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ULOGA FINANCIJSKIH INSTITUCIJA U POSLOVNIM MODELIMA DIGITALNIH VALUTA SREDIŠNJIH BANAKA

THE ROLE OF FINANCIAL INSTITUTIONS IN DIGITAL CURRENCY BUSINESS MODELS OF CENTRAL BANKS

SAŽETAK: Razvoj digitalnih valuta središnjih banaka postavio je pitanje poslovnog modela koji će se koristiti za njihovu primjenu u financijskom sustavu. Nameću se tri poslovna modela koja se razmatraju te se traži upravo onaj koji će se najbolje uklopiti u financijski sustav i omogućiti optimalno upravljanje monetarnom ekonomijom. Uloga financijskih institucija i poslovnih banaka varira ovisno o poslovnom modelu. Svaki model, direktni, indirektni ili hibridni, ima svoje specifičnosti. Središnje banke provodile su istraživanja i analize navedenih modela kako bi pronašle upravo onaj koji će ostvariti maksimalan potencijal. Provedene analize pokazuju kako središnje banke naginju hibridnom modelu, koji objedinjuje prednosti direktnog i indirektnog modela. Kroz hibridni model ne narušava se financijska stabilnost, financijske institucije imaju svoju ulogu, dok je upravljanje monetarnom politikom učinkovitije u odnosu na preostale modele.

KLJUČNE RIJEČI: digitalne valute središnjih banaka, monetarna ekonomija, financijske institucije, direktni model, indirektni model, hibridni model

ABSTRACT: The development of central bank digital currencies brings into question the business model to be used for their application in the financial system. Three business models are imposed and considered in search of the one that will best be adopted into the financial system and enable optimal management of the monetary economics. The role of financial institutions and corporate banks varies depending on the business model. Each model, direct, indirect or hybrid, features its own specificities. Central banks have implemented research and analysis of the stated models in order to find the one that would generate maximum potential. The conducted analyses show that central banks lean toward the hybrid model that encompasses the benefits of the direct and indirect models. The hybrid model does not deteriorate financial stability, financial institutions keep their role, while monetary policy management becomes more effective than in the case of the remaining models.

KEYWORDS: digital currencies of central banks, monetary economics, financial institutions, direct model, indirect model, hybrid model

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UVOD

Pojava decentraliziranih digitalnih valuta, posebice Bitcoina 2008. godine, potaknula je središnje banke na razvoj centraliziranih digitalnih valuta. Digitalne valute središnjih banaka ekvivalent su nacionalnoj fiat valuti i vezane za njenu vrijednost. Za razliku od decentraliziranih digitalnih valuta, posebice kriptovaluta, digitalne valute koje bi izdavala središnja banka bile bi pod njenim nadzorom i kontrolom. Na taj način očuvali bi se mehanizmi kojima je moguće kontrolirati optjecaj i volatilnost te očuvati stabilnost digitalne valute. Razvoj digitalnih valuta središnjih banaka dodatno je ubrzan COVID-19 pandemijom te općenito padom uporabe gotovog novca u razvijenim zemljama. Snažni trendovi digitalizacije i elektroničkog plaćanja, u kombinaciji s brojnim mjerama za suzbijanje širenja COVID-19 pandemije, pridonijeli su padu uporabe gotovog novca. Osim pada uporabe gotovog novca, dodatni motivi koji potiču središnje banke na istraživanje centraliziranih digitalnih valuta ulaganje su u tehnološka rješenja i razvoj financijske tehnologije. Središnje banke također razmatraju koji je poslovni model najprihvatljiviji, točnije koji će model izazvati najmanje poremećaje u financijskom sustavu. Istraživanja vezana za poslovni model i njegov utjecaj na monetarnu ekonomiju i financijsku stabilnost okosnica su većine inicijalnih istraživanja koja su provodile središnje banke, što je razumljivo s obzirom na to da će poslovni model činiti kostur daljnjeg razvoja centralizirane digitalne valute. Iako su središnje banke nositelji ovog projekta, primjetna je sve veća uključenost poslovnih banaka u projekt, s obzirom na to da njihovo poslovanje i status bitno ovise o poslovnom modelu koji će biti odabran za realizaciju izdavanja centraliziranih digitalnih valuta. Središnje banke stoga kroz javne pozive i savjetovanja nude suradnju s poslovnim bankama kako bi se pronašlo optimalno rješenje za realizaciju modela uz minimalne rizike i posljedice za financijsku stabilnost.

INTRODUCTION

The emergence of decentralised digital currencies, especially Bitcoin in 2008 drove central banks to develop centralised digital currencies. Central bank digital currencies are equivalent to national fiat currency and are tied to its value. As opposed to decentralised digital currencies, especially cryptocurrencies, digital currencies that would be issued by central banks would also be under their supervision and control. This way, the mechanisms that can control the circulation and volatility would be preserved, as well as the stability of the digital currency. The development of central bank digital currencies has hastened additionally due to the COVID-19 pandemic and the general decrease in the usage of cash in developed countries. The powerful trend of digitalisation and electronic payments combined with a number of prevention measures against the spread of the COVID-19 pandemic contributed to the decrease in cash usage. Besides the decrease in cash usage, additional motives driving central banks to research centralised digital currencies pertain to investments in technological solutions and financial technology development. Central banks have also been considering a business model that would be the most acceptable, or more accurately, a model that would cause the fewest disturbances in the financial system. Research related to the business model and its impact on monetary economics and financial stability is the backbone of most initial research conducted by central banks, which is understandable since a business model will be the skeleton of further development of centralised digital currency. Even though central banks have been the heads of this project, we can notice an increasing engagement of corporate banks in the project, considering that their business and status heavily rely on the business model that will be selected to achieve the issuing of centralised digital currencies. Therefore, central banks offer cooperation to corporate banks through public calls and consultations in order to find an optimal solution for realisation of the model with minimal risks and consequences for financial stability.

PREGLED DOSADAŠNJIH ISTRAŽIVANJA

Digitalne valute središnjih banaka postaju jedna od najpopularnijih ekonomskih tema. Digitalna valuta naziv je koji se primarno koristio za alternativne oblike plaćanja koji postoje isključivo u elektroničkom obliku i koje ne izdaje zakonom ovlašteno tijelo. Digitalne valute definiraju se kao digitalni prikaz vrijednosti koje nisu izdale središnje banke ili tijela javne vlasti niti su nužno vezane uz fiat valute, ali ih fizičke i pravne osobe prihvaćaju kao sredstvo razmjene koje se može elektronički prenositi, pohraniti te se njime može trgovati (EBA, 2014). U zadnjih nekoliko godina središnje banke i ekonomska znanstvena zajednica rade na istraživanjima i razvoju digitalnih valuta središnjih banaka. Digitalne valute središnjih banaka digitalizirana su verzija fiat valute. Razvoj elektroničkih oblika plaćanja te digitalnih valuta stvorio je kompleksniju podjelu novca. Prema taksonomiji Klein i sur. (2020) digitalni novac dijeli se na novac koji izdaju središnje banke i novac koji izdaju privatne organizacije. Podjela digitalnog novca koji izdaju privatne institucije identična je podjeli koju je koristio i Perkušić (2020), a riječ je o podjeli na digitalne valute izdane od strane nepoznatih ili nereguliranih tijela te na valute koje izdaju pravne osobe u zatvorenim sustavima (platformne valute). Sukladno istoj taksonomiji, digitalne valute središnjih banaka autori dijele na veleprodajne i maloprodajne. Veleprodajne digitalne valute središnje banke postoje već niz godina. Poslovne banke imaju otvorene digitalne "tekuće" račune kod središnje banke te ih koriste za izvršavanje dvaju zadataka središnje banke – provođenje monetarne politike te osiguravanje učinkovitog i stabilnog platnog prometa. Veleprodajne digitalne valute zapravo su potraživanja poslovnih banaka od središnje banke, odnosno obveza središnje banke.

Ključni su dio taksonomije maloprodajne digitalne valute središnjih banaka, koje bi postale dostupne svim korisnicima financijskog sustava. Implementacija maloprodajnih digitalnih valuta

OVERVIEW OF RESEARCH BACKGROUND

Central bank digital currencies are becoming one of the most popular economic topics. Digital currency is a concept that was primarily used for alternative payment methods existing solely in digital form and not issued by a lawful body of authority. Digital currencies are defined as a digital representation of value that have not been issued by central banks or public authority bodies, nor are they necessarily tied to fiat currencies, but are accepted by natural and legal persons as means of payment that can be transferred, stored and traded electronically (EBA, 2014). During the last several years, central banks and the economic scientific community have been working on research and development of central bank digital currencies. Central bank digital currencies (CBDCs) are digital versions of fiat currencies. The development of electronic payment methods and digital currencies has created a more complex classification of money. According to the taxonomy by Klein et al. (2020), digital money is divided into money issued by central banks and money issued by private organisations. The division of digital money issued by private institutions is identical to the division used by Perkušić (2020), which divides digital currencies issued by unknown or unregulated entities and currencies issued by legal entities in closed systems (currency platforms). According to the taxonomy, central bank digital currencies are divided by authors into wholesale and retail currencies. Wholesale central bank digital currencies have existed for several years. Corporate banks own opened digital "current" accounts at central banks and use them for the execution of two central bank tasks – implementing monetary policy and ensuring effective and stable payment operations. Wholesale digital currencies are in fact corporate bank receivables from the central bank, i.e., central bank liability.

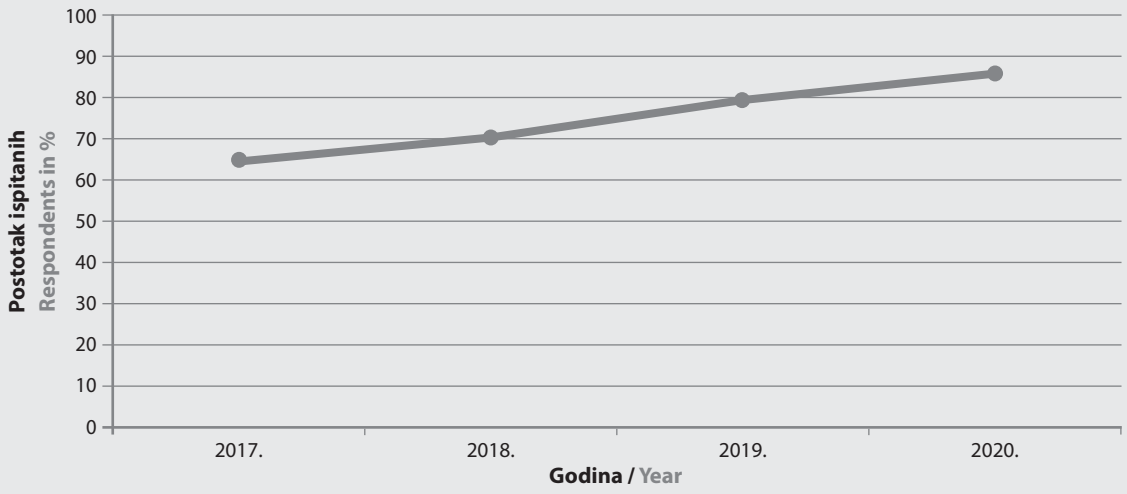
The key part of the taxonomy are the retail central bank digital currencies, that would become available to all users of the financial system. The implementation of retail central bank digital

središnjih banaka povlači za sobom niz tehnoloških i sigurnosnih izazova u svijetu financijskih institucija. U taksonomiji se navode tri moguća poslovna modela implementacije maloprodajnih digitalnih valuta središnjih banaka – direktni, hibridni i indirektni. Ne postoji konsenzus oko najboljeg modela, već svaka središnja banka individualno pristupa mogućem rješenju. Istraživanje koje su proveli Boar i Wehrli (2021) na više od 60 središnjih banaka pokazuje da interes za digitalnim valutama središnjih banaka raste. Većina ispitanih središnjih banaka, njih čak 86%, potvrdilo je da istražuju prednosti i nedostatke izdavanja digitalnih valuta (Boar i Wehrli, 2021). Istraživanje pokazuje trend rasta interesa među središnjim bankama, kao i veći broj banaka koje pokazuju interes. Također, istraživanjem je obuhvaćeno i u kojoj fazi se nalazi projekt središnje banke vezan za digitalne valute. Vidljivo je da su središnje banke napredovale iz faze istraživanja koncepata do razvoja pilot-projekta.

currencies entails a range of technological and security challenges in the financial institutions' sphere. The taxonomy states three possible business models of the implementation of retail central bank digital currencies – direct, hybrid and indirect models. A consensus about the model has not been reached, but rather each central bank approaches a possible solution individually. Research conducted by Boar and Wehrli (2021) on over 60 central banks shows a growing trend of interest in central bank digital currency. The majority of central banks participating in the research, as much as 86% confirmed that they are testing the advantages and disadvantages of issuing digital currencies (Boar & Wehrli, 2021). The research shows a growing interest trend among central banks and also a rise in the number of central banks showing interest. Also, the research also reveals the stage at which the central bank projects related to digital currency are. We can see that the central banks have moved from the stage of concept research to developing a pilot project.

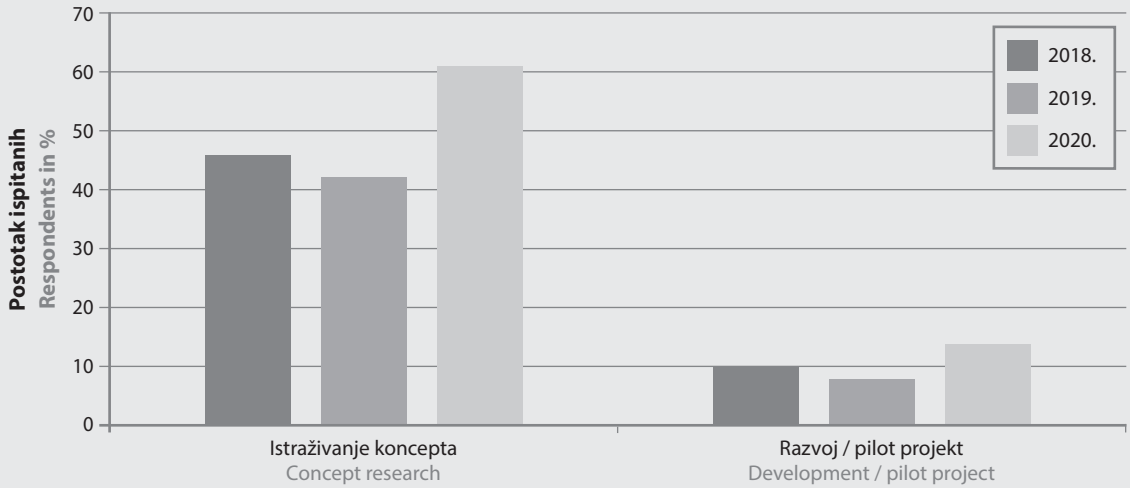
GRAFIKON 1. UKLJUČENOST SREDIŠNJIH BANAKA U ISTRAŽIVANJE DIGITALNIH VALUTA U RAZDOBLJU OD 2017. DO 2020. GODINE

CHART 1. INCLUSION OF CENTRAL BANKS IN DIGITAL CURRENCY RESEARCH FROM 2017 TO 2020



Izvor: Boar i Wehrli (2021) / Source: Boar i Wehrli (2021)

GRAFIKON 2. FAZA U KOJOJ SE PROJEKT NALAZI U RAZDOBLJU OD 2018. DO 2020. GODINE
CHART 2. STAGE OF THE PROJECT IN THE PERIOD FROM 2018 TO 2020



Izvor: Boar i Wehrli (2021) / Source: Boar i Wehrli (2021)

Središnje banke ulaze u kasnije faze razvoja projekta gdje se razmatra implementacija pilot-projekta i testiranje. 2020. godine gotovo 60% ispitanih banaka provodilo je testove, dok je 2019. godine njihov broj bio svega 42%. Kod istraživanja digitalnih valuta središnjih banaka najčešće se navodi primjer Švedske središnje banke, koja je 2016. godine predstavila projekt e-kruna. Već 2020. godine Švedska središnja banka predstavila je i prototip e-krune i započela s testiranjima. Kao što je ranije navedeno, svaka središnja banka ima individualan pristup po pitanju digitalnih valuta. Motivi uvođenja digitalnih valuta variraju, kao i predložena tehnološka rješenja. Švedska središnja banka počela je istraživati postoji li mogućnost izdavanja digitalne valute koja bi pokušala suzbiti negativne učinke snažnog pada korištenja gotovog novca te općenito povećati sigurnost i učinkovitost odvijanja platnih usluga. Švedska središnja banka provodila je istraživanja od 2010. godine s ciljem ispitivanja platnih navika. Prema Švedskoj središnjoj banci (2020), 39% ispitanika je 2010. godine

Central banks have been entering a project stage at which they are considering implementing the pilot project and its testing. Almost 60% of respondent banks were conducting tests in 2020, while a year before that only 42% were at a testing stage. The most common example in research related to central bank digital currencies is the case of the Swedish central bank that presented its project e-krona in 2016. Already in 2020, the Swedish central bank introduced a prototype of e-krona and began testing. As stated earlier, each central bank has an individual approach to digital currencies. The motives for introducing digital currencies as well as suggested technological solutions vary. The Swedish central bank started researching the possibility of issuing digital currency that would attempt to curb the negative effects of a strong decrease in using cash money and to generally increase the security and efficiency of payment services. According to the bank's report (2020), in 2010, 39% of respondents used cash as means of payment. The research was conducted continually

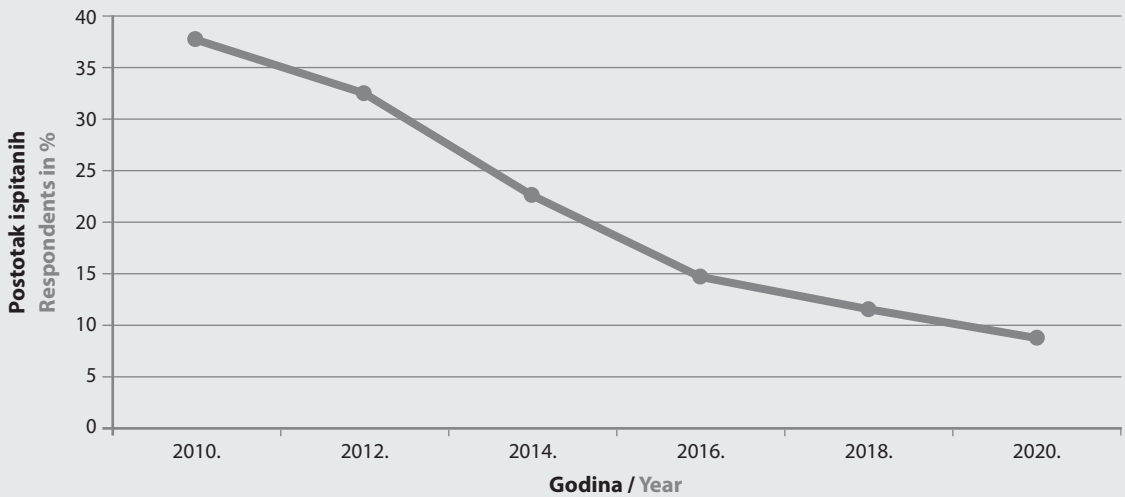
koristilo gotovinu kao sredstvo plaćanja. Istraživanje je provođeno kontinuirano od 2010. do 2020. godine, a brojka korisnika gotovog novca među ispitanicima pala je na gotovo 9%. 50% ispitanika je u 2020. godini izjavilo da su gotov novac koristili u zadnjih mjesec dana, a 2018. godine 61%. Plaćanje gotovim novcem u Švedskoj su prestigle 2018. godine i kreditne kartice.

Švedska središnja banka izrazila je zabrinutost zbog tog trenda, jer bi u slučaju kriznog scenarija ili snažnijeg financijskog šoka potražnja za gotovim novcem porasla. Švedska središnja banka (2017) navodi kako bi u takvom slučaju došlo do poremećaja u distribuciji, čak i u slučaju da se kriza mogla predvidjeti. Istraživanje provodi i Europska središnja banka, koja je za tu potrebu 2020. godine osnovala i posebnu komisiju za rad na istraživanju i izdavanju centralizirane digitalne valute. Cilj je komisije utvrditi koji su preduvjeti potrebni za uvođenje digitalnog eura te

from 2010 to 2020, and the number of respondents using cash as means of payment dropped to almost 9%. In 2020, 50% of respondents stated that they used cash money in the previous month, while in 2018, the same statement is valid for 61% of respondents. Cash payments in Sweden have also been overtaken by credit cards in 2018.

The Swedish central bank expressed concern due to the trend, because in a crisis scenario or a stronger financial shock, the demand for cash would grow. The Swedish central bank (2017) claims that in such a case there would be disturbances in distribution, even if crisis could be predicted. Research was also conducted by the European Central Bank that for this purpose founded a special commission for research and issuing of centralised digital currency. The commission's goal is to determine the prerequisites for introducing digital euro and to consider all suggested implementation models for digital currency in the euro area. The

GRAFIKON 3. POSTOTAK PLAĆANJA U GOTOVINI U ŠVEDSKOJ U RAZDOBLJU OD 2010. DO 2020. GODINE
CHART 3. PERCENTAGE OF CASH PAYMENTS IN SWEDEN IN THE PERIOD FROM 2010 TO 2020



Izvor: izrada autora prema Sveriges Riksbank / Source: author's systematization according to the Sveriges Riksbank

razmotriti sve predložene modele implementacije digitalne valute na euro područje. Komisija se uvelike oslanjala na istraživanja koja su išla u prilog implementaciji zbog pada korištenja gotovog novca te zbog izrazite digitalizacije mlađih dobnih skupina u eurozoni. Jedan od prvih izazova s kojima se komisija susrela je pitanje anonimnosti i sigurnosti. Europska središnja banka posebnu pažnju posvećuje borbi za sprječavanje pranja novca i financiranja terorizma te potpuna anonimnost korisnika sustava nije moguća. Europska središnja banka (2020) također smatra da bi digitalizacija ubrzala razvoj informacijsko-komunikacijskih tehnologija te osigurala Europi prednost u razvoju novih i modernih tehnologija. Europska središnja banka (2021) provodi javno savjetovanje, koje je obuhvatilo razdoblje od listopada 2020. do siječnja 2021. godine. Ispitanicima je postavljeno 18 pitanja, a ukupan broj ispitanika iznosio je 8221. 94% ispitanih ulazilo je u kategoriju građanstva, dok je 6% ispitanih u svojstvu pravne osobe ili subjekta. Trećina ispitanih pravnih osoba pripada u tehnološku industriju, što je važan pokazatelj interesa u tom sektoru. Ispitanici su naveli da su najbitniji privatnost, sigurnost te dostupnost u cijeloj eurozoni, ukidanje naknada te korištenje usluge i izvan radnog vremena same banke. I dok privatni korisnici pretežno inzistiraju na privatnosti, pravne osobe više teže sigurnosti transakcija nego samoj privatnosti. Ipak, po pitanju modela izdavanja, Europska središnja banka jasnog je stava kako će ona izdavati i poništavati digitalni euro, dok će transakcije, račune i provjere prepustiti poslovnim bankama. Upravo oko modela izdavanja središnje banke ne postižu konsenzus. Kod direktnog modela središnja banka ima potpunu kontrolu nad digitalnim valutama koje izdaje. Takav oblik umanjuje ulogu poslovnih banaka, jer su računi za digitalne valute otvoreni kod središnje banke. Direktni model predstavlja svojevrsnu ugrozu za financijsku stabilnost, jer može izazvati "run on the bank" efekt. Središnje banke su stabilne i uživaju veći ugled u javnosti te postoji opravdani strah da bi veći broj klijenata mogao početi povlačiti svoje depozite iz poslovnih banaka

commission greatly leaned on research studies in favour of the implementation due to the decrease in cash usage and due to strong digitalisation among young-age population in the eurozone. One of the first challenges the commission faced was the question of anonymity and security. The European Central Bank has been paying special attention to money laundering prevention and financing terrorism, so a complete anonymity of system users is not possible. The European Central Bank (2020) also considered that the digitalisation would speed up the development of information and communications technology and ensure the European advantage in the development of new and modern technologies. The European Central Bank (2021) implemented public consultations that took place between October 2020 and January 2021. A total of 8,221 respondents answered 18 questions. 94% of respondents pertained to the category of private citizens, while 6% pertained to the category of legal persons or entities. The third of respondents in the category of legal persons pertains to the industry of technology, which is an important indicator of interest in this sector. The respondents highlighted privacy, security, and availability throughout the eurozone as the most important, as well as discontinuation of fees and using services outside of a bank's working hours. Whereas private users mostly insist on privacy, legal persons lean more toward the security of transactions than to privacy itself. Nevertheless, in terms of the issuing model, the European Central Bank is adamant that it will be the one to issue and recall the digital euro, while the corporate banks will be in charge of transactions, accounts and monitoring. With the direct model, the central bank has complete control over digital currencies it issues. Such a model diminishes the role of corporate banks because the digital currency accounts are opened at the central bank. The direct model represents a risk of a kind for financial stability because it can cause the run-on-the-bank effect. Central banks are stable and enjoy a better reputation in the eyes of the public, so there is a justified fear that a larger number of clients would start to withdraw their deposits from

i prenositi ih u središnju banku. Na taj način poslovne banke suočile bi se s odljevom depozita, povećanjem troškova financiranja i gubitkom likvidnosti, što bi se odrazilo i na kamatne stope. Središnje banke se u svojim izvješćima često dotiču predloženih modela te analiziraju koji model bi bio najprihvatljiviji za njihovo ekonomsko okruženje. U većini dostupnih analiza i izvještaja, središnje banke u startu odbacuju poslovni model koji bi isključivao posrednike u vidu poslovnih banaka. Istraživanja primarno idu u smjeru razvoja hibridnog poslovnog modela, koji uključuje posrednike, točnije, poslovne banke.

METODOLOGIJA I SKUP PODATAKA

U svrhu ispitivanja koji poslovni model ima najveću zastupljenost u istraživanjima središnjih banaka, u radu su analizirana brojna izvješća i istraživanja središnjih banaka. Koristeći induktivnu metodu uz potporu analiziranih službenih izvještaja, kreirani su grafovi i statistike, koje su zatim kroz metode deskripcije pobliže objašnjene. Nasumično je odabrano trinaest središnjih banaka koje su objavile izvješća ili istraživanja. Za potrebe istraživanja ovog rada u obzir su uzeta službena izvješća i istraživanja središnjih banaka Danske, Švedske, Islanda, Euro područja, Izraela, Ruske Federacije, Ujedinjenog Kraljevstva, Kine, Japana, Kanade, Bahama, Brazila, Sv. Vincenta i Grenadina te Dominike. Sv. Vincent i Grenadini te Dominika imaju zajedničku središnju banku, Istočnokaripsku središnju banku. Razmotrit će se odabir poslovnog modela digitalnih valuta središnjih banaka te uloga koju su središnje banke navedenih država namijenile poslovnim bankama. Ključni podaci su faze istraživanja u kojima se nalaze projekti digitalnih valuta promatranih središnjih banaka, kao i odabir poslovnog modela. Projekti koji su u naprednijoj fazi razvoja nose veću težinu, s obzirom na to da se sam poslovni model definira u početnim razmatranjima. Kroz korelaciju tih podataka moći ćemo jasnije utvrditi koje su

corporate banks and transfer them to central banks. In this way, corporate banks would face deposit outflows, by increasing costs of financing and losing liquidity, which would be reflected in interest rates as well. Reports by central banks often mention the suggested models and analyse the model that would be the most appropriate for their economic environment. The majority of available analyses and reports by central banks initially reject a business model that would exclude intermediaries in terms of corporate banks. Research studies are primarily directed towards the development of a hybrid business model that includes intermediaries, more accurately corporate banks.

METHODOLOGY AND DATASET

For the purpose of evaluating the business model that is most represented in central banks' research studies, the paper analyses numerous reports and research studies by central banks. Using an inductive method supported by analysed official reports, the paper presents charts and statistics, then explains them through the descriptive method. 13 central banks that published reports or research studies were randomly selected. For the purpose of this research, the official reports and research studies were taken into account by central banks from Denmark, Sweden, Iceland, euro area, Israel, the Russian Federation, the United Kingdom, China, Japan, Canada, the Bahamas, Brazil, Saint Vincent and the Grenadines, and Dominica. St. Vincent and the Grenadines and Dominica share a central bank, the Eastern Caribbean Central Bank. The paper considers the selection of a central bank digital currency business model and the role that the central banks intended for corporate banks. Key data pertain to the stages of research in which the digital currency projects of the observed central banks are, as well as the selection of the business model. Projects that are at a more advanced stage of development bear more weight considering that the business model itself is defined in the initial contemplations. By correlating data, we will be

središnje banke odabrale određeni poslovni model i u kojoj se fazi njihov projekt nalazi.

REZULTATI I DISKUSIJA

U analizi službenih izvješća, istraživanja i ispitivanja koje su provodile središnje banke, utvrđena je faza u kojoj se nalazi istraživanje digitalnih valuta. Faze projekta su definirane kako slijedi:

1. Istraživanja (inicijalne rasprave i analize)
2. U razvoju (odabir modela, tehničkog rješenja i potencijalnih suradnika na projektu)
3. Pilot-projekti (ograničena testiranja, puštanja u optjecaj u limitiranoj količini)
4. Implementirano (projekt je gotov i pušten u optjecaj te je dostupan građanstvu za korištenje)

Kroz analizu dostupnih izvještaja utvrđeno je da su tri središnje banke implementirale digitalne valute. To su primarno karipske zemlje Bahami, Dominika

able to determine more clearly which central banks opted for a specific business model and at which stage their projects are.

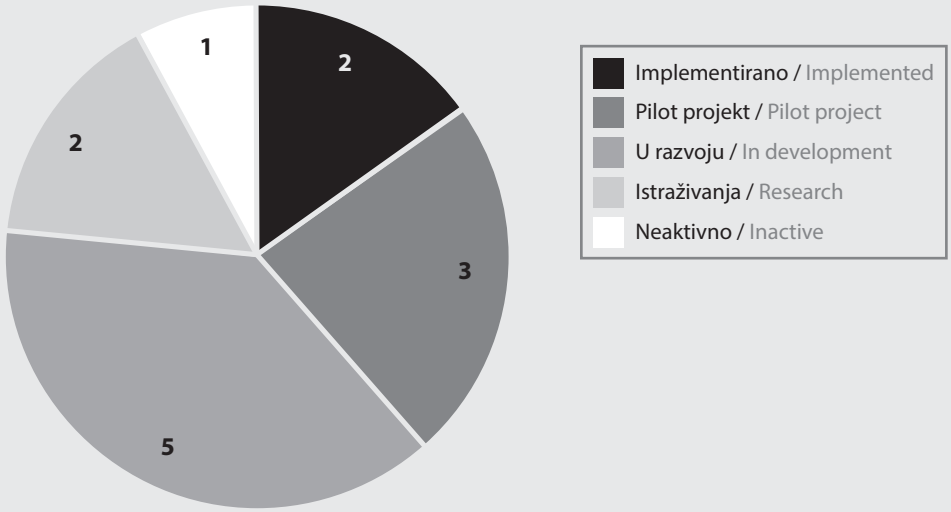
RESULTS AND DISCUSSION

The analysis of official reports, research studies and testing conducted by central banks determines the stage at which the research into digital currency is. Project stages are defined as follows:

1. Research (initial discussions and analyses)
2. In development (model selection, technical solutions, and potential project associates)
3. Pilot projects (limited testing, limited amount released into circulation)
4. Implemented (the project is completed and released into circulation, available for use to citizens)

The analysis of available reports determined that three central banks implemented digital

GRAFIKON 4. FAZA PROJEKTA DIGITALNE VALUTE KOD PROMATRANIH SREDIŠNJIH BANAKA
CHART 4. DIGITAL CURRENCY PROJECT STAGE OF OBSERVED CENTRAL BANKS



Izvor: izrada autora / Source: author

i Sv. Vincent i Grenadini (Istočnokaripska središnja banka). U pilot-projektu su zasada Ruska Federacija, Kina i Švedska. Najviše zemalja obuhvaćenih ovim radom nalazi se u fazi razvoja. To su Kanada, Brazil, Japan, Izrael i zemlje članice euro područja koje su pod jurisdikcijom Europske središnje banke. S istraživanjima su započeli Island i Ujedinjeno Kraljevstvo, dok je Danska odustala od daljnjih istraživanja.

Iako male ekonomske snage, predvodnici implementacije digitalnih valuta središnjih banaka zemlje su Kariba i Latinske Amerike. Prema Alfonso i sur. (2022), razlozi zbog kojih navedene zemlje ulažu u razvoj digitalnih valuta identičan je i ostalim ekonomijama u razvoju. Tendencija da budu uključene u globalni financijski sustav, prate razvoj digitalnih rješenja te nude siguran i efikasan platni sustav. Zemlje su to koje nemaju, primjerice, problem s uporabom gotovog novca, kao što je to slučaj kod razvijenih ekonomija. Središnja banka Bahama 2019. godine objavila je javni poziv tehnološkim kompanijama koje bi sudjelovale na projektu izdavanja centralizirane digitalne valute. Nakon odabira partnera, iste godine, krenulo se u realizaciju projekta, a krajem 2019. godine lansiran je pilot-projekt Exuma. Konačno, nakon niza testiranja, 20. listopada 2020. godine, središnja banka Bahama pustila je u opticaj *Sand Dollar* i učinila ga dostupnim građanstvu. Bahami su odabrali hibridni model, u kojem su uključene i financijske institucije u vidu poslovnih banaka, koje pružaju usluge digitalnih novčanika, dok se središnja banka brine o izdavanju i samoj arhitekturi centralizirane digitalne valute. Plaćanja su moguća i u uvjetima kada nema internetske mreže, na način da se plaćanje rezervira i autorizira, dok se realizacija i transfer sredstava obavljaju prilikom prvog povezivanja na mrežu (Alfonso i sur., 2022). Alfonso i sur. isto tako naglašavaju da je jedan od bitnijih motiva zbog kojih karipske zemlje predvode u implementaciji digitalnih valuta središnjih banaka vezan uz katastrofe, karakteristične za navedene zemlje. Prirodne katastrofe, prekidi opskrbe bankomata

currencies. These are primarily Caribbean countries the Bahamas, Dominica and St. Vincent and the Grenadines (Eastern Caribbean Central Bank). The Russian Federation, China and Sweden are at the pilot project stage. Most countries included in this research are at the stage of development. These are: Canada, Brazil, Japan, Israel, and the euro area member-states under the jurisdiction of the European Central Bank. Iceland and the United Kingdom have begun research, while Denmark discontinued further research.

Although they are small economic forces, the leaders in the implementation of central bank digital currencies are the Caribbean and Latin American countries. According to Alfonso et al. (2022) the reasons why these countries are investing in the development of digital currencies is identical to other developing economies. The tendency is to be included in the global financial system, to follow the development of digital solutions, and to offer secure and efficient payment system. These are countries that do not have a problem with cash usage for example, as is the case with developed countries. The central bank in the Bahamas published a public tender in 2019 inviting technological companies to participate in the project of issuing centralised digital currency. After selecting their partner in the same year, they began realising the project, and at the end of 2019 they launched the Exuma pilot project. Finally, after a range of testing, on 20 October 2020 the Central Bank of the Bahamas issued Sand Dollar into circulation and made it available to its citizens. The Bahamas have selected the hybrid model including financial institutions, i.e., corporate banks, offering digital wallet services, while the central bank is in charge of issuing and architecture of the centralised digital currency. Payments are possible even in offline conditions in a way that the payment is reserved and authorised, while the realisation and transfer of means is executed upon first internet connection (Alfonso et al., 2022). Alfonso et al. (2022) also emphasize that one of the most important motives behind the leadership of the Caribbean countries in the implementation of

na dijelovima otoka zbog prometnih poremećaja mogu dovesti do problema s opskrbom novcem te likvidnošću. Navode primjer uragana Maria, koji je pogodio Puerto Rico 2017. godine, kada je većina prometnica bila devastirana i opskrba je bila gotovo nemoguća. Iako u navedenim katastrofama obično nastrada i opskrba električnom energijom, ponovno uspostavljanje opskrbe jedan je od prioriteta nakon katastrofe, što bi ubrzo nakon katastrofe omogućilo korištenje računala i mobilnih uređaja. Identičan je slučaj s Istočnokaripskom središnjom bankom, koja pruža usluge za Sv. Vincent i Grenadine. Digitalna valuta središnje banke, nazvana *DCash*, dostupna je na otoku od kolovoza 2021. godine. Korišten je identičan pristup kao i u slučaju Bahama. *DCashom* se upravlja putem mobilne aplikacije. Dominika je također pod nadzorom Istočnokaripske središnje banke kao i Sv. Vincent i Grenadini. *DCash* je u Dominiki implementiran nekoliko mjeseci kasnije, u prosincu 2021. godine. Istočnokaripska središnja banka omogućila je distribuciju kroz ovlaštene financijske institucije, a valutom je moguće obavljati transakcije između kupaca i trgovaca te između korisnika međusobno (Auer i sur., 2021). Demografija i geografija Latinske Amerike idu u prilog implementaciji digitalnih valuta središnjih banaka, posebice mogućnosti transakcija u uvjetima kada nema dostupne internetske mreže. Latinska Amerika ima malu gustoću naseljenosti te izrazito raseljene i teško dostupne ruralne krajeve, gdje bi mogućnosti plaćanja putem centraliziranih digitalnih valuta bile izrazito korisne.

Kada govorimo o digitalnim valutama koje su u pilot-projektima, Središnja banka Ruske Federacije (2022) objavila je kako je prva faza testiranja završena sredinom veljače 2022. godine. Tri su banke sudjelovale u projektu, dok je još dvanaest izrazilo spremnost da se uključe. U inicijalna testiranja uključile su se najveće banke Ruske Federacije, kao što su Sberbank, VTB, Alfa banka, Gazprombank i Tinkoff (CoinDesk, 2021). Švedska provodi testiranja od 2020. godine sa zainteresiranim bankama. Za testiranje tehničkih rješenja e-krune, realizirali su suradnju

central bank digital currencies is tied to the disasters that are characteristic to these countries. Natural disasters, cut-offs of ATM availability due to traffic disturbances on parts of the islands can lead to issues with money supply and liquidity. The authors mention the example of Hurricane Maria that hit Puerto Rico in 2017, causing devastation to most roads and making the supply close to impossible. Although, these disasters usually damage power supply, the reestablishment of the supply is one of the priorities after the catastrophe, which would enable computer and mobile phone use soon after the disaster. Identical is the case with the Eastern Caribbean Central Bank that provides services for St. Vincent and the Grenadines. The central bank digital currency, called DCash, has been available on the island since August 2021. They used the same approach as in the case of the Bahamas. DCash is managed through a mobile application. Dominica also falls under the supervision of the Eastern Caribbean Central Bank, as does St. Vincent and the Grenadines. DCash was implemented in Dominica several months later, in December of 2021. The Eastern Caribbean Central Bank enables the distribution via authorised financial institutions, and the currency makes possible to complete transactions between buyers and trades and among users (Auer et al., 2021). The demographics and geography of Latin America go in hand with the implementation of central bank digital currency, especially with the possibility of transactions when there is no internet connection available. Latin America has a low population density and highly depopulated and strongly inaccessible rural areas in which the possibility of payments via centralised digital currency would be highly useful.

When looking at digital currencies in pilot project stages, the Central Bank of the Russian Federation (2022) published that the first stage of testing had finished by mid-February 2022. Three banks participated in the project, while twelve expressed willingness to be included. The largest banks of the Russian Federation were included in the initial testing, such as Sberbank, VTB, Alfa bank,

s Handelsbanken i TietoEVRY (Sveriges Riskbank, 2021). Švedska se suočava s padom korištenja gotovog novca, međutim također izražava zabrinutost oko opskrbe gotovim novcem u slučaju sistemskog šoka ili katastrofe. Švedska središnja banka izrazila je sumnju u uspješnu distribuciju gotova novca u uvjetima financijske krize ili većeg sistemskog šoka banaka, kada potražnja za gotovim novcem raste (Sveriges Riksbank, 2017). Švedska je već u ranim fazama istraživanja navela da će centralizirana digitalna valuta biti dostupna svim financijskim institucijama, tvrtkama i građanstvu, dok će se središnja banka baviti isključivo izdavanjem. Švedska središnja banka uočila je nedostatke i potencijalne opasnosti direktnog modela. Kao i ostale središnje banke, Švedska je također uvidjela potencijalnu opasnost od *bank runa*. Juks (2018) smatra da je trenutačni financijski sustav bez e-krune jednako izložen opasnosti od naglog povlačenja depozita iz poslovnih banaka. Rizik povlačenja depozita i prijenosa istih u stabilniju ili snažniju banku postoji i prije implementacije e-krune. No navodi i to da, ukoliko je e-kruna zamišljena kao digitalna valuta koja nudi prednosti u slučaju katastrofe ili krize, onda će u trenutku u kojem su poslovne banke ionako već pod velikim stresom zbog krize, tu krizu dodatno povećati ukoliko se građanima e-kruna prezentira kao utočište. U tim će slučajevima e-kruna biti percipirana kao potencijalno atraktivnije sredstvo raspolaganja i postoji velika vjerojatnost da bi građani mogli u krizi povlačiti depozite u korist e-krune i tako dodatno ugroziti likvidnost i stabilnost financijskog sustava. Međutim, u svom zaključku Juks (2018) navodi kako ne pronalazi nijedan odlučujući argument protiv izdavanja e-krune. Smatra da e-kruna nudi potencijal da učini ekonomiju otpornijom na ekonomske i tehnološke šokove. Kineska središnja banka ponudila je digitalni juan kao odgovor na izrazito brzorastuću kinesku ekonomiju. Radna skupina sastavljena u svrhu istraživanja i razvoja mogućnosti digitalnog juana navodi da je primarni interes Narodne

Gazprombank and Tinkoff (CoinDesk, 2021). Sweden has been conducting testing since 2020 with the interested banks. For testing technical solutions of the e-krona, they achieved cooperation with Handelsbanken and TietoEVRY (Sveriges Riskbank, 2021). Sweden has been facing a decrease in cash usage, but it is also expressing concern about cash supply in case of a system shock or catastrophe. The Swedish central bank expressed doubt in a successful distribution of cash money during a financial crisis or a larger bank system shock when the demand for cash is increasing (Sveriges Riksbank, 2017). In the early stages of research, it already mentioned that the centralised digital currency will be available to all financial institutions, companies, and citizens while the central bank will solely deal with issuing. The Swedish central bank noticed the disadvantages and potential pitfalls of the direct model. As well as the other central banks, Sweden also noticed the potential risk of the bank run. Juks (2018) thinks that the current financial system without the e-krona is equally exposed to the risk of sudden deposit withdrawals from corporate banks. The risk of withdrawing deposits and transferring them to a more stable and stronger bank existed even before the implementation of e-krona. However, the author also claims that if e-krona was conceptualised as a digital currency offering advantages in cases of catastrophe or crises, then at the moment in which corporate banks are already under a lot of stress due to the crisis, the crisis will be additionally increased if the citizens are presented with the e-krona as a safe haven. In these cases, the e-krona will be perceived as a potentially more attractive means to dispose of and there is a high probability that in times of crisis, the citizens would withdraw their deposits in favour of e-krona and thus additionally endanger the liquidity and stability of the financial system. Nevertheless, in conclusion, Juks (2018) is not finding a single determining argument against the issuing of e-krona, considering that the e-krona offers the potential to make the economy more resilient to economic and technical shocks. The Chinese central bank offered the digital yuan as an answer

Republike Kine da svoju rastuću ekonomiju prilagodi visokokvalitetnom tehnološkom razvoju i inovacijama. Pandemija COVID-19 znatno je promijenila navike kupaca te uz razvoj digitalnih tehnologija, kao što su internet stvari, računalstvo u oblaku te umjetna inteligencija, smatraju da je logičan slijed događaja i digitaliziranje ekonomije u smislu stvaranja novih modela (People's Bank of China, 2021). Kineska je središnja banka (2021) odlučila provesti testiranje za vrijeme Olimpijskih igara u Pekingu 2022. godine. Posjetitelji su mogli koristeći posebne aplikacije odrađivati transakcije u digitalnom juanu (Bloomberg, 2022).

Razvojem digitalne valute središnje banke bavi se pet promatranih središnjih banaka. Kanadska središnja banka izjavila je kako zasada samo istražuju mogućnosti koje digitalne valute središnjih banaka nude, no da nemaju u planu izdavati ih. Ipak, ostavljaju otvorenu mogućnost izdavanja u budućnosti, ovisno o financijskoj situaciji (Bank of Canada, 2020). Japanska središnja banka svjesna je snažne digitalizacije društva i razvoja tehnologije. Iako sama središnja banka nije razmatrala uvođenje centralizirane digitalne valute, uključila se u razvoj projekta kako bi pratila tehnološki razvoj i bila spremna reagirati u slučaju potrebe (The Bank of Japan, 2020). Banka smatra da nije izgledno da će doći do značajnog pada korištenja gotovog novca, no ostavlja tu mogućnost otvorenom. Brazilska središnja banka vidi budućnost u digitaliziranoj nacionalnoj valuti. Brazil je razvio i realizirao digitalni sustav plaćanja PIX, koji dominira u sektoru građanstva kao oblik plaćanja za manje transakcije (Alfonso i sur., 2022). Brazil vidi budućnost u digitalnim valutama središnjih banaka, no smatra da će do faze pilot-projekta biti potrebno barem dvije do tri godine istraživanja (CoinDesk, 2021). Izraelska središnja banka razmatra izdavanja digitalnog šekela od 2017. godine te provodi razna savjetovanja sa zainteresiranom javnošću. U svibnju 2021. godine središnja banka izdaje dokument pod nazivom *A Bank of Israel Digital Shekel – Potential Benefits, Draft Model, and Issues to Examine*. U

to the extremely fast-growing Chinese economy. The task force gathered for the purpose of research and development of the possibility of the digital yuan states that the primary interest of the People's Bank of China is to adapt its growing economy to the high-quality technological development and innovations. The COVID-19 pandemic has significantly affected consumer behaviours and with the development of digital technologies such as the Internet of Things, cloud computing and artificial intelligence, the logical next step is considered to be the digitalisation of economy in the sense of creating new models (People's Bank of China, 2021). The Chinese central bank (2021) decided to conduct testing during the Olympic Games in Beijing in 2022. The visitors were able to use special applications and determine transactions in the digital yuan (Bloomberg, 2022).

Five of the observed central banks are at the stage of development of the central bank digital currency. The Canadian central bank stated that they are at the stage of researching the possibilities offered by central bank digital currencies, but that they are not planning on issuing one at this time. However, they have left an open possibility of doing so in the future, depending on the financial situation (Bank of Canada, 2020). The Japanese central bank is aware of the powerful digitalisation of society and technology development. Although the bank itself has not considered introducing the centralised digital currency, it initiated its participation in project development in order to follow technological advancements and to be ready to react in case of necessity (The Bank of Japan, 2020). The bank considers that a significant decrease in cash usage is not likely, but it leaves room for the possibility. The Brazilian central bank sees the future in the digitalised national currency. Brazil has developed and realised the digital payment system PIX that dominates as a small transaction payment system among its citizens (Alfonso et al., 2022). Despite seeing future benefits of central bank digital currencies, Brazil considers that it will take at least two to three years of research before reaching the

izvješću navode kako im je namjera ubrzati razvoj digitalne valute. U izvješću se također razmatra i mogućnost izdavanja te uloga financijskih institucija u projektu. Europska središnja banka digitalni euro razmatra od 2020. godine. U srpnju 2021. godine Europska središnja banka izdaje priopćenje za javnost u kojem navodi kako nakon inicijalnih razmatranja ulazi u fazu razvoja i testiranja modela za digitalni euro, koja će trajati ukupno 24 mjeseca (ECB Press Release, 2021). U inicijalnom izvješću o digitalnom euru, Europska središnja banka navela je da razmatra isključivo mogućnost u kojoj su središnje banke samo izdavatelji, dok su poslovne banke i financijske institucije posrednici, čime se jasno opredijelila za hibridni model (ECB, 2020).

Istraživanja u smjeru digitalnih valuta središnjih banaka najavili su Island i Ujedinjeno Kraljevstvo. Središnja je banka Engleske, zajedno s Ministarstvom financija Ujedinjenog Kraljevstva, objavila početkom 2021. godine priopćenje u kojem navodi da osniva novu radnu skupinu koja bi se bavila digitalnim valutama. Cilj je radne skupine istražiti mogućnosti kreiranja i lansiranja digitalne valute koja bi postala zakonsko sredstvo plaćanja u zemlji (Bank of England, 2021). Islandska središnja banka zauzela je poprilično rezerviran stav oko izdavanja središnje digitalne valute. Banka tako navodi da ne postoji nužna potreba za razvojem i digitalizacijom nacionalne valute te da izražava zabrinutost spram posljedica koje bi izdavanje moglo izazvati na monetarnu politiku i stabilnost financijskih institucija. U zaključku sumiraju kako bi moglo doći do nepredvidivih posljedica te da je potrebno dosta istraživanja i konzultacija prije nego što se krene u smjeru realizacije središnje digitalne valute (Central Bank of Iceland, 2018). Island stoga ostavlja prostor za savjetovanje i konzultiranje, no zasada ostaje u fazi istraživanja.

Danska je jedina zemlja iz promatrane skupine koja je zaustavila razvoj digitalne valute središnje banke. Danska je središnja banka raspravu o temi otvorila 2017. godine. U analizi objavljenoj u prosincu 2017. godine navodi kako je teško vidjeti

pilot project stage (CoinDesk, 2021). The Israeli central bank has been considering the issue of the digital shekel since 2017 and has been conducting various consultations with the interested public, In May 2021, the central bank issued a document titled *A Bank of Israel Digital Shekel – Potential Benefits, Draft Model, and Issues to Examine*. The report states that it is their intention to speed up the development of digital currency. The report also considers the possibility of issuing the currency and the role of financial institutions in the project. The European Central Bank has been contemplating the digital euro since 2020. In July 2021, it published a public report in which they claim that after the initial considerations, it is entering the development stage and testing the model for digital euro, which will last for a total of 24 months (ECB Press Release, 2021). In the initial report on digital euro, the European Central Bank stated that it had been exclusively considering the possibility in which the central banks act as issuers only, while corporate banks and financial institutions act as intermediaries, making clear its opting for the hybrid model (ECB, 2020).

Research directed at central bank digital currencies has also been announced by Iceland and the United Kingdom. The Bank of England, together with Her Majesty's Treasury, released a public report in the beginning of 2021 in which it announced the establishment of a task force that would deal with digital currencies. The task force objective is to research the possibilities of movement and launch of a digital currency that would become a lawful means of payment in the country (Bank of England, 2021). The central bank of Iceland assumed a rather reserved attitude relating to the issuing of a centralised digital currency. The bank thus states that there is not a necessity for the development and digitalisation of the national currency and expresses concern about the consequences that the issuing might cause for the monetary policy and stability of financial institutions. In conclusion, they summarise that there could be unpredictable consequences and that vast research and consultation is needed before moving in the direction of realising a centralised

korist koju bi društvo ostvarilo od digitalizirane središnje valute (Danmarks Nationalbank, 2017). Danska je razmatrala direktni model, u kojem sve ovlasti ima središnja banka, što su smatrali problematičnim, jer bi se time stvorila konkurencija poslovnim bankama i izazvala nestabilnost na tržištu. Središnja je banka centraliziranu digitalnu valutu vidjela kao prijetnju, s obzirom na to da bi se nudila samo preko središnje banke. Središnja banka je izrazila zabrinutost da bi klijenti poslovnih banaka mogli povlačiti svoje depozite i mijenjati ih za centraliziranu digitalnu valutu položenu na računu kod središnje banke, što bi ugrozilo likvidnost poslovnih banaka. Također, navodi se da je Danska obavezna provesti veliku reformu zakona te prilagodbu financijskog sustava i administracije da bi ostvarili mogućnosti koje već sad nudi klasično elektroničko plaćanje. Danska stoji iza svojeg sustava plaćanja i smatra da prednosti koje digitalna valuta središnje banke nudi nisu vrijedne rizika koje pred njih stavlja (Danmarks Nationalbank, 2017). U analizi nije razmatran nijedan drugi poslovni model osim onoga u kojem su izdavanje i upravljanje računima na kojima su položena sredstva digitalne valute središnje banke u domeni upravo središnje banke.

Kada govorimo o modelu koji su navedene banke zagovarale, vidimo da je većina banaka odlučno stala iza hibridnog modela. Od 13 promatranih središnjih banaka, 11 se banaka odlučilo za hibridni model, dok su se samo dvije opredijelile za direktni poslovni model. Izuzev činjenice da se mali broj središnjih banaka odlučuje za direktni poslovni model, navedeni je model ostao uglavnom na teorijskom razmatranju i analizi. Promatrane središnje banke koje su napredovale kroz projektne faze opredijelile su se isključivo za hibridni model te su tražile i suradnju s poslovnim bankama. Poslovne su banke nakon početnih razmatranja izrazile spremnost na suradnju i razvoj mogućih rješenja za potrebe implementacije projekta.

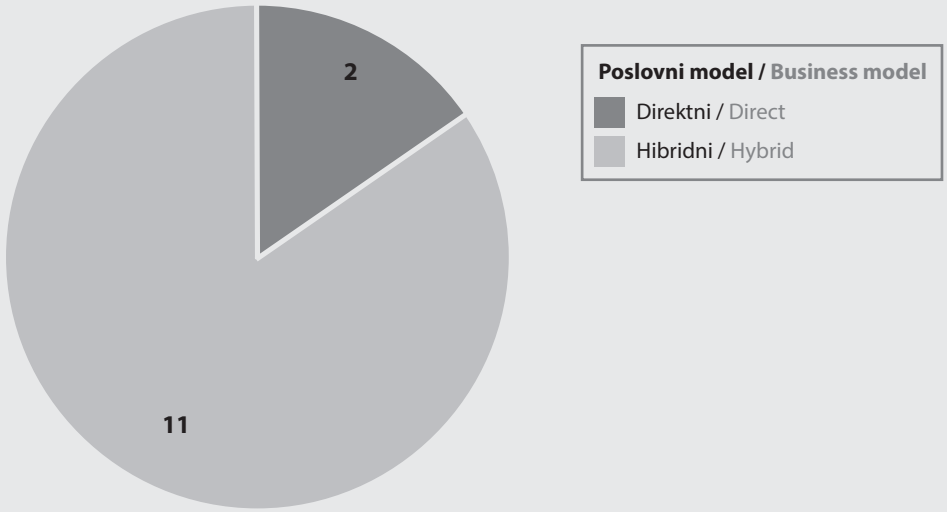
Kroz objavljena istraživanja i analize utjecaja koje bi izdavanje digitalne valute središnje banke

digital currency (Central Bank of Iceland, 2018). Therefore, Iceland has left a space for consultation, but remains at the stage of research.

Denmark is the only country in the observed group that discontinued the development of the central bank digital currency. The central bank of Denmark opened a discussion on the topic in 2017. In an analysis published in December 2017 it claims that it is difficult to see the social benefits of introducing a digitalised centralised currency (Danmarks Nationalbank, 2017). Denmark considered the direct model in which all authority is held by the central bank, which they considered problematic due to the emergence of competition to corporate banks and the cause of instability on the market. The central bank saw the centralised digital currency as a threat considering that it would be offered only via the central bank. It expressed concern that the corporate bank clients would withdraw their deposits and exchange them for the centralised digital currency deposited to the accounts at the central bank, which would put the corporate banks' liquidity at risk. Also, the report states that Denmark is obliged to implement a large-scale legal reform, and the adjustment of the financial system and administration in order to achieve the possibilities that have already been offered by the usual electronic payment system. Denmark upholds its payment system and considers that the advantages offered by the central bank digital currency are not worth the risks it imposes (Danmarks Nationalbank, 2017). The analysis did not consider any other business model besides the one in which the issuing and management of accounts with central bank digital currency deposits fall only into the central bank's domain.

When observing the model advocated by the mentioned banks, we can see that most banks decidedly backed the hybrid model. From 13 observed central banks, 11 banks opted for the hybrid model, while only 2 opted for the direct business model. Apart from the fact that a small number of banks has opted for the direct model, the model remains mostly at the stage of theoretical consideration and analysis. The observed central

GRAFIKON 5. POSLOVNI MODEL PROJEKTA DIGITALNE VALUTE SREDIŠNJE BANKE
CHART 5. BUSINESS MODEL FOR THE CENTRAL BANK DIGITAL CURRENCY PROJECT



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moglo imati na monetarnu politiku te financijsku stabilnost, jedanaest se promatranih banaka odlučilo za hibridni model, dok su samo dvije bile za direktni. Hibridni model podrazumijeva posrednike, točnije, da središnja banka ne preuzima ulogu poslovne banke niti nudi mogućnost za otvaranjem računa. Kod hibridnog modela, središnja banka brine o izdavanju i povlačenju digitalne valute, o sigurnosti infrastrukture i arhitekture tehničkog rješenja. Poslovne su banke posrednici koje nude otvaranje računa za digitalne valute, rade konverziju, provode transakcije, odgovaraju za provjere i sprječavanje pranja novca i financiranja terorizma. Dio je banaka u inicijalnim istraživanjima naveo da je hibridni model jedini ispravan, dok su neke kroz dodatne analize rizika došle do zaključka da bi isključivanje poslovnih banaka iz procesa moglo izazvati ozbiljne poremećaje u financijskoj stabilnosti. Ruska je središnja banka sredinom 2021. godine objavila suradnju sa Sberbankom,

banks that have advanced through the project stages, opted exclusively for the hybrid model and sought cooperation with corporate banks. After initial considerations, corporate banks have expressed willingness to cooperate and develop the possible solutions for the needs of project implementation.

The study of published research and analyses of the possible impact of central bank digital currencies on the monetary policy and financial stability leads to a conclusion that eleven of the observed banks selected the hybrid model, while only two selected the direct model. The hybrid model includes intermediaries, more accurately the central bank does not assume the role of a corporate bank, nor does it offer possibilities of opening an account. In the hybrid model, the central bank deals with the issuing and recalling the digital currency, is in charge of the infrastructure security and the technical solutions architecture. Corporate banks are intermediaries that offer opening of digital currency accounts, perform conversion, execute transactions,

VTB-om, Gazprombankom i Alfa bankom oko projekta digitalne rublje (Ledger Insights, 2021). Suradnju s poslovnim bankama pokrenula je i Švedska središnja banka, na čijem projektu radi Handelsbanken. Europska središnja banka je u inicijalnim istraživanjima i izvješćima koje je objavila navela kako nema namjeru preuzimati poslove poslovnih banaka te da će poslovne banke i dalje biti zadužene za provjere transakcija, verifikaciju računa i korisnika te sprječavanje pranja novca i financiranja terorizma. Direktni model, u kojem sve poslove preuzima središnja banka, razmatrali su Island i Danska. I dok je Danska središnja banka odustala od projekta jer ne vidi njegove prednosti, Island je ipak ostavio otvorenu raspravu oko razvoja digitalne valute, što ostavlja otvorenim i mogućnost promjene poslovnog modela. Direktan model bi troškove, ali i operativni dio posla, prebacio na središnju banku, što nije bilo očekivano (Auer i Böhme, 2021) niti središnje banke imaju namjeru zamijeniti poslovne banke u pružanju usluga (Carstens, 2019). Direktan je poslovni model još u teorijskim razmatranjima ocjenjivan kao problematičan, dok je kroz analizu projekata koje su vodile promatrane središnje banke vidljivo da direktan model nije zaživio dalje od inicijalnih istraživanja.

ZAKLJUČAK

Proučavanjem izvještaja koje podnose središnje banke, vidljivo je da su razlozi za implementacijom digitalne valute središnje banke uglavnom isti. Riječ je ili o praćenju trendova i držanju koraka s razvojem novih tehnologija ili o padu korištenja gotovog novca. Također, iz izvještaja je vidljivo da su gotovo svi projekti koji su u razvoju, implementaciji ili već u uporabi odabrali hibridni poslovni model. Iako je prerano da bi se kreirali zaključci i utjecaj na monetarnu ekonomiju ili financijsku stabilnost, možemo pouzdano reći da je ovaj model prikladniji te izaziva manje poremećaja u financijskom sustavu od direktnog modela. Kada uzmemo u obzir i faze u kojima se

and are accountable for monitoring and preventing money laundering and terrorism financing. In their initial research, a part of the banks stated that the hybrid model is the only appropriate model, while some did additional risk analyses that led them to a conclusion that the exclusion of corporate banks from the process would cause serious disturbances in financial stability. In the middle of 2021, the Russian central bank announced a cooperation with Sberbank, VTB, Gazprombank and Alfa bank in relation to the digital ruble project (Ledger Insights, 2021). Cooperation with corporate banks was also initiated by the Swedish central bank, with Handelsbanken working on its project. In its published initial research and reports, the European Central Bank stated that it does not intend to take over the business of corporate banks and that corporate banks will still be in charge of transaction monitoring, account and user verification, as well as prevention of money laundering and financing terrorism. The direct model, in which the central bank is in charge of all the business, was considered by Iceland and Denmark. Whereas the Danish central bank discontinued further project development due to not seeing its advantages, Iceland kept an open space for discussion on digital currency development, which in turn leaves the issue of the business model open for reconsideration. In the direct model, the expenses and the operational aspect of the business would fall under the central bank's domain, which hadn't been expected (Auer & Böhme, 2021). Also, the central banks do not have the intention to take over the provision of services usually pertaining to corporate banks (Carstens, 2019). The direct business model was assessed as problematic already in theoretical considerations, while the analysis of projects run by the observed central banks shows that the direct model was not considered past initial research.

CONCLUSION

By studying reports submitted by central banks, we can see that the reasons behind the implementation

projekti nalaze, možemo utvrditi da ovaj poslovni model ima određenu težinu. Osim što je većina analiziranih projekata odabrala upravo hibridni poslovni model te pokrenula suradnju s poslovnim bankama, projekti koji su implementirani upravo su hibridni. Digitalne valute koje su u opticaj pustile središnje banke Bahama i Istočnih Kariba koriste hibridni model. Direktni model koji su zagovarale dvije promatrane banke, Danska središnja banka i Središnja banka Islanda, nisu prošle inicijalne faze razmatranja. Obje banke su kod analize direktnog poslovnog modela navele da zahtijeva brojne adaptacije i promjene, kako u pravnom, tako i u financijskom sustavu, te postoje određeni rizici za stabilnost cijelog sustava. Izbacivanje poslovnih banaka iz procesa svakako bi izazvalo turbulencije na financijskom tržištu te stvorilo potencijal za odljev klijenata i njihovih depozita iz poslovnih banaka prema središnjim bankama. Teorijski gledano, hibridni je poslovni model optimalan za razvoj digitalnih valuta središnjih banaka, dok će se njegovi učinci u stvarnom okruženju moći detektirati tek u godinama koje dolaze. Poslovne banke su također prepoznale prednosti ovog modela te su se nakon početnog suzdržavanja aktivno uključile u suradnju i razvoj centraliziranih digitalnih valuta. Poslovne će banke svakako ostvariti korist, koja će se očitovati u tehnološkom razvoju i mogućnostima koje će banke nuditi. Opseg poslova koje su poslovne banke imale i prije zadržat će se i nakon implementacije centraliziranih digitalnih valuta. Poslovne banke će stoga morati raditi na razvoju tehnoloških rješenja u suradnji sa središnjom bankom kako bi bile u mogućnosti pružati usluge obavljanja transakcija i korištenja digitalnih novčanika u kojima bi bile pohranjene digitalne valute središnjih banaka. Također, nudit će se razne mogućnosti i oblici plaćanja, bilo preko mobilnih uređaja i digitalnih novčanika, koji bi bili u obliku mobilne aplikacije, ili putem kartica. Brojne tvrtke u tehnološkom sektoru nude razne oblike digitalnih novčanika ili aplikacija na kojima mogu biti pohranjene decentralizirane digitalne valute. Razvoj hibridnog modela omogućit će i

of central bank digital currencies are mostly the same. They pertain either to following trends and keeping up with the development of new technologies or to the decrease in cash usage. Furthermore, the reports show that almost all projects in development, implementation or already in usage have selected the hybrid business model. Although it is too early to draw conclusions and determine the impact on the monetary economics or financial stability, we can reliably say that this model is the most appropriate one and causes less disturbances in the financial system than does the direct model. When we consider the stages at which the projects are, we can determine that this business model bears a specific weight. Besides most of the analysed projects selecting the hybrid business model and initiating cooperation with corporate banks, the implemented projects are all hybrid. The digital currencies released into circulation by the central banks of the Bahamas and Eastern Caribbean use the hybrid model. The direct model advocated for by two of the observed banks, the Danish central bank and the Central Bank of Iceland, have not gone past the initial stage of research. While analysing the direct business model, both of these banks claimed that it demands numerous adaptations and changes both in legal and in financial system, and that there are specific risks for the stability of the entire system. Exclusion of corporate banks from the process would certainly cause turbulence in the financial markets and create the potential for the outflow of clients and their deposits from corporate banks toward central banks. Theoretically viewed, the hybrid business model is optimal for the central bank digital currency development, while its effects in the real environment will only be detected in years to come. Corporate banks have also recognised the advantages of this model and after the initial restraint, they actively engaged in cooperation and development of centralised digital currency. Corporate banks will certainly gain benefits reflected in technological development and possibilities that the banks will offer. The scope of business that has been held by

daljnji razvoj, kako financijskog tako i tehnološkog sektora, koji će moći ponuditi svoja rješenja za potrebe pohranjivanja, čuvanja i obavljanja transakcija s centraliziranim digitalnim valutama. Uzevši u obzir da su pilot-projekti digitalnih valuta promatranih središnjih banaka u odmakloj fazi testiranja te da su ostvarena partnerstva i suradnje s poslovnim bankama, izgledno je da će hibridni model ostati dominantan poslovni model za realizaciju navedenih projekata.

corporate banks, will remain under their authority after the implementation of centralised digital currencies. Therefore, they will have to put effort into developing technical solutions in cooperation with central banks in order to be able to provide services of executing transactions and using digital wallets in which central bank digital currencies would be stored. Also, various possibilities and methods of payment will be offered, whether through mobile devices or digital wallets in the form of mobile wallets or via bank cards. Numerous companies in the technology sector offer various forms of digital wallets and applications in which decentralised digital currencies can be kept. The development of the hybrid model will also enable further development of both the financial and the technology sector that will be able to offer its solutions for the needs of keeping, safeguarding, and executing transactions for the centralised digital currency. Considering that the pilot projects for digital currencies of the observed central banks are in the advanced stages of testing and that partnerships and cooperation with corporate banks have been achieved, it is likely that the hybrid model will remain the dominant business model for the realisation of the mentioned projects.

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