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FINTECH DEVELOPMENT AND REGULATORY FRAMEWORKS IN INDONESIA

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Abstract

This paper showcases the growth as well as the challenging factors for fintech development in Indonesia. As the eighth-biggest economy in terms of gross domestic product, and with an internet participation ratio of more than 50% and more than 50 million micro, small, and medium-sized enterprises (MSMEs), the country shows huge potential for fintech. As of 2017, $1.62 million had been distributed through 11 local peer-to-peer (P2P) platforms. However, low financial inclusion and the big financing gap among MSMEs pose a huge challenge, which the government is trying to overcome. Ensuring financial literacy will be key. An example is Finansilaku, which is providing online literacy programs for the development of the next generation. Moreover, fintech companies such as Mekar are creating shared value as P2P lending platforms for women, with a similar philosophy as Grameen Bank. Finally, this paper also discusses customers' reluctance to use fintech products and examines how regulators have adopted strategies related to regulation strategy, frameworks, market supervision, and innovation.

Keywords: fintech, financial technology, Indonesia

JEL Classification: G21, G23

Contents

1. BACKGROUND

Financial services in Indonesia have evolved in line with innovation and technology, and have also experienced boom and bust cycles as a result of financial crises, including the Asian financial crisis of 1997–98 and the global financial crisis of 2008 (Batunanggar 2001).

Financial technology (fintech) emerged with the development of information technology, including the internet, smartphones, and big data analytics, which enabled faster and cheaper distribution of financial services. Fintech presents a challenge to incumbent financial institutions as it offers alternative services to post-global financial crisis society.

Fintech also reaches parties that have been neglected by banks, while providing better services to already-banked customers. Fintech has changed the financial services landscape, and, based on cross-sector services, it will expand its market share in the coming years.

The changing environment has facilitated the emergence of new players in financial services, especially non-financial companies such as smartphone manufacturers and internet providers. The preferences of the millennial generation also open opportunities for fintech entrepreneurship.

For Indonesia, fintech provides an opportunity to close current gaps in financial inclusion and financing.

This paper outlines the fintech landscape and discusses the regulatory framework adopted by the Indonesia Financial Services Authority (Otoritas Jasa Keuangan/“OJK”). Fintech in this paper refers to non-financial companies or start-ups that provide financial services through digital platforms.

2. INDONESIA: KEY OPPORTUNITIES AND CHALLENGES

2.1 Key Opportunities

Indonesia has many opportunities in the digital economy, with regard to the size of its economy, population, and the number of internet and mobile phone users, as summarized in Box 1.

Internet penetration in Indonesia is expected to soar in the next few years. According to the 2018 Daily Social Fintech report, state-owned banks (63%) are implementing digital initiatives to escalate revenue growth compared to private-owned (21%) and *syariah* (14%) banks. Thus, the majority of financial institutions in Indonesia are already aware of the importance of technology in their business process.

Box 1: Indonesian Digital Economy and Finance – Now and Then

- Today, Indonesia is the world's 16th-biggest economy (8th-biggest according to gross domestic product purchasing power parity). It will be the world's 7th-largest economy (5th-largest by gross domestic product purchasing power parity) in 2030.
- As the world's 4th-largest country after the People's Republic of China (PRC), the US, and India, Indonesia, with a population of 261,890,900 in 2017, will enjoy the peak of demographic bonuses by 2030, enough to generate economic growth.
- Currently, there are 45 million Indonesians categorized as middle (consuming) class; by 2030, the number will be 135 million.
- Currently, there are 55 million Indonesians categorized as skilled workers; by 2030, there will be 113 million.
- Currently, the number of internet users in Indonesia is 132.7 million or about 51.5% of the total population. Together with the PRC and India, Indonesia expects to become a top information technology innovator.
- Currently, there are more than 50 million micro-, small, and medium-sized enterprises (MSMEs) in Indonesia. Because 70% of all MSME sectors do not yet have access to bank financing, the government is encouraging 6 million MSMEs to go digital to gain access to finance.

Source: Biro Pusat Statistik, World Economic Forum (2018), McKinsey (2012).

2.2 Key Challenges

Indonesia's financial sector has grown steadily and become resilient as part of its post- banking crisis restructuring program and continuous regulatory framework initiatives. However, there are two fundamental problems in Indonesia's financial sector. First is the persistent low level of financial inclusion. Based on the World Bank's 2017 Financial Inclusion Index, 48.9% of Indonesian adults have bank accounts; the government plans to improve this to 75% in 2019. The second issue is the large MSME financing gap. The World Bank and International Finance Corporation estimated that the credit gap for MSMEs in Indonesia reached $165 billion (or 19% of gross domestic product), while the current availability is only $57 billion.

Despite the high number of internet users in Indonesia, national digital channel knowledge is only at 34% and digital channel usage is only 8.7% (E&Y Census 2018). Digital finance literacy needs to be improved, with OJK and other institutions having launched related programs.

The fintech and start-up talent shortage is also an issue. According to E&Y (2018), 58% of tech and software talent is not suited to meeting their needs. To develop the capacity of Indonesia's younger generation, OJK collaborates with universities, innovation hubs, industry associations, and international agencies.

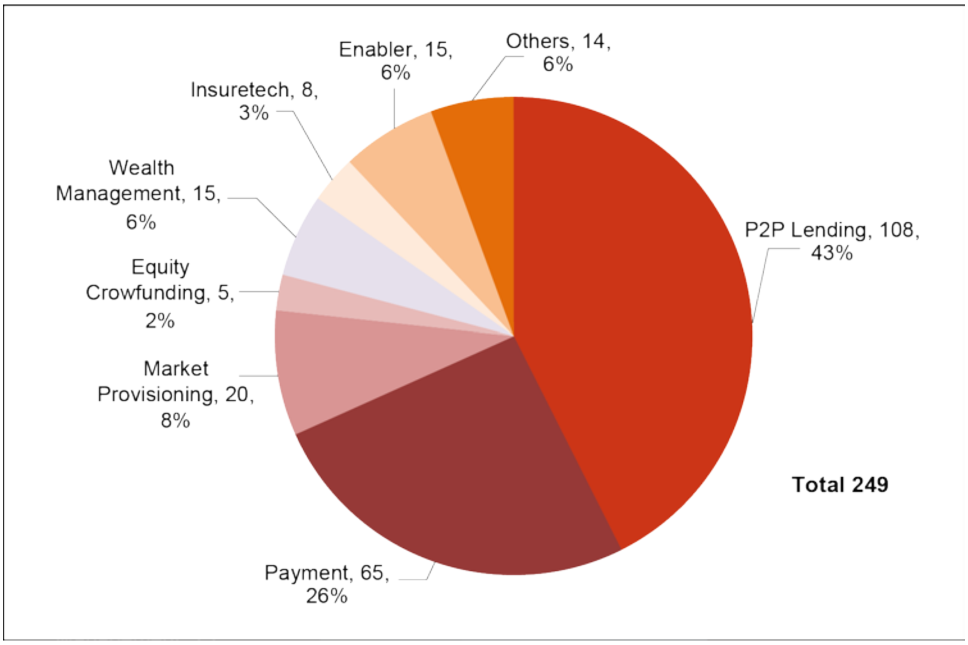
3. FINTECH IN INDONESIA

3.1 Fintech Landscape and Development

As of May 2019, there are 249 fintech companies in Indonesia, starting from deposits and lending, to payment and capital raising, as illustrated in Figure 1.

The top two fastest-growing fintech areas in Indonesia are peer-to-peer (P2P) lending and e-payment. Based on Bank of Indonesia statistics, the value of e-money transactions grew sixfold between 2012 and 2017 to IDR12.3 trillion ($840 million).

Figure 1: Indonesia Fintech Landscape – Composition
(in numbers and %)



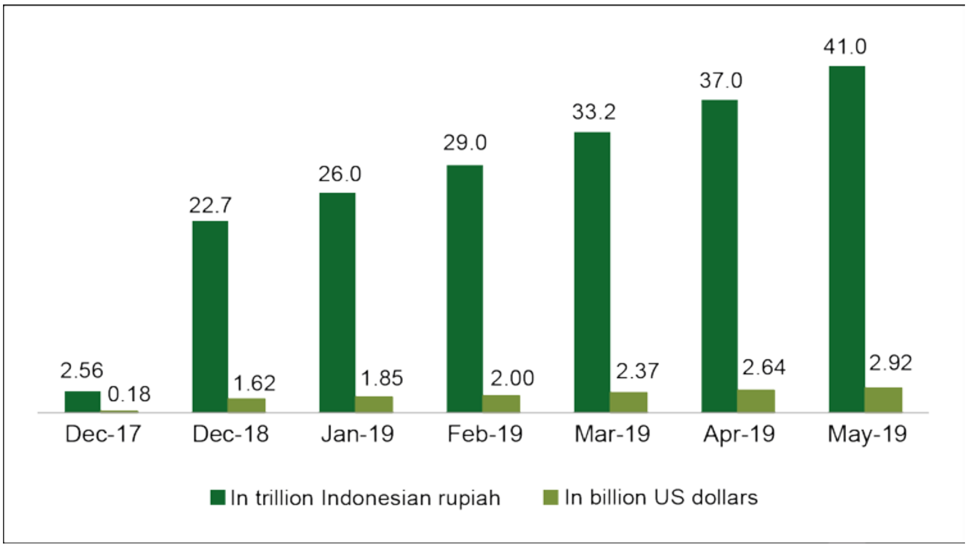
KYC = Know Your Customer, P2P = peer-to-peer.
Source: OJK.

Meanwhile, based on OJK's data as of December 2018, disbursement of credit through P2P reached IDR22.67 trillion ($1.62 million), a 645% year-on-year increase. These funds originated from 101 local P2P platforms that registered with OJK. Figure 2 illustrates the development of P2P lending in Indonesia.

As seen in Figure 3, although the trend is increasing, the number of borrowers and borrowing outside Java is always smaller (16% as of November 2018). The main reasons are that Java has the highest economic growth and the most people, while financial literacy outside Java is lower.

This is the challenge and also the opportunity for the P2P lending industry. Fortunately, some fintech companies, such as the specialized P2P lending concern Iternak, tap into this opportunity. Iternak provides loans for animal husbandry businesses, having started in West Sumatra and currently expanding to other areas. With creativity and deep understanding of the market, Iternak proves that a lending business can succeed outside of Java. However, to ensure the sustainability of its business, more advanced technology, especially with digital ID and credit scoring, is needed.

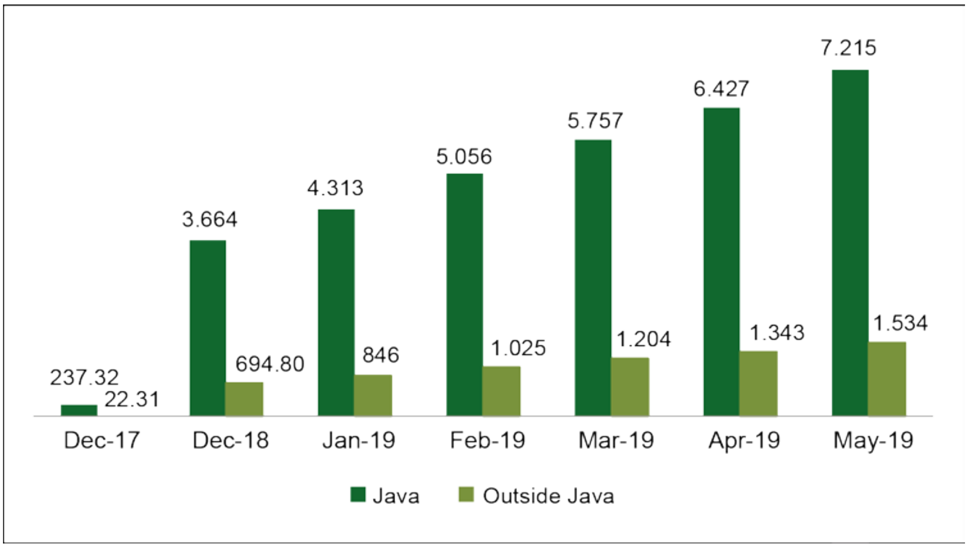
Figure 2: Total P2P Lending



IDR = rupiah, P2P = peer-to-peer, USD = dollars.

Source: OJK.

Figure 3: Total P2P Borrowers
(in thousands)



P2P = peer-to-peer.

Source: OJK.

Moreover, there are 55 other fintech firms, excluding e-payment and P2P lending, that have registered with OJK, including aggregators, credit scoring, insure-tech, financial planning, etc. They, along with e-payment and P2P lending, are expected to make financial services accessible for the unbanked and underserved society.

3.2 Financial Literacy and Financial Inclusion

Fintech improves financial inclusion by responsibly and sustainably providing individuals and businesses with access to financial products and services such as transactions, payments, savings, credit, and insurance.[1] Fintech could also deliver much-needed finance to MSMs.

Financial literacy implies the ability to create informed perceptions and make appropriate choices regarding the utilization of money. Financial literacy can make a change not only in individuals' lives, but in the integrity and the quality of markets. In Indonesia, the necessity for financial literacy is even more significant bearing in mind the low levels of education and the enormous population, most of which remains outside the official financial set-up, particularly in rural areas.

Fintech becomes one of the radical strategies to attain Indonesia's goal of 75% financial inclusion by 2019. However, the OJK survey found that only about 30% of the population are financially literate, making inclusion rife with potential hazards. Current experiences in online consumer financing have shown that poor individuals take loans that they cannot repay. Therefore, financial inclusion should be integrated with customer education and financial literacy.

The obligation of fintech in promoting financial literacy has been addressed in Article 4 of OJK Regulation No. 13 of 2018 concerning the Digital Financial Innovation in the Financial Services Sector. One example is Finansialku.com, which is geared to millennials, and condenses financial product articles into an accessible investment e-book, and provides online courses. In this way, Finansialku.com is not only building the next generation of financial planner tools, but also facilitating financial education.

Fintech also plays an important role in improving social welfare. An example of social fintech in Indonesia is Mekar, which provides financing to empower MSMEs, especially those benefitting poor women (see Box 2).

3.3 Customer Behavior and Customer Protection

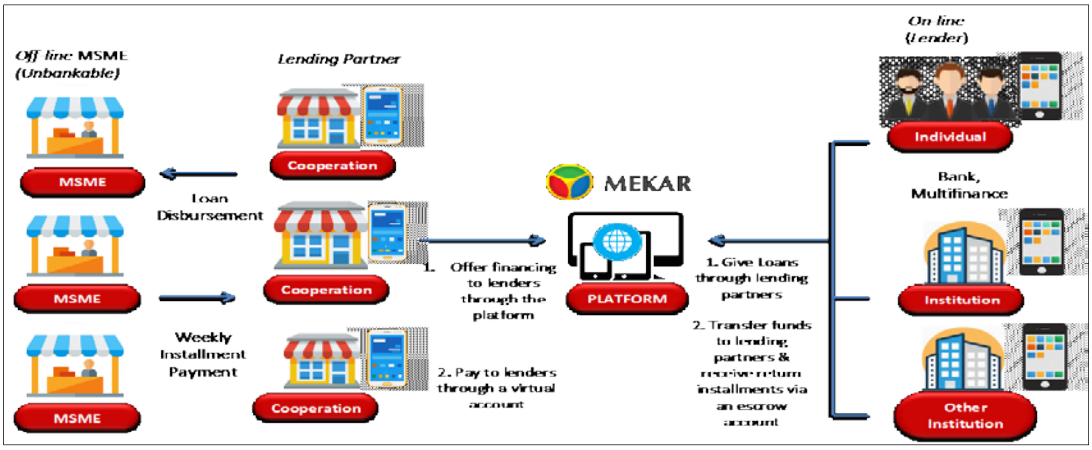
3.3.1 Customer Behavior toward Fintech

The first factor influencing the growth of fintech in Indonesia is how the incumbent financial institutions and customers respond. In general, Indonesian financial services are now more open for collaboration with fintech. Some of Indonesia's large banks have already developed incubation programs, events, and funding programs through which they interact with startups. For instance, Bank Mandiri, the biggest state-owned bank, established Mandiri Capital in early 2016 as a fintech venture fund. It has a $37 million financial plan and funded card-reader startup Cashlez, micro-lender Amartha, and point-of-sales software Moka, among other startups. Bukopin, a mid-size private bank targeting MSMEs and Indonesia's middle segment, launched a startup incubator called BnV Labs in March 2017. Startups in the program can use office space at BnV Lab's partner co-working space, Kibar. The members get mentorship and access to the bank's network. The collaboration only started in the last 2 years, so the exact result is yet to be determined. However, it inevitably brings the Indonesian fintech ecosystem into clear relief.

[1] Financial Inclusion Overview, World Bank, 2018.

Box 2: Mekar, Fintech with a Social Mission

Established in 2013, Mekar has a unique value proposition that focuses on creating social impact for micro- and small enterprises (MSEs) and empowering women. Its mission is to provide financial access to MSEs, create jobs, and connect investors and borrowers. As a peer-to-peer platform, Mekar receives funds from its investors, both individual and institutional, and gives loans to its online partners, who then disburse them to the MSE borrowers—mostly women (offline).



Mekar reaches out MSEs in all areas in Indonesia through the cooperation with the saving and loan cooperatives, rural banks, and other financial institutions, through more than 250 branch offices. Total loans disbursed as of September 2018 amounted to IDR92 billion and total borrowers numbered 33,515 people. Non-performing loans constitute only 0.53% of the total.

One of Mekar's lending partners is Komida, Koperasi Mitra Dhuafa or "Partner of the Poor Cooperative", which also focuses its service on women. Komida was established in 2004 as a microfinance company based on the Grameen Bank group lending model. It started its activity to assist tsunami victims in Aceh and opened its first branch in Darussalam in 2005.

Since 2009, Komida changed its status to a saving and loans cooperative that helped low-income women to start and grow their business. It provides loans to a group of poor but productive women without collateral, enabling them to work without leaving their house. The size of loans ranges from IDR2 million–15 million depending on the business capacity of the borrower. Its belief is that poor people can be trusted and constitute a large potential, a philosophy grounded in that of the Grameen Bank's Muhammad Yunus. Starting 235 branches that reach about 574,000 people.

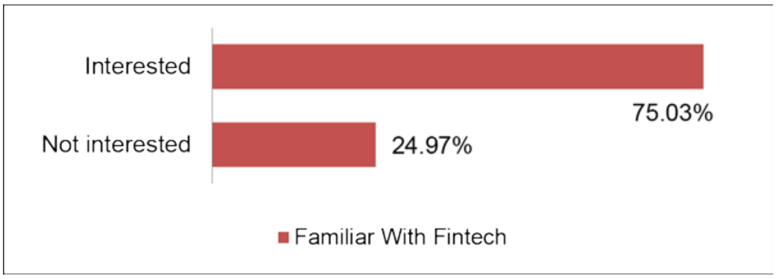
Among strong features of Komida's business model are keen identification of potential members, solid group formation, careful review of business prospects, close monitoring of members' business, direct collection of loan principal and interest, and empowerment to its members. It is also supported by competent and honest staffs developed through intensive trainings. Besides savings and loans, Komida also provides nonfinancial services to its members including health, education for members' children and family financial management.

Mekar's innovations on MSE financing to women through collaboration with lending partners such as Komida, combined with social and business empowerment, has been significantly improving the economic and social welfare of the target market.

Source: OJK and Universitas Trisakti (2018), Author analysis.

The other central stakeholders of fintech are the customers. The survey conducted by the Daily Social (2018) revealed that fintech users are now more familiar with the products and services, though they fear compliance issues and other risks (see Figure 4). This is the essential fact to be changed by increasing their financial literacy.

Figure 4: Polling of Customers Investing in Fintech



Source: Daily Social (2018), Fintech Report.

3.3.2 Customer Protection

One of the reasons why customers are reluctant to use fintech is perceived lack of safety. Based on OJK Regulation No. 1 of 2013 concerning Consumer Protection in the Financial Services Sector, consumer protection providers are obliged to incorporate transparency, impartial treatment, trustworthiness, privacy and safety of customer data/information, and simple treatment of complaints and customer disagreement resolution into their operations, along with fast and inexpensive charges.

Because of this, OJK publishes information regularly about registered fintech and encourages customers to deal only with them. OJK Regulation No. 13 of 2018 also obliges that digital financial innovation must be responsible and secure, and prioritize customer protection and governance. This issue is also addressed separately in Bank of Indonesia Regulation No. 18 of 2016 and OJK Regulation No. 77 of 2016. Other sector regulations also addressed the issue.

Regarding customer data protection, the Ministry of Communication and Informatics issued Law No. 11 of 2008 on Electronic Information and Transactions Law. It is further elaborated in the Government Regulation 82/2012 and Ministry of Communication and Informatics Regulation No. 20 of 2016 on the Protection of Personal Data in Electronic Systems. In principle, an electronic system operator should respect the privacy of personal data and treat it as confidential.

4. FINTECH REGULATORY FRAMEWORK IN INDONESIA

Alongside its benefits, fintech also comes with significant risks. Customer protection and data security have been the two main concerns. As fintech provides financial services in a user-friendly platform, this would also mean anyone who has an internet connection could use it and misuse customer data. In a worse scenario, fintech could potentially disrupt financial stability, as users fail to mitigate the risks involved in their businesses. Financial activities carried out may fall outside the rigorous regulatory perimeter and pose a risk to the broader system (KPMG 2017). A significant disturbance in these services, or disintermediation of regulated entities, may potentially have severe negative impacts for the economy (Financial Stability Board 2017).

4.1 Indonesia Fintech Regulatory Strategy

The primary challenge for regulators is to balance innovation with the integrity of the financial markets and customer protection. The regulation on fintech should nurture innovation, while also guiding it to be responsible. This implies that a balanced regulatory framework will be required. This strategy aligns with the “light touch and safe harbor” regulatory approach stated by the President of Indonesia, Joko Widodo, in the 2018 Annual Meetings of International Monetary Fund and World Bank Group (IMF-WBG) in Bali.

As Panetta (2017) argued, fintech regulation should ensure four key principles. First, the playing field should be level and tech-neutral in order to avoid supervisory arbitrage. Second, it should be adaptable, given the rapid change that will impact fintech in the future. Third, collaboration of financial sector authorities with regulators is paramount in other fields such as data protection, cyber-risk, and antitrust. Finally, the regulation should also have universal dimension to cope with the global development of technology and the market for financial services.

Another crucial issue is the speed of innovation versus the speed of regulation. The survey conducted by Daily Social in 2018 showed that fintech players view that government adoption of regulations is somehow slow. In fact, this a key challenge for all regulators. The question is, how should regulators respond?

Realizing these facts, OJK adopts five strategies to support digital financial innovations in Indonesia:

1. **Holistic and balance strategy**. OJK ensures resiliency or safety and soundness of fintech and promotes innovation and competition. Fintech must ensure customer protection in its business to create and maintain trust in the industry.
2. **Agile regulatory framework.** OJK sets the principle-based regulations for digital financial innovation, while acknowledging that the fintech industry is very dynamic. It gives the flexibility and also responsibility to the industry to define codes of conduct and operating standards that fit with their business.
3. **Market conduct supervision.** OJK is accountable for regulation and supervision of fintech. Meanwhile, fintech is responsible for managing their business by applying sound corporate governance, risk management, and compliance. OJK appointed a Fintech Association to oversee fintech development.
4. **Regulatory Sandbox**. Regulatory sandbox is the OJK testing mechanism to assess the reliability of the business process, business model, financial instruments, and the governance of the innovator based on the specific predefined criteria. The regulatory sandbox allows OJK to gain a deeper understanding of fintech business models and risks, and also allows fintech firms to improve their business models and governance (see Box 4).
5. **Digital Innovation.** OJK nurtures innovation and responsible finance through the establishment of OJK Fintech Centre, named “OJK infinity” – “OJK Innovation Centre for Digital Financial Technology” launched on 20 August 2018. OJK Infinity serves three key purposes as a learning and innovation center on fintech, as media for coordination and collaboration among key stakeholders, and as a laboratory for regulatory sandboxing.

4.2 Existing Regulations on Fintech Industry

Currently, there are two authorities regulating fintech in Indonesia. Bank of Indonesia regulates fintech relating to payments, whereas OJK regulates all fintech that provides financial services, such as digital banking, P2P lending, crowd funding, insure-tech, investment, and market aggregators. The existing regulations are summarized in Box 4 below.

OJK published POJK No.13/POJK.02/2018 as the legal umbrella for all types of fintech, effective from 16 September 2018. It is designed as a principle-based regulation for the fintech industry and aimed at creating a responsible digital finance innovation. The key content of the regulation is summarized in Box 5.

Box 4: Summary of Regulations on Fintech in Indonesia

a. OJK Regulation No.77/POJK.01/2016 on Information Technology-based Lending

The regulation is directed to support the growth of fintech P2P lending platforms, as new financing alternatives for communities that have yet to enjoy optimal services from incumbent financial service institutions. P2P platforms are classified as other financial services institutions. The regulation also mandates customer protection.

b. OJK Regulation No.12/POJK.03/2018 on the Implementation of Digital Services by Commercial Banks

This regulates the use of information technology for digital banking. All banks that wish to issue electronic/digital products must request permission from OJK. Banks must emphasize product innovation, cooperation with partners, and digital processes to ensure better services for customers and effective risk management.

c. OJK Regulation No.13/POJK.02/2018 on Digital Financial Innovation in the Financial Services Sector

This is an umbrella regulation for fintech. Any fintech companies that are not yet regulated by other authorities must apply to OJK to go through the regulatory sandbox process and get registered. The key dimension of this regulation is responsible finance innovation, adoption of a robust security system and good governance, and compliance with customer protection and anti-money laundering/combatting the finance of terrorism rules.

d. OJK Regulation No.37/POJK.04/2018 on Equity Crowd Funding

This regulation focuses on regulating equity crowdfunding. It is aimed at boosting economic growth in Indonesia by providing access to start-up companies and SMEs in raising funds electronically for development of their business.

e. Bank of Indonesia Regulation No.19/10/PBI/2017 on Fintech Companies

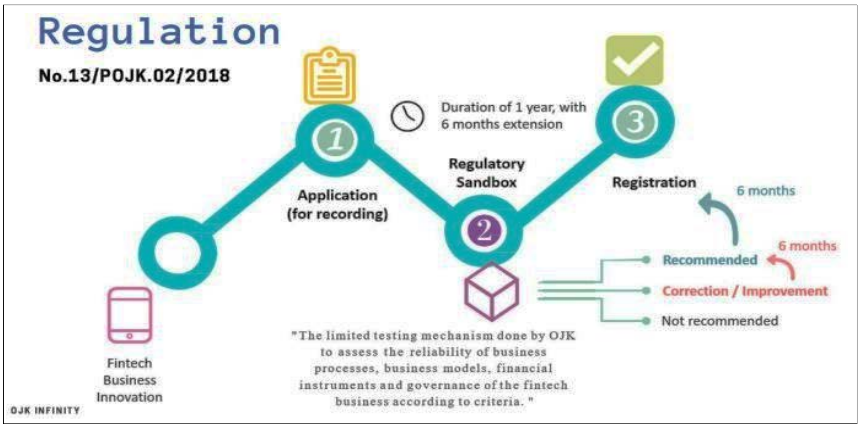
The regulation is intended to support the fintech ecosystem and the Indonesian economy, in particular companies in payment businesses. Fintech providers are obliged to register at Bank of Indonesia and cannot use digital currency. They will be tested in the regulatory sandbox for around a year before they may apply for license.

f. Bank of Indonesia Regulation No.20/6/PBI/2018 on Electronic Money (E-money)

The regulation is intended to accommodate the development of business model of e-money. The institutional capacity of e-money issuers is enhanced, including capital and ownership composition.

Source: OJK, Bank Indonesia, Author Analysis.

Box 5: Umbrella Regulation for Fintech



1. Recording and Registration Mechanism

All fintech firms not regulated by other authorities must comply with OJK regulation and follow three key steps:

a. ***Recording*** Fintech firms must submit all the documents required to OJK for verification and analysis to decide whether they: (1) meet the criteria as innovators and comply with OJK regulation; (2) are selected to be tested on the regulatory sandbox; and (3) which cluster they are classified in based on the business model mapping.

b. ***Regulatory Sandbox*** The regulatory sandbox is conducted using a sampling and prototyping method, where selected fintech from each business model (cluster) is tested. There are five key steps involved: 1) understanding the business model, business process, and governance; 2) choosing the review methodology and scenarios; 3) testing and experimentation; 4) improvement of model; and 5) final evaluation. The review process involves a panel forum of supervisors who will provide opinions whether the fintech's model is recommended, needs improvement, or is not recommended for registration or operation. The length of the regulatory sandbox process could vary from a few months to 1 year, with the extension of up to 6 months if they are required to rectify their business.

c. ***Registration*** Fintech firms that are recommended by the regulatory sandbox must apply to the registration stage 6 months at the latest after getting the recommendation status.

2. Governance, Risk and Compliance

Fintech must develop and adopt good governance, effective risk management, and compliance to all rules and regulations to ensure a safety and sound practice.

3. Monitoring and Surveillance Mechanism

Though regulated and supervised by OJK, fintech must also conduct risk self-assessment. During the regulatory sandbox, they must submit quarterly performance reports; once these are registered, the firm must submit a monthly risk self-assessment report. Fintech firms must also continuously report to customers about the performance of their portfolio.

4. Customer Protection

Fintech firms must apply the following basic principles of customer protection including transparency, fair treatment, reliability, data privacy and security, as well as effective and efficient handling of customers' complaints.

Source: OJK, Author analysis.

5. POLICY DIRECTION

Indonesia is a large nation with abundant potential that could be tapped via digital finance innovation. By preparing a right strategy and taking proactive actions, Indonesia could lead the future of finance and be one of the prominent fintech hubs in Asia.

Adoption of a balanced regulatory strategy will ensure resiliency and foster dynamic growth and innovation. Envisioning and nurturing the spirit of responsible innovations is a noble effort to establish a stable, contributive, inclusive, and sustainable digital financial sector. It is imperative to develop a new regenerative model of finance that focuses not only on profit, but also people and the planet.

Indonesia needs to develop a holistic fintech road map in line with a national digital economy strategy and road map aimed at developing a sound ecosystem, including data protection, customer protection, regulation and supervision, regulatory sandbox, innovation hub, risk management, and cyber-risk. All these initiatives must be supported by developing required talents and infrastructure. To realize this, collaboration among OJK and key stakeholders, both domestic and international, is vital. The collaboration of fintech firms with incumbent financial institutions, microfinance, cooperatives and community agents must be also engaged. Through a vibrant shared vision, the right strategy, and strong co-creation among stakeholders, we look forward to creating a more inclusive and sustainable financial sector in Indonesia.

REFERENCES

Daily Social. 2018. Fintech Report. p. 16–35. https://dailysocial.id/report/post/fintech-report-2018 (accessed 14 July 2019).

EY. 2017. ASEAN Fintech Census 2018. Jakarta: EY. https://www.ey.com/Publication/vwLUAssets/EY-asean-fintech-census-2018/$FILE/EY-asean-fintech-census-2018.pdf (accessed 14 July 2019).

Financial Stability Board (2017), Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that Merit Authorities' Attention, p. 17–21. http://www.fsb.org/2017/06/financial-stability-implications-from-fintech/ (accessed 14 July 2019).

Fintechnews Singapore. 2018. How 4 Indonesian Banks are Collaborating with Fintech Startups. Singapore. http://fintechnews.sg/17582/indonesia/banks-fintech-indonesia/ (accessed 14 July 2019).

KPMG. 2017. *Value of Fintech*, p. 42. https://home.kpmg/uk/en/home/insights/2017/10/value-of-fintech.html (accessed 14 July 2019).

McKinsey. 2012. The Archipelago Economy: Unleashing Indonesia's Potential. https://www.mckinsey.com/featured-insights/asia-pacific/the-archipelago-economy (accessed 14 July 2019).

Otoritas Jasa Keuangan and Centre for Financial Inclusion Universitas Trisaksi (2018), Kajian Peranan Fintech untuk Pemberdayaan Usaha Mikro Kecil (UMK).

Panetta, F. 2018. Fintech and Banking - Today and Tomorrow. Speech delivered at the Harvard Law School Bicentennial Annual Reunion of the Harvard Law School Association of Europe, Rome, 12 May, p. 9–10. https://www.bis.org/review/r180515d.htm (accessed 14 July 2019).

PWC. 2017. The World in 2050, The long View: How Will the Global Economic Order Change by 2050?. Jakarta: PWC. https://www.pwc.com/gx/en/issues/economy/the-world-in-2050.html (accessed 14 July 2019).

———. 2018. PwC Survey: Digital Banking in Indonesia 2018. Jakarta: PWC. https://www.pwc.com/id/en/publications/assets/financialservices/digital-banking-survey-2018-pwcid.pdf (accessed 14 July 2019).

Statistical Yearbook of Indonesia. 2018. BPS-Statistics Indonesia. https://www.bps.go.id/publication/2018/07/03/5a963c1ea9b0fed6497d0845/statistik-indonesia-2018.html (accessed 14 July 2019).

Sukarela, B. 2001. Indonesian Banking Crises Resolution: Lessons Learned and the Way Forward, Central for Central Banking Studies, Bank of England. http://www.bi.go.id/NR/rdonlyres/81804644-50F8-411E-847A-AEE92502FAAA/13371/ibcr0212.pdf.

World Bank. 2017. Global Findex Database 2017. https://globalfindex.worldbank.org (accessed 14 July 2019).

World Economic Forum. 2018. The Global Competitiveness Report 2017–2018. https://www.weforum.org/reports/the-global-competitiveness-report-2017-2018 (accessed 14 July 2019).