutions offered by Islamic banking experts regarding Islamic central banking in that period were not particularly original. Essentially, they were reduced to imitating the practice of the most successful conventional central banks, along with proposals for the necessary modifications of conventional monetary policy instruments necessary for compliance with Shariah principles. Nevertheless, according to the proposed instruments of monetary policy, it can be concluded that the creators of the original concept of the Islamic central bank considered that, unlike central banks in developed countries, the Islamic central bank must be more directly involved in financial and economic trends, which caused conflicting opinions among the Islamic economic experts.

During half a century of the existence of Islamic commercial banking, significant business results and above-average growth rates of the market share of Islamic banks have been achieved. However, significant success in developing Islamic central banking seems to have been absent. By analyzing the practice of central banking in countries with a high market presence of Islamic banks, it can be concluded that only Iran simultaneously established Islamic central banking and achieved significant results in the field of Islamic banking development. In the other mentioned countries, the conventional central bank model is in force, and the regulatory environment recognizes the specific features and needs of Islamic banks to a certain, often insufficient extent.

The practice of successful central banks is to apply indirect instruments of monetary policy. The reason for this is their aspiration to perform the role of a neutral controller to enable the successful functioning of the financial system, undisturbed by the significant interference of technocrats and politicians. The prerequisites for the successful implementation of monetary policy in this way are a developed financial market and a wide range of quality financial instruments. These preconditions are not met in the case of Islamic central banks. The deficit of Shariah-compliant financial instruments is a problem that has burdened Islamic banking since its inception. Islamic banks have been deprived of significant opportunities for managing liquidity and profitability and creating an optimal investment and financing structure, which is otherwise available to conventional banks. On the other hand, Islamic central banks cannot properly conduct the open market operations, and thereby effectively influence the movement of the money supply and the determination of the reference rate of return.

Islamic banks cannot be competitive without adequate support from an Islamic central bank. On the other hand, the Islamic central bank cannot adequately perform its function without quality Islamic financial instruments. Therefore, the high growth rates that Islamic banking has achieved in the previous decades will not be possible to maintain unless the process of Islamic financial engineering and the creation of an encouraging regulatory environment is seriously approached. When creating Islamic financial instruments, the rule that the substance must be above the form should be strictly adhered to, which has often been neglected in the process of Islamic financial engineering. The problematic approach to Islamic financial engineering is particularly prevalent in Malaysia, where numerous formally Islamic financial instruments have been created, the essence of which is Shariah unacceptable in the opinion of most Shariah experts.

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BAROMETAR/BAROMETER

FEBRUAR 2022. – JANUAR 2023. - FEBRUARY 2022. - JANUARY 2023

1.PROMET / TURNOVER

Mesec/Month	Listing	Open Market	Regulisano tržište/Regulated market	MTP/MTF	Ukupno/Total	Broj transakcija/Number of transactions
Februar 2022	1.959.662.678	11.539.264	1.971.201.942	48.167.269	2.019.369.211	1.137
Mart 2022	3.151.301.502	22.364.765	3.173.666.267	120.761.401	3.294.427.668	2.119
April 2022	2.174.994.092	157.561.026	2.332.555.118	251.428.547	2.583.983.665	2.071
Maj 2022	9.919.443.195	304.783.345	10.224.226.540	41.664.773	10.265.891.313	2.788
Jun 2022	1.934.625.257	200.481.199	2.135.106.456	142.514.877	2.277.621.333	2.299
Jul 2022	354.339.606	178.637.741	532.977.347	53.487.861	586.465.208	1.775
Avgust 2022	4.479.060.082	459.733.906	4.938.793.988	29.345.450	4.968.139.438	2.300
Septembar 2022	850.312.236	92.472.647	942.784.883	22.516.108	965.300.991	1.774
Oktobar 2022	1.382.479.554	84.339.714	1.466.819.268	440.877.757	1.907.697.025	1.642
Novembar 2022	3.393.942.645	134.121.872	3.528.064.517	182.919.377	3.710.983.894	2.090
Decembar 2022	2.706.540.040	38.091.892	2.744.631.932	173.968.399	2.918.600.331	1.957
Januar 2023	1.855.816.964	69.718.707	1.925.535.671	482.820	1.926.018.491	1.426
	34.162.517.850	1.753.846.078	35.916.363.928	1.508.134.639	37.424.498.567	23.378

*RSD

2. INDEKSI / INDICES

Februar/February 2022. Januar/January 2023		BELEX15	BELEXline
	Poslednja vrednost / Last value	860,34	1765,65
	Promena (abs) / Change (abs)	35,73	25,79
	Promena (%) / Change (%)	4,33%	1,48%
	Najviša vrednost / Maximum value	868,47	1789,15
	Najniža vrednost / Minimum value	775,14	1647,62
	Istorijski max / History maximum value	3335,2	5007,34
	Istorijski min / History minimum value	347,46	841,99
	Vrednost prometa / Value of turnover	83.137.641,00	111.685.613,00

3. TRŽIŠNA KAPITALIZACIJA / MARKET CAPITALISATION

	NOVEMBAR	DECEMBAR	JANUAR
Ukupna tržišna kapitalizacija/ Total market capitalisation	407.286.677	409.576.767	420.597.579
Regulisano tržište/Regulated Market	254.423.652	257.088.643	410.095.370
Listing	187.133.091	188.663.461	196.632.750
Prime Listing – akcije/ Prime Listing – shares	181.828.051	183.199.301	196.632.750
Standard Listing – akcije/ Standard Listing – shares	5.305.040	5.464.160	0
Open Market	67.290.561	68.425.182	213.462.619
MTP/MTF	152.863.024	152.488.125	10.502.210
BELEX15	224.824.667	228.914.555	239.585.939
BELEXline	236.980.562	240.819.083	251.276.516

*u hiljadama RSD / in RSD thousands

4. UČEŠĆE STRANIH INVESTITORA / FOREIGN INVESTORS PARTICIPATION

Februar/February 2022. Januar/January 2023	Učešće stranih investitora/Foreign Investors Participation		
	FIS	total	64,41%
		b-FIS	63,42%
		s-FIS	65,41%
	FIB		2,91%
	FIT		21,77%

Indeks_Belex15	Indeks_BELEXLine	Datum	BELEX15	BELEXLine
BELEX15	BELEXLine	4.1.2022	825,04	1.734,07
BELEX15	BELEXLine	5.1.2022	825,18	1.734,22
BELEX15	BELEXLine	6.1.2022	826,04	1.735,57
BELEX15	BELEXLine	10.1.2022	825,64	1.735,14
BELEX15	BELEXLine	11.1.2022	827,10	1.737,55
BELEX15	BELEXLine	12.1.2022	826,04	1.736,15
BELEX15	BELEXLine	13.1.2022	830,41	1.750,73
BELEX15	BELEXLine	14.1.2022	828,50	1.749,83
BELEX15	BELEXLine	17.1.2022	826,20	1.745,55
BELEX15	BELEXLine	18.1.2022	860,67	1.781,50
BELEX15	BELEXLine	19.1.2022	861,71	1.782,63
BELEX15	BELEXLine	20.1.2022	861,71	1.782,63
BELEX15	BELEXLine	21.1.2022	861,69	1.782,60
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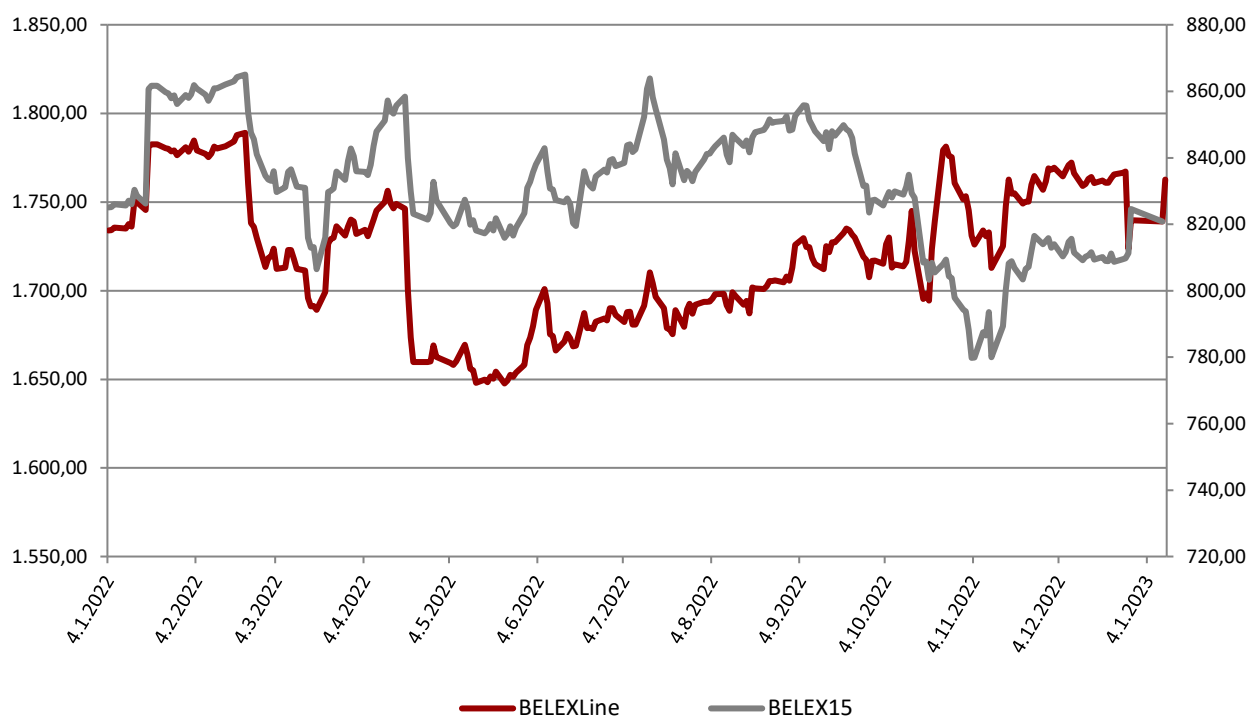
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BELEX22	BELEXLine	18.1.2023	831,64	1.749,76

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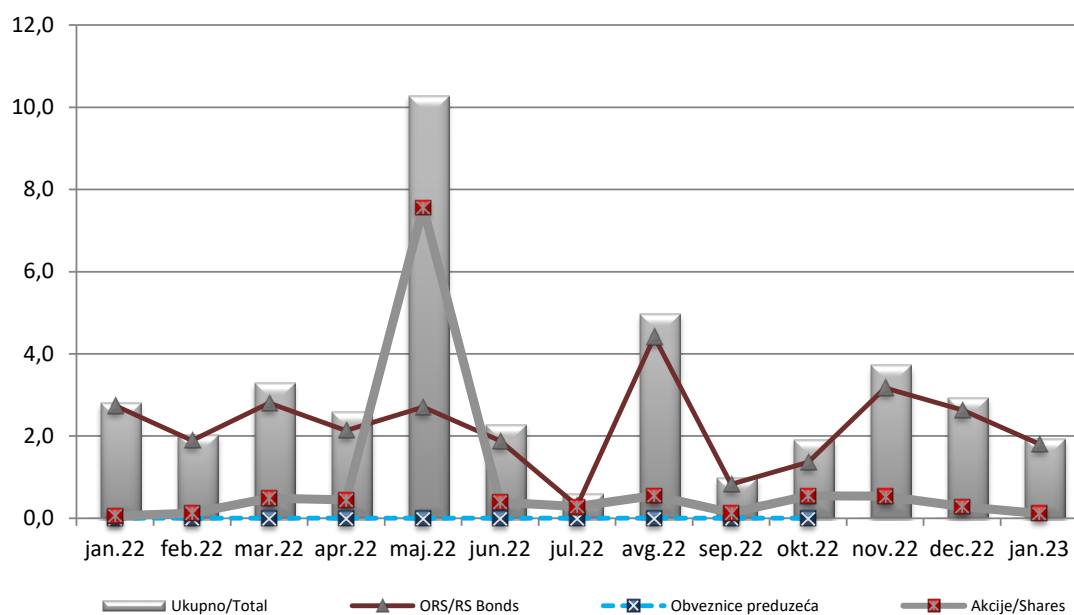


2022	Ukupno/Total	ORS/RS Bonds	Obveznice preduzeća	Akcije/Shares
januar 2022	2.798.479.938	2.736.693.452	0	61.786.486
februar 2022	2.019.369.211	1.894.745.001	0	124.624.210
mart 2022	3.294.427.668	2.805.469.107	0	488.958.561
april 2022	2.583.983.665	2.135.040.364	0	448.943.301
maj 2022	10.265.891.313	2.701.476.264	0	7.564.415.049

jun 2022	2.277.621.333	1.884.010.963	0	393.610.370
jul 2022	586.465.208	305.113.671	0	281.351.537
avgust 2022	4.968.139.438	4.415.054.752	0	553.084.686
septembar 2022	965.300.991	829.521.701	0	135.779.290
oktobar22	1.907.697.025	1.361.147.451	0	546.549.574
novembar 2022	3.710.983.894	3.173.524.753		537.459.141
decembar 2022	2.918.600.331	2.633.372.307		285.228.024
januar 2023	1926018491	1808427047		117591444

U mlrd dinarima / RSD

jan 2022- jan 2023





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- Rad treba da bude u A4 formatu, sve margine 20 mm.
- Dužina rada najviše 10 strana uključujući grafikone, tabele, literaturu i ostale priloge. Ukoliko rad po obimu prevazilazi date propozicije, na uredništvu je odluka da li će ga publikovati ili ne.
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