BI INSTITUTE

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International Flagship Seminar on Payment Systems in the Digital Era: Accelerating Innovation and Technological Development

Yogyakarta, Indonesia
26th October 2022

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International Flagship Seminar on Payment Systems in the Digital Era: Accelerating Innovation and Technological Development

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FOREWORD

Payment system has experienced significant change over the past decade with innovation, technological development and the emerging perspective of digital payments. These developments have raised demand for fast, efficient, secure, and transparency of cross-border payments. In term of responding this global issue, Central Bank is exploring and examines Central Bank Digital Currency (CBDC) which was expected to broaden the opportunities for efficient cross-border payment. On the other hand, the CBDC's design and infrastructure must be broadened by considering the CBDC's options for access and interlinking, including interoperability with non-CBDC payment infrastructure and arrangements.

According to the issue, this flagship program which is collaboration between Bank Indonesia and De Nederlandsche Bank is aimed to give an understanding about the development and innovation of payment system in digital era including ASEAN and Europe area. It is also giving an update about The Development and Implementation of Central Bank Digital Currency (CBDC) and its possibility on Cross-border Payment. Furthermore, this flagship program provides a platform for sharing knowledge and discussion for all participants and prominent speakers. Moreover, it is expected to give valuable takeaways and benefits in contributing to the national and global economy.

Jakarta, November 2023

Yoga Affandi
Head of Bank Indonesia Institute

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Dr. O.C.H.M. Sleijpen
Director, Executive Board, De Nederlandsche Bank

Ladies and gentlemen, Mr. Doni Joewono and other valued colleagues from Bank Indonesia, dear participants and attendees, Selamat datang di konferensi ini (Welcome to this conference). I have the honor to welcome you to this flagship virtual conference by Bank Indonesia and De Nederlandsche Bank, the Dutch Central Bank, on the payment system in the digital era. My name is Olaf Slejpen, and as Deputy Governor of the Dutch Central Bank, I am responsible, among others, for payments and market infrastructure. And it is within this fascinating field of work that Bank Indonesia and the Dutch Central Bank continue to have a long-lasting relationship of mutual interest and fruitful cooperation. Our cooperation has been very productive for us as well. Many staff members from both sides participated in the conferences we have organized together. We have learned from each other and exchanged views on emerging issues that capture the fast world of payments, which brings me to the topic of today's conference. As the payments ecosystem becomes more and more digital, central banks must take a critical look at their role in ensuring the smooth operation of payment systems. They might even have to reinvent themselves entirely. Central bank digital currencies, or CBDC, are one way in which central banks are trying to keep up with the digital revolution. We, as the Dutch Central Bank, have a positive stance toward our CBDC for several reasons. First, it can serve as a backup for non-cash payments as well as promote diversity in payment markets, and it could possibly make cross-border payments more efficient. Moreover, CBDC can help foster trust in the monetary system, but the introduction of CBDC is far from a certainty and cannot be the only game in town. The digitalization of the payment system has also led to the intention of the central banks to upgrade the current systems in place, something that the global payments community is indeed working on.

Let me wrap up by saying that there is much more happening in payments than we can cover in two days of virtual conferencing. Furthermore, in view of the broad range of topics and the rapid developments therein, it is vital that central banks and others work closely together, and this conference is one of those opportunities to learn from each other and to share valuable knowledge and experience. With that in mind, I wish you all a very fruitful conference. Thank you.

KEYNOTE SPEECH

Payment Systems in The Digital Era
October 26th, 2022

Doni P. Joewono
Deputy Governor, Bank Indonesia

Honorable Professor, Olaf Slejpen, Executive Board of De Nederlandsche Bank, all honorable speakers, distinguished representatives of participating countries from the central bank, ministries, academicians, respectable guests, and participants, ladies and gentlemen.

Assalamualaikum warahmatullahi wabarakatu, Shalom, Om Swastiastu, Namo Budaya, may peace be upon us, and a very good afternoon.

First of all, let us extend our appreciation and gratitude to our Allah, God Almighty, since it is only with his blessing that we can all participate in the International Flagship Seminar on Payment Systems in the Digital Era as part of the Indonesia's G20 Presidency 2022 side event hosted by the Bank Indonesia Institute. This is a hybrid event in which some will attend in person in Yogyakarta, while others will attend from all over Indonesia and the world. On behalf of Bank Indonesia, I also like to express my sincere gratitude to all our distinguished speakers for agreeing to share with us their expertise and experience regarding the payment system in the digital area, especially in this fast development of digital technology.

The massive movement of the digital economy has driven changes in digital financial innovation, especially in payment systems. It has led to the creation of economic options for new business models, new players, transformation of consumer behavior and cross-border payments. Digital payments are also one of the most important aspects driving economic recovery. This aligns with the Indonesia's 2022 Presidency: Recover Together, Recover Stronger. To address this digital challenge, regulators must be proactive in encouraging the development of technology that is

capable of increasing productivity, efficiency and inclusiveness. A regulator, on the other hand, must be aware of the balanced approach between fostering innovation and mitigating embedded ways that must be done carefully and optimally.

As regulator of the Indonesian payment system, Bank Indonesia articulates a balanced approach in the Indonesia Payment Systems Blueprint 2025. The blueprint contains five payment system visions. The first reinforces the integration of the national digital economy and finance in assuring the proper functioning of the central bank mandate. Second, foster digital transformation within the banking industry to sustain the banks' role as the main financial institution in the digital era. Third, facilitate interlinks between FinTech and banks through application programming interface (API) standardization to avoid shadow banking risks. Fourth, ensuring the balance between innovation and financial stability, including mitigating cyber risk. Fifth, guaranteeing national interest in cross-border use of the digital economy and finance. Furthermore, the implementation stage of the five visions of the Indonesia Payment System Blueprint 2025 is cascaded into several initiatives that focus on developing open banking, strengthening the configuration of retail payment systems, strengthening financial market infrastructures (FMIs), developing public infrastructure for data, as well as strengthening regulatory, licensing and supervisory functions.

We are fortunate to inform you that in 2021, we established an important milestone with the IPS Blueprint 2025. We did a regulatory reform by making improvements in payment system regulation. Furthermore, BI developed BI-FAST, a real-time payment service infrastructure, in addition to creating a national payment system standard called the National Open API Payment Standard, or SNAP. We also developed additional features of the Quick Response Code Indonesian Standard (QRIS), and since its launch on 17th August 2019, QRIS has spread to 34 provinces and 514 cities throughout Indonesia.

As of the end of August 2022, there were nearly 2 million QRIS merchants, with 90% of them micro enterprises and small business actors. The QRIS ecosystem is growing, and it is clear that the payment system is evolving as technology advances. Interoperability between countries is essential in this digital age and is a major concern. Meanwhile, this development has increased demand for a safe and efficient cross-border payment linkages, which Bank Indonesia has established with the Bank of Thailand, Bank Negara Malaysia and the Monetary Authority of Singapore. Through this collaboration, tourists from these countries can now make payments abroad

simply by scanning their QR codes with the mobile payment application at merchants throughout Indonesia and Thailand, with Malaysia and Singapore following suit in the future.

In 2018, BI established the Local Currency Settlement Initiative, which aims to diversify the settlement of bilateral transactions between Indonesia and partner countries using local currency. Under the Local Currency Settlement (LCS) scheme, the use of local currency is widely encouraged in line with the increasing volume of investment between ASEAN countries, including Indonesia. Currently, Bank Indonesia and central banks around the world are at the research stage to develop central bank digital currency, or CBDC, in response to the growth of digital currencies and to broaden the opportunities for efficient cross-border payment.

Bank Indonesia and De Nederlandsche Bank have a long-standing relationship that we believe will continue in the future. Every year, we hold a workshop and a flagship program through the Bank Indonesia Institute to share knowledge about current issues, especially the payment system. Today, we see the collaboration of the BI Institute and De Nederlandsche Bank in delivering an international flagship program that examines the payment system in the digital era with prominent speakers, which has been carefully arranged to broaden our point of view on several issues, especially the payment system in this digital era. Hopefully, this flagship seminar will improve our knowledge of issues in several aspects of the payment system in the digital era and provide comprehensive understanding of CBDC and cross-border payments, which must be a major concern in this digital era.

On behalf of Bank Indonesia, I would like to thank all speakers, moderators, participants, and the committee from Bank Indonesia and De Nederlandsche Bank who organized this seminar. Last but not least, let me extend a warm welcome to Yogyakarta and wish you a fruitful enjoyment of the city, this hotel, and culinary as well.

Assalamualaikum, warahmatullahi wabarakatu.

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- SESSION 1 -
CBDC AND INTERLINK WITH CROSS-BORDER PAYMENTS: EUROPE AREA

Inge van Dijk
Director of Payments and Marketing Infrastructure
De Nederlandsche Bank (DNB)

MC:

Thank you everyone. Now we shall begin our main agenda, presentation, and discussion with our speakers. We have now with us here, Ms. Erina to moderate this session. Erina is a graduate business student and pageant enthusiast, which led her to compete in Puteri Indonesia 2022 and finish in the top eleven as the most socially spirited scholar. In addition to 15 global awards, she is pursuing an MPA at Columbia University and has seven years of experience advocating for educational inclusion for marginalized communities. Erina is currently in charge of foreign exchange transactions as an Asia analyst in the currency operations and emerging markets division of JP Morgan Chase Bank.

Moderator: Erina Sofia Gudono, Puteri Indonesia, DIY 2022

Introduction :

Assalamualaikum, warahmatullahi wabarakatuh.

I am Erina Sofia Gudono, the moderator of today's seminar. I am honored to be here and welcome you all to this international seminar hosted by the Bank Indonesia Institute. The topic of today's seminar is the payment system in the digital era. Today's sessions will feature two distinguished speakers. Mrs. Inge Van Dijk is our first online guest today. She is the director of payments and marketing infrastructure at De Nederlandsche Bank (DNB).

In the next session, Dr. Ousmène Jacques Mandeng, is a senior advisor and leader of economics and financial strategy for Accenture's Blockchain and Multiparty Systems. He co-leads Accenture's global campaign for the dissemination of central bank digital currencies and provides thought leadership on the wider implications of the digital transformation in payments. Let me explain the format of the session before we begin. First, the first speaker will be invited to present the material, followed by a Q&A session with two questions from offline and two questions from online. Then, we will proceed to the next speaker session. Today's very interesting topic, central bank digital currencies, or CBDCs, is gaining more attention than ever before. However, the motivations for issuance vary by country. Many economic and institutional drivers of CBDC development are required in terms of policy approaches and technical designs because it takes stock of design efforts. As a result, we have our speakers today to discuss CBDC and its interrelationship with the cross-border payment system. I believe you are all eager to hear the information from our sessions. Allow me to read the CV of our first speaker, Mrs. Inge Van Dijk, before moving on to the main part. She oversees payments and collateral services, as well as retail and wholesale policy and research. Her responsibilities include thew oversight of critical payment and securities infrastructure as well as the cybercrime TIBER team. She is the MOB's vice chair (local ERBP). She is a member of the Eurosystem Market Infrastructure Board and the European Central Bank's High-Level Task Force on Digital Euro (ECB). She is a member of the Financial Stability Board's (FSB) Working Group on Regulatory Issues on Stablecoin. She leads the Dutch Instant Payments (IP) program, which was successfully launched to the market in mid-2019. Prior to that, she spent nearly a decade with the International Netherlands Group (ING), where she held various management positions in the card and retail payments sectors. Allow me to welcome the speaker, Mrs. Inge Van Dijk.

Speaker: Inge Van Dijk, De Nederlandsche Bank (DNB)

Thank you for that lovely introduction. It is an honor to be here with Mr. Ousmène, other valued colleagues from Bank Indonesia, and all the countries present, including participants and their attendees. Today, I have the honor of presenting something from the European perspective on central bank digital currencies (CBDCs) and cross-border payments, along with some slides to show everyone what is coming up in the next 45 minutes. In any case, it is a little different virtually, and I wish I could be there with you in the lovely city of Yogyakarta.

First, we will talk about CBDC and the main objectives of the digital euro, as well as how these reflect on Europe and the Netherlands, in the hope that this will benefit everyone's perspective. We will also discuss cross-border payments, the ongoing G20 initiative, and how it is seen from the perspective of De Nederlandsche Bank (DNB). We will end the presentation, and I am looking forward to your questions.

CBDC Developments Across the Globe

From our perspective, CBDC development is roaring across the globe, and there are many initiatives pertaining to wholesale and even more relating to retail. Most are aware of the 3rd Bank for International Settlements (BIS) survey on CBDC last year, where it concluded that 65 central banks were looking into CBDC. While more banks are entering the advanced stages of engagement, a broader agreement is still pending. Here are the numbers from the Atlantic Council's CBDC Tracker, which also keeps track of CBDC initiatives. To date, they have identified 105 countries that represent 95% of global GDP all exploring CBDC. In addition, there are 11 countries that have stopped looking into this and two that have cancelled it. There are also some who have made other remarks. In total, all these countries are thinking about it or designing it. Launching is quite another thing. Notably, the G7, UK, and US are further behind than any of these 105 countries. Also, the House of Lords in the UK concluded late in 2021 that there is no need for retail CBDC. In this case, where does Europe stand?

What is the Eurosystem doing? A Digital Euro

First, I will talk about what the Eurosystem is doing. Obviously, the central bank digital currency, issued by the central bank, fills a gap in between all the instruments currently available. This is a nice graph that shows where it is positioned: from private money in bank accounts shown at the bottom, to cash on the left, and reserves on the right. Central bank digital currency is placed neatly in between. It is important to note that the CBDC project of the Eurosystem is the digital euro, which will be discussed a little later. Thus, when there is mention of a digital euro, it is referring to the retail CBDC program of the Eurosystem.

The Digital Euro's Objectives and Use Cases

There has been a considerable amount of time spent by the High-Level Task Force shifting focus from the Eurosystem's 2020 report to the main objectives that the digital euro must fulfill. Highlighted in the slide are some principles in addition to these objectives, but the Eurosystem concluded with the High-Level Task Force that these are the two main objectives that a retail CBDC, the digital euro, should fulfill. One is serving as a monetary anchor, preserving and ensuring wide public access to central bank money in all euro area countries, and, of course, considering euro usage within Europe by non-euro area countries. Of course, this complicates things and brings up the first level of cross-currency. Aside from that, it should be reachable to all. This goes without saying. The second objective, which is instrumental, is that the digital euro should defend the euro area's strategic autonomy by increasing independence from non-European payment solutions, as well as the potential rise of foreign private digital monies in the euro area or foreign CBDC. The Eurosystem is blessed with a very digital market with a lot of competition, but we have also seen that investments are staggering to keep up with innovation developments, and as such, Europe needs to bundle its strengths together to ensure that our vital instruments are built and serviced by European payment providers. This is something that Indonesia and other East Asian countries can respect, as can every central bank.

Policy Dilemmas

There are a few dilemmas that the Eurosystem is currently undertaking and discussing. This is to give everyone a flavor of the ongoing debate that is not available on the Eurosystem website. First, the policy dilemma that is keeping the Eurosystem on its toes. Highly digitalized payment infrastructure is already in place in the Eurosystem. When looking at the Dutch part, we have 13% cash left and the rest is totally digital. There are some countries in Europe that are like-minded, and there are also other countries that are still strongly dependent on cash, notably the Netherlands' neighbor Germany with 40%, but all of the countries are moving towards less cash. As a result, the Eurosystem has a large install base of merchants and terminals installed, and no one wants to make large investments, especially now. The Eurosystem, therefore, needs to leverage what it has in place. The second element is that the Eurosystem should not produce undue dependence or give undue preference to certain providers, thereby ensuring a level playing field and also having oversight on these parties that

are active in the Eurosystem. The third element, which is not an easy one, is to offer a distinct value proposition, something that encourages consumers to pay with digital euros because they already have so many options, either in their phone or in their wallet, that they should add something. Where can the added value to be found? Last but not least, the existing private market payment infrastructure is good, trust is high, and the services are excellent. The Eurosystem is happy with our private market providers, and we should not crowd them out. We should make sure that it is something that comes alongside, something that comes as an addition to cash and to the digital private solutions that they currently have. These are some of the policy dilemmas that the Eurosystem is trying to tackle when developing the digital euro.

The digital euro objectives and use cases should complement, not substitute, cash and wholesale central bank deposits, while also complementing private solutions, not crowding them out. The Eurosystem believes that the intermediaries, whether they are banks or payment institutions, all of them being supervised, will play an important and key role in the distribution of the digital euro, especially pertaining to services and KYC (Know Your Customer), which will be discussed later. The digital euro should also be a source of innovation and a public good, not crowding out banks and payment institutions, while enhancing innovation and promoting efficiency in payments. These are some of the things the Eurosystem wants to keep in mind.

Why is this relevant?

The digital euro should help achieve the objectives of the core central bank functions. Here is a small illustration from the Netherlands showing how we have seen a steep rise of digital payments in point-of-sale retail, as well as the decline and use of cash. The Netherlands is currently at 13% of cash payments in terms of volume or the total of cash. The graph illustrates what it does at the point of sale. The Netherlands is roughly at 19–20%. It keeps shifting around, but in the last year, from 2019 to now, it has dropped from 30% to 20%, and this trend is not reversible. As a result, the Netherlands sees cash, the public instrument that is available today as a means of payment, is declining, and we believe in providing a public monetary anchor that also allows for the interchange between private and public money, to build and strengthen the payment system as a whole. This is the very foundation of our payment system.

Digital Euro Use Cases and Possibilities

The focus of the investigation phase that the Eurosystem is currently undertaking is first and foremost on physical store payments, e-commerce payments, and person-to-person (P2P) payments. Of course, as public institutions, we must set an example, which means we believe people should be able to pay the government with a digital euro as well. For example, paying for a passport or driver's license at a community office in a person's hometown. These are the cases that the Eurosystem is currently looking at. There is difficulty in this because at the physical store we are also looking at near-field communication (NFC) and mobile phones. This complicates things because there is a dependence on those techniques and smartphones. As a result, we are still looking into it, but as the BI Deputy Governor noted, QR codes are also very dominant in Europe, and they are an instrument that will be available to allow for e-commerce payments and possibly also physical store payments by means of the digital euro. These are some of the first cases that the Eurosystem is looking at, and in this case, we are certainly limiting ourselves to these use cases, believing that this is where the added value is and that wholesale CBDC already has a strong foothold and is already realized to a large extent. This is the first part the Eurosystem is looking at and all other elements are being considered and taken into account when designing the system, but they will not be available in the first release. This would also be unfeasible, and we are therefore taking a stepped approach.

Policy Dilemma: Privacy Option

The shows another policy dilemma that is currently being explored, looking at various options ranging from left to right or full anonymity, as we have today with cash, which is also a key benefit and strongly desired. But the Eurosystem also understands the downside of this in terms of money laundering. There is also a discussion about whether data should be transparent to the third party or intermediary, such as a bank or a payment institution, which provides the digital euro to the end user or customer. The Eurosystem is now discussing selective privacy, which entails looking at it from a different angle and possibly allowing transactions up to a certain amount; whether this is €50, €100, or €200, that remains to be seen, but one would expect the smaller payments, which are of course digital, to remain anonymous and be held against the Eurosystem's transaction money laundering system or fraud detection systems. Again, this is something we are playing with, and there have also been discussions about whether all the data from the end user should be fully transparent

to the central bank. The Eurosystem stated that full anonymity for a digital euro will not be pursued. This is something that governments dislike and is therefore one that the Eurosystem will be discarding. We are also not considering that citizens' data details should be fully transparent to the central bank, even though one could argue that the central bank is a very safe house for data. This is something that the Eurosystem does not desire. As a result, the Eurosystem will only store the minimum information necessary to settle the claim against the central bank. Meanwhile, we are looking into what data we can or should make transparent to third parties, as well as selective privacy. This is a very interesting topic since it covers some features of cash, while also making sure that the Eurosystem adheres to its laws with regard to transactions, money laundering and KYC. This is an option we are deep diving into and expect to see more of. We have already argued that the intermediary (if doing the KYC) needs to have access to the data in order to be able to perform the processing functions. These are some of our thoughts in the privacy option, with the key discussion being on how to balance privacy versus monitoring of users and certain transactions in the context of anti-money laundering (AML).

Distribution and Role of the Eurosystem

The distribution and role of the Eurosystem are the last things to talk about and highlight. How far can we go? Here, the Eurosystem attempted to identify five bars that represent a stepped approach to how far we want to go with our role in the digital euro. The starting position is that, as central banks, we would like a thin role. The market is best equipped to meet the continuous needs and demands of the market. This is not our role, but in the digital euro, this is a public instrument that we will issue. As a result, we must maintain a certain level of influence, and the question at hand is how far that influence must extend. The yellow bars show the level of influence the Eurosystem intends to leave to the market, while the blue bars show how much influence we, as the Eurosystem, might consider exercising. Through discussion, we are now considering moving to the scheme level, which is the second bar on the right-hand side. It is not a commercial scheme, but it is close. It is more than a functional scheme as it contains elements of a commercial scheme. It is in this area that we are currently moving because we want to first control the issuance of money. It goes without saying that the ledger will be kept by the central bank and that all claims must be recorded there. Preferably, by reusing our retail payment baggage in this part by ensuring we have retail bookings of individual claims

from people into the central bank's ledger. The Eurosystem can then monitor how much digital euro is in scope. However, we also want clear rules about what the digital euro entails, how people can use it, to whom, what the rules of settlement are, how it works functionally, what the basic features that it should always offer, and who has access to it, to ensure public access by all. It also means that we must consider how it is branded, as it must be visible that we are using a digital euro in a smartphone, for example. Furthermore, it is clear that we will not apply end-user management, such as KYC and inquiries, nor will we provide value-added services. This is left to the market, and as such, anyone can understand why intermediaries will be the key source of distribution. This is where the Eurosystem stands in some of the discussions over the digital euro at the moment.

Digital Euro Project Timeline

The digital euro project timeline gives a sense of where the Eurosystem is with retail CBDC in Europe. In 2020, we conducted preliminary investigations. The results of these important experiments, which can be found on our website or with some providers, led the Governing Council to decide on July 21 to launch an investigation phase. As a result, the Eurosystem is in the design phase and is considering whether to launch a digital euro. The whole phasing of this investigation phase is geared to allow the Governing Council a decision to possibly launch realization, which effectively means that in September 2023, the Eurosystem wants to have a decision where the Governing Council says they have taken everything from your design and investigation into scope and understand the implications. Then the Eurosystem will either go and deliver and build a digital euro, or we are a no-go. When that time has passed, the digital euro will still need a few years because, as one can imagine, building and developing such a system, alongside all the intermediaries and having 6,000 banks in Europe, is quite an undertaking. Therefore, this will take another few years and will not happen before 2026 or 2027. It is difficult to say at this stage. This is something that will come out of the investigation at the end. The Eurosystem is currently at Q3/2022, which means we are discussing distribution models. The Eurosystem has discussed settlement models in terms of how the ledger works and where we see the activity of intermediaries. We have also made the first analysis on the amounts in circulation, on the integration and form factor, which means the form factor is the channel, namely how it is offered to the customer, as well as identifying some prototype suppliers that will bring relevant learning experiences

into the design of the digital euro. Hopefully, this presentation has given everyone insight into the perspective of the Eurosystem on the development of retail CBDC. Many of these slides are available on the Eurosystem website, however, anybody interested may also ask any of my colleaguesin the room.

Cross-Border Payments

The second topic to touch upon, which is also in the title of this presentation, is cross-border payments. There are four elements to consider on the road to improving cross-border payments that are near and dear to the hearts of those present today, as well as to Bank Indonesia. This is an important topic with a key roadmap underneath it. I will discuss how we see the current systems playing into this, as well as how we see instant payments, or faster payments as some call them, playing into CBDC and also the crypto elements as well. What is the golden ticket that will help to improve cross-border payments? We will start with the cross-border roadmap and the G20 global targets.

G20 Global Targets for Cross-Border Payments

The G20 global targets are extremely challenging. These are truly important goals that we are trying to achieve, which many have already seen, but I will highlight them to ensure that we all understand how this works. Having been in payments for nearly 30 years, there were days when we made payments, and we would be relieved if those payments were there with the citizens the next day or a few days later. Today, we make payments easily and quickly, but only domestically, we do not do that cross-border. We are trying to do that in Europe, where we are connecting the dots. We have lots of initiatives around the globe, but effectively having a global payment system that ensures that 75% of all transactions are completed within the first hour of any business day at the beneficiary party is truly a very important initiative. Pertaining to costs, the average today, as the World Bank numbers highlight, is 6% in terms of cost when relating it to USD200, and making sure we have a global average of 3% means cutting it in half. We are also aiming for business payments to go back to 1%. This is truly something to undertake. This is a program that aims at wholesale as well as retail payments, but it is especially relevant for remittances. The World Bank sees remittances only growing, especially the last year due to the war in Ukraine, but it is expected to increase by another 4.2% to reach USD630 billion

in 2020. This follows the increase of 8.6% in 2021. Notably, we saw remittances in East Asia fall by 3.3%, making the top recipient countries India and Mexico, which are now second and third, respectively, while overcoming China, the Philippines, and Egypt.

What is the best option to realize all these important goals because they are important and our commitment to them is strong? We just had a key summit with Klaas Knot, President of De Nederlandsche Bank (DNB), who is currently the Financial Stability Board (FSB) Chair. He is making sure that we bring together the total of the community in the global world to ensure that they are committed to these important 2027, and partly 2030, targets. These are real challenges. What options do we have on the table?

Road to Improve Cross-Border Payments

In the current system, we are talking about correspondent banking, we have highlighted what is available and can see that SWIFT and many other parties are implementing ISO 20022. We have also seen that the G20 targets for the current systems are now centered around three themes. And these were fully embraced by the Summit, which took place last Monday, with all of the key stakeholders from around the world gathering to discuss the G20 goals and how to realize them. Furthermore, the key themes we will be centering around with the Financial Stability Board (FSB) in the cross-border domain are payment system interoperability and extension, data exchange and message standards, and of course, last but certainly not least, the regulatory and supervisory framework.

G20 Priority Themes

These are the key elements we will be touching on in terms of the building blocks, as well as some guidance in terms of which building blocks we will be looking at. When we look at the system of interoperability and extension, we see direct access to the payment system, which was very much underlined last Monday. The extension of operating hours is a difficult one in terms of market operating hours. This is also a key element when pursuing interlinking of payments systems, namely Building Block 30, the interconnection of payment systems for cross-border payments. We have already identified the important ISO 20022, as well as harmonized APA protocols, and reviewed the interaction between the data frameworks on cross-border AML,

which pertains to Building Block 6 (BB6). The FATF rules are key and instrumental in this aspect. There is the regulatory component, which is the supervisory component, and how we align the supervisory oversight framework, which is Building Block 4. Furthermore, CFT AML is in Building Block 5. These are the themes we will be focusing on, ensuring that we act on them and move from designing and identifying goals to actual implementation, as this is required if we are to be there by the end of 2027. That is what is happening in current systems, but are there any other systems we should think about?

Instant Payments

We have listed some of the initiatives, but not all of them, and we apologize for starting with Europe. This is not because Europe is the most important, but because it is the closest to DNB's heart. Just to list a few initiatives, we have already implemented instant payments in a number of European countries, or at least those willing to comply. As we learned in the session introduction, I was in charge of implementing instant payments in the Netherlands in 2019 before joining the Dutch Central Bank, and they now account for 10% of all retail payments, which is a staggering amount to achieve in only two years. It refers to 1 billion payments that are now instant and reach their beneficiaries in seconds. Meanwhile, other countries are doing the same thing. Spain is on the same level, Belgium is close behind, and the UK, a non-euro country, is already there. Sweden is highly on instant, but we will see that Europe is changing because we have TIPS in play as well. As with all the area countries connected, we will see from the European Commission regulation coming into force, which is expected any day now, that TIPS and instant payments will become available, with TIPS serving as the connecting point for all of Europe's countries and citizens. This is, of course, an important initiative, but it is focused on Europe and will not result in global cross-border cooperation.

BUNA has a very important initiative with 22 countries in the MEA region, which is also worth keeping an eye on. The Asian real-time corridor is critical, with two countries already in place (Singapore and Thailand) and three more in the pipeline for 2023 (Malaysia, Indonesia, and the Philippines). This is an important region. The Singapore-India pilot is currently underway. Furthermore, the Fed is launching instant payments with all the Federal Reserves in place, and they see this as a key innovation for the upcoming months. We should also not forget the Nexus Project in terms of innovation. This innovation hub has joint forces from Singapore and the

euro area through Banca d'Italia and Malaysia. All these networks and communities with important reach could be interlinked, especially because we are almost all using the same format. Some of us may use all the ISO formats, but others use ISO 20022. Therefore, connecting these instant payments and interlinking these instant payments communities is definitely an alternative to enhancing the correspondent banking network as it currently stands, and it will be very interesting to see how this develops and where this can take everyone in terms of 2027. Given the G20's timelines, the mass created here is truly something worthwhile.

CBDC

Taking into account all the projects we have talked about, it is unlikely that CBDC will lead to concrete results by 2027. We are still a long way from this, and not just in terms of implementation. To build and provide something for the retail payment system, one must have reach. As a result, we give advice at the FSB, and the G20 has deprioritized this building block. This does not mean that we will not continue to work in this area, but it does mean that CBDC is not a likely candidate for ensuring that we meet the cross-border 2027 goals. CBDC is something for the longer term, and we still have a lot of work to do there.

Cryptos

The last element to consider for cross-border payments before coming to a final conclusion is that the road to improving cross-border payments could also be through cryptos. In theory, they could improve the way we pay, and they are being used today for cross-border payments. This much we know, but we do not know anything about who is using cryptos or which parties are servicing these cryptos. As a result, we have some serious shortcomings to consider that need to be overcome first. Furthermore, a global regulatory framework for well-managed stablecoins is missing. Also, in regards to cryptocurrency, even though we have currently installed MiCar in Europe, this is just the first stepping stone into building oversight on this important new innovative product because we do see the merits of blockchain technology. That is absolutely not the discussion. We are considering bringing blockchain into play in terms of also connecting it, for example, to wholesale CBDC. This is certainly something that we are investigating. But with cryptos as they stand today and the crypto winter that we have seen all together over the last year, we know there is

a lot of work to be done in this area. Today, they are predominantly a speculative investment product. Stablecoins, on the other hand, could have the potential to function as a means of stable, but only if the risks are truly mitigated. They claim to be stable, but we have dug into this with the FSB and found that they are less stable than they claim to be. In addition, there is a lot of work to be done in terms of making it transparent how redemption actually works and how the governance of these structures functions. With that being said, while the instrument is being used today for cross-border purposes, this is not meant to ensure that we can actually develop the G20 road map. It is available today, but we also see a lot of misuse. For example, in Europe, we see a lot of students who thought they were very digital and could risk a few things and have lost their entire student allowance, which are heartbreaking situations, not to mention older people or regular citizens on the street and how they understand crypto and crypto investment products and consider all the implications of what they are actually paying with. As a result, this is something that we should steer away from. We should make sure that these products are given the opportunity to mature, but we should also make sure that we safeguard the risks as we go along. Unfortunately, cryptos, including stablecoins, are not a possibility to realize in the G20 road map at this time, and we should be looking at the first ones.

Conclusions

Overall, we can say that central banks around the world are trying out both retail and wholesale CBDC for different reasons. Also, advanced economies and emerging economies have different perspectives on this. I hope we have been able to share the Eurosystem's perspective and where we are with the investigation of the digital euro so that we can make a decision about realization in Q3/2023. This means we have just one year, and we have a lot of work still to do. Regarding cross-border payments, the ambitious work plan from the G20 is something that we should all work on together to make sure that we improve the speed, costs, access and transparency of cross-border payments by 2027—this is key. Public-private cooperation is mandatory in this aspect, and there will be no silver bullet. There is no single solution, and we should aim for all. We have our issues, and the current correspondent banking system needs to step up. We definitely need to look into the interlinking of faster instant payment systems with all of these communities coming together, which is not an easy one because it will touch on operating hours, cross-currencies and all of these aspects. We should definitely also keep in mind what is happening with CBDC and

cryptos, but as I said, this is further along the way. This is much more for the long term than for the midterm that we are looking for in terms of the G20 goals. That concludes the presentation and introduction to this most interesting topic.

Question and Answer Session

Offline Question:

Firstly, I would like to thank you for such a fascinating introduction to the topic. I was wondering, in addition to some of the benefits, objectives, and goals that you were sharing, and some of the risks you touched on, could you share some of your observations on perhaps some of the wider macro implications of CBDCs in particular, but perhaps also the wider innovations around cross-border payments? Specifically, do you see implications from increased volatility or cross-currency substitution impacting capital flow management, or inflation implications as well?

Speaker: Inge Van Dijk

I would be happy to discuss a bit of that. We are certainly looking also into the balance sheet implications and a possible bank run or crowding out private solutions and how that affects liquidity requirements, collateral requirements, the reserves, and all of the other aspects that come into play. This is a delicate balancing act, and we are looking at tools to either limit the digital euro with transaction limits or renumeration aspects to see how we can balance these items. Moreover, there is still much to be worked out and on the table. We are also contemplating the fact that no citizen in retail Europe is likely to spend more than €1000 using the digital euro. We have also done our analysis in terms of what they might mean in terms of the volume that could arise from this and how we can protect the system, so to speak, to ensure that we continue to benefit primarily from private market parties. However, we ensure that we have a public alternative in place that should not take over the market or crowd out the market, but rather play a supporting role in ensuring that we have a digital public instrument in place without becoming too dominant. This is not our aim. From that perspective, we believe that the remuneration tools, on the one hand, in terms of interest rates and how they play, and the limitations that we are considering to implement on the user side, can help offset this impact in terms of limitation, and what I just said applies to €1000. The digital euro is not

intended to be a savings tool in the same way that we have done with cash. It is only intended to be an instrument in the sense of a truly paying instrument. We would like to see funding and defunding possibilities through private funds on the back end. When it comes to private versus public, the latter must be able to fund and defund themselves, but we must also consider those who are unbanked and wish to make a cash deposit and place something on the digital euro wallet.

All of these elements are taken into account, and whenever we talk about limits and limiting the digital euro, we must carefully consider the balancing gain with the added value because it must be seamless and a simple product. However, we must ensure that some valves are in place so that we can consider closing when we see too many reserves moving from private parties to banks and to the central bank. It is not our intention to ensure a total outflow of deposits from banks to the central bank. This would definitely be the wrong way to go. However, none of these aspects are entirely clear. I hope we can show you a little more about how we are moving and how we believe we can solve the problem in about a half year. However, it will revolve around remuneration, on the one hand, against the limitations of what you can do with the digital euro without tampering with the actual user experience, as well as all of these elements combined. I hope this helps answer your question.

Online Question:

Hello, you mentioned that the CBDC project on the payment system is characterized by declining cash-use transactions as well as an increase in non-cash transactions that has increased. With the availability of financial service providers, is this going to disturb existing financial services or providers, particularly payment service providers that innovate on cashless transactions, before the CBDC implementation plan is carried out? Or perhaps you could please explain what steps your government is taking to protect them.

Speaker: Inge Van Dijk

The question is totally clear, and I thank you very much for that as well as for that interesting question and yet another very important topic that needs to be touched upon. The whole idea with the digital euro is not to crowd out the private initiatives. I mentioned that a number of times. And in my experience, whenever I have seen

a new instrument being developed, we have always had the discussion of whether this will eat into the other products that are currently available. Will it cannibalize instruments that are out there and that are functioning quite well? My experience to date showed that even with something as big a success as Ideal, it did not crowd out the cards; they were still there to a certain extent. Therefore, all these instruments come on top of each other and come alongside each other. The digital euro will just be another payment instrument in your wallet, but the public version, and you can have it alongside cash and your private instruments. The initiative from the euro system is designed in such a way that it will be attractive enough as a basic payment instrument, but it will never even try to compete with the private initiatives in terms of the added value services that they want to build. They could always also build on the added value system of a public payment instrument, similar to what they can do with a private payment instrument. There are some things to be considered that could be of added value, but intermediaries are open to offering this (yes or no). This is also still a question on the table. How do we get access to everybody, and how will we distribute this? But in terms of offering this to the public, these initiatives come alongside and will play as an additional instrument, and the added value is left to the market.

In terms of bringing value to the market and the basic instrument, this will be a pure basic instrument where you can make a payment or upload additional deposits through your private means or a cash deposit, for example, at a machine. You can also make a payment in e-commerce through QR or point of sale, possibly through NFC, and to another party. These are the elements that we are considering here with only small amounts of money, so this is never going to take the place of any private instrument that is already available. We all know that, for example, when looking at airlines, payment institutions offer complex additional added value services that we will not offer because we would not be able to or do not want to do them. This is not the area we want to go. The central bank must stay behind. It is simply a matter of ensuring that a public money instrument is available to assist alongside a private instrument.

As an aside, one of the major concerns that we have in Europe is that we are seeing a lot of de-risking from banks that are no longer happy with certain customers, so we are concerned about inclusion. Will commercial banks continue to welcome all European citizens? This is related to KYC and anti-money laundering and strict regulations, so there is a careful balancing act. But we must ensure that everyone in

Europe can pay, if not with cash, then with a simple digital alternative, such as the digital euro. On the other hand, we have the fact that in Europe, we are still very much a patchwork of countries in terms of point of sale as well as internet payments and ecommerce payments. We do not have a pan-European e-commerce payment method but rather a pan-European method for transferring funds and performing direct debits. All of these are in place, but we lack a pan-European solution or a European-built solution with pan-European reach. This is also a missing element. We have seen a number of private initiatives recently, and we are very much in favor of the market solving this critical issue. However, to date, none of these initiatives have succeeded in attracting or ensuring that they can deliver on this. The last initiative that is still off the table but is becoming more difficult as time passes is the European Payment Initiative, which is very important. If they can deliver a pan-European e-commerce solution, then the central banks do not have to step in. It is about ensuring that, in the end, Europe's vital payment system remains in good hands and offers a pan-European solution to all citizens. We are still a long way from that. This is what we are attempting to do in terms of providing a digital euro backbone, a basic solution on which the private market can lift on and build on so that it does not crowd them out. I hope this helps to answer your questions. We do not believe the government should intervene because there is already sufficient regulation in place to protect them and ensure that they have a piece of the pudding and can continue their business.

Offline Question:

I am interested in the objective of the digital euro in terms of complementing the current system as well as the digital euro as a source of innovation and public goods. Could you please elaborate on the timeline for implementation, including whether it will begin with wholesale or retail first and why?

Speaker: Inge Van Dijk

The digital euro pertains to the retail solution only, as illustrated in the use cases for person-to-person payments and person-to-business payments, in point-of-sale environments or e-commerce, and paying your government, for example, for passports. It is purely retail. Furthermore, the investigation phase is to last until

October 2023, when the Governing Council of the Eurosystem will make a decision about whether or not to implement a digital euro. Also, it will take a number of years before we are actually there. This should bring us somewhere in the vicinity of 2026–2027. It is yet to be determined, but this is where the ambition lies.

In terms of the objective, the main reason was that it was triggered by the discussion surrounding the introduction and announcement of Libra/Diem. We have seen how this initiative has developed and this is now less ambitious than maybe it was a few years ago. As a result, this has certainly sparked discussions, but I would argue that we have also been a little lazy in terms of developing cross-border payments. We have been sitting on what we have as an investment rather than looking towards new innovations. Thus, certainly, the interactions between Libra/Diem and the stablecoins in cryptos have triggered and spurred enormous growth. This has been at the heart of the discussions. On the one hand is the inclusion part, making sure that we have public payment instruments also available in a digital manner, and making sure that we have a digital version of cash in view of the decline of cash. On the other hand, the other part of my argument is certainly also that we do not have a pan-European private e-commerce point-of-sale initiative. I think everybody understands that we need to make sure that we have a better grip on payments and market infrastructures given the vital role they play, and we have seen that in how the economy has developed with the Ukraine war and everything that has followed from that, showing how important it is that you have your own vital instruments in place and that you have good oversight over them. This is the cornerstone of the digital euro, namely making sure that we enter the digital area of cash, the digital version of cash, and making sure that we have good oversight on our vital payment instruments in the pan-European area. I think these are the key elements that tie into the strategic autonomy and the monetary anchor as the key objectives of the digital euro.

Online Question:

As we all know, central banks worldwide are experimenting with CBDC for a variety of reasons. What is the primary reason for the establishment of the digital euro? Is there anything related to the proliferation of private currencies, cryptocurrencies, or financial inclusion? What are the current issues in the Eurosystem and why has CBDC suddenly become a priority?

Speaker: Inge Van Dijk

I think I just discussed that question with somebody from the audience, and I have little to add there. We discussed how it came about in terms of the innovation from cryptos and stablecoins. Financial inclusion is also a key element. The objective still stands and we want to make sure that in the face of declining cash use, which is the key remaining public instrument, we have a public alternative in place alongside a number of good private initiatives. This is for us the key urgency.

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- SESSION 2 -
TECHNOLOGY IN CBDC-BLOCKCHAIN OR OTHERS

Dr. Ousmène Jacques Mandeng
Senior Advisor and Lead of Economics and Financial Strategy, Accenture's Metaverse Continium Business Group

Moderator: Erina Sofia Gudono, Puteri Indonesia, DIY 2022

Introduction

Dr. Ousmène Jacques Mandeng co-leads Accenture's campaign to disseminate central bank digital currencies, as well as thought leadership on the broader implications of digital transformation in payments. He has also played important roles in CBDC projects such as Jura, E-Krona, Khokha 2, and mBridge. He has held senior positions in financial markets and at the International Monetary Fund (IMF) over the course of his two-decade career. He is a Visiting Fellow at the London School of Economics and a member of the Bretton Woods Committee, and he has frequently commented on the international monetary system. He also holds a PhD from the London School of Economics.

Speaker: Dr. Ousmène Jacques Mandeng, Senior Advisor and Lead of Economics and Financial Strategy, Accenture's Metaverse Continium Business Group

Thank you for the kind introduction and for inviting me to this event. I am excited to be here as this is my first visit to Yogyakarta. Today's presentation will provide an overview of the roles CBDC has played in a variety of projects and will hopefully lead everyone to what could be the next generation of CBDC projects as we move toward adoption in the short-medium term. Yogyakarta is a special place when it comes to innovation around money. This is a reminder that the first Indonesian currency, the Oeang Republik Indonesia (ORI), was introduced in Yogyakarta in 1946. It did not last very long, but it is exciting to see here, within the context of the Dutch Central Bank, admitting that the ORI was intended to replace the Dutch colonial currency issued by De Javasche Bank (DJB). We have an interesting backdrop, therefore, when it comes to the innovation of money in this city.

When I talk about CBDC, and there is a debate about account-based versus token-based CBDC, I am talking about token-based CBDC that typically lives on a blockchain or other DLT-enabled platform. We see the innovation with CBDC being in the adoption of a new medium, which is a digital token with properties akin to a bearer instrument. Thus, it is similar to a banknote but to exist in the digital space, and the innovation truly is that new medium. It is to complement what are physical banknotes, reserves (scriptural monies), and now tokens as a third format of money. It would be the exact same rupiah but in a different format. Think of it like the introduction of paper currency in the nineteenth century, when silver and gold coins were commonly used, and paper currencies were introduced in large part to facilitate payments as payment needs changed over time. We are now at the point where we require a new medium to address current and, particularly, future payment needs. It is just another medium.

There was a question earlier about what the implications might be, for example, for monetary conditions or monetary policy. A priori, there is nothing to suggest that a new medium should necessarily change monetary conditions. The central bank is always in control of its balance sheet, and it can always conduct policy operations if it is unhappy, with a sharp increase in demand for central bank mediums for example, if a future CBDC is adopted widely. Monetary policy concerns should not be at the fore when giving considerations to CBDC. Various motives have been discussed as to why central banks may introduce the CBDC, and these vary by country depending on the circumstances. One of the key objectives, as we see it, is financial system diversification. It is a new medium, a new payments infrastructure, and it is about providing more options to give rise to more competition in payments. This is really what CBDC is all about. It is to expand the system and it is about financial deepening. It is also to make it easier for new actors to enter the system. Functionality is also key. These tokens have functionalities that existing monies do not have, which may help to address future use cases more efficiently, some of which we may not even be aware of. We often hear the question, what is the problem that CBDC is trying to solve? This is the wrong question because it implies that we know all the problems that exist—this is very backward looking. We do not know many of the problems that exist; many may lie in the future, and the idea of CBDC is in part to address future payment needs, some of which we may not even know. As a result, functionality is key. Doing new things that DLT enables us to do is what CBDC is all about and why it is so exciting to consider. To be honest, the blockchain space has provided a

large supply of financial innovation, and it is appropriate for central banks to look at this and say, well, if there is that much innovation in this space, maybe we should consider adopting it as well to equip the financial system to meet future demand in payments more effectively.

One important aspect is access, and what you will hear later when we discuss some of the international CBDC projects is the combination of new functionality and new access to central bank money. The European Central Bank (ECB), for example, is considering allowing non-residents or foreigners to hold digital euros, something that is currently not possible except for physical banknotes. By providing new access, we can do new things, which is particularly important for international payments. If we want international payments to change from how they are now, giving foreigners access to your national currency will most likely be a key component.

Not to repeat what could be different motives, namely the decline of cash in everything, financial inclusion, and everything else that has already been mentioned, it is worth considering to what extent CBDC could contribute to making national currencies more attractive. The ECB has given us a huge new avenue of consideration in this regard, namely when it announced a digital euro in its 2020 report, it claimed that the digital euro will serve to make the euro a more attractive currency. Basically, it is about greater diversification of international payments and less dependence on the dollar, which is clearly the dominant currency in international payments. CBDC is also about new functionality that makes a currency more attractive, particularly for smaller countries and smaller currencies, to play a larger role in international payments. We will discuss Project mBridge to illustrate what this means. I find that many central banks often discuss CBDC in a defensive manner. It is because of Libra and the decline in cash, but really it should be about financial innovation. I hope financial innovation plays a key role in driving this enthusiasm and support for CBDC adoption. This is what it should be all about.

There is a discussion about retail versus wholesale. It is the same CBDC, but who can hold it will make a difference. The case is more complicated in retail, and it is unclear whether there is a case for central bank money for small value payments. The decline of cash is itself evidence that we do not require central bank money for small value payments. Nonetheless, there is a strong normative argument that every citizen should have access to the safest form of money, which may be a good reason for CBDC to consider granting public access. However, the case will be

contested further. Wholesale is a different story. This is where central bank money is the preferred medium because it is riskless. We want a riskless medium to make payments for large value transactions, which is where central bank money plays a key role. CBDC will almost certainly have the greatest impact on wholesale payments.

I am fortunate enough to have been involved in some of the most important CBDC projects, including the e-krona, a retail CBDC project; Khokha 2, with the South African Reserve Bank, which is a wholesale domestic CBDC project; Jura, with the central banks of France and Switzerland that is a wholesale cross-border project. A report co-authored by four central banks, the People's Republic of China, Hong Kong, Thailand and the UAE, will be released in the coming days if it has not already been published with the BIS Innovation Hub concerning Project mBridge.

E-krona

Regarding e-krona issued by the Swedish central bank, Riksbank, the motivation is that cash has almost disappeared in Sweden. It is extremely difficult to make cash payments in certain Swedish urban centers. In fact, younger people have never seen a banknote, which is quite astonishing. The Riksbank asked itself whether it should withdraw completely from retail payments or provide a more user-friendly alternative, which is where the concept of an e-krona came from. This project is now in its third year of a five or six-year journey. We are developing a test platform to test various functionalities, both with market participants, such as FMIs, and others. The idea is that at some point, a decision will be made to proceed with this as a general use CBDC, but Sweden already has a very sophisticated retail payment system. Can CBDC provide a differentiated user experience that will attract people to use it? That remains to be seen, and there are doubts. One interesting aspect of the e-krona is that Accenture pioneered what is now the standard approach of a two-tier distribution system, which means that the central bank will issue CBDC to financial intermediaries, and the financial intermediaries will then distribute it to the general public. We have basically replicated the cash cycle. Cash is introduced, issued by the central bank, placed in the ATM machines of the banks, and then the general public can withdraw it from the ATM machine. That is the idea. We did the same thing with the e-krona. We believe that by preserving the existing monetary relations in the economy, this can mitigate what has been seen as a major concern, namely, the extent to which a CBDC can crowd out private monies. It effectively serves as a substitute for bank deposits. One could argue that if CBDC, which is the safest money, can be held, why

would anyone need a bank account in the first place? We had a lengthy discussion about this in Sweden. The Riksbank has become far more relaxed in recent years. It is unclear whether there is a real threat of disintermediation. We have observed, and this is an empirical observation, that even in times of financial distress, there are very few movements from weak banks to strong banks or from private banks to public sector banks, for example. The assumption is, therefore, that increasingly it is unlikely that CBDCs will change the propensity of the general public to hold central bank money. e-Krona is an interesting project. It is a retail CBDC, similar to what the ECB is also embarking upon, and we will see if it eventually leads to adoption or not.

Khokha 2

Khokha 2 is the second project after Khokha 1. Accenture has also worked on Project Jasper with the Bank of Canada and Project Ubin with the Monetary Authority of Singapore. These were first-generation CBDC projects, with the idea of trying to replicate the processes of large-value payment systems. Can CBDC replicate these processes? That was really the aim of Khokha 1, Jasper, and Ubin. And yes, CBDC can do that. Khokha 2 was about integrating a stablecoin, a debenture, which is a debt instrument issued by the central bank, and a wholesale CBDC. It investigated how the coexistence of a privately issued stablecoin and wholesale CBDC could transform the money market. It is a blockchain-based instrument issued by the South African Reserve Bank to absorb liquidity. In addition, we had the wholesale CBDC to inject liquidity. It is fair to say that it was an exciting project, and it does demonstrate what is absolutely key, namely that if we have the coexistence of CBDC and reserves, but also a private medium like stablecoin, we must ensure that the integrity of the money market is preserved, as this is essential to maintaining the currency's singleness, which in this case is the rand, and it works. If we ensure that funds can flow seamlessly from one infrastructure to another, there is no reason to believe that the coexistence of these various instruments should impair money market integrity. These were interesting lessons from the Khokha and Khokha 2 projects, which we presented earlier this year in April.

Another exciting project is Jura, which is cooperation between the Central Banks of France and Switzerland, as well as the BIS Innovation Hub. This project is sort of the next generation. It is a pilot, so we had real transactions for the first time, and it is a cross-border project that pioneered allowing foreign institutions for the first time, namely Swiss banks to hold a euro CBDC and French institutions to hold a Swiss

franc CBDC. For the first time, this allowed a cross-border transaction outright in central bank money. We also issued a commercial paper on DLT in France as part of the project, and we were able to test delivery-versus-payments and payments-versus-payments transactions on a platform in Switzerland. Everything was tokenized, and we were able to move these tokens back and forth irrespective of borders, creating a completely new geography of money in a completely new architecture for how foreign exchange transactions could be performed. As a result, Swiss banks were able to exchange euros for Swiss francs in central bank money with the French entity. With tokens, the payment is the settlement. It is similar to tendering a banknote in that the debt obligation is discharged, the banknote is accepted, and the transaction is settled. It is final. This is exactly what makes tokens so exciting because we can abbreviate wholesale transactions. When thinking about how payments work today, there are at least four processes. The obligation is discharged, which is the payment. Clearing, netting, and finally settlement at the end of the day, in the middle, or somewhere in between for high-value payments. With tokens, however, the payment is the settlement. When we combine these four processes into one, it should result in significant efficiency gains.

If we also tokenize securities, we can do simple token-for-token swaps in a delivery-versus-payment fashion. We can use programmability to ensure that this exchange is atomic, which means that both lags of the transaction must succeed or none will. It essentially means that there are no more open positions in trading. As a result, trading becomes riskless in terms of settlement. Furthermore, payments-versus-payments transaction becomes riskless from a credit point of view because we use central bank money. It is that completely new architecture that we have explored in Project Jura. I believe that is the future of how international payments will be conducted, and I hope that this will be investigated further in the future, despite what the G20 appears to have decided. Jura was an exciting project and it was a pilot in which real money was exchanged. The interesting thing about working on a project like this is that only when we are doing real transactions with real banks do we have to take real risks and make real adjustments to ensure that the transactions are consistent with internal and external controls. We also did not operate in a sandbox. All transactions had to be in compliance with existing regulations. In France, we have a regulation that allows a commercial paper to be registered directly on blockchain without the use of a CSD. As a result, we were able to complete this without any regulatory exceptions and in accordance with existing rules. And, yes, the important

thing is that we only move towards a near-production or production-like environment when we conduct real transactions, ask real questions, and answer real questions.

mBridge

The last project I want to mention is mBridge. There are at least three CBDC models in international payments. The first model assumes that each central bank has its own DLT network and there are cross-network exchanges that are effectively atomic. One approach is for the central bank to ensure network interoperability. The second approach, which we used in Jura, is to deploy your CBDC on a foreign platform. It was a big step forward that the Central Bank of France deployed it on the Swiss platform. Central banks typically own and manage their own large-value payment system. We asked the Banque de France to deploy its currency on a foreign platform, and we engineered it to retain essential controls, namely control over all transactions conducted in its currency. Deployment in a foreign network is approach number two. The third approach is mBridge, which is building a settlement corridor. The idea is almost like a scheme where the settlement conditions are the same for all participating entities. This was a pilot project with four central banks and twenty commercial banks participating, and all transactions were real. We had a large volume of transactions. More than $20 million was exchanged between these different entities, and every commercial bank participant on the platform was able to use the CBDC issued by the four participant central banks. This project is exciting because it was about creating a new governance structure, or at least exploring one. How could it be done with four central banks participating in a project like this? How can we solve for the fact that we have four different jurisdictions and do not have a common regulatory framework? That is one aspect. The other is much more interesting at the economics level. The idea was to use local currencies for international payments. As mentioned earlier, most payments in Asia are still conducted using the dollar. For example, one number that we have from a study done a few years ago shows that 80% of Thailand's imports were invoiced in dollars even though it trades only 8% with the United States. There is a discrepancy between the currency of the trading partner and the use of a third country currency. However, the challenge in mBridge, apart from the tech, which we knew works, was to make countries use local currency for conducting international payments to support international trade. That may well be the biggest hurdle, namely, providing sufficient incentives for countries to

use their own currencies. That makes mBridge an exciting project, and I feel there is a lot of ambition regarding this project as maybe becoming a vehicle to move forward and offer an alternative infrastructure to the existing correspondent banking network. Also, on mBridge, all transactions were instant transfers in CBDC or atomic exchanges, payments-versus-payments for FX transactions. This is a project to be followed as well, and we hope there will be a next iteration of the project, possibly with the participation of an even larger group of central banks. Something to reflect on: this new governance structure that was mentioned, how would it be done? It can be done on the basis of a treaty, for example, to ensure or give confidence to all participants that when they transact on the platform, payments are conducted in line with established rules and regulations. What we had done with mBridge as an interim is that we basically used it only to deliver the token into the wallet, but settlement conditions were still determined locally. This allows for more flexibility, but the idea will eventually be like a scheme on a platform where a settlement is made if one conforms to the platform's rules rather than their local rules. This is something to think about as we move forward.

We have done many CBDC projects, and it is fair to say that in the evolution of projects, we have done proof-of-concept projects and pilots, we know the tech works, and now we should think about the next generation that will bring us closer to eventual production and deployment. These new generations will explore two aspects. The first is programmability, which we say is one of the key advantages of a DLT platform, but how can we use programmability to make payments more efficient? Not only payments, but also settlement if we have tokenized securities. The second is traceability because tokens have the ability to trace their history through time, creating new data and insights into how payments are made.

I will focus on programmability and illustrate two exciting aspects, namely how liquidity will change in an instant in an atomic environment. In theory, in an instant and atomic environment, no one is short of liquidity because they either have the cash or the security. If you have security in an instant environment, you can repo it instantly if you need cash. In theory, it would be a completely different way of thinking about liquidity than we do now. Today, liquidity helps us greatly in bridging open positions when trading. In an instant and atomic environment there are no open positions, so the very meaning of liquidity should change dramatically. Some may argue that the current system has many advantages because we have clearing and netting, which reduces the amount of currencies, for example, that we need to exchange. I would

argue that in an instant and atomic world, however, gross settlement is far more effective because received funds can always be reused instantly, eliminating the need for clearing and netting. I have already been mentioned what we have done in Project Jura for foreign exchange. Think about how foreign exchange could be conducted if, for example, Indonesia had a rupiah CBDC and Thailand had a baht CBDC and Thai and Indonesian financial intermediaries could exchange these outright. Today, for example, they would most likely not do it, or they would cross it using the dollar. The transaction would take place in part in New York, where Citibank would wire money from the Indonesian bank to the Thai bank, and the other leg would take place in the large-value payment systems of the respective countries. In a CBDC world, there could be an outright exchange of these tokens. Again, that new architecture would also imply that the liquidity we need today, the collateral we need to post, the delays, and the divorce we have today between trade execution and settlement, will all disappear. As a result, that should give us completely new opportunities for managing foreign exchange transactions.

Securities Settlement

Another interesting issue is securities settlements. Securities settlements are two completely parallel processes. One is the transfer of ownership of the security, which is typically done in a CSD, and the other is the transfer of the payment. We have become pretty good at coordinating these processes, but if both the security and the cash were in a token format and on the same DLT network, we could do a simple token exchange, which is likely to be far more efficient. In a securities settlement environment, we could do atomic instant exchanges between a security token and a cash token and settle at T+0 or same day settlement. Not all market participants would prefer to settle in real time at T+0. Brokers who maintain open positions during the day, for example, may not want to be hit every time they advertise a bid or an offer. Even in a T+0 environment, therefore, we would need a sliding window for settlement, which is certainly possible and being tested right now. Think about how this could transform the way we deal with securities. If we open it up, we can ask why we should allow only domestic entities to have better access to CBDC? Going back to the earlier question about cross-border participation, we could have foreign participants, say, in the Indonesian debt market, irrespective of their residency, by allowing them to exchange securities tokens for cash tokens. It is less about replicating existing processes and more about discovering new ones.

To conclude, Indonesia is considering at least experimenting with CBDC to determine a good use case. Rather than thinking about the use case, it is more beneficial to thank about how CBDC could help equip the Indonesian financial system with more functionalities. The financial system will then figure out what the best use cases are. That would be the best course of action. Indonesia's geography is special, with thousands of islands, and cash distribution is very expensive. Cash, overall, is a very costly medium to keep in circulation, and given the geography of Indonesia, CBDC appears to be a viable substitute for the expensive cash distribution. There may be a case for CBDC, but it is unclear whether Indonesia truly needs CBDC for this. Is this really a case for the central bank, or is it a case for providing the right incentives for banks to provide an infrastructure that could substitute for the use of cash? The emphasis for Indonesia, as we have discussed with many central banks, should be on diversification rather than trying too hard to find the use case. More importantly, we simply want to provide access to central bank money and ensure that access is equitable not only for the incumbent infrastructure, but also across a broader range of financial market infrastructures. That is the idea. There is no reason why a central bank should only provide a medium for the cash infrastructure and reserves, when there may be interesting alternative infrastructures that could use central bank money as a settlement medium.

At the beginning of my presentation I mentioned the ORI, which was introduced in 1946 and did not last very long. The rupiah was introduced in 1951. CBDC may not be as historically significant as the introduction of a new currency, but it is certainly something that we hope central banks will see as the obvious thing to do in hindsight. When paper currency was introduced in the nineteenth century, it was just as controversial as CBDC is today. People were concerned that paper money would lead to inflation and unstable monetary conditions, and there was enormous resistance to it. In Germany, for example, modern paper currencies were introduced in the middle of the nineteenth century. When they were first introduced by the central bank, which began operations in 1876. It took until 1901 for the banknotes issued by the central bank to become legal tender, in part due to resistance and suspicion that paper currency is not the 'real thing'. Today, we are having the same debate that we had previously. Another interesting example is when banks say CBDC is about bank disintermediation, and we hear a lot of resistance from banks. It was the same debate that caused a significant delay in the adoption of a central bank in the United States. The Federal Reserve Bank was only established in 1913

due to resistance from the banks, who feared that a large state institution would crowd out the banks and take away their business, which is why they resisted it. Nonetheless, the Fed was adopted, the so-called sectional system, in which you had twelve fairly autonomous Federal Reserve regions, and this was also in response to bank opposition to a huge government centralized institution. On that note, the debate we are having today has happened before, and perhaps that should be part of how we think about it looking forward.

Q&A Session

Offline Question:

Is CBDC not highly contextual because each government is unique in terms of its strength, human rights values, and other characteristics, the CBDC output may differ by country? Each country, for example, may have a very different CBDC protocol. Given that each country has its own set of rules, how does cross-border work? Do you mean a cross-chain thing, or do you have a massive CBDC for the entire world for cross-border or something?

Speaker: Dr. Ousmène Jacques Mandeng

Well, there are two questions to it. One is, how can we solve for CBDC being exchanged across networks? This is the problem of interoperability. Technically, this problem has mostly been solved, and we have demonstrated in many projects that we can have a permissioned blockchain, Corda for example, that can be exchanged with a token that is circulating on Quorum, for example, or on Hyperledger Fabric and Corda, or Ethereum and Corda. The technology works. Do not think of it as a token going from one network to another. The token can only live within its own network, but we can ensure that the two networks are synchronized in such a way that needed information can be exchanged in a split second. A protocol that we typically use is called a hashed timelock contract (HTLC). It basically leads to a very short instant of synchronizing the two networks, and that allows the exchange to take place. That works pretty well, and therefore, we do not think that is going to be a constraint. We should not be worried. We hear many central banks say, oh, we need a common standard, and so on, but the technology is evolving too fast for a standard. A standard would mean that we unduly constrain innovation going

forward. We should focus on interoperability, but again, it has mostly been solved. We should see the parallel development of different blockchains or DFT platforms. As long as we ensure they can communicate with one another, it should not be an issue.

To answer the other point, should we have a common currency? This was the other point raised. That is an interesting suggestion in theory, but it is extremely difficult to do in practice. The euro area is a good example. What they have done there is fantastic. It is the most ambitious project when it comes to a currency union, but it also illustrates how difficult it is to have a single currency be used by various countries that do not also coordinate their fiscal policy and their structural policies. Therefore, an international currency or CBDC is great in theory but nearly impossible to do in practice. The International Monetary Fund (IMF) Special Drawing Rights (SDRs) is another interesting example. The SDR was introduced in 1969, but has never had the success that was imagined by its creators, namely eventually substituting for what, at the time, was a gold-based and eventually a dollar-based system. For the same reason, imagining how to build a global CBDC to fit in most countries is difficult. Therefore, it is doubtful we will have anything like a common currency, but we can have different currencies that can be exchanged seamlessly in a future environment.

Question:

I like the word you used, atomic. It represents granularity. My question is about some choices. We know you are involved in many projects related to the preparation of digital currency. In terms of design, for example, choosing between remunerated CBDC and unremunerated CBDC is important because the choices have consequences. When the CBDC is unremunerated, people tend to maintain the status quo. When they choose a new alternative, for example, they are exposed to new risks, new options, and new things. It requires a sweetener, but if you introduce remuneration, there is a risk of crowding out third-party liabilities on the bank. As a result, which has the most optimal design? Second, when choosing between wholesale and retail, both options have consequences, and I am familiar with the majority of the CBDC designs you discussed. Which one is more preferable, retail or wholesale?

Speaker: Dr. Ousmène Jacques Mandeng

Interest-bearing or remuneration—absolutely. Should CBDC be remunerated if it is a cash-like instrument? In Sweden, for example, this has been discussed since the beginning. A future e-Krona should have the possibility to be interest-bearing, but the interest rate is very likely to be set at zero, similar to the interest rate on cash today. When interest rates are put up, it obviously makes it look even more like a deposit. Those who are concerned about CBDC crowding out a deposit will likely be more concerned if it becomes interest-bearing. It depends on the purpose of the CBDC. If it is simply a transaction instrument, it should not bear interest. If it is a store of value, it may be worth considering making it interest-bearing on the retail side. On the wholesale side, things are very different because CBDC should be a substitute for reserves. CBDC should be remunerated in countries where reserves are remunerated because banks should be indifferent to holding reserves or holding CBDC. It is fairly straightforward. We obviously want the two mediums, reserves or CBDC, to be fungible. Like cash, CBDC is typically issued against reserves. There is a substitution of central bank liabilities and no creation of new money. If reserves are remunerated, it is pretty clear for wholesale that CBDC should be remunerated also. If not, banks will always switch out of CBDC and back into reserves before the end of the day in order to collect the interest, which one might want to avoid. This remains an open discussion. If central banks decide to implement CBDC, it would have zero interest.

Regarding wholesale versus retail, the strongest use case is wholesale because CBDC is central bank money. Central bank money is a very small subset of money. Most money is private, but central bank money is very special and is the preferred medium for large-value payments. That is where we need it, therefore, the case for CBDC is strongest for wholesale. However, some may argue that because reserves are digital, we already have wholesale CBDC. This is often put forward, but I would argue that the innovation of CBDC is not that it is digital, the innovation is the new medium, the token, and that is what we want. It is about diversifying central bank mediums. The strongest use case is wholesale CBDC.

Question:

You said the new thing about wholesale CBDC is not that it is digital but that it is tokenized. However, based on your experience with Jura at the Banque de France and the Swiss Central Bank, it is possible that CBDC will be held not only by domestic banks, but also by foreign banks. If that is the big shift, do you agree that we would create the same situation if central banks allowed foreign banks to hold central bank money, which we do not allow for a variety of reasons? I believe the reason is that as a central bank, we have prudential supervision as well as other controls. However, if a large CBDC is used for cross-border payments, where a Swiss bank or an Indonesian large bank is holding large amounts of central bank money, that would represent a major shift. Do you agree?

Speaker: Dr. Ousmène Jacques Mandeng

That is absolutely a fair point. We could allow it, but central banks typically do not. However, the Swiss National Bank does allow non-resident banks to hold accounts in the large-value payment system. This is how you would solve it, and that is true. In the European Union, the European Treaty does allow for that. The European Treaty says central banks can open accounts with financial intermediaries. It does not say they have to be in the euro system. The ECB says that, but that can be changed. It is a fair point. The thing is central banks have resisted it in large part because it involves giving access to your balance sheet directly by opening an account. If one does not supervise the entity, many central banks just do not like it. Therefore, it is a practice we see nowhere. Switzerland is a rare exception. Interacting with a token is much easier. A wallet is downloaded, and a token is received, rather than connecting to large-value payment systems or giving access to an account to interact with the tokens. It is a far lighter way of allowing access to money. But it is a fair point. It is a combination of access and functionality that makes token-based CBDC interesting. It is not only the access. Buna, for example, in the MENA region of North Africa and the Middle East, is a project by the Arab Monetary Fund about connecting all the different real-time gross settlement systems (RTGS) of the region with one another. That is the alternative approach, and it can be done. We should think about the combination of access and functionality to give us new ways of conducting payments, rather than simply extending the way we conduct payments today. That is where I see the interest. Let me expand on the digital euro, because some say the digital

euro could simply be based on the existing faster payment system. Then we do not have to build new infrastructure, we can just use what we have. I think that would be a missed opportunity. It would have very little innovation, and it would mean we just leverage what we already have. We just extend existing systems. That is not about diversification, nor will it give us new functionality. Therefore, it would be a real pity if we were to take such a route. Again, the debate is about the combination of new infrastructure and new mediums that makes it exciting.

Question:

I have two questions. The first is about seigniorage in the context of central banks. We can see that CBDC is another form of money that comes in digital form. This means that the seller banks will print less money as way to promote CBDC. What will happen to the seigniorage if this happens? When CBDC was promoted during this project, would seigniorage be reduced. The second question is, since CBDC is being implemented in so many countries, what is the main challenge in terms of public acceptance?

Speaker: Dr. Ousmène Jacques Mandeng

The money a central bank makes by issuing reserves is known as seigniorage. CBDC would not change that. CBDC would not change seigniorage revenues because CBDC would still be distributed against reserves, and thus, as with cash, the central bank seigniorage would not be impaired. It would only be impaired if reserves were to be substituted for other mediums. If, for example, banks decided to use non-central bank monies, the central bank balance sheet would experience shrinkage. Only then would there be an impairment of seigniorage. However, CBDC effectively leaves the balance sheet intact and thus should not affect seigniorage.

Regarding acceptance, I agree that adoption has been slow. Smaller countries, such as Nigeria and the Bahamas, have shown that the uptake has not been particularly exciting. China is running a large pilot. It is a partial adoption, and we know very little about it. The technology is new, so there will undoubtedly be some resistance. To some extent, the technology is mature enough to address most payments use cases. It will undoubtedly be a challenge to introduce retail CBDC in a large country like Indonesia. DLT can manage ten million people in Sweden

easily, but 350 million or more in Indonesia will be a different story. With 1.3 billion people, India is also considering a CBDC, which is a completely different type of leap in terms of the performance that a DLT would have to deliver. There are networks that use shading of the network load to ensure that we have the performance levels that we require. Most wholesale use cases can be addressed by DLT. Already a few years ago, we deployed Corda, a private permissioned DLT platform, to replicate all New York Stock Exchange transactions in collaboration with the Depository Trust & Clearing Corporation (DTCC), and we achieved performance equivalent to the existing systems. DLT can easily handle wholesale transactions. When it comes to retail, however, it will be more challenging, and for large countries like Indonesia, it will undoubtedly be a special challenge.

Question:

The growth of blockchain, cryptos and digital currencies is promoting the process of CBDC development by central banks around the world. Despite this, the implementation of blockchain in the CBDC design remains controversial since blockchain-based CBDC has issues with performance, scalability, and cross-chain interoperability. Could the use of a permission blockchain, in your opinion, resolve or mitigate these issues? If not, do you have any other technology suggestions that appear to be a better fit for CBDC?

Speaker: Dr. Ousmène Jacques Mandeng

Performance and scalability are not an issue in wholesale, but in retail, if there is high usage at peak times, it may be a challenge, especially for very large economies. Why do we need DLT in the first place? The interesting thing is not the DLT but the token. The real question, therefore, should be what is the best technology for deploying tokens? We have concluded that the best technology is blockchain or other DLT platforms, but there may be alternative technologies. For the time being, it appears that DLT is the best technology to deploy digital tokens, which is why we are looking at DLT in the first place. The interesting thing is not the DLT but the token and what we can do with the tokens. That is why I do not see an alternative today, but there will undoubtedly be some alternative in the future. The points raised here, such as scalability, performance and cross-chain interoperability are all part of

the debate. However, we believe that most of these issues have been resolved and that they are unlikely to be an obstacle. The maturity of the technology will always be an issue, but as with all new technologies, such as the introduction of real-time gross settlement systems, it will take time and there will be hiccups along the way. Naturally, for reputational reasons, it can only be adopted if it is production-ready and extremely robust, which is the case for most applications today. However, there will always be marginal cases where this is not the case.

Question:

I have two questions for you that I hope you can shed light on. First, how do you see the financial market infrastructure connecting with the CBDC retail payment system? Will the wholesale CBDC in the Financial Market Infrastructure (FMI) be the liquidity source for the retail system, or will the CBDC retail payment system be a part of the FMI? If that is the case, what do you think it will be? Second, according to your explanation, if the securities and tokens are placed in the DLT system, will a security settlement be possible? Could you please explain the settlement process if the securities are tokenized but the settlement is done in conventional currencies, and vice versa? Is this a possibility?

Speaker: Dr. Ousmène Jacques Mandeng

Regarding the first question about retail payments and CBDC, that could be a question about integration. In Sweden, for example, the idea was that the retail CBDC, or the eKrona, would use the existing acceptance infrastructure. The idea is not that we should build new terminals, for example, at the point of sale, but that we can use what we have already. And by enabling, for example, a device, it could be your mobile phone or it could be a card that is token-enabled to use, for example, near-field communication (NFC), the existing terminal infrastructure, and the existing acceptance infrastructure. That is quite key. Also, the idea here about the liquidity source is that the central bank issues CBDC to banks in the same way that it does with cash today. Every morning, the banks will call the central bank and say they need an amount of rupiah to be distributed to their cash machines. The same will be done for CBDC. There could be different models. We have experimented with a model where CBDC is uploaded into an electronic vault as a bank and then

distributed to end users or distributed on demand. A user goes to his or her app and says they want to have Rp100 million of CBDC debited from their account, and upon debiting the bank account, there is an instant issuance of CBDC from the central bank through the intermediary, and it is credited to the wallet of the user. There are different models, and the liquidity, if understood correctly, would always be provided by the banks, and the banks need to make sure, like in today's world when it comes to cash, that they have sufficient reserves to be able to purchase CBDC and distribute it to their customers. That is the same.

When it comes to the security settlement, could we have tokenized security but cash in the conventional payment system? Yes, and there are solutions that have been developed. Project Helvetia by the Swiss National Bank, for example, had this solution. Also, the Bundesbank, the German central bank, has developed the so-called trigger solution, by which someone can have tokenized security, but then the payment will be done in the large-value payment system by effectively coordinating the two. To answer the question, it is possible, but it would not allow us to exploit the benefits afforded by token-based mediums. It would be halfway compromised. Some central banks insist they want to absolutely keep using their large-value payment systems, and they may consider, therefore, a solution in that regard. However, that would mean we would underperform when it comes to the possibilities that a token-based environment would afford us.

Question:

I would like to ask about the programmability of money. At the Annual Meetings of the International Monetary Fund (IMF) in Washington, DC, there was a panel on CBDC. The first Deputy Managing Director of the IMF, who happened to be a Chinese national, was very fond of this capability of CBDC to program what money can be used for and whatnot. For instance, it could be used for food but not for buying alcohol or whatever. This is not something that we are looking at in the digital euro. We are looking at perhaps programmable payments but not programmable money. What is your opinion on these capabilities and whether you should use them for CBDC?

Speaker: Dr. Ousmène Jacques Mandeng

That is an interesting question. Programmability is certainly one of the features of a DLT environment. It can basically be programmed to embed the most complex business logic. It is essentially a minicomputer or software, and it becomes immutable once it is embedded in the system. It will execute automatically in the event of an external event, or it could mean that it is restricted to certain types of expenditures, for example. There will always be a tension between, on one hand, the universality of central bank money, namely that it can be used everywhere and it should be unencumbered money, to the advantages of programmability. As a result, there will always be tension. When it comes to programmability, the instant and atomic exchange that is achieved through programmability will certainly be a key feature that we will try to exploit. Consider very complex transactions. I mentioned how liquidity management could be transformed. One could borrow money instantly but also repay it instantly. These are the kinds of things that programmability would allow anyone to do. There is one interesting aspect that we are only now starting to discuss, namely could programmability be allocated to a third party? Would central banks really want to deal with programmability, or would they provide the infrastructure and the medium, but programmability is something that a third party could do? For instance, the government. Is it really the central banks' responsibility to deal with social benefits that are distributed by the government but someone wants them spent on alcohol, cigarettes, or whatever? The central bank should not have to deal with that. The central bank does not deal with restricting alcohol consumption or whatever. The government, however, may request the ability to program it in order to impose certain restrictions. We can see this division of labor as an interesting feature of a CBDC-type environment. The infrastructure will be provided by the central bank, but the government may use it to pursue other policy objectives. For example, restricting the use of benefits, tying subsidies to other special aspects, or possibly implementing an automated deduction of VAT at the point of sale. There are many possible applications, but the central bank should say this is unencumbered money. I do see, however, a division of labor between fiscal authorities, and we want to maintain the dividing line between monetary and fiscal operations. Whether it is a fiscal operation. It would be a fiscal operation if you can buy food but not alcohol. It should be up to the government to program it in such a way that the restriction is maintained. That is how we see it going forward.

Online Question:

How does wholesale CBDC differ from RTGS systems that settle transactions on central bank accounts, and what impact might the introduction of CBDC have on the circulation of currency for payments by the general public?

Speaker: Dr. Ousmène Jacques Mandeng

When it comes to strictly payments, and this is why the first projects I mentioned were about replicating existing processes, can CBDC replicate a large-value payment system? It really is not an interesting case for CBDC, in part because large-value payment systems work very well, instant and very performant. Furthermore, CBDC is not so interesting as a payment instrument. It is more interesting as a settlement medium in light of the use cases that we discussed earlier. The idea of using CBDC to replace an RTGS system is not something that makes sense to pursue. It may be an eventual outcome of large-scale adoption, but it should not be an objective per se because large-value payment systems work well. Strictly when it comes to payments, CBDC is not interesting.

Regarding the other part of the question on how CBDC will change currency in circulation, this is about wholesale CBDC. Obviously, wholesale CBDC and currency in circulation are two different things, because currency in circulation is what the non-bank public holds and wholesale CBDC is what the banks would hold. Therefore, wholesale CBDC should not change or have an impact on the currency in circulation. These are two different things. Wholesale CBDC is an interbank instrument for interbank clearing, and retail CBDC is held by the non-bank public and may affect currency in circulation if we think of currency in circulation as being banknotes. To some extent, CBDC may complement the use of banknotes, but it may also be a substitute for banknotes. As a result, we may see banknotes declining and CBDC being adopted. From an accounting perspective, should CBDC be part of the currency in circulation? Absolutely, it should be part of M1, and if we see an increase in currency in circulation, being the sum of banknotes and CBDC, which is typically demand-driven, the central bank may eventually decide to conduct monetary policy operations to eventually contain, if it perceives there is an undue expansion of currency in circulation. Think of CBDC for the non-bank public as being like banknotes.

Question:

While some countries are implementing local currency settlement (LCS), do we really need the cross-border CBDC?

Speaker: Dr. Ousmène Jacques Mandeng

I emphasized the notion of diversification at the start of my presentation. CBDC is interesting because it is a new rail, a new infrastructure that is peer-to-peer, and thus it stands in stark contrast to the intermediated infrastructure that we currently have in place. Looking at how payments are processed today, money never moves. It is simply an adjustment of account balances. We must go through a correspondent to wire money from one bank to another that does not have a direct relationship. This means that if someone wires money to a friend and his or her bank does not have a direct relationship with the other bank, the correspondent will adjust the account and credit the friend's bank. Every bank is a completely isolated institution. We are saying we need interoperability for DLT but in today's world, there is no interoperability. Each financial institution is completely isolated and manages its own ledger. Banks can only communicate with one another through secure messages, such as Swift or other messages. When considering a DLT world, it could not be more dissimilar. We are transitioning from ledgers that are managed in complete isolation by individual institutions to a world where we effectively share a common ledger. It could not be more different. We have much greater information symmetry, and we share the common truth across the institutions. I am not arguing that CBDC can do everything better than cross-border payments. That is not the point. The idea is that it can do certain things much better, but the important thing is the optionality, diversification, and different business models that it can give rise to. That is really what this should be about. Competing models are possible but that is not a problem at all. It is diversification that should be at the center, and if we equip systems by being able to do more things because we have a more diversified infrastructure, it will help systems function better—that is really the idea. We do not want to give the impression that CBDC will replace everything. That is certainly not the idea. The idea is to expand the system rather than substitute existing systems.

Online Question:

I have a question about the digital yuan. What are your thoughts about this? Will the digital yuan affect the global economy?

Speaker: Dr. Ousmène Jacques Mandeng

That is an interesting question. The internationalization of the Chinese yuan, also known as the Digital Currency Electronic Payment (DCEP) or digital renminbi (RMB), is an ambition that China has entertained for many years without much success. I think a digital renminbi will change that. China has been very active in the mBridge project, and I think there is an ambition to use the Chinese renminbi more, particularly in international transactions. China is the second-largest economy globally, but its currency is not used in international transactions. This is an asymmetry at the core of the problems with the so-called international monetary system. Taking a step back, emerging markets now account for 45–50% of world GDP, with their currencies playing almost no role in international payments. Emerging markets are extremely important and active on the real side of the economy, but they play no role on the monetary side (below the line). This asymmetry is at the core of the tensions we see in international payments, volatility and external imbalances. China's ambition to introduce the digital renminbi should be viewed as a logical consequence of its important role in the real economy. I think that making the digital renminbi more accessible and interesting with more functionality will increase interest in using it. Platforms, such as mBridge and possibly other infrastructures, where the digital renminbi is being introduced will make it more accessible for international payments. Could it have an impact on the global economy? Yes, it could. Greater symmetry between real and monetary transactions in the international economy would be desirable. Furthermore, diversification of the international monetary system, which is what this is all about, is a critical objective. It is a debate that we have had for decades, along with the frustration that we rely on only one or two currencies for international payments. Furthermore, greater diversification would increase liquidity, reduce dependence on a single country's monetary policy, and appear to be the natural evolution toward a more stable international financial system. In this sense, I hope China succeeds, along with other countries as well.

Question:

The introduction of CBDC into the world will help financial inclusion. What is your take on that? Do you think this is something the world is expecting, or is it something that will not have a direct impact on the economy but will eventually arrive at some point? I would like to know your take on it.

Speaker: Dr. Ousmène Jacques Mandeng

Financial inclusion was the question, right? And remittances is another one. Is there a role for central banks when it comes to financial inclusion? That should be the question. Is there a reason to believe that central banks are better at financial inclusion than, say, the private banking system? Is there a market failure? Is that the reason why citizens may not have access to a safe settlement medium? I have my doubts when it comes to the role of central banks for financial inclusion and, therefore, the role of CBDC for financial inclusion. Financial inclusion is about a payment instrument, but above all it is about basic banking and insurance services, and CBDC will not change that. What that role is in very low-income countries is unclear. Indonesia is different, but in very low-income countries, the lack of access to payment infrastructure is often because of very fundamental problems. It could be due to a lack of mobile phone coverage, a lack of electricity, or other things for which central banks are extremely unlikely to provide any solution. There could be initiatives where the central bank will work with infrastructure providers, and so on. Financial inclusion is debated very differently in advanced economies and in emerging markets. In advanced economies, there is a concern that with the introduction of a digital medium, it will exclude those people that are not digitalized because, for whatever reason, they do not have access to digital means, the internet, etc., and that is a concern. In advanced economies, CBDC is seen as an instrument of exclusion, but in emerging markets, it is often seen as an instrument of inclusion. But is it really the central bank that should be driving that? Herein lie my doubts. I do not think a central bank has comparative advantage in ensuring financial inclusion.

One thing that is related a little bit is remittances, something that is often discussed in connection with CBDC. Is there really a role for central bank money when it comes to remittances? Maybe small amounts, like $200, or whatever is being transmitted, is that really something a central bank should be concerned with? I do

not think so. There are private solutions, and many work well. Is there really a case for a central bank? We are working on a project idea because what we want to do is abbreviate the various sorts of payment chains as they exist. First of all, when it comes to remittances, would a central bank really want to have its currency being used by the non-bank public in the recipient country? Think about it. Would Saudi Arabia or the Philippines, Indonesia's neighbor, one of the biggest recipients of remittances, would Saudi Arabia, the second-biggest remittance payer, want a Filipino to hold a riyal CBD in his or her wallet to make a payment domestically? Probably not, and neither would the Philippine Central Bank want it. We could think of a way by which a Filipino resident working in Saudi Arabia could send money to an intermediary in the Philippines, CBDC possibly, and that intermediary would then credit the beneficiary's account, meaning that the CBDC would be limited to being received by a financial intermediary that can then use the CBDC either to sell it to the central bank or maybe use it for making payments for imports and so on in the future. That I can see, but I cannot see sending a Saudi riyal to a Filipino and then the Filipino making a payment at a shop in the Philippines. That is something remittances using CBDC will never be able to do. We also have to look at it from both sides. When it comes to financial inclusion, do central banks really have competence? And when it comes to remittances, can we really imagine that the central bank would want its currency to be in circulation? Remember, it is also about dollarization and so on in a foreign country. I have my doubts there is a role for CBDC there.

Question:

I would like to ask about your conclusion that we may introduce CBDC as we did paper money in 1951, but recently new challenges have emerged. We are aware of constraints, such as the digital divide, internet penetration and digital literacy. Unlike paper money, CBDC requires technological advancement. How do you see this in Indonesia, especially given that digital development is concentrated in major cities? I am concerned that CBDC will not be widely accepted. In the use cases of Big Tech for payments, however, they incentivize people to use them by offering discounts or cash back, and so on. How do you see these technological constraints to CBDC implementation? I do not believe CBDC can attract people by offering incentives, as Big Tech has done.

Speaker: Dr. Ousmène Jacques Mandeng

To be widely used, the technology would have to be widely available, as it is in urban centers. There is an offline capability that is often discussed when it comes to CBDC. Could CBDC be used offline in remote areas to make payments even if there is no internet or mobile phone coverage? That is certainly something that can be done, and it is something that we have been exploring in a number of projects, including the eKrona in Sweden. Even if there is no electricity or internet, someone can use a phone to make a payment. Obviously, the phone must have a battery, but if two phones are in close physical proximity, the devices can be used to make a payment. This would allow payments to be made offline, for example, in very remote areas where there is no DLT or mobile phone coverage. We do not want to minimize the technological challenges of making this work across the entire country, and a combination of offline and online capabilities will undoubtedly have to be considered. Indonesia, in particular, has a very large population, and there will undoubtedly be additional challenges. One would have to consider carefully whether it can really work at that scale with the required performance. If you can answer that question, then the combination of offline and online will work and should provide universal coverage. At the very least, if people are offline, they will have to come online on occasion in order for transactions to be validated, but the advantage of using tokens is that the actual payment takes place even if the person is offline. It is not validated because it must come online to be validated by the underlying DLT platform, but the payment is made. Unlike an account-based system, where payment instructions are only provided in an offline environment, that is one advantage of a CBDC based on a token. However, it is something that would require further exploration. My working assumption is that there is a way to make it work but I hear you, and yes, there are undeniably challenging circumstances in Indonesia.

Moderator:

Ladies and gentlemen, we have reached the end of this seminar, but before we do, I would like to summarize what Dr. Ousmène has said about CBDC and how it could be a complementary solution for cash and wholesale central bank money, as well as a component of liquidation. Meanwhile, public and private collaboration is required to implement digital payment transformation and risk mitigation in order

to further explore CBDC as a cross-border payment, particularly for our long-term projections. I would like to thank our two speakers for their informative and interesting presentations, as well as all of the attendees for their active participation.

- SESSION 3 -
BANK INDONESIA INITIATIVE ON REGIONAL PAYMENT CONNECTIVITY: INTERLINKING ASEAN PAYMENTS

Arya Rangga Yogasati
Head of Payment Systems, Technological Innovations for the Digital Economy, and Finance Division, Bank Indonesia

MC:

Distinguished hosts from the Bank Indonesia Institute, esteemed speakers, moderators, participants, ladies and gentlemen, good afternoon, and welcome to the second day of the Bank Indonesia Institute International Flagship Seminar on Payment Systems in the Digital Era, which is taking place here in Yogyakarta. Today, we will have more up-to-date payment system topics with speakers from Bank Indonesia and Indonesia's electronic payment provider, DANA. Siwi Lungit, a senior broadcaster at TVRI Yogyakarta, will moderate the sessions on the second day. But first, a brief introduction before I invite her to the stage. Siwi Lungit is a TVRI Yogyakarta producer. She also hosts Plengkung Gading and Behind the Walls of the Kraton. She is also a lecturer at the Radaya Binatama Communication Academy Yogyakarta in addition to her work as a producer. Throughout her career, she has served as an master of ceremony and is currently a moderator at G20 events as well as events hosted by other ministries or institutions. Ladies and gentlemen, please join me in welcoming Siwi Lungit as our moderator.

Moderator: Siwi Lungit, Senior Broadcaster, TVRI Yogyakarta

Very good afternoon to all distinguished participants. First of all, I would like to express my gratitude and greetings to all of the participants, including those who are joining this seminar virtually. Ladies and gentlemen, and also distinguished participants, during Indonesia's G20 Presidency and the ASEAN Central Bank Governors Meeting in April this year, central bank payments, digitalization, and cross-border

payments became the priority agenda. Cross-border payment linkage through the interconnection of national QR codes of payment between two countries represents another milestone of the Indonesian Payment System Blueprint 2025. It also provides more options for users in cross-border payment transactions and becomes a key to improving transaction efficiency as well as promoting digital economic and financial inclusion. In this session, our first speaker from Bank Indonesia will be discussing the BI initiative on regional payment connectivity and QR payment linkage in ASEAN. Let me give you a brief introduction to our first speaker. Our first speaker, Arya Rangga Yogasati, has served as Head of Payment Systems, Technological Innovations for the Digital Economy, and Finance Division at BI since January 2022. Before that, he was a Senior Analyst in the Payment System Regulatory Division, Payment System Policy Department from April 2019 to December 2021. He also has experience as a Junior Associate at Bahar and Partners Law Firm, where he worked until June 2016. He has worked at BI for 15 years. He completed his studies at Northwestern University Law School in 2012 and his Bachelor of Law from the University of Indonesia in 2005. Ladies and gentlemen, please welcome our first speaker, Arya Rangga Yogasati. Arya Rangga Yogasati would like to talk about the Bank Indonesia Initiative on Regional Payment Connectivity, mainly on QR payment linkage in ASEAN. Arya Rangga, the floor is yours.

The Implementation of Cross-Border QR Code Payment Linkages

Speaker: Arya Rangga Yogasati, Head of Payment Systems, Technological Innovations for the Digital Economy, and Finance Division, Bank Indonesia

Honorable guests, Ms. Inge Van Dijk from De Nederlandsche Bank, Dr. Olaf Sleijpen from the De Nederlandsche Bank, Dr. Ousmène Jacques Mandeng from Accenture, and Handy Putranto from DANA, one of the payment service providers in Indonesia, distinguished participants, I would like to thank the Bank Indonesia Institute for organizing this seminar on payments systems in the digital era in collaboration with De Nederlandsche Bank. The topic is very timely, and I thank you for inviting me to represent the Payment System Policy Department of BI in this event to share BI policy and the implementation of cross-border QR code payment linkages with fellow regulators, market players, and other relevant stakeholders.

The policy mix of payment system digitalization alongside monetary policy aims to promote inclusivity, maintain stability and boost growth. Payment system policy

is implemented through three key strategies to achieve fast, convenient, efficient, secure and robust payment systems. First, accelerating sound, competitive and innovative payment system industry consolidation. Second, developing integrated, interconnected and interoperable payment system infrastructures. Third, promoting sound, efficient and prudent market practices. BI issued the Indonesia Payment System Blueprint 2025 as policy directions on payment system digitization that aims to accelerate the integration of the digital economy and finance. We have also set five visions of Indonesian payment systems as the underlying of the blueprint, in which the payment system should support the integration of the digital economy and finance, digital banking transformation, interlinks between banks and FinTech, and to strike the right balance between innovation and stability, including risk mitigation. Payment systems should also be able to support the national interest in cross-border payment systems. These visions are implemented in five main initiatives: (i) open API, (ii) the development of retail payment systems, (iii) the development of large-value payment systems and financial market infrastructures, (iv) data, and (v) regulatory reform. There are four key milestones in the implementation of the Blueprint. Since 2020, we have implemented regulatory reform, restructuring the regulatory framework to accommodate and facilitate the development of digitalization. We now prioritize a principle-based regulatory approach over a rule-based one, enabling us to be more agile and forward-looking when regulating digitization. In addition, we issued new regulations to replace or amend existing regulations to simplify them. This is a significant milestone for digital payments because we accommodate the new approach and policy on service provision, payment system infrastructure operation, and exit policy. The second milestone is the development of the retail payment system, where Bank Indonesia has developed and implemented BI-FAST, which is retail fast payment infrastructure that operates 24/7 in real time and is very efficient. Most people here are already familiar with BI-FAST, and we are confident that the majority use it as well. We encourage more people to use BI-FAST. The third milestone is payment system standardization. We have already issued national standards for API for payments or what we call SNAP. In addition, we already issued a national standard QR code for payments or what we call QRIS (Quick Response Indonesian Standard) code. Most recently, we developed domestic government credit cards. It is a credit card that can be used by the government to support government expenditures using domestic payment schemes. This is the most recent development.

QRIS: Game Changer in Digital Payments

QRIS has been a game changer in digital payments as well as becoming an entry point to the digital economy and finance ecosystem, especially for micro, small and medium enterprises (MSMEs). QRIS enables merchants, whether online or offline, including e-commerce, to shift from cash to non-cash transactions, facilitating various payment instruments as well as sources of funds (SoF). The journey begins with MSME onboarding to gain access to digital payments through bank or non-bank payment service providers. As a result, they will be able to both make and accept payments. We observe that QRIS boosts transactions for merchants, which will eventually increase the transactions and profitability of the merchants. QRIS also enables MSMEs to provide an alternative method of non-cash payment to its customers, resulting in increased transactions for merchants and boosting profits. We also see QRIS as an entry point to the digital economy and finance ecosystem because QRIS unlocks broader access to other digital financial services, such as financing and investment by utilizing their payment account, which also requires the users to have the QRIS transactions recorded electronically. Eventually, it forms a credit profile that allows users to obtain financing from a formal financial institution. Those are some of the benefits of QRIS. Before moving on, I would like to highlight the importance of synergy between regulators and the industry for QRIS development. I see representatives from the Indonesian Payment System Association here. We developed QRIS features and business models in collaboration with the Indonesian Payment System Association (ASPI), and it is still ongoing. I think it is very important to have strong synergy not only among regulators but also with the industry. Furthermore, we at BI continuously support digital innovations by providing a sandbox in which all QRIS feature and business model development are facilitated. In addition, we promote digital literacy through an initiative called BI Live Sandbox Space (BLISS), which is also in synergy with the industry.

QRIS Transactions are Accelerating

QRIS transactions are accelerating, showing significant growth in September 2022. Transaction value amounted to Rp9.66 trillion, growing 354% (yoy). In addition, transaction volume totaled 91.75 million transactions in September 2022, growing 184% (yoy). The expansion of QRIS covers not only the supply side for merchants but also the demand side for users. Last year, BI policy focused on achieving 12 million QRIS merchants, and by the end of 2021, the total number of QRIS merchants had

exceeded 40 million, which is way beyond target. This is quite an achievement, not only for BI but also for the industry. This year, we are focusing on how to achieve an additional 15 million new QRIS users, and as of September 2022, additional QRIS users amounted to 12.2 million, bringing the total amount of QRIS users to 23.7 million. As for the merchants, as of 21st October 2022, the number of QRIS merchants had already increased to 20.2 million, of which more than 90% are MSMEs. We believe QRIS is a tool that can be used to promote inclusivity, especially for MSMEs. Meanwhile, BI continues to develop QRIS features and business models to support the acceleration of the national economic recovery. We have already issued some policies on QRIS. First, Bank Indonesia issued a 0% MDR policy for micro merchants, which will be effective up to December 2022. This demonstrates BI commitment to support and empower microbusinesses, especially in order for them to deal with the adverse impact of the pandemic. The 0% MDR policy also shows that we encourage and aim to attract more micro businesses to adopt QRIS as their digital payment channel to support financial inclusion.

Through the second policy, BI adjusted the QRIS transaction limit from Rp5 to 10 million per transaction to facilitate larger-value transaction use cases as well as the electronification of government transactions and MSMEs, taking into account the risk management fulfilled by payment service providers (PSPs). The third policy is the development of QRIS features and business models, including cross-border QRIS. We have also developed other QRIS features, such as merchant-presented mode, customer-presented mode (QRIS without presence), and we are still developing QRIS for transfers, withdrawals and deposits (QRIS TTS). QRIS has also been able to boost interconnections among payment service providers and payment system infrastructure operators. The interconnection ecosystem is supported by 53 banks and 13 non-bank payment service providers, as well as four Payment System Infrastructure Operators (PIP), or switchers.

QR Code Payment Linkages

QRIS aims not only to promote digital payments in the domestic market but also to facilitate cross-border payments. By utilizing QR code or quick response code payment linkages, cross-border payments can be strengthened even further. Several ASEAN countries have already engaged in bilateral cooperation and are building QR code payment linkages with QR code payment-based modalities. For instance, we can see that Indonesia, Singapore and the Philippines are already cooperating

bilaterally on QR code payment linkage. Also, Singapore and Malaysia, Singapore and Thailand as well as Malaysia and Thailand. Indonesia has engaged with several ASEAN countries, including Thailand, Singapore and Malaysia, to develop cross-border QRIS or cross-border QR payment linkages. Moving forward, we acknowledge an opportunity to expand our existing bilateral cooperation with other countries, and we are fully committed to strengthening cross-border payment interconnections. Digital payment initiatives, including cross-border payments, have been a top priority agenda under Indonesia's G20 Presidency. These initiatives are being pursued through a number of strategies, such as QR code payment linkage. This must be supported by strong synergy among central banks. Promoting cross-border interoperability and interconnections requires a holistic approach that goes beyond simply boosting economic activity. It also involves maintaining stability. This is why we are focused on building and developing QR code payment linkage as well as optimizing the use of local currency in bilateral transactions for settlement processes. We firmly believe that faster, cheaper, more transparent and more inclusive cross-border payment services will yield widespread benefits, contributing to robust, sustainable, balanced and inclusive economic growth and development.

Facilitating Cross-Border Economic Activities

Indonesia continues to develop these features as well as business models, such as the cross-border QRIS, with the aim of facilitating trade activities and the tourism sector, especially for MSMEs, and strengthening macroeconomic stability through the use of local currency transaction schemes. We have also developed QR payment linkages with Thailand, Singapore and Malaysia. In terms of progress, we moved from the piloting phase to the implementation phase with Thailand in August, launched by Joko Widodo, the President of the Republic of Indonesia, along with the initiative to begin work on the QR payment linkage with Singapore. We have also been conducting a piloting phase with Malaysia to develop this type of linkage, which has been ongoing since January of this year. What is cross-border QRIS, what is its status and scope, and how does it work? In general, cross-border QRIS transactions in Indonesia are divided into two types: Indonesian inbound transactions and Indonesian outbound transactions. Inbound transactions enable users from counterpart countries to make payments using their domestic payment applications at counterpart Indonesian merchants by scanning a QR code. With outbound transactions from within the country, users can make payments via Indonesian payment applications to transact

with counterpart country merchants by scanning their QR code. In the case of Indonesia and Thailand, when users from Thailand visit Indonesia, they will be able to purchase goods or services by scanning QRIS from Indonesian merchants, and vice versa when Indonesians go to Thailand. We see the potential of cross-border QRIS when looking at the number of tourist visits prior to the pandemic among these three countries, Singapore, Thailand and Malaysia. We can see that the number is high, and cross-border QRIS will be able to facilitate retail transactions to and from those three countries once implementation begins. This will promote economic activities between Indonesia and these countries, and hopefully boost economic growth.

The Role of Central Banks and Project Journey

Central banks play a pivotal role in facilitating cross-border interconnections, especially the development of cross-border QR code payment linkage. This is one of the lessons that we learned from our experience building QR code payment linkage with Thailand. First was the role of the initiator. Bilateral financial cooperation between two central banks has become an important milestone in the initiation of cross-border QR code payment linkage. Bank Indonesia and the Bank of Thailand (BoT) signed a memorandum of understanding, or MOU, in 2019, long before initiating the development, the testing, the piloting and the implementation test. The objective is to strengthen policy synergy in the context of the payment system, while also promoting financial innovation. To succeed, central banks must play a role as initiators. Second, the central bank's role as a facilitator of the collaboration of relevant stakeholders and respective countries under the joint stewardship of BI and BoT has made QR code payment linkage between Indonesia and Thailand possible. The stakeholders involved in this collaboration include central banks, the Indonesian Payment System Association, the Thai Bankers Association, payment service providers, payment system infrastructure operators, and appointed cross-currency dealer banks that act as settlement banks. Central banks facilitated discussions among these players on the technical aspects of development, including the interlinking model that we developed and the business aspects by providing a conducive environment, including regulatory support, especially during the piloting and implementation phases. Third, the role of central banks as supervisors. BI and the BoT oversee the progress of the development, the piloting, and up to the implementation. We continue to monitor progress and ensure that service providers and operators stay within the parameters of the central bank policy and regulatory framework. BI and

BoT also supervise the discussions between these players in order for them to come up with a business model that serves national and public interest. The final one is the central bank's role in advocacy. The piloting phase began in 2021 followed by the implementation phase in 2022. The central banks alongside with the industry continue to disseminate, campaign and educate the public on the use and benefits of QR code payment linkage, either using traditional media platforms, social media or digital platforms, as well as in international and national level discussion forums.

I would like to share the project journey in developing cross-border QRIS with Thailand. Initiation was the first stage of BI's project journey in developing cross-border QRIS with Thailand. BI and BOT initiated bilateral cooperation, and the central banks then encouraged industry representatives to establish a working group comprised of technical and business working groups to discuss and exchange information about technical specifications, commercial aspects, and setting up project timelines. The development phase follows, and it consists of two technical streams that were assigned to develop interconnections between Indonesia and Thailand switchers, as well as the development of the application of payment service providers to enable linkage with their respective switchers. The business stream was assigned to determine commercial aspects, including the proposed pricing scheme, legal documents, business operations and settlement arrangements. The third phase is testing, in which industry representatives from respective countries conduct end-to-end testing of the payment processing. This includes technical and operational aspects, as well as currency arrangements for settlements. The piloting phase follows, during which we continue to conduct end-to-end testing in a limited scope, while also attempting to gather feedback from the industry on the user journey, the application, system operations and system parameters to ensure system readiness as well as risk-mitigation measures. Finally, there is the implementation phase. After all systems and infrastructure have been tested, we proceed to the implementation phase. This marks the beginning of full-fledged implementation and public dissemination. This was our experience when working with Thailand to develop a QR code payment language.

Guiding Principles and Linkage Scheme

The following slide outlines three guiding principles for developing cross-border QRIS with other countries. First, cross-border QRIS transactions should be more efficient than other payment methods, such as cash, credit or debit card transactions, withdrawing cash from ATM machines overseas, or exchanging banknotes at money

changers. Currently, we are trying to set up a more efficient pricing scheme and a more efficient fee using cross-border QRIS. The second principle is to make sure transaction settlement is done using the local currency transaction (LCT) scheme, which aims to maintain macroeconomic stability. The third principle is a linkage model, which utilizes interconnections between switchers or payment system infrastructure operators or networks, which are the back-end payment system infrastructures in the respective countries. The switcher-to-switcher linkage scheme that we have been developing enables payment service providers in each country, either as issuers or acquirers that become members of those switchers, to comply with the specifications for cross-border QRIS and make required adjustments accordingly. There are four Indonesian switching institutions that are participating in cross-border QRIS: Rintis Sejahtera (ATM Prima), PT Artajasa Electronic Payments (ATM Bersama), PT Daya Network Lestari (ATM Alto), and PT Jalin Payments Nusantara (JPN). The switcher in Thailand is the National ITMX (NITMX). The switcher from Malaysia is Payments Network Malaysia (PayNet), and the switcher from Singapore is Network for Electronic Transfers (NETS). Several appointed cross-currency dealers, or ACCD banks, who facilitate the settlement also participate in the scheme. Looking at the merchant ecosystem in each country and how the payment ecosystem is structured, we see it covers a lot of merchants in each country. For example, many merchants in Thailand are facilitating QRIS payments, with around 7 million merchants. In Singapore, there are more than 120,000 points of sale that facilitate QR code payments. Meanwhile, Indonesia has a total of 22.2 million QRIS merchants. If we succeed in implementing this QR code payment linkage among these countries, this will benefit merchants and users not only in Indonesia but also in Thailand, Singapore and Malaysia.

Transaction Flow

I would like to highlight the transaction flow and cross-border QRIS transactions. The first step a user needs to take is to scan the QR code for the transaction, followed by the authorization of their identity and the source of funds by the payment service provider. After that, the payment request or order is forwarded to the switchers, and finally, the fund settlement will be facilitated by the settlement bank. Cross-border QRIS transactions are very convenient and easy to use. In fact, it is not much different from using QRIS domestically in Indonesia. For example, if an Indonesian user purchases goods from a Thai merchant in an outbound transaction, they simply need to open their payment application and scan the Thai QR code. They then input

the value of the goods or services in Thai baht and confirm the beneficiary and the value in rupiah. This is where the local transaction settlement occurs. After that, the user needs to input a PIN as a security feature in the application, followed by a notification that the payment was successful. Users who want to make cross-border QRIS transactions in Thailand need to locate the QR code logo. This logo should display a QR code at Thailand merchants because not all online payment service providers have joined the cross-border QRIS scheme. Therefore, there may still be merchants who are not accepting cross-border QR transactions yet.

Progress of Cross-Border QRIS Transactions

Here are two charts showing the progress of cross-border QRIS transactions between Indonesia and Thailand. It shows positive development since implementation in August of this year. Looking at the chart, the value of Indonesian inbound transactions has reached Rp9.04 million, while the transaction volume amounted to 115 transactions. However, this is still quite limited and relatively low. We have coordinated with our colleagues in BOT to encourage more Thai users to use cross-border QR transactions. On the other hand, Indonesian inbound transactions show positive development. The total value of transactions has reached Rp764 million, with a total transaction volume of 2,141 transactions. The positive developments are due to a massive campaign done by BI and the industry, which included social media and Indonesian influencers who created digital content while making transactions in Thailand using the cross-border QRIS payments that went viral. This is some of the evidence, and we look forward to more transactions in the future on cross-border QRIS transactions with Thailand and other countries.

Indonesian PSP Participating in Cross-Border QRIS

This shows the providers and operators that are participating in cross-border QRIS from Indonesia. Currently, there are eight payment service providers acting as issuers, and if a user has a payment account with any of these providers, they can use the cross-border QRIS in Thailand. On the acquirer side, there are 40 payment service providers acting as acquirers. Thailand users can transact with Indonesian QRIS merchants, already covering 98% of QRIS merchants in Indonesia. This interconnection is supported by four switchers.

Thai PSP Participating in Cross-Border QRIS

On the Thai side, there are four issuers and five acquirers participating in the cross-border QRIS scheme, including one switcher. Recently, BoT informed BI that there will be five additional payment service providers in the very near future who will be joining this scheme. Once those five providers join the scheme, it will cover up to 80 or 90% of the total merchants that facilitate QR payments. Moreover, this will expand the adoption of cross-border QRIS, particularly for Thai issuers that facilitate cross-border QRIS inbound transactions as well.

Key Takeaways

To reiterate, here are three takeaways. First, Indonesia will further strengthen cross-border payment interconnections by utilizing QR payment linkage in collaboration with other central banks and the industry. Second, the expansion of payment service providers participating in cross-border QRIS and the dissemination to promote cross-border QRIS adoption will be continuously enhanced. Lastly, innovation of QRIS features and collaborations with relevant stakeholders, including other central banks and the industry, are prerequisites for developing QR code payment linkages moving forward.

Moderator:

Thank you for such an interesting presentation. Looking at the number of QRIS users, especially for cross-border payments, we still have a very low number of QRIS users for cross-border payments. We remain confident, however, there will be more QRIS cross-border payments in the future and that they will keep increasing, especially in Indonesia. Thank you very much for the interesting presentation. We still have 20 minutes for the Q&A session.

Q&A Session

Offline Question:

This is very interesting because it opens up the opportunity to optimize the use of QRIS in the ASEAN region. Is there any potential sweetener? For example, we could offer a fixed exchange rate or a discount to encourage adoption. When introducing

something new, especially when it competes with cash or credit cards, it is important to offer something enticing, such as a sweetener for the program. Additionally, have you considered expanding beyond the ASEAN region? Many tourists visit Japan, Korea or Hong Kong, and they make a lot of transactions there as well.

Speaker: Arya Rangga Yogasati

I have had a lot of questions about the sweetener for QRIS transactions. What are the benefits of using QRIS not only for users but also merchants? I will talk about the sweeteners for the merchants first. The MDR, or Merchant Discount Rate, which is a fee charged to merchants for accepting payments using payment instruments. The MDR rate for QRIS ranges from 0 to 0.7%. If we compare that with other payment methods, such as credit cards using the international principal scheme, the MDR rate can range from 1 to 3%. Therefore, QRIS is much more efficient for merchants facilitating transactions. For the users, many payment service providers offer promotions. If a user transacts and buys something with QRIS, they can earn points, get a discount, or get some other incentive. We also regularly conduct what we call Nasional QRIS Week. During National QRIS Week, we collaborate with payment service providers and all Bank Indonesia representative offices to campaign QRIS to users and merchants, and during this period, we will offer some kind of promotion to encourage QRIS use. The other benefit for users is that if they do not need to carry cash in their physical wallets, all they need is their gadget or smartphone. Some users think it is more convenient and secure not to carry a lot of cash in their physical wallets. Some also believe it is more hygienic, especially during the pandemic. Additionally, users can manage and monitor their transactions, thus controlling their spending more efficiently. For merchants at traditional markets, the cost of cash handling might be an issue if they transact using cash. By accepting QRIS as the payment method, the exact price is tendered as the payment, which will reduce the fee for cash handling and also reduce the risk of fraud or counterfeit banknotes. There are many benefits to using QRIS.

To answer the second question about the plan to expand to other countries, we are absolutely still discussing this with several central banks, and hopefully, in the near future, other countries will participate in this QR code payment linkage. However, this needs a process, not only up to the implementation phase, but we also need to discuss the development phase, the testing phase, and the piloting phase. Hopefully, we can expedite this process moving forward.

Follow-Up Question:

Perhaps the next agenda item is to make socialization a priority for travel agents as well. For example, if there is a tour group or travel agent, they should be advised to use cross-border QRIS.

Speaker: Arya Rangga Yogasati

Yes, that is a good idea.

Moderator:

Yes, good idea. Responding to the first question, other than sweeteners, it will be essential and important to educate people about the benefits of using QRIS in the future.

Question:

With regards to cross-border QRIS, is the central bank looking at lifting the IDR restrictions for transactions done abroad? For example, if a QRIS transaction is done in Indonesia and a cross-border transaction is initiated, the foreign party would also see the amount displayed in QRIS and complete the transaction. However, what if the QRIS is displayed in IDR on a website in Thailand and the person in Thailand completes the transaction with an IDR amount? This would mean there is a utilization of IDR abroad. Are there any plans to lift the IDR restrictions, or is it the same for Thailand's currency when used in Indonesia? Another question is, can we bring QRIS abroad? This is a customer request because they had a promotion in Thailand, and as a non-resident on a temporary basis, they wanted to set up a stand or booth there. They have QRIS in Indonesia and would like to use it in Thailand, but we may not be aware of any regulations or restrictions on our currency.

Speaker: Arya Rangga Yogasati

I hope I have understood the questions correctly, starting with the second question first. Recently, the Embassy of Singapore contacted BI to organize an MSME showcase in Thailand and asked whether they could use QRIS as the payment method in

Thailand. However, one must not only consider the technical aspect but also the jurisdiction of the local authorities. For example, in Indonesia, only one QR code for payment is allowed, which is QRIS. Furthermore, whenever we want to showcase QRIS in another country's territory, we need to discuss this with the central bank in the country, which is what we did with BoT. There are some restrictions, similar to what we have in Indonesia, and they may provide exemptions, but they are limited in scope.

Regarding the first question, can a foreigner use a QRIS payment or QR code for cross-border payments in Indonesia? From a technical aspect, it is possible, but not all payment service providers support it. This is because it is similar to QRIS, but adjustments to the specifications may need to be conducted by payment service providers. We do not encourage people to do that because we are not sure whether it will work effectively or not. For now, we are focusing on physical transactions happening in Thailand's territory using Indonesian domestic payment applications.

Question:

Thank you for this insightful presentation. It was very interesting. On one side, there is the technology, such as the QR code, and on the other side, there are the financial aspects of this new scheme. I understand that there are limits to the MDR, and I wonder how you manage the public-private collaboration and who determines the fee structure and how are the switchers paid? Is there an exchange rate, and how do you prevent a situation where only a few switchers become dominant and monopolistic like Visa and MasterCard?

Speaker: Arya Rangga Yogasati

OK, thank you for your questions. They are very good, and not many people ask them. Regarding the pricing scheme, I understand that it may be uncommon for people in other countries, but in Indonesia, the central bank has the authority to set up a pricing scheme for the payment system. This includes the fee structure for payment services provided by payment service providers or the operation of payment system infrastructure. Although we do not determine all pricing schemes in the industry, we are committed to developing a pricing scheme that is more efficient than other

payment methods for QRIS. We work with the industry to come up with proposed pricing schemes for QRIS, and Bank Indonesia evaluates whether they are fair and more efficient compared to others. Then we decide on the pricing for that feature. Regarding your concerns about monopolies, I do not think there will be monopolies. Honestly, all the switchers participating in the scheme are Indonesian switchers. There are no other Indonesian switchers other than the four switchers participating in the cross-border QRIS we are now developing. We also emphasize the importance of the domestic scheme and encourage first-mover participation. In Thailand, four switchers are already participating, and for Singapore, Malaysia, and other countries, we will invite them to participate in the QR payment linkage in the future.

Online Question:

Microenterprises, the driving force of Indonesia's real sector economy, face a myriad of complex issues regarding the optimization of QRIS usage. These issues include low levels of literacy and technological proficiency among micro-enterprise players, requiring focused attention to optimize QRIS usage. Furthermore, weak network infrastructure or internet connections in remote areas where microenterprises are located pose significant obstacles to QRIS transactions. Additionally, the imposition of fees or merchant discount rates (MDR) of 0.7% on transactions may be a consideration for microenterprises when deciding to use QRIS. Given these challenges, what is the most effective step Bank Indonesia can take to optimize QRIS usage, particularly for micro-enterprise players?

Speaker: Arya Rangga Yogasati

To answer the first question about financial literacy, this is one of the main challenges that we face when we are not only campaigning for QRIS but the whole digital payment system, where financial literacy becomes our focus. All Bank Indonesia representative offices, the Indonesia Payment System Association (ASPI), all payment service providers, and all payment system infrastructure operators are encouraged to enhance financial literacy, especially in remote areas. We have been doing this for quite a while, but yes, there is still homework to do, and we are moving in the right direction.

To answer the second question about infrastructure, this is one of the main challenges we face in our digital payment campaign. It will probably be useless to talk about digital payments that are not supported by solid or strong digital infrastructure, such as internet networks and others. We have cooperation with the Ministry of Communication and Information Technology, and they have a program called BAKTI Kominfo. They have identified the remote areas that need to be enhanced in terms of digital infrastructure, and they are building and developing the digital infrastructure in those areas. We have also been trying to match them with the identification that we have been doing at Bank Indonesia. Our aim is to expand the adoption of QRIS by targeting the same remote areas. This will not only improve digital infrastructure but also promote the adoption of QRIS in these areas. This is one of the solutions we are working on with the government.

Regarding the question about MDR for QRIS, the rate ranges from 0 to 0.7%. The 0% is for micro-merchants, effective until December 2022, and 0.7% for other small and medium enterprises (SMEs). A 0.7% rate is already more efficient than other payment methods, but people need to understand that there is no such thing as a free lunch going forward in this situation. Yes, we can set a 0% policy, but it is not be sustainable if we push the industry to set up a free charge for merchants. We need to strike an optimal balance between the interests of all parties involved, including customers, merchants, and providers or operators. That way, this will create a more sustainable ecosystem for the future.

Moderator:

We appear to be running out of time, and that marks the end of session one. To summarize, QRIS in Indonesia has supported national economic recovery, and as a result, Bank Indonesia continues to motivate society to take advantage of QRIS' benefits. Meanwhile, Bank Indonesia continues to face challenges and difficulties. In terms of the cross-border payment system, Bank Indonesia is continuing to strengthen innovation and collaboration with various stakeholders.

MC :

Siwi Lungit, as moderator, and Arya Rangga Yogasati, as speaker, thank you for your thoughtful presentation and discussion. Ladies and gentlemen, before we begin the final session for today, we will take a quick break.

- SESSION 4 -
CBDC THROUGH MARKET LENS: OPPORTUNITIES AND CHALLENGES

Handy Putranto
Lead Product Manager for Core Payment, DANA Indonesia

MC:

Welcome back, participants. We will now begin the last session of our seminar with the topic, CBDC Through the Market Lens: Opportunities and Challenges. And to moderate the session once again, Siwi Lungit, the floor is yours.

Moderator: Siwi Lungit

Thank you so much to everyone for being so enthusiastic about following the entire agenda during the seminar, especially those of you who follow this seminar virtually. Today, in the second session, we would like to discuss CBDC through a market lens: opportunities and challenges. While we have been discussing CBDC issues and future implementation for several days, we all know that the examination of CBDC design and infrastructure must be broadened by considering its access and interlink options. Since CBDC has the potential to have a wide-ranging impact on various aspects of the economy, a careful assessment is required. In the second session, we will look at CBDC through a market lens: opportunities and challenges. Our speaker is Handy Putranto, who has been the Lead Product Manager for Core Payment at DANA Indonesia since 2018. He is an expert in money transfers, payments, and digital goods. He is also a finalist for the G20 Hackathon CBDC, and it has an achievement to help build a money transfer solution in DANA that now scales to a million transactions per day. He also has experience as a Trade Marketing Executive at Mondelez International from 2014 until 2017. He completed his degree at the Economics Faculty of the University of Indonesia. Ladies and gentlemen, please welcome Handy Putranto.

Speaker: Handy Putranto, Dana Indonesia, Lead Product Manager

Thank you for the opportunity, it is an honor for me to stand and speak here. As this is the final session, we should change the format to include more discussions because CBDCs are new and very conceptual. I went around the room yesterday asking about CBDC, and everyone has their own interpretation of CBDC. Today, we would like to have a more in-depth discussion. If you have any questions during my presentation, please raise your hand. I am not a CBDC expert but Dr. Ousmène is also here as an expert on CBDC, and hopefully he can help us answer some questions later.

The State of Play on Digital Wallet and the Move Forward

CBDCs are highly contextual, with each country's challenges and opportunities being different. We have a major contribution in underbanked and unbanked populations in Indonesia, and credit card penetration is low. Looking at the growth of Indonesia's digital penetration, it appears to be more similar to China than to the United States. We skipped the credit card penetration phase and went straight to digital payments. We have also seen an increase in digital adoption, with many smartphone users and digital payment users, and it keeps growing every year. Furthermore, we have a massive consumer payments market, and digital payments are growing strongly. We are unique and big, but a large portion of the population remains unbanked or underbanked. The greater purpose of DANA is to bridge the financial inclusion gap. Whatever we discuss today should be for better financial inclusion in Indonesia. Every day, we must find new ways to improve financial inclusion. We currently have 120 million users, performing 10 million transactions per day, and eat 8,000,000 transactions just for breakfast. Yes, we can still double it, and it is simple for us. We have 20 million merchant acceptances, the #1 financial best-in-class ranking, and an 85+ Net Promoter Score. We have over 50 avenues of integration with financial institutions and 900 employees from all over Indonesia. DANA is 100% Indonesian.

Our backbone for payments is QRIS, which is very unique and very Indonesian. Before QRIS, every bank and every player had their own QR. Right now, there is only one QR, which is QRIS, and it enables financial inclusion. People do not need to download a different wallet or different application to pay; they only need one, which they can scan. From the merchant's perspective, they only need to integrate with one, and they can accept payments. It moves people from cash to cashless, and QRIS is one of the success stories that DANA Indonesia and all the players in

this space have already made. DANA is already part of QRIS cross-border as well, but we do not need to explain more about QRIS cross-border. We are also a part of the National Open API Payment Standard (SNAP) published by Bank Indonesia. We standardize the application programming interface (API) for payments, and before SNAP, every bank and every merchant had different API standards. Right now, we have one API standard. In the Western world, it is called the open banking system, and in Indonesia, we call it SNAP. We are already there, and we have standardized everything, which saves us time and money as we connect with more banks and merchants, while also promoting financial inclusion for the people. We are 100% SNAP and a first mover along with fifteen others, and we see the potential to be open for the cross-border. Perhaps SNAP can be open for the cross-border as well later on.

Rethinking CBDC and its Market Preparedness

First, consider the economics of fiat money. Indonesia is a very large archipelago, so the cost of cash handling is also large. We have a 4 to 15% cost of cash handling between the creation of cash and the printing of money, which is Rp16 trillion. Then there is cash distribution, which includes returning cash to its original location. It is very costly, and we can save 10 to 20% through digitalization. As a result, digitalization is essential for a more efficient system and greater financial inclusion. CBDC has a lot of opportunity with payment systems, two-tier payment systems, and a tech-based and novel interface. Earlier, Dr. Ousmène stated that we would discuss digital money and smart contracts in a more simplified manner. There is interoperability in multiple dimensions. What do Indonesians think of CBDC? 60% of Indonesian consumers say they are likely to use CBDCs. On the surface, however, we are getting ahead of ourselves because the concept is not yet built here. CBDC is still a concept and an experiment. We see a lot of concepts and how the CBDC with China, the UN, and digital are moving forward, but in general, CBDCs are very conceptual. They are still a proof of concept, and there are still pilots everywhere. CBDC has no set method or design.

Earlier, I went around the room and asked participants what they thought CBDC was, and everyone had their own opinion. What exactly is CBDC, and how does it work? Also, what is the trade-off of CBDC, given that every opportunity comes with a trade-off? The BIS white paper by Raphael Auer and Rainer provides a good understanding of the basics and trade-offs of CBDC design. The first is about convenience, real-time payment, and cash-like, peer-to-peer and related

to CBDC architecture. Is the CBDC claimable directly to the central bank, or must it go through intermediaries? That is the first stage, and then it is about resilient and robust operations. Should it be DLT-based, or should it be a central bank infrastructure? Also, should it be account- or token-based access technology? It should also be accessible to all and ensure privacy in lawful exchange and related with cross-border payments. Regarding the challenges and trade-offs, who should decide which is the best trade-off? I think the user should decide, and we should see the local challenges. We have two types of users here: end users and industry. We also have a local challenge and a crypto challenge because CBDC are similar to crypto, digital tokens, DLTs, and such. This comes with a challenge as well. The local challenge is that we have a huge population, we are an archipelago, and we have low infrastructure, including electricity, internet, and so on. Users want it fast, secure, simple and private, and they want to use it anywhere, anytime and 24/7. For the industry, it is about interoperability, resilience, robustness and programmability. Crypto, on the other hand, still faces many challenges, like low digital literacy. If the design is a digital token, then the user still needs to store the key securely for themselves as well as remember the blockchain address, which is usually a long random number with words. This is DANA's approach to the design and what we also bring to the Hackathon G20.

First is wholesale, which is beyond our scope and still needs a lot of exploring. There was a long post on Reddit talking about the future of cross-chain, and the author said cross-chain is impossible because there are too many attack factors, but perhaps multi-chain is probable in the future and is something we should all be thinking about. For the design approach, we can combine both account- and token-based technology using multi-signature. In terms of account based or digital tokens, there is no need to pick one because we can combine them. We prefer not to use DLT for the sake of reliance, robustness and speed. What is distributed ledger technology? For the design approach, claimable CBDC is sent to the central bank to help users feel secure, and even if they get it from the intermediaries and they collapse or there is fraud, they can still redeem the CBDC through the central bank directly. Also, the intermediary approach to Know Your Customer (KYC) and retail payment. DLT is the capability to split the ledger and build transparency between nodes. The nodes maintain the integrity and security of the ledger. The Byzantine Generals problem is a well-known computer science problem related to achieving consensus in a distributed network where some nodes may be faulty or malicious.

In this problem, multiple generals are trying to coordinate an attack on a city, but they cannot trust each other completely due to the possibility of traitors or unreliable communication channels. If most of the generals agree to attack together, the attack will succeed. However, if several generals become cowards or traitors, the attack will fail. In the context of distributed ledger technology, consensus mechanisms are used to ensure that all nodes in the network agree on the state of the ledger. However, which ledger is correct, and which is not? Imagine there are three transactions from A to B to C to D to E to F. How can we ensure that the same transaction is recorded in each ledger? What if the first ledger only records the first transaction and the second ledger can only record two or three? Who has the right to write in the ledger? Bitcoins use proof of work to solve this problem. As a result, the ledger must perform some of the work, which is literally the membrane. In proof of work, nodes compete to solve a complex mathematical problem by using brute force to validate transactions and add new blocks to the blockchain. Once a node successfully solves the mathematical problem, it is allowed to add a new block of transactions to the blockchain, and the rest of the ledger will follow. Ethereum uses Proof of Stake, a different consensus mechanism, to solve the consensus problem. DLT requires a consensus mechanism, but it can potentially slow down transactions. However, without a consensus mechanism, DLT would not be possible. However, CBDC does not necessarily require DLT because CBDC stands for Central Bank Digital Currency and is centralized in nature, unlike DBDC, which stands for Decentralized Bank Digital Currency. Bitcoin and Ethereum require DLT and a consensus mechanism because they are decentralized, which means there is no single truth or objective factor that can be assessed.

What is a digital token? In the case of Bitcoin, access to CBDC is tied to cryptographic schemes, where a private key is used to sign transactions. From the private key, a user can generate a public key and then an address. However, it is not possible to go backward from the address to the private key. In the context of Bitcoin, the private key is used to generate the public key through an elliptic curve, and the public key is used to generate the Bitcoin address through a hashing function. However, it is important to note that this process is unidirectional and irreversible, meaning it can only go forward, not backward. Users must remember the private key to access and transfer the token because it serves as proof of ownership. In the cryptocurrency world, private keys are often stored in seed phrases, which are approximately twenty-four words that can generate the private key. This makes it

easier for users to remember their private key. With digital tokens, programmability can be built on top of that. In Ethereum, this is achieved through smart contracts, where a user can build logic on top of the digital token. For example, one could create a smart contract that ensures that universal basic income can only be spent on specific items, such as groceries, and not on alcohol or cigarettes.

Core Features

Based on the core features of CBDC, there are some basic principles that need to be ensured, such as no harm to monetary and financial stability, coexistence and complementarity of public and private money, and promotion of innovation and efficiency. To achieve this, we need to ensure that CBDC is secure, interoperable, has a robust legal framework, and meets regulatory standards. To successfully implement CBDC, there needs to be synergy between all stakeholders involved. Indonesia is a large country with a fast-growing population spread across an archipelago. The central bank alone cannot achieve financial inclusion through CBDC. Therefore, collaboration with the private sector is crucial to reaching a wider audience and promoting financial inclusion. A central bank serves as the core leader with the help of DLT, and a payment interface provider connects the user to the ledger. The user merchant then uses the payment interface provider to process transactions. From a user perspective, there should be no difference between CBDC and non-CBDC transactions, except that they need to remember their seed phrase or private key. Other than that, it is still the same as using any other payment method, such as GoPay.

Our proposal for the Hackathon involves a hybrid mode concept, where intermediaries help bridge the gap between the central bank and the user. In this model, the money can be claimed by the user directly from the central bank, making it more accessible during situations, such as bank rushes. For the Indonesian market, our proposal involves allowing users to open accounts at Mandiri, BCA, or DANA and complete the KYC process through intermediaries. The intermediaries can then generate addresses or keys for the user. To make transactions easier, if a user wants to send money to a friend but does not have their address (which is long and complicated), they can provide their phone number instead. The sender can sign the transaction as the key owner, and the intermediaries can facilitate the transaction between different banks, such as from DANA to BCA. All of these transactions can happen off-chain, using a multi-signature approach, before being recorded on the Bank Indonesia ledger as the ledger owner. Users will be given a new address when

they open an account, and KYC will be required for all transactions on-chain. We are not worried about the scalability and robustness aspects because we are not just using DLT. Everything centralized is fast. The intermediary will also sign the transaction and transmit it to the node operator. Users can send their phone number as a proxy, and there is no need for them to remember the blockchain address. KYC and non-KYC users will have different capabilities. Currently, in Indonesia, we have a different approach for KYC and non-KYC users. Non-KYC users cannot send money and can only receive up to Rp10 million in their wallet. We can still maintain this principle by locking it off-chain. With this concept, since all transactions are on-chain, we use a digital token, which ensures anonymity and allows everyone to query and check the ledger. This ensures that the ledger is not broken and that no one cheats it. This is AML on steroids.

Key Takeaways

Indonesian users are much more likely to view the potential of CBDC favorably than those in developed markets, and this could be a leapfrog moment for them. However, as the technology is still new, we should be cautious and vigilant in implementing it, as it has the potential to bring about significant changes. Furthermore, central banks can work with the private sector to ensure the widespread availability of CBDCs for consumers and educate them about the benefits in terms of convenience, security, and low cost. We can help central banks ensure that CBDC can promote financial inclusivity. Users who are prepared to use CBDC see a wide range of potential uses, such as complementing payment apps, cards, mobile wallets, and cash. CBDCs can also be a tool for financial inclusion. Indonesians are already accustomed to using digital payments. Together with players like GoPay and others, we can promote financial inclusivity. As long as we can ensure that CBDCs are not seen as just another new payment method and are integrated seamlessly in the background, there is no need for consumers to fully understand what a CBDC is. We can help facilitate this integration.

Moderator: Siwi Lungit

Thank you and give a big round of applause to Handy. We still have enough time for questions and answers. As a reminder, we can address questions in bahasa Indonesia if it is more comfortable. We would like to open the first session for offline participants.

Offline Question:

I am interested in your optimism, particularly regarding the potential of CBDC as a new tool for financial inclusion in Indonesia. Could you please elaborate further on how CBDCs can be used as financial inclusion tools, given that many rural areas in Indonesia do not have internet access? Additionally, could you please share more information about the estimated infrastructure costs involved in building the CBDC on your system?

Speaker: Handy Putranto

To address your first question, there are many things we can build on top of CBDCs, such as programmable digital tokens. For example, we can implement universal basic income, which would allow us to directly help people and ensure that the money is used for its intended purpose. By implementing universal basic income, we could prevent the money from being used for things like cigarettes and alcohol. With these types of new rules and limitations, we could potentially send money directly to those who need it, opening up new possibilities for financial inclusion.

Regarding your other question, offline payments can be made using hashed logins, which is something that is known on the Lightning network. As the use of CBDCs grows, we may be able to implement similar solutions to enable offline payments using programmable digital tokens. Also, even people without an internet connection can participate in Lightning Network transactions. Both the sender and recipient can receive the money by locking the transaction in their smart contracts. Once either the seller or the buyer has access to the internet, the transaction can be settled on the ledger. I appreciate Dr. Ousmène discussing how CBDC can offer solutions for various issues in the future, some of which we may not see right now. There is a lot of potential for CBDC to bring about positive changes.

Regarding the second question about the cost of infrastructure, I believe intermediaries such as DANA and GoPay will still exist, as we only maintain our own ledgers. We do not maintain the CBDC ledger, although we may create a copy of it. The central bank will be responsible for recording every transaction in Indonesia, which will require a significant amount of infrastructure. However, I am not worried about technical limitations, as companies like Google and Apple can handle massive transactions, equivalent to a small or medium country. While Indonesia is a large

country, I do not think that recording all transactions on-chain will be a technical limitation in theory, though it remains to be seen in practice. Also, you previously mentioned that DLT is necessary to use digital tokens. However, I disagree and believe that digital tokens can be utilized without a distributed ledger by downloading the Ethereum repository from GitHub and running it on your own server. While a distributed ledger is required for maintaining transaction integrity, it may not be a necessary requirement for digital tokens unless there is a need to split the ledger.

Online Question:

From a PSP perspective, do we still need to implement CBDC, considering that Bank Indonesia already provides QRIS for retail payments, BI-FAST for wholesale payments, and Local Currency Settlement (LCS) for cross-border payments?

Speaker: Handy Putranto

In my opinion, we do need CBDC because it can solve different issues, but it is not urgent, so we should proceed slowly. Perhaps we can observe another country's implementation of CBDC and learn from it. There is no need to rush because we can still do many things to promote financial inclusion without CBDC. What kind of different needs can CBDC solve? Firstly, it improves security by making CBDC redeemable directly at Bank Indonesia, removing public concerns about bank runs. After CBDC, there will be no bank runs, and every penny can be redeemed directly at the central bank. Secondly, by building a digital token, we can add smart contract logic, which can open up a lot of possibilities with those types of capabilities.

Question:

Concerning programmable money, so to speak. It is also a question for Dr. Ousmène. We discussed the PFMI, the Principles for Financial Market Infrastructures at a recent seminar, Principle 9 on money settlement and Principle 8 on final settlement states that settlements should be final and irrevocable when the payment is settled, it is final and can be used for anything. And my question is, if you would, for example, mark some government distribution and say you can only use it for healthy food and not for cigarettes and so on, what would this mean? Would you get two or

three different kinds of money, or would you have more wallets in effect? If you say that the money is yours but actually you cannot use it unless you use it for a certain purpose, this would be a major change to the character of money. Actually, one could argue it is no longer money. It is like a voucher, and of course you can make a voucher on a blockchain, and the voucher can be in the currency of the rupiah. I can understand that, but would that then be the architecture, and would you then have as many different vouchers and schemes as any government would invent? From a central bank perspective, you are not a central banker, but I would be at least hesitant to be involved in this proliferation of different currencies, like the non-cigarette rupiah, the holiday rupiah, and so on. It could also become a mess, maybe, and, well, just a question on the efficiency of this.

Speaker: Handy Putranto

I think it is more of an ideological question. What is right to be considered money? Should it be designed with anti-censorship values in mind, or can it be used for everything? That is why CBDC is highly contextual. Are we allowed to use it or not? It depends on us. This does not mean that we should not build the capability of smart contracts on top of a digital token, but how we use smart contracts depends on us. Like every country, we have certain values. To answer the second question, it is not different money for different purposes, it is still the same money because we can build that logic on top of the smart contract. For example, we can call it eRupiah, and the logic of the smart contract will be based on eRupiah. Therefore, it is the same eRupiah, but the amount for certain cases may be different. You cannot use this certain amount in this case, but it is all theoretical.

Question:

I was in Argentina after the financial crisis, I think it was around the year 2002. And there was a big problem with the peso, and then the governments were issuing their own banknotes. You had the official banknotes and the regional banknotes, and they were all in pesos, but you could use the local banknotes to pay taxes. They were actually paid as a salary to civil servants, and then I saw in restaurants that it was possible to make some advertisements, so you could pay 50% in copper and the other 50% in whatever. I would think that as soon as you implement something

like this, there could be a risk that you say, Okay, I like cigarettes, and it would be easy to create a market that you can exchange the vouchers for money that you can use for anything, and then you can say it is the same rupiah, but it is not. I can give another example of East Germany and West Germany, which had the same 1-1 Deutsche Mark (parity rate), but it was not 1-1. This was the official rate, but there was a black market. Then one could argue, is this the way we like money to function and also free markets to function in the price formation of money?

Speaker: Handy Putranto

That is a good case study, but I think it is just one aspect. CBDCs use a lot of technology from the cryptocurrency world, but I do not think cryptocurrencies are the best solution. However, one thing that is highly valued in the cryptocurrency world is the user experience (UX). Currently, many engineers are building cryptocurrencies without considering the UX. But I believe that with the right UX, we can ensure that users can easily understand which portion of their funds they cannot use for certain purposes, such as buying cigarettes. This will be a technological challenge, but I think it can be addressed at the UX level rather than the technological level. From a technological perspective, if one use case fails, it does not mean we cannot build the foundation of a digital token. Maybe we can ensure that no one builds a smart contract that does not allow users to buy cigarettes, as long as we agree on this as a country. I do not think this issue should block the development of digital tokens.

Online Question:

I am wondering why DANA is so intent and aggressive in pursuing CBDC research. What are the primary driving forces behind this?

Speaker: Handy Putranto

Some of us may come across as aggressive because we are participating in the G20 Hackathon. However, as a company, we are not generally aggressive. We are here to learn and gain a better understanding of things. We do not have a research team; rather, we are a small group of individuals who have joined hands to participate in the G20 Hackathon because we share a passion for cryptocurrencies and want

to bring positive change into people's lives. This is not a company-wide approach, but rather a few of us who are enthusiastic about this concept and have decided to participate in the G20 Hackathon.

Moderator: Siwi Lungit

It is not about being aggressive, it is more about the G20 Hackathon and its process.

Speaker: Handy Putranto

Yes, I think it is mostly based on curiosity. Yesterday, I walked around the room and asked people about CBDC. One of the questions that stood out was about where to start learning about CBDC, as it is vast and still largely conceptual. I believe that everyone has their own way of approaching this, and I am often asked this question. My answer is to read the Bitcoin white paper. Many of the technical concepts behind CBDC are derived from cryptocurrency, and the Bitcoin white paper is the genesis of this technology. If you want to learn more about CBDC and its technical and conceptual basis, I believe that is a good place to start.

Moderator: Siwi Lungit

Everyone has an opportunity to learn more about CBDC and how we see it in the future, as it will potentially offer solutions to many problems. However, we must also consider the challenges, opportunities, and our vision for the future. I am interested in the program of the Hackathon, and perhaps you could share it with us. It would likely be an interesting story for the audience.

Speaker: Handy Putranto

Technically, we did not win, and we are not in the top three. We are only in the top twenty for the shortlist for CBDC. However, this is still something new for us as a company, as we have never previously explored cryptocurrency. In fact, several of us had to study the good and bad aspects of cryptocurrencies, the current state of the financial system in Indonesia, and how to strike a balance to create a CBDC.

Everything related to CBDC is still very conceptual. I do not believe there is a definitive way to say what is right or wrong about CBDC. Everything is still in the pilot and white paper phases, and each country may have different approaches.

Question:

Before I ask my question, I would like to mention the current forecast. Many global institutions, such as the IMF, World Bank, and even our President Jokowi, have warned us about the forecast for 2023, namely the threat of recession and the development of CBDC programs may lead to high costs. From the perspective of a private company like DANA, do you think it is still relevant for central banks to continue developing CBDC, or should we suspend it temporarily until the economy recovers from the recession?

Speaker: Handy Putranto

I think this question is related to the previous one about the origin of CBDC, correct? In my opinion, CBDC is going to provide a lot of opportunities in the future. Smart contracts and digital accounts can enable many things, but it is not an urgent matter. If financial inclusivity needs to be improved urgently, we can still prioritize initiatives like QRIS, SNAP, and others, rather than CBDC.

Question:

One thing that I do not understand today is exactly what problem we want to solve with CBDC. This is the first issue. Second, how do you think CBDC can replace the current electronic money that is already in place when people are already aware of electronic payment options, like QRIS or BI-FAST? When I look at the current CBDC, especially the digital yuan or renminbi (RMB) issued and backed by the People's Bank of China (PBOC), it seems that it is not widely adopted in China. They use it as a bonus or giveaway for people, which demonstrates that CBDC acceptance by the Chinese people is not that high. Do you think that Indonesia will face similar problems when introducing CBDC?

Speaker: Handy Putranto

Good questions. What can CBDC solve that our current financial system cannot already solve? The answer is the capability to claim redeemable money directly from the central bank. In the future, there will be no bank runs because all your money will be in the form of digital tokens, and even if intermediaries collapse, you can go directly to the central bank because it uses the same ledger. There is only one ledger; therefore, your ownership is always accounted for, whether you own the money directly or through intermediaries. I think this is the first problem that CBDC can solve. The second issue is about smart contracts and how we can build programmable money. This refers to what kind of logic can be added on top of money and how it can be used. A lot of logic can be built on top of money. For example, if we look at how Ethereum works and how DeFi (decentralized finance) works, we can see that A can be transferred to B and then to another user. We can ensure that the purpose of the money is fulfilled, or we can give money to our friends and ask for it back in 90 days, or whatever time we want. A lot of different use cases can be built on top of programmable money. Currently, we do not see many different use cases for programmable money in the cryptocurrency world because smart contracts are mostly used for trading. However, once it is implemented in CBDC, which is real money, we can start to see a lot of different things about how to program money. Obviously, no one can answer this question clearly because no CBDC has been fully implemented and we do not know exactly how programmable money can be built yet. Could you please repeat the second question?

Question:

The second question was about the acceptance of CBDC by the people. If we look at other countries that have introduced CBDC, the acceptance has not been great, with only a small number of CBDCs currently in circulation. For example, when we look at the renminbi or the CBDC in Nigeria, the numbers in circulation are not high. Do you think that if Indonesia were to introduce CBDC, it would also face similar issues with the acceptance of CBDC?

Speaker: Handy Putranto

I think the issue with CBDCs is that everything is still in the pilot phase. Since it is still in the pilot phase, people are not required to use it. In China, the biggest pilot has already happened, but I do not think they are going to force it on people right away. They are still assessing whether the systems are in place and whether they have a positive impact on people. Right now, it is still a choice for users, but I do not think the Chinese Government will keep it that way forever. As for ensuring user adoption, I believe it depends on the design of the CBDC. Do you want the CBDC to run in the background, where users are not even aware that it is a CBDC? They can still use apps like DANA, GoPay, or BCA without even knowing if it is a CBDC. Or do you want to make it a separate payment method or currency, like a different form of rupiah? Again, it depends on the design you choose. In terms of user understanding, I think it is best designed to run in the background. Users do not need to know the complexities of CBDCs, which can be very complicated. You cannot simply throw it at ordinary people and expect them to understand things like private keys, which are crucial to using CBDCs. It all depends on how we communicate the information to users and the design of the CBDC. There is no right or wrong way at this point since everything is still in the pilot phase.

Question:

I have been following CBDC for a while, and coincidentally, I am from the Indonesian Central Securities Depository (KSEI), and I just wanted to ask if Handy has any information regarding the implementation of CBDC in the capital market. The possibility is that CBDC can be implemented in the form of a blockchain, cryptocurrency, and so on, just like it was explained yesterday. As for the capital market itself, we have tried to implement blockchain, but we have not seen the actual product until now. Will CBDC have a similar outcome? We need to look at several aspects and challenges, such as the difficulty of implementing blockchain and crypto in the stock market itself. The other question is about crypto. For example, if CBDC is in the form of crypto, it might not be under central bank supervision or even the Otoritas Jasa Keuangan (OJK), which is the financial supervisor. Is it possible to have regulations in the future that allow the central bank to implement crypto or blockchain in the central bank through CBDC?

Speaker: Handy Putranto

I think the first and second questions are related to how CBDCs work in stocks. There is a lot of experience regarding how to tokenize stocks. Binance tried to tokenize Apple stock on their platform, but it only worked for a week or two before they closed it. From a technological aspect, it is very doable because smart contracts ensure ownership in the real world and in the digital world. Regarding the tokenized stock, I think it is theoretically possible.

Speaker: Dr. Ousmène

In the DLT environment, we have securities that are tokenized. For a security to be tokenized, it is very similar to the securities that are dematerialized today. Moving from dematerialization to tokenization is a fairly small step, but it basically means that all the information that is needed for the transfer of ownership is encapsulated into the token, which can represent a bond or a stock. Once we have a security tokenized and we have cash tokenized, say, central bank money, which is typically the preferred medium to clear securities, then trading of securities becomes very easy. We have explained today how complicated it is. We have CCPs or other intermediaries that make the trading, clearing, netting and settlement of securities quite cumbersome, but it also takes time to do so. If both the security and the cash are in token format, then all it takes is a simple exchange of tokens, which would be a significant simplification of the trading processes. This is really where the interest is. I tried to make the point yesterday as well. CBDC is not as interesting as a payment instrument because we already have many payment instruments. But it is interesting as part of a settlement infrastructure that relies on properties that allow you to transact in tokens, making these transactions much simpler and faster. That is really where the interest is, and we have discussed quite a bit what the use of CBDC is, and yesterday I also made the point that for retail payments, it is not so clear in large part because citizens will not know the difference between making a payment with a debit card, QRIS, or CBDC at the point of sale; they are completely indifferent. It is about acceptance. It just has to work and most citizens do not know the difference between central bank money and other forms of money, which is a good thing. Therefore, it is not so much strictly about payments as it is about settlement. How

can we facilitate particularly large-value payments where central bank money plays a key role? And how can we take advantage of these token exchanges, which would make settlement as we know it much simpler? I think this is where the value is.

Speaker: Handy Putranto

Thank you for answering the hard question. I think that if we can tokenize securities, even if we trade peer-to-peer, we will not need an exchange. Trading directly peer-to-peer after working hours is a possibility in theory. However, blockchain only ensures ownership in the digital world but how can it be enforced? A legal framework is required. I think that is the problem with tokenized securities. Binance attempted to tokenize Apple stock, but it failed, and they closed it within two weeks. I believe that, in terms of the technological concept, it is very possible, but as a legal framework, no one is ready for it yet. Regarding the third question related to CBDCs and cryptocurrency, CBDCs use the technology of cryptocurrencies, but CBDCs are not cryptocurrencies. They use similar technology as Bitcoin or Ethereum from the crypto world, but they are different things.

Question:

I have a response to our discussion. First, if you talk about CBDC, please do not misunderstand, CBDC is not payment, CBDC is cash. If you are talking cash, we have physical cash and digital cash. I am from Peruri, and we are now getting physical cash, but we are questioning if we need CBDC and if we need digital cash. That is what we researched for almost two years. If we are talking CBDCs, then it is not the same with cryptocurrencies. We have two types of currency: physical cash, which includes banknotes and coins, and digital cash. Digital cash includes central bank digital currencies (CBDCs) issued by central banks as well as private digital currencies, like cryptocurrencies. CBDCs are issued by central banks, cryptocurrencies are privately issued. It is important to note that central banks do not use cryptocurrencies because they are privately issued. In our regulations, money or cash is only banknote paper and coins, electronic money is not money. Our regulation states that electronic money is a distribution channel for money. It is like a car. If we are talking about how CBDC is replacing money, CBDC digital money or digital cash. Electronic money is just a

distribution channel for cash based on our regulations. While we are talking about CBDCs, payment is just one use case, CBDC can be used for retail payments, which is why we are comparing whether it is better or not to compare CBDC and QRIS. CBDC can also be used for wholesale, where we can compare CBDC wholesale and BI-FAST. Additionally, CBDCs can also be used for cross-border. It is about the use case. When discussing CBDC technology, it is important to note that it is not limited to blockchain. The Central Bank of the Bahamas, for example, has explored the use of blockchain-based platforms for their CBDC project. Additionally, other countries, such as Ghana, have also developed their own CBDC technologies, such as the SAD platform, which may incorporate proprietary technologies from Jadwa Investment and Development (J&D). It is possible that other CBDC projects may also be exploring the use of other digital technologies, including blockchain. In fact, there are more than eight technology providers, not just the blockchain. Blockchain has a problem because it must be decentralized and a central bank is centralized. How to compromise between centralized and decentralized? I agree with the speakers that for CBDC we need to exercise research but also develop prototypes and test them in the ecosystem. I agree with that, but talking about CBDC is talking about digital money. Payment is just a use case.

Speaker: Handy Putranto

I agree, but I think it is important to clarify definitions. Technically, CBDC is not money but rather a ledger system that enables the transfer of debit and credit money. This is what we used to call distributed ledger technology. The challenge is to ensure that all transactions can be processed in real-time on a single ledger, while also making the ledger transparent and accessible to everyone. Ultimately, it comes down to how we define money and its uses.

Online Question:

Financial literacy is a serious challenge, especially for central banks, whose primary objective for issuing a CBDC is to promote financial inclusion. From an industry perspective, do you think it would be easier to introduce CBDC to people with minimal digital literacy than traditional banking services or instruments in order to increase financial inclusion? As far as I know, CBDC requires a digital wallet that can only be supported by smartphones or other electronic devices.

Speaker: Handy Putranto

To address the first question, it depends on the CBDC's design. If the aim is to promote transparency and understanding of the CBDC, then individuals' understanding of the necessity for a smartphone or digital wallet is critical. It depends on the digital account architecture and how smart contracts can operate on top a digital account. Users can still have CBDC even with these requirements. The answer depends on the CBDC's design. Would the CBDC be brought in front of the user, or would it only be active on the back side? People do not really care whether it is a new form of money or the same digital money they used before. It depends on the design. Is it more difficult to bring CBDC to the public as a new form of money and people would need to understand how to secure their private key? Yes, it is going to be hard—much harder. However, we must remember that the new generation is adapted to digital literacy and will likely have better digital literacy skills. Something that may be seen as complex now may be easier for someone who is 10 or 15 years old. Many Bitcoin and Ethereum developers are below 20 years old.

Online Question:

Since CBDCs allow central banks to exert control over how people spend their money, such as by restricting purchases of items like cigarettes, do you think that the complete control of the central bank and reduced user privacy could lead to the creation of more alternative cryptocurrencies?

Speaker: Handy Putranto

Good question. I do not think the central bank limits what people can transact. They do not have ownership to regulate transactions. The central bank's role is to build the platform on which a smart contract can be created on top of the CBDC. Who can write the smart contract can be decided, either the government, police, or other entities to decide the rules. However, the central bank's role is to build the platform. Regarding privacy, I do not believe that users will have less privacy due to increased central bank control. Users are still anonymous in the ledger, even in digital form, because we use digital mechanisms. Therefore, they remain anonymous in the ledger. Some users are not anonymous on the off-chain because the government or central bank can now see that a blockchain address is privately owned. However, there is no

less privacy. How we use the platform depends on us as a society. If we collectively agree that money cannot be used to buy cigarettes, then we can push for that. Nonetheless, it does not mean we should stop building the platform because it could open doors to many other opportunities. I only used that as an example because it is easy to understand, but it does not imply that I support such an approach.

Moderator: Siwi Lungit

Thank you. What a fruitful discussion. We have received numerous questions from both offline and virtual participants. In summary, CBDC could potentially solve many issues, but we must evaluate it cautiously and address the challenges and opportunities it presents. Regrettably, this marks the end of session two with Bapak Handy. Let us give him a big round of applause.

Master of Ceremony

Thank you so much, moderator and speakers. Unfortunately, we have to close our seminar for two days, and before we officially close the program, I would like to invite the director of the Bank Indonesia Institute, Ibu Arlyana Abubakar, to officially close the program by delivering the closing remarks.

- CLOSING REMARKS -

Payment Systems in The Digital Era
October 27th, 2022

Arlyana Abubakar
Director of Bank Indonesia Institute, Bank Indonesia

First of all, let us extend our praise to God Almighty for his blessing that we are now at the end of an International Seminar on Payment Systems in the Digital Era. On behalf of Bank Indonesia, I would like to express my sincere gratitude to our prominent speakers for the valuable presentations, fruitful discussions, and inspiring insight concerning digital payment issues from both a regulatory and business perspective. Digitalization of the payment system has proven to be a game changer. Technologically driven innovations in payment systems have led to the creation of economic options through new business models, new players, and the transformation of consumer behaviors in the economic and financial landscape. The digitalization of payments opens up wider opportunities for an efficient and inclusive payment system. Faster, more affordable, more transparent, and more inclusive cross-border payment services and connectivity, while maintaining safety and security, would have widespread benefits for citizens and the economy worldwide. It will also support economic growth, international trade, global development, and financial inclusion, as well as boost the post-pandemic recovery and increase productivity.

Massive movement and innovation in digital payments have driven changes in the payment system, especially in cross-border payments. As we know, increased global movements of products and services, capital and people have led to the rising economic relevance of cross-border payments during the last several decades. On the other hand, these developments have raised demand for secure and efficient cross-border payments. While innovation in cross-border payments is emerging, there are still some concerns about costs, limited transparency, speed and limited access to cross-border payments. On the other hand, the implementation of Central Bank Digital Currency, or CBDC, may broaden the opportunities for efficient cross-border

payments. An improvement in cross-border CBDC might be achieved by providing secure settlement, reducing the costly and lengthy intermediation chain throughout the payment process, and avoiding operation hour mismatch by being accessible all the time. And to achieve this purpose, as presented by the speakers in the seminar, the appropriate CBDC utilization must be properly designed. The examination of the CBDC's design and infrastructure must be broadened by considering the CBDC's options for access and interlinking, including interoperability with existing payment infrastructure and arrangements. Since CBDC might have a broad impact on various aspects of the economy, it is necessary to conduct a careful evaluation, including the study of monetary policy, security and financial system integrity. CBDC initiatives are conducted in collaboration with the central banks and other related authorities. We should collaborate to create interoperability, such as by developing a common standard as well as guidance on interoperability and interfacing with international payment infrastructure to enable cross-border payments. All in all, CBDC, which is formulated through a well-designed and well-targeted regulatory reform, will be able to bring all parties together to collaborate to accelerate the economy, recover together and recover stronger.

Currently, Bank Indonesia and other central banks from five ASEAN countries have initiated cross-border payments through multilateral payment connectivity in ASEAN as part of an effort to strengthen economic integration in the region. The ASEAN-5 central banks are committed to collaborating on improving cross-border payments. These initiatives will grow from bilateral interlinks to global collaboration for even broader interlinks, including to support small and medium enterprises in exporting their products. It starts with QR and quick payments, and we see many potential developments coming in.

I would like to express again my appreciation to all participants for taking part in the seminar and my sincere gratitude to all speakers and panelists for sharing their fruitful and valuable insight. I hope all of us will stay safe and healthy and may we all be able to meet again at another event in the near future.

Thank you very much.

MC:

Thank you, Ibu Arlyana, ladies and gentlemen. That was the end of our program, but before we close this program, we would like to ask for your kind assistance to fill out the daily questionnaire or evaluation by scanning the QR code shown on the screen or simply clicking the link given in the chat box. After completing the questions, you will find the link to download today's materials. Once again, we thank you and our speakers from De Nederlandsche Bank that came all the way to Jakarta and speakers from Accenture's Metaverse Continuum Business Group, DANA, and Bank Indonesia for addressing insightful topics, not to mention our moderators for leading the sessions. Hopefully, this event will be beneficial for everybody, especially with the important issues discussed. We hope to see you again at the next Bank Indonesia Institute events. Stay safe and have a good afternoon.

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