



**ADB Working Paper Series**

**BIG DATA-BASED PEER-TO-PEER  
LENDING FINTECH:  
SURVEILLANCE SYSTEM THROUGH THE  
UTILIZATION A OF GOOGLE PLAY REVIEW**

---

Nika Pranata and Alan Ray Farandy

No. 943  
April 2019

**Asian Development Bank Institute**

Nika Pranata and Alan Ray Farandy are researchers at the Economic Research Center of the Indonesian Institute of Sciences.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

Working papers are subject to formal revision and correction before they are finalized and considered published.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. Some working papers may develop into other forms of publication.

Suggested citation:

Pranata, N. and A. R. Farandy. 2019. Big Data-Based Peer-to-Peer Lending FinTech: Surveillance System through the Utilization of a Google Play Review. ADBI Working Paper 943. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/big-data-based-peer-peer-lending-fintech>

Please contact the authors for information about this paper.

Email: [nika.pranata@lipi.go.id](mailto:nika.pranata@lipi.go.id)

Asian Development Bank Institute  
Kasumigaseki Building, 8th Floor  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

© 2019 Asian Development Bank Institute

**Abstract**

Peer-to-peer lending (P2PL) FinTech is growing rapidly in Indonesia. With its flexibility and simplicity, P2PL reduces the gap in financing that cannot be fulfilled by banks. However, the rapid development of P2PL also raises a number of problems that burden users such as unethical debt collection methods, and the imposition of excessive interest rate and other costs that potentially threaten national financial system stability. Therefore, by utilizing big data, which in this case is 40,650 reviews from 110 P2PLs obtained from Google Play within the period of March 2016–August 2018, this research builds a big data-based P2PL surveillance system based on four aspects, namely legality, review rating, debt collection methods, and level of interest rates and other costs. By using relational database, structured query language (SQL) and text analysis, we made several findings: (i) the majority of P2PL in Google Play are unauthorized; (ii) on average, authorized P2PL receives a better review rating; (iii) there are a lot of negative reviews related to unethical debt collection methods and excessive imposition of interest rate; and (iv) there are four P2PLs that required special supervision from the Indonesia Financial Service Authority (OJK). Furthermore, in accordance with the findings, the OJK should not passively wait for official reports to be filed by the public regarding violations of P2PL businesses. Through this big data-based system, the OJK can proactively find these violations, given that the system is proven to be able to act as an early warning system for the OJK in terms of P2PL surveillance.

**Keywords:** fintech, peer to peer lending, big data, review, Google Play

**JEL Classification:** G23, G24, G28

## Contents

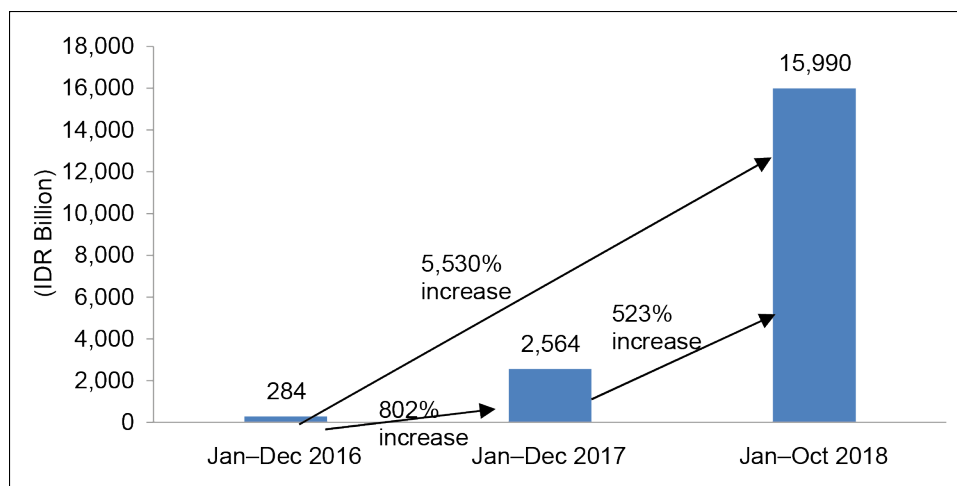
|     |   |    |
|-----|---|----|
| 1.  | INTRODUCTION .....  | 1  |
| 2.  | LITERATURE REVIEW .....   | 2  |
| 2.1 | Definition of Financial Technology .....                              | 2  |
| 2.2 | Classification of Financial Technology .....                          | 3  |
| 2.3 | P2PL Surveillance System in Indonesia.....                            | 3  |
| 2.4 | Text Analysis Based on Big Data .....                                 | 4  |
| 3.  | DATA AND METHODOLOGY .....  | 4  |
| 3.1 | Legality Aspect .....   | 5  |
| 3.2 | Rating Aspect .....   | 5  |
| 3.3 | Appropriateness of Debt Collection Method Aspect .....                | 6  |
| 3.4 | Interest Rate and Other Charges Aspect .....                          | 6  |
| 3.5 | Classification of P2PL Surveillance Urgency Level .....               | 7  |
| 4.  | RESULTS AND DISCUSSION .....  | 8  |
| 4.1 | Analysis of Legality Aspect.....                                      | 8  |
| 4.2 | Analysis of Review Rating Aspect.....                                 | 9  |
| 5.  | ANALYSIS OF APPROPRIATENESS OF DEBT COLLECTION<br>METHOD ASPECT ..... | 10 |
| 5.1 | Analysis of Level of Interest Rate and Other Charges Aspect .....     | 13 |
| 5.2 | Classification of Surveillance Urgency Level of P2PL .....            | 15 |
| 6.  | CONCLUSIONS .....   | 16 |
| 7.  | POLICY RECOMMENDATIONS .....  | 17 |
|     | REFERENCES .....  | 19 |
|     | APPENDIX.....   | 21 |

# 1. INTRODUCTION

In 2017, the World Bank Global Financial Inclusion recorded Indonesia's financial inclusion index at 48.9% and only 18.4% of Indonesian adults borrowed money from a financial institution or used a credit card. This figure is lower compared to other Southeast Asian countries such as Singapore (46.9%), Cambodia (26.7%), Malaysia (23.4%), Viet Nam (21.7%), Thailand (20.4%), and Myanmar (19.1%). It is only higher than the Philippines (10.7%) and the Lao People's Democratic Republic (8.6%) (World Bank, 2018). This fact is supported by the finding of Financial Inclusion Insights (2017) that most Indonesian people who need credit borrow money from family, friends or neighbors rather than from a bank. These Indonesians assume that they are neither bankable nor have sufficient collateral, they lack required documents, and do not know how to obtain credit from a bank.

In this digital era, there is an emergence of financial technology (FinTech) providing lending services through an online platform known as peer-to-peer lending (P2PL). To date, there are more than 260 P2PLs in Indonesia, of which only 64 are officially registered with the Indonesia Financial Service Authority (OJK). P2PL services offer a variety of facilities for borrowing with simpler requirements than banks. There is no collateral requirement, the processing is faster and there is no need for physical presence (internet access is all that is required to reach the service). P2PL growth has increased more than 56 times in less than 2 years (OJK 2018), from Rp284 billion in December 2016 to more than Rp15,900 billion in October 2018 (Figure 1).

**Figure 1: P2PL Loan Disbursement December 2016–October 2018**



Source: OJK (2018).

Nevertheless, PSPL's simplicity and rapid development has raised several risks. First, there is a risk of default, since there is no collateral or physical contact requirement. Second, there are risks associated with data security (cyber risk), governance, and customer privacy. The latter risk is due to system vulnerability and misuse of data, either intentionally or unintentionally (Narain 2017). In addition, OJK surveillance of P2PL services is relatively weak, as there are 227 illegal P2PLs operating on several platforms.

Indonesian PSPL services present several customer protection problems. One such problem is unethical collection methods. *RupiahPlus*, an Indonesian P2PL, violated the ethical conduct of debt collection by contacting persons listed in a borrower's contact list when the borrower was late on an installment. Debt collection is also conducted in inappropriate ways, such as by intimidation, threat and humiliation, prompting the creation of an online petition that has been signed by more than 5,000 people (Change.org 2018). These bad practices violate OJK Regulation Number 1 of 2013, concerning the consumer protection of the financial services sector, and Ministerial Regulation of Communication and Information Number 20 of 2016, concerning the protection of personal data in electronic system.

P2PL has been utilizing technology to its advantage, thus the OJK should proactively implement technology, particularly by using big data, to create an early warning system rather than passively waiting for official reports of violations to be filed by customers. Google Play represents a big data source related to the service quality of P2PL through customer evaluation of P2PL services. Compared to other application platforms such as iOS App Store and Amazon App Store, Google Play is, by far, the largest applications platform in the world. As of March 2018, Google Play had been downloaded more than 3.3 million times, whereas iOS App Store had been downloaded about 2.03 million times (Statista, 2018).

There has been no single research conducted on developing or utilizing big data, or considering Google Play as the basis for a P2PL surveillance system. Therefore, this study aimed to develop a P2PL surveillance and early warning for P2PL violations by utilizing Google Play as the main data source by considering four aspects, namely: (i) mapping the legal status of P2PLs operating in Google Play Indonesia; (ii) analyzing performance quality of P2PL services by reviewing user ratings; (iii) finding and analyzing negative reviews related to inappropriate debt collection methods by using text analysis based on certain keywords representing unethical debt collection methods; and (iv) finding and analyzing negative reviews related to the imposition of excessive interest rates and other charges by using text analysis based on certain keywords representing such practices. Furthermore, we set up a grading system based on the four aforementioned aspects into five categories. The grading is meant to determine the urgency level of P2PLs surveillance.

## 2. LITERATURE REVIEW

### 2.1 Definition of Financial Technology

"FinTech" is short for two words, financial and technology and literally means financial technology. More broadly, FinTech is a company or part of a company that combines modern financial services with innovative technology (Dorfleitner, Hornuf, Schmitt and Weber 2017). Generally, FinTech attracts consumers through its internet-based products and services, which usually use web applications as the platform, making FinTech more efficient, transparent and automated, and differentiated from conventional financial services.

The Central Bank of Indonesia (BI) uses the term *TekFin* (*Teknologi Finansial*) instead of FinTech. In the Regulation of the Board of Governors (PADG) Number 19/15/PADG/2017 on the Procedures for Registration, Delivery of Information and Monitoring of Financial Technology Services, BI defines *TekFin* as (i) the use of technology in the financial system that produces products, services, and/or new business

models (ii) and have an impact on monetary stability, financial system stability, and/or smoothness, security and reliability of the payment system.

## 2.2 Classification of Financial Technology

The Financial Stability Board classifies FinTech into five main categories based on its functions, namely: (i) payments, clearing and settlement (ii) deposits, lending and capital raising; (iii) insurance; (iv) investment management; and (v) market support (Financial Stability Board 2017). BI divides FinTech into five similar categories, which are: (i) payment system; (ii) market provisioning; (iii) investment and risk management; (iv) lending, financing, and capital raising, and (v) other financial services (Departemen Kebijakan Sistem Pembayaran 2017).

The composition of FinTech providers in Indonesia, according to the Indonesia Fintech Association, is dominated by payment and lending services, each of which has a 39% share of the FinTech companies in Indonesia, followed by market provisioning (11%), investment management (11%), insurtech (4%), and equity capital raising (3%). As of June 2018, P2PLs in Indonesia had disbursed loans exceeding Rp7.6 trillion, or about \$514 million (Infobank, 2018).

**Table 1: FinTech Composition in Indonesia**

| Type of FinTech        | Total Share | Number of Companies |
|------------------------|-------------|---------------------|
| Payment                | 39%         | 92                  |
| Lending                | 32%         | 75                  |
| Market provisioning    | 11%         | 26                  |
| Investment management  | 11%         | 26                  |
| Insurtech              | 4%          | 9                   |
| Equity capital raising | 3%          | 7                   |

Source: Infobank (2018).

## 2.3 P2PL Surveillance System in Indonesia

The OJK has established two new specialized units to monitor P2PL in Indonesia, the Financial Innovation Group and Directorate of Fintech Regulation, Licensing, and Supervision. In addition, they have issued three regulations related to P2PL: the Financial Services Authority Regulation (POJK) No.13/POJK.02/2018, concerning Digital Financial Innovation in the Financial Services Sector; POJK No.77/POJK.01/2016, concerning Information Technology-Based Money Lending and Borrowing Services; and its derivative regulation, OJK Circular Letter Number 18/SEOJK.02/2017, concerning Governance and Risk Management of Technology-Based Money Lending and Borrowing Services.

These regulations require P2PL businesses to be in the form of liability companies or cooperatives. P2PL business activities range from providing, managing, and operating information technology-based lending to loan services. Each loan provided by P2PL has a maximum amount of Rp2 billion. Before operating, a P2PL must register and propose a license to the OJK. After being registered, they are obliged to report every three months. As a risk mitigation effort, it is also mandatory for them to ensure the confidentiality, integrity and availability of all managed data from the time data is obtained until the data is destroyed. Currently, OJK's supervision of P2PLs is passive, receiving quarterly reports from P2PLs and official complaints from consumers.

## 2.4 Text Analysis Based on Big Data

One example of big data-based text analysis is sentiment analysis. Sentiment analysis is an analysis of opinions, evaluations, judgments, attitudes and emotions of an entity that can be in the form of products, services, organizations, individuals, issues, events, and topics (Liu 2012). The text of sentiment analysis can be pulled from a document, sentence, or other content and divided into positive and negative sentiment groups. As an example of sentiment analysis on the events of the Arab Spring, Akaichi, Dhouioui and Lopez-Huertas Perez (2013) analyzed sentiments on Facebook statuses in Tunisia during that time. From the results of the sentiment analysis, they uncovered the opinions and reactions of the Tunisian community to the Arab Spring.

Sentiment analysis has also been used to track disease outbreaks. De Quincey and Kostkova (2010) extracted “tweets” from Twitter to get information about swine flu. Such information can be used as an early warning to the public and stakeholders who manage outbreaks. The use of big data is also a common practice in the business sector (Sharef, Zin and Nadali 2016). The use of big data has a high commercial value for entrepreneurs, where it is increasingly being relied on for product reviews, either through social media or reviews from application stores. When companies listen to customers’ voices and take an action according to what the market needs, they gain benefits and profits by fulfilling the market’s desires.

## 3. DATA AND METHODOLOGY

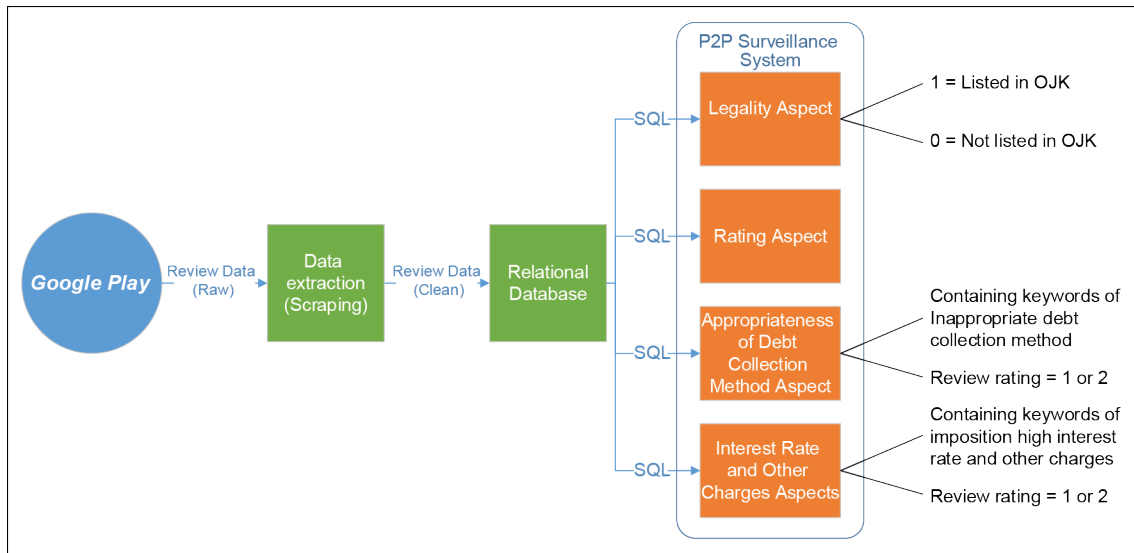
This study utilizes a big data analytics approach with the main data obtained from reviews of P2PL applications on Google Play. Data retrieval is done by “scraping.” Scraping is a data mining technique of extracting and organizing data from a website or another platform by running an algorithm script that is carried out automatically with the aim of further analysis (Krotov and Tennysson 2018).

The review data consisted of P2PL name, review date, rating (1–5), contents of the review, and name of the reviewer’s account. The scraping process extracted data from 110 P2PLs, with a total of 40,650 reviews obtained between the date of the first review received by a P2PL in Google Play Indonesia (3 March 2016) until the date of scraping (28 August 2018). All reviewed P2PLs were those that were registered with and authorized by the OJK as of June 2018.

After the raw data was cleaned, it was stored in a relational database. Data analysis was conducted using structured query language (SQL). SQL is a technique of defining and processing data sourced from a relational database to produce certain information by using standardized database management language (IBM 2018). The results of the data processing were mapped based on certain criteria that were classified into four main aspects of the supervision system, namely: (i) legality; (ii) rating; (iii) appropriateness of debt collection method; and (iv) interest rates and other costs. The flow of analysis is displayed in Figure 2.



**Figure 2: Analysis Flow of P2PL Surveillance System Based on Google Play Review**



### 3.1 Legality Aspect

The legality of a P2PL was based on the registration and licensing status of its operating on Google Play in Indonesia by matching it to the list of registered P2PL in the OJK as of June 2018. The aspect of legality was assessed by a dummy variable with a value of 1 if the P2PL was registered in the OJK, and 0 if the P2PL was not registered in the OJK.

### 3.2 Rating Aspect

Analysis on this aspect is based on the rating given by the user to the P2PL application. Each review has a rating range of 1–5, where 1 is the worst score and 5 is the best score. The analysis was carried out by looking at the average and trend of review ratings of all P2PLs (aggregates). In addition, we also identified P2PLs the average rating of which was not good enough (rating < 3).

$$\text{Rating average} = \frac{\sum_{i=1}^n}{n} \tag{1}$$

Where:

*i*: Rating of review-*i*;

*n*: Total number of reviews.

*Note: Review ratings included in the calculation were only those reviews with comments, i.e., words or sentences written in the review by the user.*

### 3.3 Appropriateness of Debt Collection Method Aspect

This aspect investigated the appropriateness of the debt collection method of a P2PL based on the review rating and content of the reviews provided by users on Google Play. We set criteria that classified a method as inappropriate if the review contained certain keywords that represented unethical practices, and had a rating of 1 or 2. These keywords are listed in Box 1, and their English translations are in Box 2.

#### Box 1: Keywords Representing Inappropriate Debt Collection Methods

*“sopan” “polite” “etika” “ajar” “krama” “bahasa” “pendidikan” “kasar” “maki” “rude” “ancam” “ancem” “threat” “arogan” “arogan” “arogant” “arrogant” “santun” “hina” “malu” “shame” “terror” “teror” “nerror” “neror” “kata2in” “katain” “ngata2in” “ngatain” “cemar” “broadcast” “sebar” “nyebar” “nebar” “tebar” “privacy” “privasi” “prifasi” “pripasi” “pripasy” “prifasy” “kontak” “contact” “temen” “teman” “keluarga” “rekan” “atasan” “family” “collector” “colector” “kollektor” “colektor” “kolektor” “kolector” “kollektor” “kollektor”*

#### Box 2: English Translation of Keywords Representing Inappropriate Debt Collection Methods

*“polite” “ethic” “insolent” “manners” “language” “educat” “rude” “scorn” “scold” “abuse” “threat” “arogant” “courtesy” “civilized” “enbaras” “humiliate” “shame” “teror” “defamation” “broadcast” “spread” “privacy” “contact” “friend” “family” “partner” “boss” “relative” “colector”*

In addition to mapping the number of reviews discussing inappropriate debt collection methods, and to be more comprehensive, the analysis also calculated the number of reviews related to inappropriate debt collection methods over the number of reviews with a rating of 1 or 2. The formula for the ratio is as follows:

$$\text{Ratio of inappropriate debt collection method} = \frac{\sum_{j=1}^t}{m} \quad (2)$$

Where:

*j*: Inappropriate debt collection method review *j*;

*t*: Total number of inappropriate debt collection method review;

*m*: Total number of reviews with rating of 1 and 2.

### 3.4 Interest Rate and Other Charges Aspect

This aspect mapped bad reviews related to the imposition of excessive interest rates and other charges such as administration fees, and fine amounts of those who used P2PL services. Similar to the appropriateness of the debt collection method aspect, this aspect was also based on specific keywords and review ratings. The reviews that we classified as negative with respect to interest rates and other burdensome costs were reviews that contained specific keywords related to the imposition of excessive interest rates and other costs, with a review value of 1 or 2. These keywords are listed in Box 3, and the English translations are contained in Box 4.

**Box 3: Keywords Representing Inappropriate Debt Collection Methods**

*“bunga” “rentenir” “lentenir” “cekek” “cekik” “lintah” “lintag” “denda” “biaya” “interest”*

**Box 4: English Translation of Keywords Representing Inappropriate Debt Collection Methods**

*“interest” “rate” “shark” “shylock” “strangle” “leech” “fine” “penalty” “fee” “charge” “cost”*

In addition to mapping the number of reviews on the imposition of excessive interest rates and other charges, and to be more comprehensive, the analysis also calculated the number of reviews related to the imposition of excessive interest rates and other charges method over the number of reviews with a rating of 1 or 2. The formula for the ratio is as follows:

$$\begin{aligned} & \text{Ratio of imposition of excessive interest rates and other charges review} \\ & = \frac{\sum_{k=1}^p}{m} \end{aligned} \quad (3)$$

Where:

- k*: Imposition of excessive interest rates and other charges review-*k*;
- p*: Total number of impositions of excessive interest rates and other charges review;
- m*: Total number of reviews with rating of 1 and 2.

### 3.5 Classification of P2PL Surveillance Urgency Level

This classification is based on four aspects that have been discussed previously. The classification is divided into five categories ranging from A to E. Category A is the best grade, belonging to P2PL with good compliance and services. Category E is the worst ranking; a P2PL that falls into this category is one with the highest level of urgency in terms of supervision, and repression, if it is needed.

This classification can help the OJK supervise and assess P2PLs. P2PLs receive a score of 1 for bad performance of an assessed aspect, and a score of 0 for a good assessment. After assessing the four aspects, the P2PL score is totaled to get the total value. If the total value is 0, then the P2PL gets the best score, which falls into category A. If it gets a total score of 1, 2, 3, or 4, then the P2PL value is B, C, D or E, respectively. An E grade means that a P2PL scored poorly in all of four aspects.

In the Legality aspect, P2PLs that were not registered or licensed by the OJK received a score of 1. P2PLs that were registered with the OJK scored 0. In the Rating aspect, a P2PL with an average rating below 3 scored 1, otherwise it scored 0. The third aspect, appropriateness of debt collection method, was based on two criteria: the total number of inappropriate debt collection reviews, and the ratio of inappropriate debt collection reviews over the total number of reviews with a rating of 0 or 1. If the number of inappropriate reviews was above 15 and the ratio was above 10%, then the P2PL scored 1. If only one criterion was met, or neither criteria was met, it scored 0.

The fourth aspect, interest rates and other charges, was based on two criteria: the total number of negative review related to the imposition of excessive interest rates and other charges, and the ratio the total of these negative reviews over the total number of reviews with a rating of 0 or 1. If the number of negative review related to the imposition of excessive interest rates and other charges was above 15, and the ratio was above

10%, then it scored 1. If only one criterion was met or neither criterion was met, then it scored 0.

**Table 2: Calculation of P2PL Surveillance Urgency Level Classification**

| No. | Aspect                                    | Scoring   |
|-----|---|---|
| 1   | Legality                                  | 1 = Illegal, 0= Legal   |
| 2   | Review rating                             | 1 = Avg rating < 3, Otherwise = 0   |
| 3   | Appropriateness of debt collection method | 1 = Ratio of Inappropriate Debt Collection Method (RIDCM) > 10%, and number of negative reviews related to IDCM >15, Otherwise = 0<br><br>$RIDCM = \frac{\text{Total Number of Negative Reviews Containing IDCM Keywords}}{\text{Total Number of Negative Reviews}}$                        |
| 4   | Level of interest rate and other charges  | 1 = Ratio of Excessive Imposition of Interest Rate and Other Charges (REIROC) > 10%, and number of negative reviews related to IDCM >20, Otherwise = 0<br><br>$RHIROC = \frac{\text{Total Number of Negative Reviews Containing HIIROC Keywords}}{\text{Total Number of Negative Reviews}}$ |

Classification Scoring:  
 A: Total score of four aspects = 0;  
 B: Total score of four aspects = 1;  
 C: Total score of four aspects = 2;  
 D: Total score of four aspects = 3;  
 E: Total score of four aspects = 4.

Note: A negative review is a review with a rating of 1 or 2.

## 4. RESULTS AND DISCUSSION

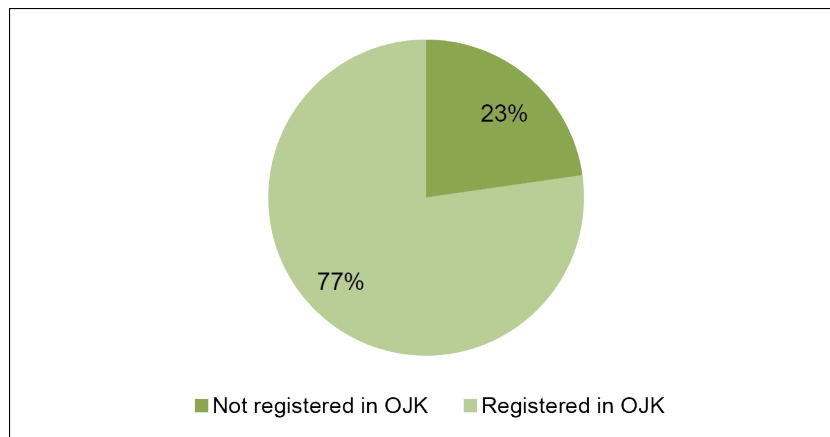
### 4.1 Analysis of Legality Aspect

Twenty-five of 110 P2PL applications found on Google Play Indonesia were officially registered or licensed by the OJK, whereas the remaining 85 applications were not listed in the OJK. Those that were not listed in the OJK violate Article 7 of POJK No.77/POJK.01/2016 regarding the registration and licensing requirements of information technology-based lending and borrowing services. Failure to comply with this Article creates a harmful condition for customers, since P2PLs that are not registered may be running businesses that failed to pass the screening process conducted by the authorities and very likely do not comply with the requirements mandated by authorities.

Of the 110 P2PLs found on Google Play, 18 had no review comments in either text or sentence form. In the following sections, the analysis will focus only on applications that have commented reviews. This section discusses the average rating of reviews given by users ranging from 1 to 5, with 1 as the worst rating and 5 as the best rating

Table 3 shows that the average rating of registered P2PLs is significantly higher than those that are not registered. The average rating of registered P2PLs is 3.41, whereas the average rating for unregistered P2PLs is 2.83. The unregistered P2PL rating is relatively low considering that a rating of 3 is the median grade or has a mean of fair. The ratings difference is likely due to the fact that registered P2PLs must report to the OJK every three months regarding their total disbursements, the quality of loans and the quality of their service. Therefore, they have a push factor to comply with rules and regulations settled by authorities.

**Figure 3: Composition of P2PL Based on Legality Aspect**



Source: Authors' calculation based on Google Play's Review Data.

**Table 3: Average Rating of P2PL Based on Legality Status**

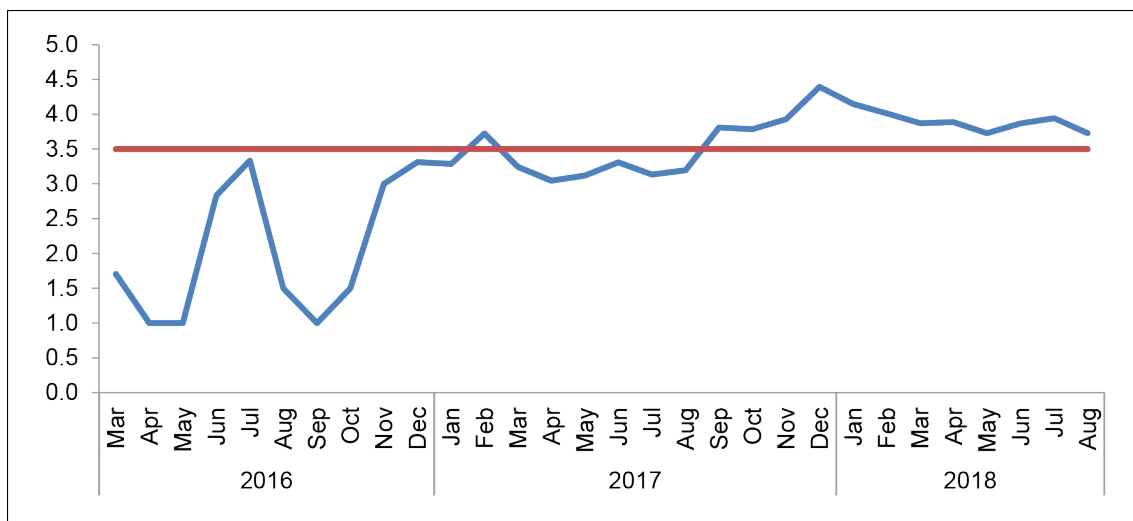
| Legality Status           | Average Rating |
|---------------------------|----------------|
| Registered in the OJK     | 3.41           |
| Not registered in the OJK | 2.83           |

Source: Authors' calculation based on Google Play's Review Data.

## 4.2 Analysis of Review Rating Aspect

Between March 2016 and November 2016, which marked the emergence of P2PL on Google Play Indonesia, the average rating was below 3.0, although it improved above 3.0 in July 2016. After November 2016, the average P2PL rating was good with a score and in December 2017 achieved the highest rating of 4.4 (Figure 4). The low rating at the beginning of P2PL appearance on Google Play was mainly the results of numerous bugs in the apps that caused many system errors, thereby triggering bad user reviews.

**Figure 4: Aggregate Average Rating of P2PLs in Google Play Indonesia**



Source: Authors' calculation based on Google Play's Review Data.

There were a lot of P2PLs with an average rating below 3.5. There were 64 out of 92 P2PL applications in this group, or about 70% of the total. In terms of legality, there were more Illegal P2PLs with a worse average rating compared to those that were registered in the OJK (Table 4). The same condition also happened on the level of average rating below 3.

**Table 4: P2PLs Average Rating below 3.5 and 3.0**

| Condition                       | Number of P2PL Registered in the OJK | Number of P2PL Not Registered in the OJK | Total |
|---------------------------------|--------------------------------------|--|-------|
| Average rating is less than 3.5 | 12                                   | 52                                       | 64    |
| Average rating is less than 3.0 | 8                                    | 36                                       | 44    |

Source: Authors' calculation based on Google Play's Review Data.

The large number of low-rated P2PLs found in Google Play is attributable to users' whose loan applications were rejected for failing to meet a P2PL's minimum loan requirements, resulting in the posting of negative review comments. Bad reviews were also caused by technical errors in the applications, inappropriate debt collection methods, and the imposition of excessive interest rates and other charges.

## 5. ANALYSIS OF APPROPRIATENESS OF DEBT COLLECTION METHOD ASPECT

From March 2016 through August 2018, there were 836 reviews that could be categorized as reviews related to inappropriate debt collection methods. Reviews with a rating of 1 or 2 also contained certain keywords that represented intimidation, threats, humiliation, the spread of information about a debt to friends and relatives of the borrowers, and attempts to collect debts from borrower's friends, relatives and office partners. One official statement from a borrower stated that the debt collector intentionally created a *WhatsApp* group composed of all the contacts in the debtor's cellphone for the purpose of embarrassing her in the group.

Prior to February 2018, the number of reviews in the category of inappropriate debt collection method ranged from 1–16 reviews per month. However, from March 2018 to July 2018 there was a significant increase in the number of reviews in this category. In fact, in a few months it had doubled. In March 2018, there were 32 reviews. In April 2018, the reviews in this category reached 66. There were 115 negative reviews in June 2018, which increased to 206 negative reviews in July 2018. Upon closer examination it was found that, of the increase in the number of negative reviews related to inappropriate debt collection methods in the period March 2018–August 2018, almost half of them (49%) were contributed by only 5 P2PLs: *RupiahPlus*, with 114 reviews (15%); *DanaRupiah*, 91 reviews (12%); *UangTeman* (9%); *Do-It Pinjaman Uang*, 52 reviews (7%); and *Tangbull*, 49 reviews (6%). This finding is confirmed by news in the mass media in the first half of 2018, where customers lodged numerous complaints against *RupiahPlus* until it was reported to the OJK.

For balance, we also calculated the ratio by dividing the number of negative reviews related to inappropriate debt collection methods over total negative reviews (reviews with a rating of 1 or 2). The results showed that, on average, almost 10% of negative reviews are related to inappropriate debt collection. Analyzed year by year, the ratio in 2016 is the highest. This result is not related to the number of complaints related to inappropriate debt collection, as the number of P2PL at this time was small,

considering that 2016 was the first year P2PL was on Google Play Indonesia. In following years, the review ratio grew from 2.2%–10.6% per month. Detailed monthly data of this finding are listed in Table 5.

**Table 5: Monthly Numbers and Ratio of Negative Reviews Related to Inappropriate Debt Collection Methods, March 2016–August 2018**

| No.<br>(a) | Month<br>(b) | Year<br>(c) | Number of Reviews of<br>Inappropriate Debt<br>Collection Method<br>(d) | Total Number of<br>Reviews with a<br>Rating of 1 or 2<br>(e) | Ratio of Reviews of<br>Inappropriate Debt<br>Collection Method<br>(d)/(e) |
|------------|--------------|-------------|--|--|---|
| 1          | March        | 2016        | 1  | 23   | 4.35%   |
| 2          | September    |             | 1  | 2  | 50.00%  |
| 3          | May          | 2017        | 6  | 26   | 23.08%  |
| 4          | August       |             | 6  | 70   | 8.57%   |
| 5          | July         |             | 3  | 47   | 6.38%   |
| 6          | September    |             | 2  | 86   | 2.33%   |
| 7          | October      |             | 3  | 134  | 2.24%   |
| 8          | November     |             | 4  | 174  | 2.30%   |
| 9          | December     |             | 15   | 199  | 7.54%   |
| 10         | January      | 2018        | 19   | 402  | 4.73%   |
| 11         | February     |             | 16   | 389  | 4.11%   |
| 12         | March        |             | 32   | 515  | 6.21%   |
| 13         | April        |             | 66   | 759  | 8.70%   |
| 14         | May          |             | 117  | 1,105  | 10.59%  |
| 15         | June         |             | 115  | 1,251  | 9.19%   |
| 16         | July         |             | 206  | 1,939  | 10.62%  |
| 17         | August       |             | 224  | 2,653  | 8.44%   |
| Total      |              |             | 836  | 9,774  | Average ratio: 9.96%  |

Note: There are certain months that are not in the table, such as April–August 2016, and several other periods. This is because in that month/period there were no negative reviews found related to inappropriate debt collection methods.

Source: Author's calculation on Google Play's Review Data.

Out of 836 negative reviews related to inappropriate debt collection methods, 558 (67%) originated from just 10 P2PLs (out of a total of 110 P2PLs). The 10 P2PLs with the highest number of negative reviews related debt collection methods are, in order: *RupiahPlus* (13.6%); *DanaRupiah* and *UangTeman* (11.5%); *Tangbull* (6.6%); *Do-It Pinjaman Uang* (6.2%); *Tunai Kita* (5.5%); *Pinjam Uang* (3.2%); *Pinjam Yuk* (3.1%); and *Kredit Pintar* and *JULO* (2.8%) (Table 6).

In addition to looking at the number of reviews for each P2PL, we also calculated the ratio of number of negative reviews related to inappropriate debt collection methods over all negative reviews rated 1 or 2. This assessment was necessary because P2PLs with a large number of users tend to have more negative reviews than P2PLs with a small number of users. The top 10 P2PLs with the largest ratio have an average ratio of 24.1%, with a ratio ranging from 15.4% to 40%. An example of our interpretation is *Easycash*, which has a ratio of 34%, meaning that of out of all *Easycash* negative reviews (rated 1 and 2) there are 34% negative reviews related to inappropriate debt collection method. Detailed information on the number and ratio of negative reviews related to inappropriate debt collection methods are listed in Table 7.

**Table 6: Top 10 P2PL with the Highest Number of Negative Reviews Related to Inappropriate Debt Collection Methods, March 2016–August 2018**

| No.<br>(a) | P2PL Name<br>(b)           | Number of Reviews of Inappropriate Debt Collection Method<br>(c) | Total Number of Negative Reviews Related to Debt Collection Method<br>(d) | Percentage of Each P2PL Contribution to Total Number of Negative Reviews Related to Debt Collection Method<br>(c)/(d) |
|------------|----------------------------|--|---|---|
| 1          | <i>RupiahPlus</i>          | 114  | 836   | 13.6%   |
| 2          | <i>DanaRupiah</i>          | 96   |   | 11.5%   |
| 3          | <i>UangTeman</i>           | 96   |   | 11.5%   |
| 4          | <i>Tangbull</i>            | 55   |   | 6.6%  |
| 5          | <i>Do-It Pinjaman Uang</i> | 52   |   | 6.2%  |
| 6          | <i>Tunai Kita</i>          | 46   |   | 5.5%  |
| 7          | <i>Pinjam Uang</i>         | 27   |   | 3.2%  |
| 8          | <i>Pinjam Yuk</i>          | 26   |   | 3.1%  |
| 9          | <i>Kredit Pintar</i>       | 23   |   | 2.8%  |
| 10         | <i>JULO</i>                | 23   |   | 2.8%  |
| Total      |                            | 558  | 836   | 66.7%   |

Source: Authors' calculation based on Google Play's Review Data.

**Table 7: Top 10 P2PL with Highest Ratio of Negative Reviews Related to Inappropriate Debt Collection Methods, March 2016–August 2018**

| No.<br>(a) | P2PL Name<br>(b)           | Number of Reviews of Inappropriate Debt Collection Method<br>(c) | Total Number of Negative Reviews (Rated 1 or 2)<br>(d) | Ratio of Reviews of Inappropriate Debt Collection Methods<br>(c)/(d) |
|------------|----------------------------|--|--|--|
| 1          | <i>Dana Pinjam</i>         | 2  | 5  | 40.0%  |
| 2          | <i>Easycash</i>            | 16   | 47   | 34.0%  |
| 3          | <i>RupiahPlus</i>          | 114  | 337  | 33.8%  |
| 4          | <i>Dana Flash</i>          | 8  | 31   | 25.8%  |
| 5          | <i>Utunai</i>              | 19   | 74   | 25.7%  |
| 6          | <i>Do-It Pinjaman Uang</i> | 52   | 298  | 17.4%  |
| 7          | <i>AyoRupiah</i>           | 15   | 90   | 16.7%  |
| 8          | <i>Saku Kamu</i>           | 1  | 6  | 16.7%  |
| 9          | <i>DanaRupiah</i>          | 96   | 610  | 15.7%  |
| 10         | <i>Dompot Kartu</i>        | 8  | 52   | 15.4%  |
| Total      |                            | 331  | 1,550  | Average ratio: 24.1%   |

Source: Authors' calculation based on Google Play's Review Data.

Based on our results, we predict that there are three P2PLs (*DanaRupiah*, *Do-It Pinjaman Uang*, and *Tangbull*) that have the potential to harm the public, especially borrowers, and that may become public cases of inappropriate debt collection methods, similar to the case of *RupiahPlus*, which was reported to the OJK by its customers in the second quarter of 2018 in connection with this issue. These three P2PLs, along with *RupiahPlus*, have the highest number of negative reviews and ratio related to improper debt collection methods (Tables 6 and 7).



## 5.1 Analysis of Level of Interest Rate and Other Charges Aspect

Another aspect of frequent complaint by P2PL users is the imposition of excessive interest rates and other charges. In fact, the Chair of the OJK Board of Commissioners issued a personal opinion stating that P2PLs resemble loan sharks using online platforms (Jumena 2018; Laureceno 2018; Rossiana 2018). Currently, there are no OJK regulations regarding the upper limit of interest rates that can be charged by P2PLs. Consequently, P2PLs have the freedom to charge any interest level and other costs that they want. The P2PL reviews on Google Play indicate that the interest rate applied by P2PLs is in the range of 0.2%–3% per day. The majority of users felt that a 1% interest rate per day was burdensome.

**Table 8: Monthly Numbers and Ratio of Negative Reviews Related to Imposition of Excessive Interest Rates and Other Charges, March 2016–August 2018**

| No.<br>(a) | Month<br>(b) | Year<br>(c) | Number of Reviews<br>of Imposition of<br>Excessive Interest<br>Rates and Other<br>Charges<br>(d) | Total Number of<br>Reviews with a<br>Rating of 1 or 2<br>(e) | Ratio of Reviews of<br>Imposition of<br>Excessive Interest<br>Rates and Other<br>Charges<br>(d)/(e) |
|------------|--------------|-------------|--|--|---|
| 1          | March        | 2016        | 4  | 23   | 17.4%   |
| 2          | December     |             | 1  | 6  | 16.7%   |
| 3          | January      | 2017        | 3  | 16   | 18.8%   |
| 4          | February     |             | 3  | 9  | 33.3%   |
| 5          | March        |             | 2  | 18   | 11.1%   |
| 6          | April        |             | 2  | 21   | 9.5%  |
| 7          | June         |             | 1  | 17   | 5.9%  |
| 8          | July         |             | 9  | 47   | 19.1%   |
| 9          | August       |             | 6  | 70   | 8.6%  |
| 10         | September    |             | 3  | 86   | 3.5%  |
| 11         | October      |             | 6  | 134  | 4.5%  |
| 12         | November     |             | 17   | 174  | 9.8%  |
| 13         | December     |             | 11   | 199  | 5.5%  |
| 14         | January      | 2018        | 21   | 402  | 5.2%  |
| 15         | February     |             | 15   | 389  | 3.9%  |
| 16         | March        |             | 30   | 515  | 5.8%  |
| 17         | April        |             | 50   | 759  | 6.6%  |
| 18         | May          |             | 64   | 1,105  | 5.8%  |
| 19         | June         |             | 72   | 1,251  | 5.8%  |
| 20         | July         |             | 159  | 1,939  | 8.2%  |
| 21         | August       |             | 174  | 2,653  | 6.6%  |
| Total      |              |             | 653  | 9,833  | Average ratio: 10.1%  |

Note: There are certain months that are not in the table, such as May 2017, and several other periods. This is because in that month/period there were no negative reviews found related to the imposition of excessive interest rates and other charges.

Source: Authors' calculation based on Google Play's Review Data.

In addition to excessive interest rates, some users also complained about other excessive charges, such as administrative fees and the amount of late payment penalties. In the period from March 2016 to August 2018, there were 653 negative reviews with rating of 1 or 2 complaining about the imposition of excessive interest rates and other costs. The average ratio of excessive interest rates over the total number of negative review was 10.1%. In other words, about 10% of the negative reviews rated 1 or 2 were complaints about excessive interest rates and other fees. This ratio is similar to the ratio related to complaints about inappropriate debt collection methods.

Table 8 shows that the number of negative reviews related to interest rates and other costs increased over time, coinciding with a commensurate increase in the number of P2PLs and the number of borrowers. Significant increases occurred after May 2018, when the number of negative reviews related to interest rates and other costs reached more than 1,000 reviews per month. In terms of ratio, the early period of P2PL operation on Google Play Indonesia demonstrates a ratio that is high and fluctuating, reaching its highest point in February 2017 with a ratio of 33%. Beginning in 2018, the ratio stabilizes around 3.9–8.2%.

If we look deeper, negative reviews on the imposition of excessive interest rates come from only a small portion of P2PLs. As shown in Table 9, 73% of all negative reviews related to interest rates come from only 10 P2PLs. In fact, only 5 P2PLs contributed to more than half of the total reviews. The 10 P2PLs with the highest number of negative reviews related to interest rates and other costs are: *Tunai Kita* (13.9%); *Tangbull* (12.3%); *DanaRupiah* (11.3%); *UangTeman* (9.6%); *Raja-Uang* (5.8%); *Kredit Pintar* (4.6%); *RupiahPlus* (4%); *Pinjam Uang* and *Pinjam Yuk* (3.7%); as well as *Cashwagon* (3.4%).

**Table 9: Top 10 P2PLs with the Highest Number of Negative Reviews Related to the Imposition of Excessive Interest Rates and Other Charges, March 2016–August 2018.**

| No.   | P2PL Name            | Number of Reviews of Imposition of Excessive Interest Rates and Other Charges | Total Number of Negative Reviews Related to Imposition of Excessive Interest Rates and Other Charges | Percentage of Each P2PL Contribution to Total Number of Negative Reviews Related to Imposition of Excessive Interest Rates and Other Charges |
|-------|----------------------|---|--|--|
| (a)   | (b)                  | (c)   | (d)  | (c)/(d)  |
| 1     | <i>Tunai Kita</i>    | 91  | 653  | 13.9%  |
| 2     | <i>Tangbull</i>      | 80  |  | 12.3%  |
| 3     | <i>DanaRupiah</i>    | 74  |  | 11.3%  |
| 4     | <i>UangTeman</i>     | 63  |  | 9.6%   |
| 5     | <i>Raja-Uang</i>     | 38  |  | 5.8%   |
| 6     | <i>Kredit Pintar</i> | 30  |  | 4.6%   |
| 7     | <i>RupiahPlus</i>    | 26  |  | 4.0%   |
| 8     | <i>Pinjam Uang</i>   | 24  |  | 3.7%   |
| 9     | <i>Pinjam Yuk</i>    | 24  |  | 3.7%   |
| 10    | <i>Cashwagon</i>     | 22  |  | 3.4%   |
| Total |                      | 472   | 653  | 72.3%  |

Source: Authors' calculation based on Google Play's Review Data.

**Table 10: Top 10 P2PLs with Highest Ratio of Negative Reviews Related to the Imposition of Excessive Interest Rates and Other Charges, March 2016–August 2018**

| No.<br>(a) | P2PL Name<br>(b)                  | Number of Reviews of Imposition of Excessive Interest Rates and Other Charges<br>(c) | Total Number of Negative Reviews (Rated 1 or 2)<br>(d) | Ratio of Reviews of Imposition of Excessive Interest Rates and Other Charges<br>(c)/(d) |
|------------|-----------------------------------|--|--|---|
| 1          | <i>RupiahNow</i>                  | 11   | 55   | 20.0%   |
| 2          | <i>TunaiTunai</i>                 | 3  | 15   | 20.0%   |
| 3          | <i>Dana Pinjam</i>                | 1  | 5  | 20.0%   |
| 4          | <i>Tangbull</i>                   | 80   | 472  | 16.9%   |
| 5          | <i>Pinjaman Online Cepat Cair</i> | 11   | 67   | 16.4%   |
| 6          | <i>Raja-Uang</i>                  | 38   | 233  | 16.3%   |
| 7          | <i>Dana Flash</i>                 | 5  | 31   | 16.1%   |
| 8          | <i>Pinjam Yuk</i>                 | 24   | 195  | 12.3%   |
| 9          | <i>DanaRupiah</i>                 | 74   | 610  | 12.1%   |
| 10         | <i>Tunai Kita</i>                 | 91   | 958  | 9.5%  |
| Total      |                                   | 338  | 2,641  | Average ratio 16.0%   |

Source: Authors' calculation based on Google Play's Review Data.

## 5.2 Classification of Surveillance Urgency Level of P2PL

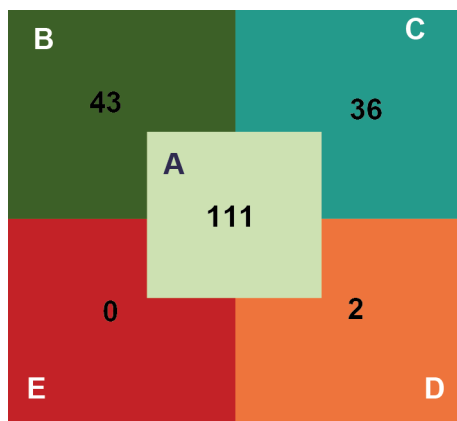
The results of this assessment are classified into five categories based on the four aspects previously mentioned. The categories vary from A to E, where A represents the best-performing P2PLs in terms of compliance and providing services, based on Google Play reviews, and E represents the worst value, with P2PLs scoring poorly in all of the aspects. P2PLs in the E category require the highest level of supervision compared to the other categories, and may, in fact, require serious action from OJK.

There are 11 P2PLs classified in category A: *UangTeman*; *Ammana*; *Kredit Pintar*; *PinjamanGo*; *Julo*; *Tunaiku*; *Winwin Mobile Apps*; *Cicil*; and *Qreditt*. There are 43 and 36 P2PLs in categories B and C, respectively. The majority of P2PLs in this study are classified as category B, meaning that the P2PL has one negative assessment out of the four considered aspects. The majority of negative assessments are related to the legality aspect, with 32 out of 43 P2PLs classified as B category not officially registered in the OJK.

Two P2PLs, *DanaRupiah* and *Tangbull*, are in the D category. Both P2PLs have bad assessments in almost all aspects, with the exception of one aspect where they had average ratings above 3.0. *DanaRupiah* has an average rating of 4.07 and *Tangbull* has an average rating of 4.13. No P2PL falls into the E category.

Special attention should be paid to P2PLs that fall into categories D and E. The OJK must monitor these P2PLs intensively in order to provide better consumer protection. The OJK should take action against those P2PLs whose violations of OJK's regulations burden consumers. For purposes of harm prevention, the OJK should also consider heavier supervision of P2PLs in category C, which can be considered an early warning stage. A complete list of P2PLs categories based on the classification of urgency level of supervision is listed in Table A1 in the appendix.

**Figure 5: Number of P2PLs Based on Assessment of Classification of Surveillance Urgency Level**



## 6. CONCLUSIONS

P2PL FinTech, especially those using the Android platform, is growing very fast in Indonesia. This is evident from the skyrocketing of reviews on Google Play, where there were 66 reviews in 2016 and 40,650 reviews in August 2018. By using big data in the form of reviews from 110 P2PLs on Google Play within the period of March 2016–August 2018, there were several findings based on four aspects, namely: (i) legality; (ii) review rating; (ii) debt collection method; and (iv) interest rates and other charges.

First, on the aspect of legality, the majority of P2PLs (77%) operating on Google Play were not registered and/or officially licensed by the OJK. Second, in terms of review ratings, there were differences in performance between registered P2PLs and illegal P2PLs. In general, P2PLs registered with the OJK received much better review ratings than P2PLs not registered with the OJK, which was 3.41 compared to 2.83, respectively. Furthermore, there were only 8 registered P2PLs with a rating below 3, whereas for the illegal P2PLs, there were 36 P2PLs with a rating below 3.

Third, from the aspect of the appropriateness of debt collection methods, there were many reviews that contained user complaints related to carrying out threats, intimidation, humiliation, and collecting debts from the friends and relatives listed in a debtor’s cellphone contacts. Approximately 10% of the negative reviews rated 1 and 2 were related to unethical debt collection methods. There were four P2PLs with the highest number and ratio of negative reviews related to inappropriate debt collection methods, namely *RupiahPlus*, *DanaRupiah*, *Do-It Pinjaman Uang*, and *Tangbull*. This confirms the widely spread news in the mass media of many people becoming victims of *RupiahPlus* due to its unethical debt collection method. We predict that if this finding is not taken seriously, there will be a great number of complaints related to the same issue directed at *DanaRupiah*, *Do-It Pinjaman Uang*, and *Tangbull*, which will also end up in a significant number of users becoming their victims with wide-spread coverage in the mass media in the near future.

Fourth, and similar to the debt collection methods that are beyond the appropriateness limit, users of P2PL services on Google Play also complained a lot about excessive interest rates, administrative costs and the amount of penalties. About 10% of negative reviews rated 1 or 2 were related to the imposition of excessive interest rates and other charges. In addition, the range of interest rates charged by P2PLs varied from 0.2% per day to 3% per day. This rate is considerably higher than those of other financial institutions such as banks, causing some users who had received loans from P2PLs to be deterred from taking another loan from a P2PL. In fact, the review data showed that, in order to pay off their current debt, some users had to borrow from other sources, including from other P2PLs. Such activity could potentially trigger an increase in the number of defaulted loans, which, at a significant amount, could potentially cause a shock to the stability of the national financial system.

Fifth, in terms of the classification of the supervision urgency level, there were five categories with a ratings range from A-E. Eleven P2PLs classified in category A, 43 P2PLs in category B, 36 P2PLs in category C, 2 P2PLs in category D, and none in category E. Category A is the lowest urgency level in terms of supervision, indicative of a P2PL's high level of compliance. P2PLs classified in category E, on the other hand, need serious supervision and possibly repressive action by the OJK. Two P2PLs, namely *DanaRupiah* and *Tangbull*, are in category D because of their ratings in three aspects; they were not registered with the OJK, they received numerous complaints related to unethical debt collection methods, and a significant number of user complaints related to the imposition of excessive interest rates and other charges.

Sixth, big data, which in this case was Google Play reviews, has proven to be a useful source of data for the relevant authorities in terms of P2PL supervision. Review data from Google Play, if it is processed and analyzed properly, can be utilized as a P2PL early-warning system for anticipating issues such as fraud, high NPLs, and large numbers of defaulted loans, which burden users and threaten national financial system stability.

## 7. POLICY RECOMMENDATIONS

Based on our findings, there are several policies that need to be adopted in order to create a FinTech industry environment that is prudent, sound, and resilient. First, because the majority of P2PLs operating in Google Play were not officially registered with the OJK and received worse performance ratings than registered P2PLs, the OJK should order illegal P2PLs operating on Google Play to immediately register with the OJK under strict deadlines. Now that the FinTech industry in Indonesia is no longer nascent, but in fact there are a great number of P2PLs running services in Google Play, the OJK needs to be firm by not giving extensions of time for registration. P2PLs that miss the deadline should be removed from Google Play through collaboration with Google. Registration of a majority of P2PLs with the OJK assists the OJK in terms of providing supervision and guidance given the mandatory quarterly report requirement.

Second, given the considerable number of negative reviews concerning unethical debt collection methods, the OJK needs to formulate a Standard Operating Procedure for Debt Collection. The OJK could adopt a policy similar to the 2012 Bank Indonesia Regulation No.14/17/DASP concerning the Implementation of Payment Instrument Activities Using Cards, which contains the mechanism and terms of credit card debt collection methods. With the existence of distinct standard operating procedures and regulations, P2PL would have clear guidance and standardized references related to

debt collection methods. This would permit the OJK to take firm action against P2PLs practices that violate the rules.

Third, the OJK needs to closely and intensively supervise and monitor, and perhaps take action against, the three P2PLs (*DanaRupiah*, *Do-It Pinjaman Uang*, and *Tangbull*) engaging in unethical collection methods before the situation reaches the level of the *RupiahPlus* case.

Fourth, the OJK is advised to set a ceiling on interest rates, administrative costs, and the amount of fines. If this is not regulated, then P2PLs can freely set high interest rates and other costs in the pursuit of large, instant profits that burden the community and create borrowers who are unable to pay back their loans. While currently the number of borrowers and the amount of P2PL loan disbursements are lower than other financial institutions, the growth in the number of borrowers and outstanding debt reaching three digits annually, threatens national financial system stability, especially from the household sector considering that the majority of P2PL borrowers are individuals.

Fifth, and based on the results of the classification of supervision urgency level, the OJK needs to conduct intensive, in-depth and serious supervision of P2PLs before more victims are created. If necessary, repressive action should be taken with the two P2PLs included in the category D (*DanaRupiah* and *Tangbull*), considering their bad assessments on three aspects; not being officially listed in the OJK, the highest negative numbers and review ratios regarding unethical debt collection methods, as well as the imposition of excessive interest rates and other charges. The OJK should also pay special attention to the 36 P2PLs who fall into category C.

Sixth, the OJK can no longer passively wait for complaints from the public. In keeping with P2PLs' adoption of high technology to run their businesses, the OJK should also adopt current technology and innovation such as the use of real-time big data, as developed in this study, by utilizing reviews data from Google Play. Through this big data-based supervision system, the OJK can be proactive and implement an early warning system that is comprehensive, accurate, and fast, considering that the data can be obtained in real time, as soon as a review is posted in the database. If this system had been implemented at the beginning of the year, some cases that emerged in the media could have been avoided or, at least, the number of victims could have been minimized, considering that, from the previous result and analysis, this system issued an early warning that *RupiahPlus* had the highest number and ratio of negative reviews negative related to inappropriate debt collection methods.

## REFERENCES

- Akaichi, J., Dhouioui, Z., and Lopez-Huertas Perez, M. J. 2013. "Text Mining Facebook Status Updates for Sentiment Classification." In *2013 17th International Conference on System Theory, Control and Computing, ICSTCC 2013; Joint Conference of SINTES 2013, SACCS 2013, SIMSIS 2013—Proceedings* 640–45). <https://doi.org/10.1109/ICSTCC.2013.6689032>.
- Change.org. 2018. Penagihan Pinjaman Fintech Sangat Meresahkan. <https://www.change.org/p/ojk-penagihan-pinjaman-fintech-sangat-meresahkan> (accessed 28 January 2019).
- De Quincey, E., and Kostkova, P. 2010. "Early Warning and Outbreak Detection Using Social Networking Websites: The Potential of Twitter." In *Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering*. [https://doi.org/10.1007/978-3-642-11745-9\\_4](https://doi.org/10.1007/978-3-642-11745-9_4).
- Departemen Kebijakan Sistem Pembayaran. 2017. *Penyelenggaraan Teknologi Finansial*. Jakarta: Indonesia. <http://www.bi.go.id/id/ruang-media/siaran-pers/Documents/Tayangan-PBI-TEKFIN.pdf> (accessed 5 June 2018).
- Dorfleitner, G., Hornuf, L., Schmitt, M., and Weber, M. 2017. *FinTech in Germany*. Springer Nature. <https://doi.org/10.1007/978-3-319-54666-7>.
- Financial Inclusion Insights. 2017. *Indonesia Wave 3 Report Financial Inclusion Insights Tracker Survey*.
- Financial Stability Board. 2017. *Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that Merit Authorities' Attention*. <http://www.fsb.org/wp-content/uploads/R270617.pdf> (accessed 8 February 2018).
- IBM. 2018. Structured Query Language. [https://www.ibm.com/support/knowledgecenter/en/ssw\\_ibm\\_i\\_72/db2/rbafzsqlcon.htm](https://www.ibm.com/support/knowledgecenter/en/ssw_ibm_i_72/db2/rbafzsqlcon.htm) (accessed 5 September 2018).
- Infobank. 2018. INFODATA. *No. 483–September 2018–Vol XL*, 16.
- Jumena, E. 2018. "Fintech Lending Jangan Jadi Digital Rentenir." *Kompas*. <https://ekonomi.kompas.com/read/2018/03/04/223700926/fintech-lending-jangan-jadi-digital-rentenir> (accessed 6 September 2018).
- Krotov, V., and Tennysson, M. 2018. "Scraping Financial Data from the Web Using the R Language." *Journal of Emerging Technologies in Accounting*, 15 (1): 169–81. <https://doi.org/https://doi.org/10.2308/jeta-52063>.
- Laureceno, S. F. 2018. "Asosiasi Fintech Tak Mau Disebut Rentenir." *detikFinance*. 2018, from <https://finance.detik.com/moneter/d-3901545/asosiasi-fintech-tak-mau-disebut-rentenir> (accessed 6 September 2018).
- Liu, B. 2012. *Sentiment Analysis and Opinion Mining. Synthesis Lectures on Human Language Technologies*. Morgan&Claypool Publishers. <https://doi.org/10.2200/S00416ED1V01Y201204HLT016>.
- Narain, A. 2017. "Two Faces of Change." *Finance & Development*, 53 (3).
- OJK. 2018. *Ikhtisar Data Keuangan Fintech (P2P Lending) Periode Oktober 2018*. [https://www.ojk.go.id/id/kanal/iknb/data-dan-statistik/fintech/Pages/Ikhtisar-Data-Kuangan-Fintech-\(Peer-To-Peer-Lending\)-Periode-Oktober-2018.aspx](https://www.ojk.go.id/id/kanal/iknb/data-dan-statistik/fintech/Pages/Ikhtisar-Data-Kuangan-Fintech-(Peer-To-Peer-Lending)-Periode-Oktober-2018.aspx) (accessed 28 January 2019).

- Rossiana, G. 2018. "OJK Sebut Fintech Rentenir, Ini Pembelaan Asosiasi." *CNBC Indonesia*. <https://www.cnbcindonesia.com/fintech/20180306123942-37-6370/ojk-sebut-fintech-rentenir-ini-pembelaan-asosiasi> (accessed 6 September 2018).
- Sharef, N. M., Zin, H. M., and Nadali, S. 2016. "Overview and Future Opportunities of Sentiment Analysis Approaches for Big Data." *Journal of Computer Science*. <https://doi.org/10.3844/jcssp.2016.153.168>.
- Statista. 2018. Number of Available Applications in the Google Play Store.
- World Bank. 2018. DataBank: Global Financial Inclusion. <https://databank.worldbank.org/data/source/global-financial-inclusion/preview/on> (accessed 20 January 2019).



## APPENDIX

**Table A1: Classification of P2PL Supervision Urgency Level Based on Four Aspects Assessment**

| P2PL Name                      | Legality Aspect | Review Rating Aspect | Appropriateness of Debt Collection Method Aspect | Interest Rate and Other Charges Aspect | Category |
|--------------------------------|-----------------|----------------------|--|--|----------|
| <i>Ammana</i>                  | –               | –                    | –  | –                                      | A        |
| <i>AyoRupiah</i>               | X               | X                    | –  | –                                      | C        |
| <i>Bos Tunai</i>               | X               | –                    | –  | –                                      | B        |
| <i>Cash Dana Kilat</i>         | X               | X                    | –  | –                                      | C        |
| <i>CashBon</i>                 | X               | X                    | –  | –                                      | C        |
| <i>Cashcepat</i>               | –               | X                    | –  | –                                      | B        |
| <i>Cashwagon</i>               | –               | X                    | –  | –                                      | B        |
| <i>Cicil</i>                   | –               | –                    | –  | –                                      | A        |
| <i>Crowdo</i>                  | –               | X                    | –  | –                                      | B        |
| <i>Dana Flash</i>              | x               | –                    | –  | –                                      | B        |
| <i>Dana Pinjam</i>             | x               | –                    | –  | –                                      | B        |
| <i>Dana Sukses</i>             | x               | x                    | –  | –                                      | C        |
| <i>Danamas P2P</i>             | x               | –                    | –  | –                                      | B        |
| <i>DanaPinjaman</i>            | x               | –                    | –  | –                                      | B        |
| <i>DanaRupiah</i>              | x               | –                    | x  | x                                      | D        |
| <i>Do-It Pinjaman Uang</i>     | –               | –                    | x  | –                                      | B        |
| <i>Dompet Ajaib</i>            | x               | x                    | –  | –                                      | C        |
| <i>Dompet Kartu</i>            | x               | –                    | –  | –                                      | B        |
| <i>Dompet Kilat</i>            | –               | x                    | –  | –                                      | B        |
| <i>DoRi</i>                    | x               | –                    | –  | –                                      | B        |
| <i>Easy Pinjaman</i>           | x               | x                    | –  | –                                      | C        |
| <i>Easycash</i>                | x               | –                    | –  | –                                      | B        |
| <i>FastRupiah</i>              | x               | x                    | –  | –                                      | C        |
| <i>Finmas</i>                  | –               | x                    | –  | –                                      | B        |
| <i>flash Rupiah</i>            | x               | x                    | –  | –                                      | C        |
| <i>Gampang Pinjaman Rupiah</i> | x               | –                    | –  | –                                      | B        |
| <i>Go Dana</i>                 | x               | x                    | –  | –                                      | C        |
| <i>Go Duit</i>                 | x               | x                    | –  | –                                      | C        |
| <i>Go Uang</i>                 | x               | x                    | –  | –                                      | C        |
| <i>GoDuit</i>                  | x               | x                    | –  | –                                      | C        |
| <i>GoKredit</i>                | x               | x                    | –  | –                                      | C        |
| <i>GoPinjaman</i>              | x               | x                    | –  | –                                      | C        |
| <i>HaloCash</i>                | x               | x                    | –  | –                                      | C        |
| <i>HotDana</i>                 | x               | x                    | –  | –                                      | C        |
| <i>Indodana</i>                | –               | –                    | –  | –                                      | A        |
| <i>JULO</i>                    | x               | –                    | –  | –                                      | B        |
| <i>Kami Dana Rupiah</i>        | x               | –                    | –  | –                                      | B        |
| <i>Klik ACC</i>                | –               | x                    | –  | –                                      | B        |
| <i>KooRupiah</i>               | x               | x                    | –  | –                                      | C        |
| <i>Kredina</i>                 | x               | x                    | –  | –                                      | C        |
| <i>Kredit Cepat</i>            | –               | –                    | –  | –                                      | A        |
| <i>Kredit Mini</i>             | x               | –                    | –  | –                                      | B        |
| <i>Kredit Pintar</i>           | –               | –                    | –  | –                                      | A        |
| <i>KreditNow</i>               | x               | –                    | –  | –                                      | B        |
| <i>Kredito</i>                 | –               | x                    | –  | –                                      | B        |

*continued on next page*

Table A1 continued

| P2PL Name                             | Legality Aspect | Review Rating Aspect | Appropriateness of Debt Collection Method Aspect | Interest Rate and Other Charges Aspect | Category |
|---------------------------------------|-----------------|----------------------|--|--|----------|
| <i>Kuredi</i>                         | x               | –                    | –  | –                                      | B        |
| <i>Modalku Dana Usaha</i>             | x               | x                    | –  | –                                      | C        |
| <i>Pasar Pinjam</i>                   | x               | –                    | –  | –                                      | B        |
| <i>Pinjam Gampang</i>                 | –               | x                    | –  | –                                      | B        |
| <i>Pinjam petir</i>                   | x               | x                    | –  | –                                      | C        |
| <i>Pinjam Plus</i>                    | x               | x                    | –  | –                                      | C        |
| <i>Pinjam Uang</i>                    | x               | –                    | –  | –                                      | B        |
| <i>Pinjam Yuk</i>                     | x               | –                    | –  | –                                      | B        |
| <i>Pinjaman</i>                       | x               | x                    | –  | –                                      | C        |
| <i>Pinjaman Online Cepat Cair</i>     | x               | x                    | –  | –                                      | C        |
| <i>Pinjaman Online dengan Cicilan</i> | x               | –                    | –  | –                                      | B        |
| <i>Pinjaman Uang Tanpa Jaminan</i>    | x               | –                    | –  | –                                      | B        |
| <i>PinjamanGo</i>                     | –               | –                    | –  | –                                      | A        |
| <i>Pinjamanku.com</i>                 | x               | x                    | –  | –                                      | C        |
| <i>Pinjamduit</i>                     | x               | –                    | –  | –                                      | B        |
| <i>Qreditt</i>                        | –               | –                    | –  | –                                      | A        |
| <i>Raja Pinjaman</i>                  | x               | x                    | –  | –                                      | C        |
| <i>Raja Rupiah</i>                    | x               | x                    | –  | –                                      | C        |
| <i>Raja–Uang</i>                      | x               | –                    | –  | x                                      | C        |
| <i>Rumah Pinjaman</i>                 | x               | x                    | –  | –                                      | C        |
| <i>Rupiah Cepat</i>                   | –               | –                    | –  | –                                      | A        |
| <i>Rupiah Get</i>                     | x               | x                    | –  | –                                      | C        |
| <i>Rupiah Kita</i>                    | x               | –                    | –  | –                                      | B        |
| <i>Rupiah Zone</i>                    | x               | –                    | –  | –                                      | B        |
| <i>RupiahNow(official)</i>            | x               | x                    | –  | –                                      | C        |
| <i>RupiahPlus</i>                     | –               | –                    | x  | –                                      | B        |
| <i>Saku Dana Rupiah</i>               | x               | –                    | –  | –                                      | B        |
| <i>Saku Kamu</i>                      | x               | x                    | –  | –                                      | C        |
| <i>Tangbull</i>                       | x               | –                    | x  | x                                      | D        |
| <i>Tunai Kita</i>                     | –               | x                    | –  | –                                      | B        |
| <i>Tunai Plus</i>                     | x               | –                    | –  | –                                      | B        |
| <i>Tunai Wallet</i>                   | x               | x                    | –  | –                                      | C        |
| <i>TunaiKan</i>                       | x               | –                    | –  | –                                      | B        |
| <i>TUNAIKU</i>                        | –               | –                    | –  | –                                      | A        |
| <i>TunaiTunai</i>                     | x               | x                    | –  | –                                      | C        |
| <i>Uang Box</i>                       | x               | –                    | –  | –                                      | B        |
| <i>Uang Rupiah</i>                    | x               | x                    | –  | –                                      | C        |
| <i>Uang Tunai</i>                     | x               | –                    | –  | –                                      | B        |
| <i>UangBagus</i>                      | x               | –                    | –  | –                                      | B        |
| <i>UangMe</i>                         | x               | –                    | –  | –                                      | B        |
| <i>Uangonline</i>                     | x               | x                    | –  | –                                      | C        |
| <i>UangTeman</i>                      | –               | –                    | –  | –                                      | A        |
| <i>Utunai</i>                         | x               | –                    | –  | –                                      | B        |
| <i>Utunai Pro</i>                     | X               | –                    | –  | –                                      | B        |
| <i>Wall In</i>                        | X               | –                    | –  | –                                      | B        |
| <i>Wecash</i>                         | X               | x                    | –  | –                                      | C        |
| <i>Winwin Mobile Apps</i>             | –               | –                    | –  | –                                      | A        |

Note: x = poor result.