

# THE PRESENCE OF COMMERCIAL BANKS IN METAVERSE'S FINANCIAL ECOSYSTEM: OPPORTUNITIES AND RISKS

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## Abstract

The metaverse has been widely discussed as it is believed will affect almost every sector, one of those is the financial sector. The financial sector developed in the metaverse will likely be based on *decentralized finance* and *blockchain technology*, the latter of which is the primary source of the development of *cryptocurrency* and *stable coins*. Other than *cryptocurrency* and *stable coins*, *CBDC* is also predicted to emerge as one of the payment instrument options used in the metaverse. The presence of these technologies has formed the unique financial ecosystem in metaverse, differentiating it from the existing ecosystem which is characterized as *centralized* and *traditional finance*. The recently developed *Meta Fi* has created the question of whether commercial banks, as one of the most important financial institutions in the current financial ecosystem, will be able to penetrate and keep its relevance in the *Meta Fi*. This research will attempt to answer this question by explaining *Meta Fi*, its characteristics, and how commercial banks could co-exist alongside *blockchain-based* service in Metaverse.

**Keywords:** *commercial banks, decentralized finance, financial sector, metaverse, metaverse finance*

## I. INTRODUCTION

Digital technology and the Internet have rapidly progressed and disrupted many activities, particularly in the financial sector. To maintain its relevance, banking industries have attempted to innovate in the field of digitalization and automation so that they may generate more effective and efficient financial services for customers. *Digital banking* has been one of the innovations which has emerged. This innovation has answered the call for flexibility of the service amid the Pandemic era (COVID-19), when a series of social restriction regulations was enacted by the Government of Indonesia (“GOI”).

*Digital Banking*, according to Financial Service Authority Regulation No. 12/POJK.03/2018 (“POJK No. 12/2018”) is defined as a banking service to obtain information, conduct communication and transaction by using certain

electronic media to optimize the usage of customer's personal data to deliver a faster, easier, and better service-experience to the customers, as well as allowing the implementation of self-service within the banking service. *Digital banking* has allowed customers to receive banking services with little to no assistance, or "touch", from registration, opening new bank accounts, conducting several banking transactions (transfers, payments), closing accounts, to other related services such as financial advising, investment, e-commerce transactions, etc.

*Digital banking* in the Indonesian banking industry has evolved, giving the commercial banks an opportunity to increase their scalability through connectivity-based business models. The concept of *digital banking* can be traced back to 2016, where Jenius (a platform introduced by PT Bank BTPN, Tbk) developed as a new business model known as digital bank. In 2021, Bank Jago, Neobank (Bank Neo Commerce), Blu by BCA, LINE Bank (KEB Hana Bank Indonesia), and MotionBanking (Bank MNC International) launched as the digital banking services from many commercial banks. The increase in digital banking in Indonesia has been an interesting phenomenon, not only because it has allowed customers the flexibility to receive banking services, while also allowing commercial banks to develop new services on the digital platform.

The presence of technology has allowed the banking industry to discover and develop new services. The most recent idea which is currently developed is the metaverse. The metaverse offers a three-dimensional virtual world, in which people can access information and services using certain technology and devices.

The metaverse can be defined as a post-reality universe or virtual world that combines physical and digital realities, thus enabling multi-sensory interactions between the virtual environment and the users and digital objects in it. In addition, there are five core technologies which form the metaverse, including (a) Augmented Reality ("AR"), Virtual Reality ("VR"), Mixed Reality ("MR"), Extended Reality ("XR"), and Artificial Intelligence ("AI").<sup>1</sup>

The metaverse allows the integration of both physical and virtual worlds, creating a whole new virtual community which allows people accessing it to connect, communicate, work, play, socialize, and conduct transactions with one another. The metaverse has the potential to facilitate long distance virtual access and provide an opportunity for its users to access the best services

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<sup>1</sup> James Robinson, Jeanette Whyte, and Christiaan Segura, *Exploring Metaverse and The Digital Future* (GSM Association, February 2022), 7, <https://www.gsma.com/asia-pacific/wp-content/uploads/2022/02/270222-Exploring-the-metaverse-and-the-digital-future.pdf>.

and goods unhindered by the boundaries of time and place.<sup>2</sup> Other than that, the metaverse could also be the *game-changer* in digitalization era, exceeding the existing technology which only provide limited experience in virtual world (communicating, working, and connecting through devices) to creating a virtual world composed of places to work, enjoy entertainment, interact, travel online, create and sell virtual art, shopping, and do many other activities similar to those in the physical world. This potential creates a bigger opportunity for many parties to create new business models in the metaverse. By 2025, Bloomberg has predicted that metaverse may have the potential to increase economic growth up to USD 73 Billion. This calculation has been increased from its 2020 prediction of USD 12 Billion.<sup>3</sup> Bloomberg also predicted the metaverse will also create a significant financial ecosystem valued up to USD 800 Billion with annual growth above 15%.<sup>4</sup>

Based on this metaverse development data, actors in the economic and financial sectors, particularly banking, have begun to take concrete steps to optimize existing opportunities and increase the competitive advantage to compete in the era of technological disruption. In capitalizing on this potential, JP Morgan was the first financial institution to enter the metaverse by opening a lounge on Decentraland, which is one of the most popular metaverses.<sup>5</sup> In addition, KB Kookmin Bank has developed a virtual finance city, which has been operating since July 2021.<sup>6</sup> The developed financial city includes a financial and business centre consisting of a public relations and recruitment booth, as well as an auditorium and a telecommuting centre to facilitate communication and collaboration among telecommuters and office workers. Financial institutions in Indonesia have also taken concrete steps toward the development of banking services in the metaverse. It is known that as of March 2022, PT Bank Rakyat Indonesia (Persero) Tbk., PT Bank Negara

<sup>2</sup> Christine Moy, *Opportunities in the Metaverse: How Business can explore the metaverse and navigate the hype vs reality* (JP Morgan, January 2022), 5, <https://www.jpmorgan.com/content/dam/jpm/treasury-services/documents/opportunities-in-the-metaverse.pdf>.

<sup>3</sup> Bloomberg Intelligence, "Metaverse may be \$800 billion market, next tech platform," accessed May 24, 2022, <https://www.bloomberg.com/professional/blog/metaverse-may-be-800-billion-market-next-tech-platform/>.

<sup>4</sup> Bloomberg Intelligence, "Tech Platform."

<sup>5</sup> Kate Birch, "JP Morgan is first leading bank to launch in the metaverse," accessed May 24, 2022, <https://fintechmagazine.com/banking/jp-morgan-becomes-the-first-bank-to-launch-in-the-metaverse>.

<sup>6</sup> Fasika Zelealem, "South Korea's KB Bank enters metaverse", accessed May 24, 2022, [https://finance.yahoo.com/news/south-korea-kb-bank-enters-121438920.html?guccounter=1&guce\\_referrer=aHR0cHM6Ly93d3cuZ29vZ2x1LmNvbS8&guce\\_referrer\\_sig=AQAAAAMmFX4rBgSCSA2HHMAmOdaum4uqyXLJHKEecMjysJipH92Ep4lFB4JdQnd3vTX8wHriGc6QGqtPuPzKYs83mlR0lV9iDcFEKXck1Goh96btlmlRQfxv18M3AmU2CsW705bVVFCoBjivXi4yVibe-Q\\_\\_NCMenkxsXltofYhy2iXB](https://finance.yahoo.com/news/south-korea-kb-bank-enters-121438920.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2x1LmNvbS8&guce_referrer_sig=AQAAAAMmFX4rBgSCSA2HHMAmOdaum4uqyXLJHKEecMjysJipH92Ep4lFB4JdQnd3vTX8wHriGc6QGqtPuPzKYs83mlR0lV9iDcFEKXck1Goh96btlmlRQfxv18M3AmU2CsW705bVVFCoBjivXi4yVibe-Q__NCMenkxsXltofYhy2iXB).

Indonesia (Persero) Tbk., and PT Bank Mandiri (Persero) Tbk. several state-owned banks have attempted entrance to the metaverse.<sup>7</sup> The metaverse is expected to offer a notable change for financial inclusion in Indonesia, because it has removed the limitations of space and time, so that it can be reached by customers from all over Indonesia.

In addition to providing profitable business opportunities, the metaverse also carries risks that need to be mitigated. Pratama Persada, one of the researchers at the Communication Information System Security Research Center (CISSReC) concluded that the risk of cyber-crime in the virtual world has the potential to be greater than others have estimated. The metaverse integrates several systems and applications from different platforms, so the potential risk of cybercrime, especially in the financial and banking sectors, is bigger.<sup>8</sup> Banking was one of the sectors that hackers were targeting, even before the metaverse became a reality. Based on data from the National Cyber and Crypto Agency (BSSN), there were 927 million cyber-attack attempts in 2021.<sup>9</sup> The share of cyber-attacks on the financial industry, including banking, was 21.8%.<sup>10</sup> In addition, various crimes have had the potential to appear in the metaverse, such as social engineering, phishing, fraud, and money laundering. Banks need to ensure the security of the services provided in the metaverse, both in terms of technology infrastructure, applications, and third-party operators who provide services.

Against this backdrop, this paper further discusses the potential of financial services in the metaverse, as well as the risks and challenges that service providers and participants in the Metaverse need to be aware of mitigate. In addition, this paper also discusses the role of the Central Bank of Indonesia (“Bank Indonesia”) in dealing with the entry of the financial and banking industry into the metaverse. This is done so that the metaverse can be utilized properly by considering all potential risks, so that economic and financial stability can be well maintained, and the country’s economy can continue to develop. This paper is written to address the research questions below:

- a. What is the potential for commercial banks to develop banking services in the metaverse?
- b. What are the risks and challenges to be aware of in the metaverse?

<sup>7</sup> Suheriadi, “Susul BNI dan BRI, Bank Mandiri Siap Masuk Metaverse, accessed May 23, 2022, <https://www.fortuneidn.com/finance/suheriadi/susul-bni-dan-bri-bank-mandiri-siap-masuk-metaverse>.

<sup>8</sup> Fahmi Ahmad Burhan, “Ramai Bank Rambah Metaverse di RI, Ahli IT Ingatkan Risiko Keamanan,” accessed May 24, 2022, <https://katadata.co.id/desyetyowati/digital/6238329fda7d6/ramai-bank-rambah-metaverse-di-ri-ahli-it-ingatkan-risiko-keamanan>.

<sup>9</sup> Fahmi Ahmad Burhan, “Risiko Keamanan.”

<sup>10</sup> Ibid.

- c. What is the role of Bank Indonesia in promulgating regulations for the implementation and development of banking services in the metaverse?

The purposes of this paper are to:

- a. Find out the potential for the development of banking services by commercial banks in the metaverse;
- b. Find out the risks and challenges that need to be considered in developing banking services by commercial banks in the metaverse; and
- c. Find out the role of Bank Indonesia in preparing regulations for implementing and developing banking services by commercial banks in the metaverse.

This paper attempts to answer the questions above through a qualitative research approach, as the paper requires several research approaches using non-numerical data. This paper uses a normative research method. In writing this paper, the authors primarily formed opinions based on applicable regulations, and related journal articles. Other references are also being used as secondary reference, which comprises of (a) working papers and reports, (b) internet websites, and (c) official working papers. From these references, the authors have used several data as a medium to describe ideas in a clearer way, among those are in the form of charts, tables, schematics, and figures.

## **II. LITERATURE REVIEW**

### **II.A. The Metaverse**

During its emergence, the Internet was still connected to users in the form of physical cable connections and protocol settings that allowed users to communicate over a single network.<sup>11</sup> Web 1.0 brought the Internet to many users, allowing people to consume static content in read-only format. Web 2.0 ushered in an era of dynamic, interactive pages, and enabled communications among users. Web 3.0 that is currently developing can connect users, content, and digital programs directly without the use of intermediary applications. Web 3.0 is built on a blockchain system, which allows the storage of bookkeeping and data to exist across multiple, distributed computer systems. In addition, users can operate within this system collectively, so that users can control their own data and keep records of all their activities on Blockchain technology. It is this Web 3.0 framework that allows for creation advanced applications and technologies that can be used by multiple users at the same time, including the metaverse.

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<sup>11</sup> Robinson, Whyte, and Segura, *The Digital Future*, 6.

The term ‘metaverse’ first appeared in Neal Stevenson’s novel *Snow Crash*, published in 1992.<sup>12</sup> In that novel, the term metaverse represented a parallel virtual universe created from computer graphics, where users from all over the world could connect with each other via goggles and earphones. According to the *Encyclopaedia journal*, the term metaverse consists of two words, namely Meta (a preposition from Greek which means post, after, or beyond) and universe. In other words, the Metaverse can be defined as a post-reality universe or virtual world combining physical and digital realities, thus enabling multi-sensory interactions between the virtual environment and the users and digital objects in it.

There are currently many companies interested in developing the metaverse, from gaming companies, (Epic Games, Tencent) to technology giants (Microsoft and Facebook).<sup>13</sup> Because there is no official definition of the metaverse, each company has its own definition and concept in understanding it. Mark Zuckerberg (founder and CEO of Meta) stated that the metaverse is the embodiment of the Internet that can be entered by its users, so that Internet users do not just see what is on the Internet but can enter and interact directly in the virtual world. Tim Sweeney (founder and CEO of Epic Games) defines the metaverse as three-dimensional social media that can be accessed in real time and allows users to create and share content across the digital media. In addition, users have the same opportunity to change the socioeconomic conditions in the virtual world. Another concept was also expressed by the CEO of Newzoo, Peter Warman, who considers the metaverse as a place that allows its users to be players, fans, and creators at the same time to optimize user engagement and drive digital business potential and opportunity. From those definitions, we may highlight several similarities which are agreed on as the main requirements of a successful metaverse:

- a. Decentralized;
- b. Interconnected and Interoperable; and
- c. Safe and Trustworthy.

The development of the metaverse relies on the integration of several digital technologies known as Extended Reality or Cross Reality (XR). XR consists of Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) which allow users to enter and interact in all virtual worlds on the Metaverse more easily, quickly, and seamlessly.<sup>14</sup> VR is a technology creating a virtual world, where users can enter and interact with each other like in the

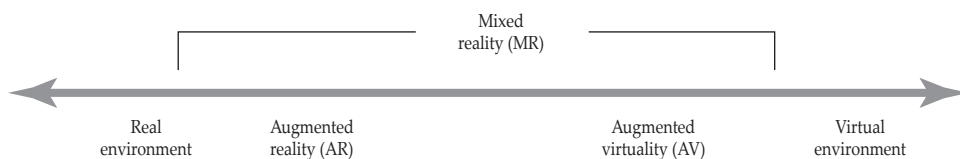
<sup>12</sup> Stylianos Mystakidis, “Metaverse,” *Encyclopedia*, no. 2 (February 2022): 492.

<sup>13</sup> Ellavie Ichlasa Amalia, “Apa itu Metaverse: Definisi, Relevansi, dan Potensinya?”, accessed May 2 2022, <https://hybrid.co.id/post/apa-itu-metaverse>.

<sup>14</sup> Mystakidis, “Metaverse,” 487.

real world with the help of VR glasses and headsets. AR is a technology that expands the real world of humans by adding layers of digital information to it, so that objects that do not exist in the physical world appear as if they exist. An example of the application of AR technology is the Pokemon Go game, where users only need to use a cell phone that supports AR features to be able to experience this. Meanwhile, MR is a combination of VR and AR technology, in which objects, locations, and humans that exist in the real world are dynamically integrated into the virtual world to produce new environments and visualizations, so that physical and digital objects coexist and interact in real time. In its first implementation, MR also used headsets and consoles to support users in experiencing the new experiences created by this MR technology. The relationship between these three technologies and their impact on the physical and digital environments can be seen in Figure 2.1.

**Figure 2.1. Relationship between AR, VR, and MR Technologies and the Physical and Digital Environment**



Other important technologies in the metaverse are Artificial Intelligence (AI) and Machine Learning (ML). AI is the ability of computers or machines to imitate human tasks through learning and automation, understood as the simulation of high-level functions of “intelligent humans” in areas such as visual processing, speech processing, and analytics.<sup>15</sup> AI is generated from ML, which is an algorithm that is implemented, processed, and analysed on a regular basis, thus rendering machines or computers artificially ‘intelligence.’ AI makes data more interactive, rather than just readable data. In addition, the data generated will follow user preferences, so that the resulting information is more accurate, and the processing of data and information is optimized and efficient. Implementation of AI in the metaverse to build a world through words and improve the quality of communication among users and the system or through a voice assistant. This will certainly help users to interact and transact business on the metaverse, as well as increasing the positive experiences while on the metaverse.

<sup>15</sup> Robinson, Whyte, and Segura, *The Digital Future*, 7.



## II.B. The Financial Ecosystem in the Metaverse

Many issues will arise from the development of the metaverse, one of which is a new financial ecosystem that is different from that of the real world. Citigroup, states that the metaverse will give rise to a unique financial ecosystem called Metaverse Finance / Meta Fi.<sup>16</sup> This ecosystem is a combination of Decentralized Finance (“DeFi”), Centralized Finance (“CeFi”), and Traditional Finance (“Trad Fi”).<sup>17</sup> This financial ecosystem provides space for the formation of new, unique financial services that are different from financial services developed in the real world.

The concept of DeFi is a financial ecosystem that is growing with the significant role of a distributed ledger (blockchain) in it. Financial services, transactions, and economic activities are carried out only by the parties involved, without using intermediaries. DeFi replaces the intermediary’s role with blockchain, and specific protocols called smart contracts. A smart contract is a protocol or program designed to work automatically based on orders that have been prepared by the makers, allowing work to be carried out without human intervention. DeFi offers a new financial ecosystem where financial services form without the role of intermediaries such as banks or other financial institutions. The role of the bank is replaced instead by blockchain technology which allows activity to be carried out only between the parties involved. DeFi enables financial services to be developed using smart contracts that replicate the role of intermediaries on the blockchain, which are tailored to the type of services or activities transacted by the Parties.

Meanwhile, Trad Fi is the traditional financial ecosystem that runs in the real world. This financial ecosystem is dominated by the conventional banking infrastructure, where banks act as the main financial institutions that hold great trust from the public.<sup>18</sup> Banks play a major role in moving financial markets, through receiving funds from people who have funds and channelling funds to people in need of credit through various financial services. One of the characteristics of Trad Fi is the minimal role of technology and digitization in the services provided.

CeFi is a term that refers to the financial ecosystem that is transitioning from Trad Fi to DeFi.<sup>19</sup> The characteristics of CeFi are marked by the waning of the dominance of banking as the main source of financial transactions, which is being replaced by technology-based institutions such as Fintech,

<sup>16</sup> Kathleen Boyle, *Metaverse and Money: Decrypting the Future* (Citi GPS, March 2022), 9, <https://ir.citi.com/gps/x5%2BFQJT3BoHXVu9MsqVRoMdiws3RhL4yhF6Fr8us8oHaOe1W9smOy1%2B8aaAgT3SPuQVtwC5B2%2Fc%3D>.

<sup>17</sup> *Ibid.*, 9.

<sup>18</sup> *Ibid.*, 177.

<sup>19</sup> *Ibid.*, 178.



centralized crypto exchanges.<sup>20</sup> The increasing popularity of electronic money, digital wallets, and other technology-based forms of payment is another characteristic of CeFi, where even in the case of electronic currencies, the financial ecosystem still relies on several financial institutions but has shifted to financial institutions other than established commercial banks.

## **II.C. Banking Ecosystem in the Metaverse**

The metaverse with its various technologies has a huge influence on the global economy. One of the industries affected is banking, which has the largest share in the current financial industry landscape. system continue to evolve along with the development of financial technology. Banks in the traditional form are based on a two-tiered model that are regulated by one central bank and serve the financial needs of customers directly. Traditional banks have a physical form factor in the form of main and branch offices.

In Indonesia, based on Law Number 10 of 1998 concerning Banking (the “Banking Law”), a Bank is a business entity that collects funds from the public in the form of savings and distributes them to the public in the form of credit and or other financial instruments to improve the standard of living of the community. A commercial bank is a bank that carries out business activities conventionally and or based on Sharia principles, which in its activities provides services in payment traffic.

In addition to having a function as a financial intermediary, banks also play roles as an agent of trust, agent of development, and agent of service. Banks are required to be trustworthy parties and are based on the trust of their service users. In addition, banks can provide services to the community to is designed to develop income through investments, consumption, distribution, and other uses of money. Banks also play a role in providing financial services for the public’s commercial interests.

The definition and function of the bank does not only apply to traditional banks but also to digital banks. Digital banks are merely an evolution of traditional banks which increasingly prioritize technology-based services. The most obvious difference between the two types of banks is that digital banks do not maintain a physical form factor, allowing the entire transaction process can be done online. The advantages of digital banks include ease of access, more flexibility, and lower costs.

In general, traditional, and digital banks apply the same system so that the products and services provided are not substantially different. The most basic banking service is providing deposit and credit products.

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<sup>20</sup> Ibid.

There are banks that have endeavoured to enter the metaverse to improve services for their existing customers. These banks include KB Kookmin Bank, Industrial Bank of Korea in South Korea, Bank of America, JP Morgan in the United States, and Mecrobank in Sweden. In Indonesia, banks that have announced they will join the metaverse ecosystem are PT Bank Negara Indonesia Tbk (BNI), PT Bank Rakyat Indonesia Tbk (BRI) and PT Bank Mandiri Tbk (BMRI). These three banks entered the metaverse in collaboration with the WIR Group, which is an Augmented Reality and Metaverse technology development company.<sup>21</sup> WIR Group has developed Metaverse Indonesia and state-owned banks that have stated that they will join will build a relevant digital business ecosystem within Metaverse Indonesia.

With the metaverse, banks gain new opportunities in developing their business. For example, banks can facilitate payment transactions in the virtual world, provide new interaction experiences for customers with digital technology, and innovate products and services such as facilitating digital payments, acting as a custodian of customers' digital assets, and virtual engineering of assets or properties for customers.

## **II.D. Financial and Banking Regulation related to Digitalisation**

Until now, countries use existing banking regulations to regulate digital banks that develop within their jurisdictions.<sup>22</sup> Meanwhile, jurisdictions that specifically formulate regulatory frameworks for digital banks formulate licensing requirements like those for traditional banks. The fundamental difference in terms of licensing requirements between digital and traditional banks is related to the technological elements and objectives of these businesses. Requirements for digital banks tend to be more related to management expertise in technology, technical infrastructure assessment, a satisfactory record of accomplishment in technology and/or a commitment to financial inclusion.

Since October 30, 2021, digital banks in Indonesia have been regulated by two new regulations issued by the Financial Service Authority Regulation, namely POJK No.12/POJK.03/2021 concerning Commercial Banks ("**POJK No. 12/2021**") and POJK No.13/POJK.03/2021 concerning the Implementation of Commercial Bank Products ("**POJK No. 13/2021**"). Based on Article 1 POJK No. 12/2021, Digital Banks are Indonesian Legal Entity Banks (BHI) that provide and carry out business activities through electronic channels without physical offices other than a head office or use of

<sup>21</sup> Syahrizal Sidik, "Bank BUMN Ramaikan Bisnis Metaverse," accessed May 11, 2022, <https://katadata.co.id/syahrizalsidik/finansial/622726c509321/bank-bumn-ramaikan-bisnis-metaverse>.

<sup>22</sup> Johannes Ehrentraud, Denis Garcia Ocampo, Camila Quevedo Vega, *Regulating Fintech Financing: Digital Banks and Fintech Platforms* (Bank for International Settlements: FSI Insights on policy implementation No. 27, August 2020), 1, <https://www.bis.org/fsi/publ/insights27.pdf>.

limited physical offices.

Bank BHI operating as a Digital Bank must meet the following requirements: (a) have a business model using innovative and safe technology to serve customer needs; (b) manage a prudent and sustainable digital banking business model; (c) have adequate risk management mechanism; (d) fulfil governance aspects, including the fulfilment of the Board of Directors who have competence in the field of information technology and other competencies in accordance with the provisions of the OJK regarding the fit and proper qualifications for the main parties of financial service institutions; (e) carry out protection of customer data security; and (f) contribute to the development of a digital financial ecosystem and/or financial inclusion. These six requirements are the difference between commercial banks and banks that can be referred to as digital banks, or BHI.

Article 25 of POJK No. 12/2021 states that a digital bank can be established by one of two options, namely the establishment of a new BHI bank to become a digital bank or the transformation of a BHI bank into a purely digital bank. POJK No.13/2021 concerning the Implementation of Commercial Bank Products is expected to accelerate digital transformation to provide greater bandwidth for banks to be more innovative in providing digital products and services. Based on Article 15 POJK No. 13/2021, there are additional documents that must be submitted regarding the offering of digital banking services, namely a description of the cooperation mechanism carried out with Bank partners in the context of providing digital banking services and resulting in an independent party examination that provides an opinion on product characteristics and the adequacy of information technology system security. Related to the implementation of digital banking services. This regulation is expected to protect customers from digital services that are not credible or open to breaches of security.

Indonesia currently has not taken legislative action to clarify national legal jurisdiction over transactions made over digital systems. Reflecting on other countries, for example, the European Union has issued a data protection law called the General Data Protection Rule ("GDPR"). Articles 5-10 of the GDPR make it clear that the legal jurisdiction over these entities lies in every company that offers products/services to every citizen of the European Union is required to have a representative office (a legal form of a Permanent Business Entity) in the territory of the European Union member states to enter the market as an entity in the jurisdiction.

One important aspect of the payment system in the metaverse is data security and regulations regarding whether payment service providers ("PJP") in Indonesia can process crypto payments and other digital transactions. Currently, Indonesia still does not have a legal framework for the protection of

user data. The Personal Data Protection Bill (“PDP Bill”) which is predicted to revolutionise regulation of data security is still being deliberated in the House of Representatives of the Republic of Indonesia (the “DPR”) and it is not clear when the debate will be concluded, and the bill will be presented for signature. To fill this legal vacuum, Indonesia can follow the example of Singapore’s Digital Payments Act which was enacted in 2019. Under this law, Singapore classifies the types of payment system providers into seven types, which in turn requires three types of licenses for operation. payment system. PJP must classify itself into seven types of services in order to further manage the right license. The PJP must also comply with the risk management guidelines set by the Monetary Authority of Singapore (“MAS”) and comply with the Singapore Data Sovereignty Act.<sup>23</sup>

### **III. ANALYSIS AND DISCUSSION**

#### **III.A. The Opportunities for Commercial Banks in the Metaverse**

##### **1. Banking Service and Product**

Almost 90% of banking revenues are generated by lending to third parties. Credit distribution is an effort by banks to maintain liquidity and banking resilience. In general, banks adhere to the 5C principle (Character, Capacity, Capital, Condition, and Collateral) in assessing the creditworthiness of an entity, either individual or corporate, in obtaining credit. The digital revolution, in general, changes the business processes carried out by the bank from initially focusing on traditional services to digital based services. In digital lending, there are several innovations that become banking references in the credit approval business process to customers, including:

##### **a. Payment Systems in the Metaverse**

Considering that the metaverse ecosystem is a virtual space with a unique transaction experience, banks have been expected to evolve their services to provide the best service unique to the metaverse. One service that has often been offered is an integrated payment service. Banks can work with payment system architecture providers to develop blockchain-based payments in the metaverse. One example of the is Square App, which is currently developing a blockchain-based payment system where it will collaborate with major American banks such as Citibank and JP Morgan and act as a bridge to the metaverse

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<sup>23</sup> Parliament of Singapore, “Payment Service Act of 2019,” accessed May 11, 2022, <https://www.mas.gov.sg/regulation/acts/payment-services-act>.

ecosystem by using its existing infrastructure as a payment processor.<sup>24</sup> This mechanism is expected to save on the costs of independently developing payment architectures that must be borne by the Bank as well as ensuring the reliability of the current infrastructure capable of processing payments in the metaverse.<sup>25</sup>

### ***b. AI-based Credit Scoring***

Another area where the metaverse can provide a unique opportunity is AI-based credit scoring. When a customer submits a credit application to an Indonesian commercial bank, the first step in the loan approval process is to check a customer's credit score through the BI-Checking system. This is a problem because currently less than 25% of Indonesia's population has had any contact with banking services before applying for credit.<sup>26</sup> Given the low penetration of banking credit in Indonesia, a tool is needed that can assess the unbankable population. Another interesting statistic is that smartphone penetration in Indonesia is extraordinary at 125% of the total population.<sup>27</sup>

For this reason, one of the innovations that is developing in the metaverse is the assessment of a person's creditworthiness by relying on AI-based machine learning (ML). The use of ML for individual assessment has advantages because the data used can be analysed in real-time. In addition, the data utilised does not only rely on the daily behaviour of users' transactions. The use of machine learning in the credit-scoring setting itself allows for a wider use of real-time data analytics that are not only sourced from historical transaction data. Credit Scoring by utilizing AI can use public credit data more by tracking customer e-commerce transactions and using user searching data on social media, for example.<sup>28</sup> This will certainly provide a distinct perspective from the traditional credit scoring approach which is still based on the scorecard approach or dynamic characteristics that occur before a loan application. The AI approach also allows the imposition of often overlooked data such as projections of future salary levels, the AI approach also allows entering

<sup>24</sup> Cryptocurrencyfacts, "Square's Cash App," accessed April 29, 2022, <https://cryptocurrencyfacts.com/exchanges/squares-cash-app/>.

<sup>25</sup> Ibid."

<sup>26</sup> World Bank, "Mobile Banking in Indonesia: Assessing the Market Potential for Mobile Technology to Extend Banking to the Unbanked and Underbanked, Final Report" accessed April 29, 2022, <https://documents1.worldbank.org/curated/en/728801495012734121/pdf/115103-WP-Mobile-Banking-Final-Report-PUBLIC.pdf>.

<sup>27</sup> Yosepha Pusparisa, "Daftar Negara Pengguna Smartphone Terbanyak, Indonesia Urutan Berapa?" accessed April 29, 2022, <https://databoks.katadata.co.id/datapublish/2021/07/01/daftar-negara-pengguna-smartphone-terbanyak-indonesia-urutan-berapa>.

<sup>28</sup> Volodymyr Sofinskyi, "Credit Scoring Using Machine Learning," accessed May 10, 2022, <https://datrics.ai/use-cases/credit-scoring-using-machine-learning>.

macroeconomic conditions as an assessment of a person's credit score such as the unemployment rate, inflation rate, and repayment ability or in other words an AI-based credit scoring approach increases precision. and score accuracy using Smart AI base.

The technology available to banking is a metadata approach, such as that of African start-ups, namely Weza and CredoLab, which use data access on users' cell phones so that the resulting AI-based analysis can better describe user profiles.

## **2. Business Unit Transformation**

The metaverse will not only offer opportunities to create new banking services, but also change the way banks interact with their customers. In this transformation, the metaverse will create new industries and new ways of working and engaging with others. Banks in the metaverse will benefit from several new opportunities, from providing payment pathways that drive and reorganize transactions for the 3D world to engaging with employees in new ways and finding new, more interactive and humanistic ways to connect and engage online with customers. It is important for banks to strike a balance between perspective and opportunity in the metaverse. Here are some things that will change the way banks operate, engage, and create new innovations in the metaverse:<sup>29</sup>

- (a) Renew the experience of current customers and employees through the latest technology that continues to develop;
- (b) Connect with customers in new, more meaningful ways; and
- (c) Create new products and new markets.

Below are several innovations which are currently in development across the banking industry:

### **a. Virtual Banking Branches**

Concepts unique to digital banking in the metaverse allow customers to receive banking services independently. Thus, it is possible for banks to provide services through a virtual metaverse. This concept can be implemented through the customer service team and tellers on duty at the virtual banking branch so that they can get fast service with unlimited access and maintain engagement and interactivity like real-world services.

The development of virtual banking branches has the potential to increase bank scalability by relying on a connectivity-based business model reaching a broader community by utilizing increasingly developed

<sup>29</sup> Katie Burke, "Banking in the metaverse: the next frontier," accessed May 8, 2022, <https://bankingblog.accenture.com/banking-in-the-metaverse-the-next-frontier>.



technology, as well as deepening relationships with customers through more accessible interactions. Banks can continue to develop and expand their target markets without being burdened by the addition of a physical network of branch offices, even without physical branch offices at all, better known as branchless banking.

Based on an IFC study, branchless banking can reduce service costs to banks by between 50-70%. This further supports the viability of branchless banking through virtual banking branches which are very possible to be applied in the metaverse so that banks do not need to establish many branches to market products and serve customers. Banks only need to set up one main branch in the metaverse that can serve real customers from all over the world.

With 47% of bankers believing that customers will use augmented reality (AR) and/or virtual reality (VR) as alternative channels for transactions by 2030, it is not surprising to see early industry pioneers in this area. JP Morgan has become the first bank to set up a discreet office in the metaverse. The financial services company released the Onyx lounge at the Metajuku Decentraland mall, one of the most popular metaverse platforms in the world.<sup>30</sup>

In addition, KB Kookmin Bank, one of the largest financial institutions in South Korea, has been continuously developing a virtual financial city pilot that includes a financial and business centre consisting of virtual branches where customers can access personalized financial information and interact one-on-one with their financial services providers,<sup>31</sup> financial advisors over VR, public relations, and recruitment booths, as well as auditoriums and telecommuting centres, to facilitate communication and collaboration.

Shinhan Bank is one of the South Korea banks most active in adopting a metaverse-themed initiative with plans to develop its own metaverse platform that will offer a virtual banking branch and financial education. Shinhan Bank also plans to be the first bank to offer metaverse services to large customers, namely universities to target millennials and Generation Z because Shinhan Bank believes that millennials and Generation Z are the key to the digital platform. The Shinhan Bank metaverse platform is targeted for completion in mid-2023.

Financial institutions in Indonesia have also taken concrete steps toward the development of banking services in the metaverse, especially state-owned banks. As of March 2022, PT Bank Rakyat Indonesia (Persero)

<sup>30</sup> Birch, "metaverse."

<sup>31</sup> Zelealem, "metaverse."



Tbk. (BBRI), PT Bank Negara Indonesia (Persero) Tbk. (BBNI) and PT Bank Mandiri (Persero) Tbk. (BMRI) are state banks that have entered the metaverse.<sup>32</sup> The metaverse is expected to become a game changer for financial inclusion in Indonesia, because it has broken down the boundaries of space and time, so that it can be reached by customers from all over Indonesia. Banks are expected to be more local in serving the community by providing banking education and other digital services that can be accessed anytime and anywhere. This digitalization is also expected to make it easier for the public to access banking services quickly, easily, effectively, and securely.

### ***b. Branding Strategy***

The metaverse has created opportunities for banks to further strengthen their brands, making it easier to market their financial services they offer. It is very unlikely that people would enter the metaverse to visit their banks as all the processes can be done easily online and visiting a bank, even a virtual bank, is not an enjoyable experience. However, by entering the metaverse, these institutions remain relevant and place their mark on the world that demonstrates growth potential.

An example of a branding strategy tailored to the metaverse is HSBC's investment in a piece of land in The Sandbox which will be developed to interact with sports, e-sports, and gaming enthusiasts.<sup>33</sup> The bank said its partnership with The Sandbox will enable it to create innovative brand experiences for new and existing customers.

### ***c. New Working Culture***

The metaverse requires employees and all stakeholders to adapt to new ways of working and interacting. Advances in technology are hard to avoid and rejection of the metaverse can keep us locked out of a growing and richer virtual world. If the metaverse delivers what it promises, all those involved in bank operations and development will be able to have an interactive and dynamic professional world to collaborate and create in virtual spaces with more real-life connections than ever before through technology.

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<sup>32</sup> Leo Dwi Jatmiko, "Ini Alasan Bank BUMN Masuk ke Metaverse Lebih Awal dari Swasta," accessed May 11, 2022, <https://finansial.bisnis.com/read/20220321/90/1513335/ini-alasan-bank-bumn-masuk-ke-metaverse-lebih-awal-dari-swasta>.

<sup>33</sup> Joana England, "Why are Banks and Fintechs Entering the Metaverse?" accessed May 11, 2022, <https://fintechmagazine.com/crypto/why-are-banks-and-fintechs-entering-the-metaverse..>

According to Blue Ivy Group, there are several things related to the impact of the development of the metaverse that will affect the strategy of employer branding and employee experience in the next three to five years:<sup>34</sup>

- 1) The trend of working remotely will become more common;
- 2) Better quality meetings;
- 3) Diversity and a sense of belonging;
- 4) Training, development, and onboarding; and
- 5) Candidate experiences in recruitment process and career fair.

Several prototypes of a new working culture were designed by Bank of America which held immersive training, such as the implementation of VR training by Bank of America for 50,000 employees.<sup>35</sup> The training simulated customer service scenarios for branch employees so they can detect emotions and adjust behaviour accordingly. Hana Bank of Korea has launched a digital innovation taskforce focused on developing initiatives in the metaverse and recently held an opening ceremony for new employees at Zepetto, the metaverse for Hana Bank's business platform.<sup>36</sup> Also from Korea, NongHyup Bank held a town hall meeting at the metaverse, where an awards ceremony was held at the meeting to reward employees for their achievements in digitization.<sup>37</sup>

To date, technology has primarily served to promote communication and interaction in the workplace functional despite physical distance, but it does not really replicate the experience of being present with team members in person, making it a bit difficult to read body language or share spontaneous ideas when not accidentally crossing paths which usually would usually happen when meeting or working in person. In the metaverse, anyone can join team members in a virtual workspace as a 3D avatar, in a way that is much closer to the real world, including body language.

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<sup>34</sup> Stacy Parker, "How the Metaverse Will Change Your Employer Brand & Workplace Culture," accessed May 11, 2022, <https://bluivygroup.com/blog/how-the-metaverse-will-change-your-employer-brand-and-workplace-culture/>.

<sup>35</sup> Bank of America, "Bank of America is First in Industry to Launch Virtual Reality Training Program in Nearly 4,300 Financial Centers," accessed May 11, 2022, <https://newsroom.bankofamerica.com/content/newsroom/press-releases/2021/10/bank-of-america-is-first-in-industry-to-launch-virtual-reality-t.html>.

<sup>36</sup> Anna J. Park "Metaverse' Becomes New Growth Engine of Financial Industry," accessed May 10, 2022, <https://m.koreatimes.co.kr/pages/article.asp?newsIdx=314385>.

<sup>37</sup> Anna J. Park, "Financial Industry."

### **III.B. The Risks of Commercial Banking in the Metaverse**

The following are some of the challenges and risks of developing banking in the metaverse.<sup>38</sup>

1) Interoperability.

The main challenge in making all functions in Metaverse work effectively is ensuring interoperability among all virtual worlds to provide a seamless experience for users. This also includes accessibility issues for entering the metaverse through various portals and devices, from browsers, mobile applications, computers, laptops, and tablets. In addition, another challenge related to this interoperability is related to the integration of various digital objects and services in the metaverse created from different systems and developers.

2) Online Safety and Wellbeing

In this era of digitalization, Internet users face difficulties, such as harassment and cyber bullying that can affect their comfort and trust in the virtual world. According to an Anti-Defamation League report, 83% of adults and 60% of children have experienced violence or harassment in the virtual world, especially in online multiplayer games. This problem has the potential to worsen because the metaverse removes boundaries between the real and virtual worlds, so that violence or cyber bullying in the virtual world could carry over to the real world.

3) Cyber and Data Security

The metaverse is of course synonymous with the use of digital technology that retrieves, stores, and processes all user data and information to respond to their needs in the metaverse. For this reason, ensuring the security of systems, data, and applications in the metaverse is a challenge for developers and service providers. Some cyber risks, such as phishing, hacking, and malware can damage all services, applications, and digital devices on the metaverse, and all user personal information can be stolen easily. In addition, other risks are selling counterfeit Non-Fungible Tokens (“NFTs”) and abusing the NFT market for money laundering. Therefore, an integrated system security framework is needed to allow users to transact securely in the metaverse.

4) Awareness and Adoption

Although the construction of a digital technology infrastructure and tools can be negotiated at the management level, stimulating public awareness and the desire to adopt or use services in the metaverse is still a challenge. This awareness and desire from the community to enter the metaverse will

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<sup>38</sup> Robinson, Whyte, and Segura, *The Digital Future*, 21-23.

certainly impact the success of the services and business ecosystem in the metaverse.

5) Digital Divide

The COVID-19 pandemic accelerated technological disruption and made connectivity a key factor in being able to survive and operate amid a pandemic. However, the pandemic has also exposed a digital divide among countries and regions. Regardless of the opportunities presented, the metaverse will exacerbate the digital divide because users not only need access to the Internet and smartphones, but also need accessories such as VR glasses, headsets, and premium 5G devices to interact optimally in the metaverse.

6) Regulations

Formulating a regulatory framework for the metaverse is a challenge as policymakers struggle to keep up with technological developments and market disruptions, such as the explosion of data, cryptocurrencies, and digital services. Regulations regarding access rights and management of all data generated in the metaverse are also required. In addition, there are challenges related to the regulation of global intellectual property rights, including copyright and infringement thereof. One of the big questions in the metaverse is about what state laws apply in the metaverse, and if not, how to create new laws, possibly through international treaties, in the metaverse. This question will have an impact on the uncertainty of the sovereignty of countries, including Indonesia, in the metaverse. As a result, it is unclear whether the relevant authorities (BI, OJK, Ministry of Communication and Information Technology, etc.) in Indonesia will have the authority to regulate, supervise and intervene in economic activities and transactions that occur in the metaverse.

### **III.C. Regulatory Perspective: Presence of the Central Bank in the Metaverse**

The presence of commercial banks in the metaverse raises an issue regarding what authority will regulate banking activity. To answer this, it should firstly be determined what law will apply in the metaverse. Since the metaverse is a virtual world with no predetermined domicile, it is difficult to determine which law will apply. Therefore, there are theories which have been developed to address this issue:

a) Data Center Location Theory

This theory determines the legal jurisdiction in the metaverse based on where the location of the data centre holding the relevant data sits. Since a

data centre has a legal domicile, it is easier to determine what law will apply on it. The law applied to a particular data centre will therefore apply to the metaverse. This theory originates from Articles 5-10 of the GDPR, which attempts to determine the law applied to services or goods based on the law that is applied in the domicile of the company or bank.

The advantage of this theory is that it makes it easier to determine the legal jurisdiction of the metaverse. However, it should be noted that the metaverse will be made up of multiple data centres. In this case, the metaverse will be split into several legal jurisdictions and limit the applicability of each law existing in the metaverse. In addition, it should also be noted that Indonesian legal jurisdiction may exist in the metaverse only if one or more data centre is situated in Indonesia.

b) Law of the Metaverse Theory

This theory determines jurisdiction over transactions on the metaverse legal as a *sui generis* legal theory, which is separated from the existing legal jurisdiction in the world. Therefore, there are essentially no positive laws applied on the metaverse. Having its own jurisdiction, the metaverse will have its own legal framework.

The advantage of this theory is that there will be only one law applied in the metaverse, hence increasing legal certainty for activities in the metaverse. However, this theory is difficult to implement because there is currently no authority which has the right to regulate and supervise the Metaverse as a whole. The establishment of such authority will also be a problem since it is still unknown what authority or country has the right to establish another authority in the Metaverse.

According to the above theories, it can be concluded that only the data centre location theory provides the possibility for Indonesian Law to be applied in the metaverse. By assuming there is one or more data centre located in Indonesia's jurisdiction, the metaverse (wholly or partially) will be determined as part of Indonesia's legal jurisdiction. Therefore, giving room for Indonesian law to be applied in the metaverse.

The presence of Indonesian law in the metaverse will grant Indonesian authorities the right to regulate and supervise activities in the metaverse. One of the authorities will be Bank Indonesia. In this scenario, there are several ways that this can be considered by Bank Indonesia in regulating and supervising activities in the metaverse:

a) The establishment of Self-Regulatory Organizations ("SROs")

As Bank Indonesia has been granted the authority to regulate and supervise activity in the metaverse, it can appoint one or more non-governmental entities to be SROs. An SRO is an organization given the authority to create, amend, implement, and enforce rules of conduct with respect to

the entities subject to its respective jurisdiction and to resolve disputes through arbitration or other means.<sup>39</sup>

Appointment of an SRO has proven to be an efficient mechanism of regulation in certain fields. This is because SROs, by their nature, have greater flexibility in adapting to regulatory requirements to a rapidly changing business environments.<sup>40</sup> In addition, the SRO mechanism also provides a greater chance for regulations to be formulated in accordance with the business and market needs, as it is drafted by market participants with intimate knowledge of the market who know how to maximize the regulatory benefits (e.g., orderly markets, customer protections, reduction of systemic risks).<sup>41</sup>

The SRO mechanism would work best in the field where industry representation and self-regulation are integral parts of the regulatory scheme.<sup>42</sup> In the case of the metaverse, SROs will work well and effectively to regulate and supervise activities. This is because MetaFi has a decentralized nature, where the presence of market participants is more dominant than the regulatory authority. The metaverse has also developed mostly because of the industry innovation implemented by companies. Therefore, it can be concluded that the metaverse by its nature is an industry-driven ecosystem, which is best regulated under the SRO mechanism, giving the industry a greater chance to be involved in the regulation making process.

The role of SROs may differ from one country to another. This difference can be accounted for because of the different market sectors and maturity of the market.<sup>43</sup> Therefore, the details of what authority an SRO will have and how its relationship with Bank Indonesia as statutory regulator may be discussed further in accordance with the market and regulatory needs.

The establishment of an SRO to address the legal complexities of the metaverse offers an advantage to the regulatory scheme of Bank Indonesia in the Metaverse, as mentioned below:

- a. There would be a double *layer governance system*, ensuring the effectiveness of regulation and supervision to the activities in the Metaverse;
- b. Accommodate the limited capability and knowledge of existing regulators toward business and market needs, in formulating appropriate regulation in the Metaverse;

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<sup>39</sup> International Organization of Securities Commissions (IOSCO), *Model for Effective Regulation: Report of the SRO Consultative Committee* (May 2000), 3, <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD110.pdf>.

<sup>40</sup> *Ibid.*, 3.

<sup>41</sup> *Ibid.*

<sup>42</sup> *Ibid.*

<sup>43</sup> *Ibid.*, 11.

- c. A more dynamic governance system, as SROs afford more flexible to the changes and transformation in the Metaverse.
- b) The development of Central Bank Digital Currency (“CBDC”) to create a new financial ecosystem

As explained before, the metaverse is simply a series of financial ecosystems, composed of many activities conducted by parties. These financial ecosystems are built upon the Blockchain technology, which allow parties to conduct many activities without the presence of intermediary. What makes the transaction and activities possible to happen in blockchain technology is the existence of fungible tokens (cryptocurrency and stable coins), which are widely agreed upon to be used as medium of exchange. It may be concluded that the financial ecosystem in the metaverse is built upon blockchain technology and tokens. From this fact, Bank Indonesia could build a similar ecosystem by developing CBDC from blockchain (or alternative technology) and promote it as a medium of exchange in the metaverse. As it is developing, CBDC will be another option of medium of exchange beside cryptocurrency and stable coins. The possibilities of CBDC to turn into a financial ecosystem will depend on how intensely it is used in transactions and activities in the metaverse.

As CBDC evolved to a financial ecosystem, Bank Indonesia will obtain authority over the industry in the metaverse. As issuer of the CBDC, Bank Indonesia will be in control toward the issuance, circulation, and other monetary aspect of CBDC. Therefore, the presence of Bank Indonesia in the control of CBDC will also affect the industry and activities in the CBDC ecosystem of the metaverse.

CBDC may have a bigger role in the metaverse, more than just a medium of exchange. It may transform to be a financial ecosystem which is able to accommodate many transactions and activities in the metaverse, like the financial ecosystem built upon cryptocurrencies or stable coins. This financial ecosystem may give Bank Indonesia greater authority toward CBDC as a payment instrument, which will affect the industry of the metaverse. In time, CBDC will also be a monetary tool in the metaverse which gives Bank Indonesia greater control of the inflation and economic stability from the metaverse.

This regulatory scheme will give several advantages to Bank Indonesia in regulating and supervising activities in the metaverse, as follows:

- a. A more flexible regulatory scheme, as CBDC will directly connect to the activities and industry in the metaverse;
- b. CBDC has potential to be utilized as monetary tools for Bank Indonesia to secure financial and payment system stability.



#### **IV. CONCLUSION AND RECOMMENDATION**

Based on the analysis and discussion of available theories and sources of information, the following conclusions can be drawn:

- 1) The metaverse offers new growth opportunities to various sectors including the economic and financial sectors. Economic and financial sector actors, especially commercial banks, should take concrete steps to maximize the opportunities that exist. The banking potential in the metaverse has two broad lines, namely the potential for banking services and products and the potential for bank development as a business unit. The potential for banking services and products in the metaverse include payment services by banks in the metaverse, artificial intelligence (AI)-based credit scoring, and the use of digital assets as collateral. In addition, the development of the potential of banks as business units, including virtual banking branches, development of branding strategies, and a new work culture in banking companies.
- 2) The potential for banking development in the metaverse also comes with risks and challenges that need to be faced. We have identified risks and challenges, including interoperability, online safety and well-being, cybersecurity and data security, awareness and adoption, digital divide, and regulation.
- 3) Bank Indonesia as the central bank should prepare itself to face the new world, especially to support economic and financial players to increase business potential and financial services, as well as to face the risks and challenges created, through the following ways:
  - a. Giving confidence to market players to regulate the industry independently by establishing a self-regulatory organization (SRO). BI together with the relevant regulators only need to play a role in supervising all financial activities in the metaverse in general to ensure that there is no missing link between the authorities and the SRO.
  - b. Expanding the space for BI regulation, supervision, and intervention in the payment system and economic activities in the metaverse through the development of CBDCs and a new CBDC-based financial ecosystem.

Based on the results of the analysis and discussion in this paper, the recommendations that we can provide include:

- 1) Banks must prepare themselves by analysing the market landscape and technology to understand how these two things develop, including the opportunities that exist and the parties to work with. In addition, banks must also evaluate technology readiness before making changes, and prepare capital to invest in the procurement of VR technology, AR,

distributed ledger, and digital capital markets. Banks must also prepare new skill sets related to the core technology of the metaverse, namely AR, VR, XR, blockchain, AI, digital assets, and other things for all human resources involved in banking development in the metaverse.

- 2) Bank Indonesia together with the relevant authorities need to formulate regulations related to the metaverse such as data access rights, the right regulatory approach to regulate SRO, standardize metaverse services for banks and formulate related consumer protection mechanisms in the metaverse.
- 3) Bank Indonesia needs to develop a CBDC as a first step to develop a new financial ecosystem in the metaverse as an option for the community, which will become a space for the Central Bank to regulate, supervise, and intervene in economic activities and payment systems in the metaverse according to national interests.

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