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STRATEGY ANALYSIS FOR FINANCIAL TECHNOLOGY PEER TO PEER LENDING INDUSTRY: INTEGRATION OF SYSTEM DYNAMICS AND GAME THEORY

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ABSTRACT

In Indonesia, internet users from 2013 to 2018 have increased about 52%. This growth indicates that people behaviour change in many aspects of life including in economy. One example is (Fintech P2P Lending). P2P lending is a service that offers online borrowing, lenders can loan to small business or individuals. This is in line with the Indonesia Financial Services Sector Master Plan 2015-2019. Indonesia support the rapid growth of the financial technology ecosystem, but there is need good understanding between related parties such as P2P Lending companies, lenders and borrowers. A system dynamics will be helped to find a alternative solution that captured into a model and act as calculators to takes value to fill payoff table in game theory. Game theory is used as a multiplayer decision model of situations involving two or more things of interest. Integration of system dynamics and game theory can produce the best strategy for Fintech P2P Lending in running its business while considering profit for lenders and borrowers. The best strategy is known by use non-cooperative and cooperative game theory. The result shown the best strategy for each player with non-cooperative game is when the company chooses a high level of profit margin, borrower chooses low level of debt time, and lender chooses high level of ROI. In cooperative game, the best strategy is when the company chooses a high level of profit margin, borrower chooses low level of debt time, and lender chooses low level of ROI.

Keywords: Fintech P2P Lending, System Dynamics, Game Theory

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PREFACE

Alhamdulillahirabbil'alamin. Praise the presence of Allah SWT who has delegated His grace and hidayah without stopping to the author, do not forget the shalawat and greetings to the lord of the Prophet Muhammad and his entire companions and family. This thesis entitled "Strategy Analysis For Financial Technology Peer To Peer Lending Industry: Integration Of System Dynamics And Game Theory" is arranged to fulfill the requirement of completing master degree program and obtaining Masters of Engineering, Institut Teknologi Sepuluh Nopember (ITS) Surabaya.

The success of this thesis can not be separated from the help of some parties who always give support and motivation. Therefore, on this occasion the author would like to express gratitude to the parties, among others:

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The writer also fully aware that this report still miss a lot of part. Therefore, any critics and suggestion regarding this report is welcomed. Hopefully this final report can give benefit to the readers and please your forgiveness if there are any unpleasant words and mistake during the process of making this report.

Surabaya, July 18th 2018

Writer

LIST OF CONTENTS

LIST OF FIGURES

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LIST OF TABLES

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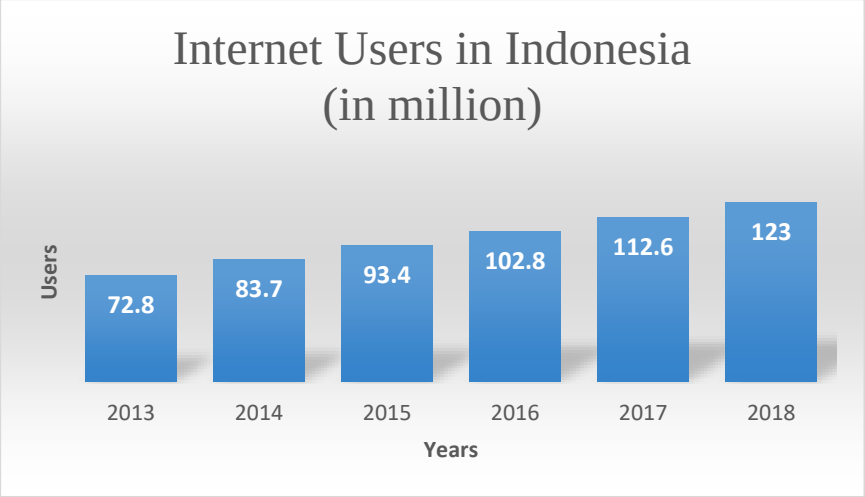
CHAPTER 1
INTRODUCTION

In this chapter would be discussed about research background, research problem, objective, benefit, scope, and systematic research.

1.1 Background

Nowadays, the development of information system and technology in Indonesia have been increasing rapidly. It influences the orientation of human behavior in accessing various information or using various features of electronic services in it. In Indonesia, internet users from 2013 to 2018 have increased about 52% (See Figure 1.1) (Asosiasi Penyelenggara Jaringan Internet Indonesia, 2017):



Source: (Asosiasi Penyelenggara Jaringan Internet Indonesia, 2017)

Figure 1. 1 The Development of Internet Users in Indonesia

This growth indicates that the level of technology utilization's of Indonesian people is very high. Furthermore, it change people behavior in many aspects of life including in economy. One example that exists recently is emerge of Financial Technology (Fintech). Fintech is a disruptive innovation that introduces practicality, convenience, ease of access, and economical cost. This kind of innovation basically transforms a system or existing market that is less desirable by market rulers to be something that will be demanded and needed by the community (Hadad, 2017).

Disruptive innovation give an impact to whole financial services industry, and start to change the industrial structure, technology, and marketing model to consumers (Hadad, 2017). Fintech is a business line that uses software to provide financial services such as internet banking,

mobile payments, crowdfunding, peer to peer loans, online identification, blockchain innovation, and so on (Sahi, 2017).

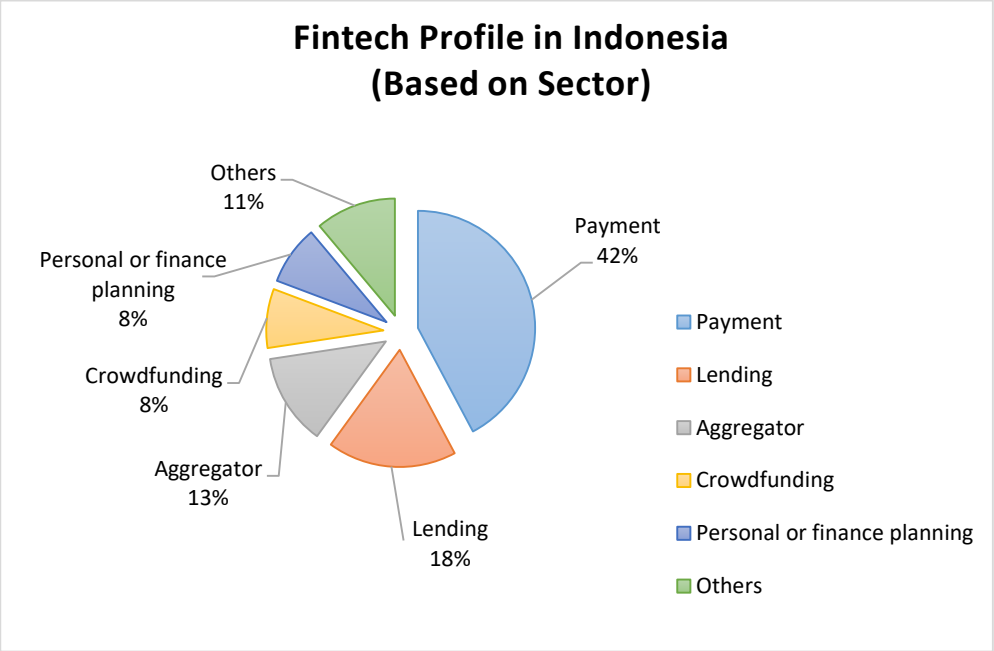


Figure 1. 2 Fintech Profile in Indonesia (Based on Sector)

In Indonesia, the perpetrators of Fintech are still dominated by business payments of 43%, lending by 17%, aggregators by 13%, followed by crowdfunding, financial and personal planning, and others. The number of firms that have sprung up to 2016 is 165 and still has potential to increase (Association of Fintech Indonesia and OJK, 2017).

In the finance industry, Fintech is a new breakthrough for people to seek funding alternatives in addition to conventional financial industry services. Today's society needs democratic, transparent, and broad-based public financing, this is not found in traditional finance industries that have strict rules and limitations of services for specific local communities. The presence of Fintech also poses a role in providing structural solutions for the growth of electronics-based industries, encouraging the growth of small and medium-sized businesses with wide market reach, promoting equity of the population, helping with the still large domestic funding, encouraging the uneven distribution of national financing, as well as improving national financial inclusion (Hadad, 2017).

In this study, business processes will be examined towards peer-to-peer landing (P2P Lending). P2P lending is a service that offers online borrowing, lenders can loan to small business or individuals. Initially, the essential trait that described P2P Lending as "elective" was a guarantee to 'return' to casual and direct lending inside a group of put stock in peers. The desire to 'cut out the middle-man' or to generally decrease grating in encouraging access to product and services

has been a center component behind the drive of internet based trade (Mateescu, 2015). In financial industry currently, Fintech P2P Lending comes as an alternative to conventional banking in lending and borrowing activities. It is clarified by Deputy Commissioner of Strategic Management of the Otoritas Jasa Keuangan (OJK), Imansyah, explained that the Fintech P2P Lending Company is capable of becoming a new financing alternative for people not reached by the conventional finance industry. In addition, P2P lending is also expected to accelerate the distribution and balancing level of financing for MSMEs or small businesses to various regions while maintaining a careful level of risk (Prayitno, 2017).

Systems in Fintech P2P Lending and traditional loan financing have a fundamental difference in running their business processes. In traditional loan financing, lending process takes longer and complex requirements because the rules are so tight. Loans given in high amounts with rates ranging from low to medium, loan risks tend to be low but high transaction costs, and traditional loan financing approvals require collateral from borrowers. While the presence of Fintech P2P Lending provides convenience for people who need small funds in a short time with easy requirements, loose regulations, and low transaction costs. The convenience makes the trade off, interest rates are applied and the risks are medium to high. Explanation of comparison between traditional loan financing and Fintech P2P Lending can be seen in Table 1.1 below:

Table 1. 1 Comparison between the Traditional Loan Financing vs Fintech P2P Lending

Major Aspects	**Traditional Loan Financing**	**Fintech P2P Lending**
Process	Long time, complex	Fast, simple
Regulation	Strict	Loose
Risk	Low	High
Interest Rate	Low-Medium	Medium-High
Loan Amount	High	Low
Transaction Cost	High	Low
Collateral	Yes	No
Party Involved	Borrower, bank	Borrower, lender, platform

Source: (Yan Feng, 2015)

Practice in Fintech P2P Lending requires colaboration with multiple stakeholders in its business processes, good integration had positively impact for the continuity of Fintech P2P Lending in the financial industry. As for the business process of Fintech P2P Lending with related parties can be explain in Figure 1.3

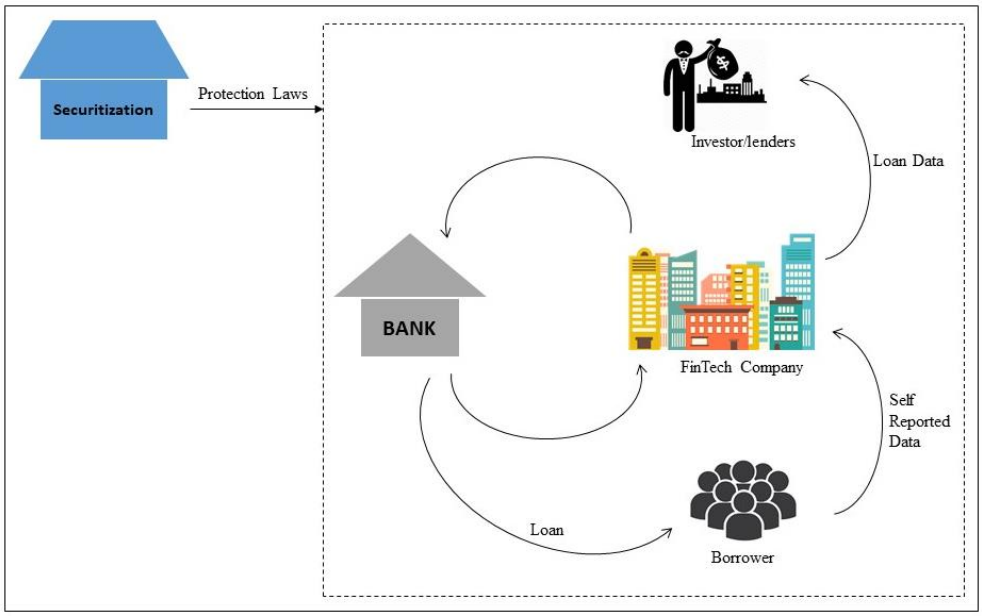


Figure 1. 3 Business Process of Fintech P2P Lending

Fintech P2P Lending company confront investors with borrowers. Every investor is required to meet income and wealth in accordance with certain conditions. As lenders, they are entitled to browse the loan list and view the profile information of the borrower who has already registered. If the borrower's profile matches and qualifies the risk class as well as the lending rate set, then the borrower is entitled get the loan to be transferred through a bank account. P2P Lending activities include the role of the regulator to manage the business process well and not harm either party.

OJK acts as a regulator that is expected to protect people from high risk, disiplining the Fintech to make lending-borrow more transparant and provide accurate education to public for using Fintech as an efficient financing solution. According to Vice Chairman of the Board of Commissioners of OJK, Nurhaida in Jakarta (Ant, 2018), until this moment OJK keep trying to perfect the regulation so can facilitate and encourage the Fintech industry to grow better by not sacrificing the service quality to related people. She said that the regulation will be attempted to complete no later than semester I-2018. The fact implies that the regulations on Fintech P2P Lending still have not been able to deal with the rapid development of Fintech.

The existence of Fintech P2P Lending is also a threat to the sustainability of traditional financial services such as banks because it offers more convenience in conducting financial activities. Although basically the services provided are the same, but there are fundamental differences such as interest rate offered, loan repayment period, and large loan amount (Wijaya, 2017). This should be a consideration for the banking industry to make new breakthroughs that can still exist and survive in the digital era.

In Global Partnership for Financial Inclusion (2010), digital finance and financial inclusion like P2P Lending have a few advantages to providers of digital finance, users of financial services, goverment and the economy, for example, expanding access to finance among poor people, poverty reduction, increasing aggregrate expenditure for goverments and economy growth. This is in line with the Indonesia Financial Services Sector Master Plan 2015-2019 which has three targets that are contributive in supporting the acceleration of national economic growth, maintaining stable financial system as a foundation for sustainable development, and inclusive improving the welfare of the community by opening access to finance (Hadad, 2017).

Behind Indonesia's bravery in supporting the rapid growth of the financial technology ecosystem, there is still need for a good understanding between related parties such as P2P Lending companies, investors and borrowers. That way, the development of Fintech P2P Lending industry is able to fulfill the needs of each stakeholder without anyone feeling disadvantaged. However, current condition of Fintech P2P Lending has some challenges to develop. Funding from Fintech P2P Lending, amount of lenders and borrowers has grown significantly since early 2017. Based on information from the Director of Fintech Licensing and Oversight Management OJK, Hendrikus, from the end of 2016 to the end of August 2017, the number of lenders increased by 296% but still one third of the total borrower available, total lender is 48,034 people and borrower is 120,174 people. Funding value increased up to 497% reaching Rp 1.46 trillion, this figure still can not fill funding gap in Indonesia which still require funding up to Rp 1.7 trillion in Indonesia (Hana, 2017). This indicates that the existence of Fintech P2P Lending is still needed to grow and expand in order to open access to public funding.

Table 1. 2 Development of Fintech Funding

Indicator	**Last year 2016**	**August 2017**	**%**
Lender (person)	12.145	48.034	296
Borrower (person)	50.863	120.174	136
Funding Accumulation (in million)	242.489	1.446.466	497

Source: (OJK, 2017)

The success of Fintech P2P Lending growth in Indonesia is influenced by the society in applying technological product innovation. Although in Indonesia almost everyone is using smartphones and is an active internet user, but not all are able to utilize the existence of Fintech P2P Lending and do not have an account at the bank (Fauziyah, 2017). The absence of legal regulations on P2P Lending has a potential to cause harm to the community, moreover the community also lack understanding of the Fintech P2P Lending business processes, so they can

not mitigate the risks. Besides that, the desire to invest needs to be balanced with good financial literacy, so there is no illegal collection of funds and causes the development of loan sharks. To optimize the role of Fintech, it is necessary to build a mutually beneficial business synergy for the interests of each related parties, such as P2P Lending companies, lenders, and borrowers. They have their own role in maintain the stability of the financial system in Indonesia. Therefore, a strategic analysis is needed that capable to develop Fintech industry based on the needs of the community under the regulatory framework that is able to mitigate risks and provide protection to the people.

This research will use systems dynamic and game theory approach to make the best strategy that can be applied to develop Fintech industry in Indonesia especially in P2P Lending business with consider advantage for lender and borrower. Game theory is used as a multiplayer decision model of situations involving two or more things of interest. Fintech P2P Lending has a role to get benefit from the provision of platforms, lenders as providers of funds that expect the benefits of investing activities, and borrowers are interested to borrow funds by considering the specified interest rate. The interaction between three players makes it possible to analyze the best logical and rational strategies, so that every player achieves the highest utility. To be able to perform analysis using game theory method, it takes value to fill payoff table, and the value will be searched with system dynamics approach. System dynamics that act as calculators are also able to model how the behavior of the system and its characteristics. It is hoped that integration of system dynamics and game theory can produce the best strategy for Fintech P2P Lending in running its business while considering profit for lenders and borrowers.

1.2 Research Problems

Based on background that has been described, the issues will be discussed in this study is “How to analyze some strategies of Fintech P2P Lending companies in order to increase profit margin by considering the benefits for borrowers and lenders?”

1.3 Objectives

The purpose of this research is to analyze Fintech industry development strategy by taking the related parties. More specifically, this study has the following objectives:

1. To formulate an improved model of the Fintech P2P Lending system in financial industry Indonesia.
2. To recommend an ideal strategy for the company Fintech P2P Lending, lenders, and also borrower.

1.4 Benefits

The expected benefits of this research are as follows:

1. For researchers and academics, add knowledge of Fintech's industrial development strategy especially for P2P Lending and as a reference for further research.
2. For writers, offer a deeper insight into P2P Lending's industrial conditions and be able to apply industrial engineering science in Fintech's market research.
3. For the government, know the right scenarios in developing the P2P Lending industry with consider several parties.
4. For Fintech P2P Lending, get the best strategies that benefit the company by considering lenders and borrowers.

1.5 The Scope of Research

The scope of this research includes the problem limits and assumptions to limit the study during research. The limitations of the problem and the assumptions used are as follows:

1.5.1 Limitations

To obtain a representative outcome, it is necessary to limit the scope of the research to be observed, as follows:

1. Each actors that correlated in this research has a determined strategic choice.
2. There are three players in this research, P2P Lending companies, lenders, and borrowers.
3. The object to be observed is the Fintech company especially in P2P Lending.
4. Data in system dynamic model use from expert information.
5. Method used system dynamics and cooperative game theory.
6. Strategy analysis is projected for 5 years.

1.5.2 Assumptions

The assumptions used include:

1. Political factors doesn't affect the policies that adopted for develop Fintech industry.
2. There is no monetary crisis.
3. Exchange rate rupiah against dollar is stable.
4. Moneter policy is not involved in model. The model only discusses interaction between lender, Fintech P2P Lending company, and borrower.
5. The average of monthly income lender is Rp 8.000.000 and desired to borrow of borrower is Rp 2.500.000.

1.6 Systematics Research

Systematic writing that used in this research are follow as:

CHAPTER 1 INTRODUCTION

This chapter describes the background of research, research problem, objectives to be achieved, benefits gained, the scope of research, and systematics of writing in preparing thesis research reports.

CHAPTER 2 LITERATURE REVIEW

This chapter describes the underlying review literature in this research. Literature review obtained from several sources such as books, ebooks, websites, journals, and some other supporters.

CHAPTER 3 RESEARCH METHODOLOGY

This chapter describes the steps taken in the overall research. The research procedure is arranged systematically into four main steps namely the preparation phase of research, data collection and processing, analysis and discussion, as well as conclusions and suggestions.

CHAPTER 4 MODEL CONCEPTUALIZATION

This chapter presents descriptions of simulation model making and conceptual modelling, as well as running simulation models. Next will be an analysis of the model.

CHAPTER 5 GAME THEORY ANALYSIS

This chapter will explain the analysis and interpretation of the data that has been done in the previous chapter by using game theory approach. The best scenario will be a consideration for decision maker and analysis can assist in the preparation of the conclusions and suggestions of subsequent research.

CHAPTER 6 CONCLUSION AND SUGGESTION

This chapter describes the conclusions derived from a series of research that have been done. It is also discussed about the suggestions needed in the development of better research.

CHAPTER 2
LITERATUR REVIEW

This chapter contains conceptual about strategy, financial technology, systems dynamic and game theory.

2.1 Strategy

Strategy is an overall approach related to the implementation of the idea, planning and execution of an activity within a certain time. Strategy is a tool to achieve goals, so that companies can view objectively internal and external conditions, and can anticipate changes in the external environment (Rangkuti, 2009). According to Porter (1996), strategy is a series of activities that are different from what has been done before, thus provide a valuable position. As the core of management, the strategy lays out the company's position, makes some conclusions, and forges every activity well, resulting in reciprocity in the competition, the combination of activity, and the suitability between activities performed by the company. In business, strategies include geophysical expansion, diversification, acquisition, product development, divestiture, liquidation, market penetration, tightening, and joint ventures. Strategies are potential actions that require top management decisions and large amounts of enterprise resources. So a strategy is an action or activities undertaken by a person or company to achieve goals or goals that have been set (David, 2011).

The concept of strategy at least includes five interrelated meanings, where strategy is a (Mintzberg, 2007):

1. Planning to clarify the direction of the organization in a rational way to realize long-term goals.
2. References from the assessment of consistency or inconsistency of conduct and actions taken by the organization.
3. Angle positioned by the organization when it comes to its activity.
4. A perspective concerning an integrated vision between the organization and its environment that becomes the boundary for its activity.
5. Details of the organization's tactical steps containing information to trick competitors.

So, strategy is important to influence the success of each company in achieving long-term goals. In line with Marrus's understanding in Umar (2001), the definition of strategy is a process of determining the plans of top leaders that focus on the organization's long-term goals, along with the preparation of a way or effort how to achieve that goal.

According to Grant (1999) strategy has three important roles in filling the management objectives, among other:

1. Strategy as support for decision-making.

   Strategy as an element to achieve success. Strategy is a form or theme that provides unity of relationships between decisions taken by individuals or organizations.

2. Strategy as a means of coordination and communication.

   One of the important role of strategy is as a means of coordination and communication to provide a common direction for the company.

3. Strategy as a target.

   Strategy concept will be combined with mission and vision to determine where the company is in the future. Goal setting is not only done to provide direction for the preparation of strategy, but also to form aspirations for the company. Thus, the strategy can also serve as the company's target.

There are several levels of management strategies that develop based on development of the company's business, among others (David, 2011):

1. Corporate Strategy

   It is a strategy that reflects the whole direction of the company, with the goal of creating growth for the company and management of various business lines of products. At this corporate level there are three kinds of strategies that can be used, namely:

   a. Growth strategy is a strategy based on the stage of growth that being passed by the company.
   b. Stability strategy is a strategy in facing the decline in income that being faced by a company.
   c. Retrenchment strategy is an implementation of strategy to minimize or reduce the effort of company.

2. Business Strategy

   It is a strategy that occurs at the level of a product or business unit and is a strategy that emphasizes the banking position of competing products or services on specific industries or specific market segments. There are three kinds of strategies that can be used in this business-level strategy, namely "Cost Excellence Strategy, Differentiation Strategy and Focus Strategy". Strategies at this level are discussed and defined by managers who are assigned responsibility by top management to manage the business. Strategies applied to business units are often called generic strategies. Business strategy is the basis of coordinated and sustained effort, directed towards the achievement of long-term business

goals. A business strategy shows how long-term goals are achieved. Thus, a business strategy can be defined as a general overall approach that directs the principal actions of a company. So, the mean of company's business strategy is the pattern of decisions within the company that determines and discloses target, goals and objectives that produce policy, planning to achieve goals. The company's strategy applies to all large corporations or small firms, whereas business strategy focuses solely on determining how companies will compete and position themselves among their competitors.

3. Functional Strategy

   It is a strategy that takes place at a functional level such as, operations, marketing, finance, human resources. Research and development where this strategy will improve the functional area of the company so as to get competitive advantage. This strategy should refer to the business strategy and corporate strategy. Focusing on maximizing the productivity of resources used in providing the best value for customer needs. Functional strategy is often also called Value-Based-Strategy.

2.2 Financial Technology

Financial Technology (Fintech) is an application of digital technology to provide business, consumers, and goverments with new products and services that probably disrupt the financial sector. Fintech can reduce costs and increase convenience for consumers and firm, and increase competition among businesses (The Parliamentary Office of Science and Technology, 2016).

2.2.1 Evolution of Fintech

Financial technology begans since the launch of automatic teller machines in 1967. From 1967 to 1987, financial services shifted from analog to digital industry. The establishment of NASDAQ in the US in 1971 was the first step in the development of the National Market System in the future, allowing the transition from securities trading to full electronic commerce. International payment services began to be encouraged by the establishment of the Society of Worldwide Interbank Financial Telecommunications (SWIFT) in 1973. The organization was established to link the domestic cross-border payment system (Nasdaq and Swift in Sahi, 2017).

Throughout the 1980s, financial institutions expanded their use of IT in internal operations in stages. This is due to a computerized process and risk management technology developed to manage internal risks. Toward the end of the 1980s, the advent of internet fueled the rapid development of financial institutions. In early 1995, Wells Fargo used the World Wide Web to

provide online accounting checks where the manifestations of internet-based financial services. In 2005, the first direct bank without a physical branch appeared in the UK (Sahi, 2017).

Since then, many emerging innovations have succeeded in transforming an existing system or market by introducing practicality, convenience, ease of access, and economical cost. One such innovation is Fintech that provided such as internet banking, crowdfunding, peer-to-peer landing, mobile payments, roboadvisory, blockchain, and so on. In 2008, there was a financial crisis that shifted the focus of the bank to a whole new range of financial services that provided resources and legitimacy. The Fintech industry is currently characterized by new competition and diversity, bringing opportunities and risks to be carefully considered (Arner, et al., 2015)

2.2.2 Business Process of Fintech

Fintech has an innovative business model as they utilize advanced technology to eliminate intermediaries in the financial system, reducing infrastructure costs by collecting complex data and complex algorithms from users, and focusing on key objectives in terms of lean and agile organizations. Customer resources of technology and e-commerce giants allowing them to rival incumbent financial institutions overnight. Lack of regulatory burdens and lack of organizational legacy also facilitate their agile moves in this sector (Chishti and Barberis, 2016).

According to Douglas (2016), success of start-up and e-commerce companies depend on a combination of cutting-edge technological capabilities and the flexibility to change laws and regulations. Success factor of the company relies on its low profit margins, innovative, asset light, measurable, and appropriate business models. Users usually have a low willingness to pay for wide internet access services and tend to opt for a free service. Their large customer base is a stepping stone to expand their financial services. On the other hand, find for their innovative advantages without incurring large fixed costs for assets. In this era, mobile infrastructure offers many online application services that make the need for physical outlets is reduced. The main foundation for the success of Fintech movement lies in the abundance of smartphone usage and innovation in mobile technology Most start ups of Fintech are supported by online business opportunities in terms of scalability (Chuen and Teo in Erman, 2015). In Fintech environment, peer-to-peer lending and payment services are the most disruptive ones.

2.2.3 Peer-to-Peer Lending

Fintech companies can be categorized into vertical alternative loans especially when associated with a peer-to-peer lending platform or underwriter / loan platform that uses learning technology and machine algorithms to assess creditworthiness (KPMG, 2016).

Peer-to-Peer (P2P) loan platform is an online platform refers to "peer-to-peer" or "person-to-person", where borrowers ask for loans, and private lenders bid to fund this (Klafft, 2008). P2P loans benefit among borrowers because of low perceived interest rates, simplified application processes and lending processes faster than traditional processes. On the other hand, the risk may be higher because it is impossible to ascertain the credit value of the lender or the borrower in most cases. In general, creditors lend small loans to reduce the risk of repayment (Kalmykova and Ryabova, 2016).

This platform combines multiple data sources and uses cutting-edge analysis for credit decisions. Documentation, loan servicing and managing the repayment process are the responsibility of the lender. It is possible to assess individual institutional and banking funds. In addition, partnering with banks in the form of loans also allows for legal protection. Automatic underwriting and lending processes are different from banks. This makes it possible to capitalize on economies of scale (Douglas, 2016).

It is important to note that many banks and institutional investors such as hedge funds and other business entities play an active role in the P2P portal. About 80% of funds are associated with this entity. In order to match borrowers and lenders efficiently, P2P companies apply sophisticated credit modelling and underwriting skills. In addition, they offer automated loan options according to the criteria set by the investor (PwC, 2015).

2.3 System Dynamic

The System Dynamic is a discipline developed by Jay W. Forrester at MIT University during the 1950s. This approach aims to analyze and solve complex problems related to policy analysis and design by applying feedback control theory to an organizational simulation model (Forester, 2003).

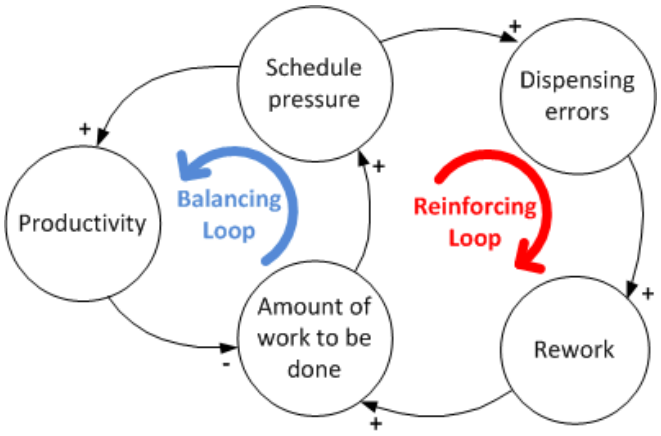
System Dynamic are systems that are affected by time changes, which use time as an independent variable. Given the time as an influential variable, making the system dynamic can show a change due to the changes caused (causal) that can change over time. Therefore, the system dynamic is a modelling and simulation methodology to understand and analyze how decision-making can affect the system. The purpose of this model is used not only to make estimates but to design a long-term policy by management. System dynamic methods study the system's point of view consisting of elements interacting in a mutual relationship to produce a certain behavior. It is translated into mathematical models which will then be simulated with the help of computers (Widodo dkk, 2010).

2.4.1 Systems Dynamic Components

According to Richardson (1981), system dynamic method is a dynamic problem, that the problem has a change pattern of time behavior as time increases on the system, and the problem has feedback which has causal feedback loop. In system dynamic, the components are classified based on steps of model making, that are making causal loop diagram and stockflow diagram.

According to Chaerul et al (2008), the causal loop acts as a mechanism of causal hypothesis that has feedback mechanisms between elements through arrows marked positive (+), or negative (-). The arrows between elements of X-Y mean that the Y element is influenced by the element X. If the arrow is marked positive (+), it means that the greater the value of the element X, will affect the change in the value of the element Y. Also if the arrow marked positive (-), means that the greater the value of the element X, will affect the change in the value of the element Y.

While in determining the type of causal loop there are two types, there are positive causal loop (+) and negative causal loop (-). It is stated as the positive causal loop when the total number of positive signs all or the number of negative signals numbered even, which means the feedback is reinforcing. If the total number of negative signs all or the number of negative signs amounted to an odd number can be regarded as a negative causal loop, which means the feedback is balancing.

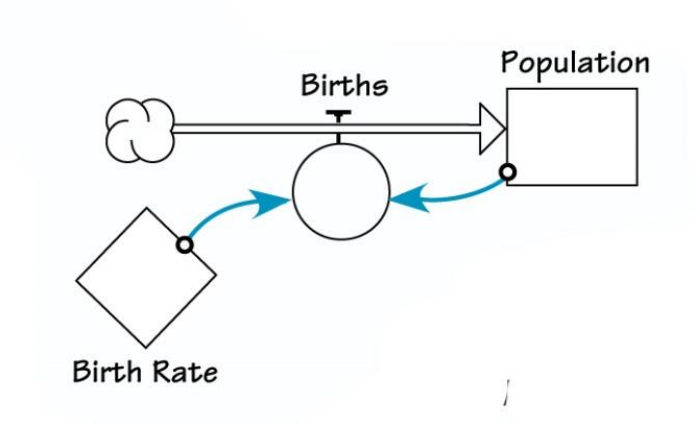


Source: https://systemsthinkinglab.com/causal-loop-diagram/

Figure 2. 1 Causal Loop Diagram

After making causal loop diagram completed, the model will be made into stockflow diagram. Components on the stockflow diagram are classified into 3 types of variables, namely: stock, flow, and converter. Variable stock symbolized by rectangle, which means representing the main accumulation in the system. Variable flow symbolized by valve, which means the rate of change of variable stock that represents the activity of adding or reducing stock. While the variable converter symbolized by the circle, which means representing some other variables in the system.

These variables are connected by one or more connector in the form of arrows, as connecting information representing cause and effect on the model structure.



Source: *(Aronson & Angelakis, t.thn.)*
Figure 2. 2 Stock Flow Diagram

2.4.2 Verification Model

Model verification is done with the purpose of knowing the consistency of units and equations and errors in modelling. The process of model verification is done using software stella 9.13. The parameters of a model have been verified consistency when a display appears on windows that says "All units within your model appear to be consistent". While the parameter of a model has been verified without any error is the appearance of windows that states "Verification complete. No errors were found ".

2.4.3 Validation Model

Model validation was performed through several tests, such as: boundary adequacy test, parameter assessment test, and extreme condition test (Sterman, 2000). According to Barlas (1996) from some of the above mentioned tests, mean comparison test is often used in the model validation process. The mean comparison test is used to determine the mean percentage of error rate (mean error) between the actual data and the model simulation result data. The average parameter of an acceptable error rate of less than 10%, which is determined by the following formula:

$$E = \frac{|\bar{S} - \bar{A}|}{\bar{A}} = \frac{\left|\frac{1}{N}\sum_{i=1}^{N} S_i - \frac{1}{N}\sum_{i=1}^{N} A_i\right|}{\frac{1}{N}\sum_{i=1}^{N} A_i}$$

Where,

E = Persentage mean error

$\bar{S}$ = Mean simulation data

$\bar{A}$ = Mean actual data

S_i = Simulation time at i

A_i = Actual data at i

N = Time

2.4 Game Theory

Game theory is a powerful framework for analyzing decision-making by some players whose decisions will be related to one another (Von Neumann and Morgenstern, 1944). Game theory deals with decision making in strategic settings, where there are activities considering the preferences and rational choices of other players into the decision to make the best choice for themselves. Mathematical models related to conflict and cooperation between players are calculators for calculating strategies. The stakeholders (players) realize that every decisions taken will affect each other. There are several kinds of settings in game theory such as; players have their own choices and do not cooperate with other players in the absence of possible benefits, some players make mutually binding agreements for mutual benefit, and those who form coalitions will work together for mutual benefit. The field of cooperative game theory studies takes strategic decisions where binding agreements are possible and where agents can act collectively (Chalkiadakis, Elkind, & Wooldridge, 2012).

2.5.1 Cooperative Game Theory

Cooperative game theory suggests that the conditions necessary for coalition formation are stable coalitions, where no member of the coalition has the motivation to abandon it. The concept of the most famous solution that formalizes this idea is the core. The solution known as Shapley's value provides a unique way to divide the coalition's value among players in such a way that it meets various criteria of justice (Chalkiadakis, et al., 2012).

The cooperative game is determined by the pair (N, v) where N is a set of n agents and v: $2N \rightarrow R$ is a characteristic function that assigns v (S) to each subset $S \subseteq N$, representing the value that the agent in S can obtain and distribute among themselves if they work with each other. The solution of such cooperative games usually consists of a payment vector x: $N \rightarrow R$, where x (i) is the payment agent I receive. Let x (S) = P $i \in S$ x (i) denote total payments to subset $S \subseteq N$. Generally required x (N) = v (N). The payment vector x is either stable or in the core if x (S) $\geq$ v (S) for all $S \subseteq N$ (Gillies 1953). That is, the total payment of x (S) to a subset of S should be no less than the value of S that can be generated by itself. Otherwise, S will have an incentive to deviate and work on its own. (Li & Conitzer, 2015)

2.5 Related Research

To find out the latest research developments, a review of previous research was conducted to determine the position and differences of current research, the research on the topic of Fintech P2P Lending with various methods, and similar methods used in various problems. The summary of related research:

Table 2. 1 Related Research with Similar Topic

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
1	Oanh Truong	How Fintech Industry is Changing the World	2016		Li terature and empirical studies. Empirical studies for validation and review literature for verification	PwS, Capgemini, and KPMG	Describes the evolutionary history of Fintech, identifies the success factors of Fintech and its real-life applications, and demonstrates Fintech's changing innovations in different areas, including online banking and payment processes (individual and group consumers)	The evolution of digital technology changes consumer behavior and traditional business models. Fintech plays a key role in sustained economic growth. Conventional business should be more flexible and adaptation to the development of the era in order to still exist	This thesis focuses on the global level of Fintech's evolution. For further research can discuss more specifically how Fintech in the region, such as Single European Payment Area (SEPA) or other

Table 2. 2 Related Research with Similar Topic (Continued)

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
2	Imanuel Adhitya Wulanata Chrismas tianto	Analisis SWOT Implementasi Teknologi Finansial terhadap Kualitas Layanan Perbankan di Indonesia	2017		Qualitative descriptive	In area fore, outermost, and remote	Analyzing more deeply about the strengths, weaknesses, opportunities, and threats (SWOT) of the implementation of financial technology on the quality of banking services in the digital era through the study of banking literature	The financial technology has a good level of effectiveness to improve the quality of banking services in Indonesia, so that the banking management can implement it to reach all levels of Indonesian society, especially for people living in 3T (Outside, Outermost and Remote)	It needs follow-up efforts from the government, OJK, banking practitioners, and financial technology service providers to conduct a more in-depth study about implementation of these financial technologies in Indonesia

Table 2. 3 Related Research with Similar Topic (Continued)

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
3	Can Erman	Financial Technologies Effect on Financial Services an Open Innovation Perspective	2017		Qualitative study with several different perspectives. Semi-structured interviews, reports of corporate consultants, economic reports of the organization, company website	Finland	Understand the triggers of Fintech's development	The trigger of Fintech is the global economic crisis of 2008, technological developments after 2008	Increase the number of interviewers who can increase the credibility of the research objectives. It can also use quantitative approaches to Open Innovation strategies, new business models, the impact of Fintech, the impact of existing regulations, and changes in organizational culture.
							The role of Open Innovation methods in the field	The need for collaboration, outsourcing becomes more important for today's stakeholders, the importance of the alliance, the importance of timeliness, stakeholders have to redefine their boundaries, the new regulation as a service model improves Open Innovation on financial services	
							Shows the advantages and disadvantages of the target player and Fintech	Capital and customers are of primary importance to stakeholders, supported by technology, flexibility, and low regulation. Fintech's disadvantages are inflexibility, regulation, outdated technology, and cultural gaps	
							Risk and challenge of Fintech	Fintech's coverage risks and challenges are regulation, Brexit, doubts about Fintech, over valuation from Fintech	

Table 2. 4 Related Research with Similar Topic (Continued)

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
4	Qingyao Wan, Dongyu Chen, Weihua Shi	Online Peer-To-Peer Lending Decision Making: Model Development and Testing	2016	Partial Least Squares (PLS) Structural Equation Modelling (SEM)		Online Lenders in China	Explore the lender's decision making process in online peer-to-peer (P2P) lending using trust theory and valence frameworks to develop integrated decision models	The results showed that initial trust and perceived benefit determined willingness to lend, and that the fear of borrower opportunism did not have a significant impact on this willingness. Initial trust increased willingness to lend both directly and indirectly, increased it by increasing perceived benefit.	Identify features of an online P2P loan and provide valuable insights for borrowers, lenders, and intermediaries.
5	Dongyu Chen, Fujun Lai, Zhangxi Lin	A Trust Model for Online Peer-to-Peer Lending: a Lender's Perspective	2014	Structural Equation Modelling (SEM)		Chinese online P2P intermediary	Develops an integrated trust model specifically for the online P2P lending context, to better understand the critical factors that drive lenders' trust	The results show that both trust in borrowers and trust in intermediaries are significant factors influencing lenders' lending intention. However, trust in borrowers is more critical, and not only directly nurtures lenders' lending intention more efficiently than trust in intermediaries, but also carries the impact of trust in intermediaries on lenders' lending intention.	Need to obtain responses from multiple intermediaries, use longitudinal studies, and perform cross-cultural comparisons between China and other developed countries to unviel differences in lenders' behaviors

Table 2. 5 Related Research with Similar Topic (Continued)

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
6	Quanlong Liu, Xinchun Li, Maureen Hassall	Evolutionary Game Analysis and Stability Control Secnarios of Coal Mine Safety Inspection System in China based on System Dynamics	2015	System Dynamics	Evolutionary and Game Theory	State Administration of Coal Mine Safety (SACMS), the Local Regulation Departments of Coal Mine Safety (LRDCMS), and coal enterprises	Describe the interactions between the stakeholders in China's coal mining safety inspection system, and analyze the stability of stakeholder interaction and to identify equilibrium solutions	The SACMS, LRDCMS, and coal enterprises strategy selections fluctuates repeatedly. These fluctuations make it difficult for the SACMS to design and implement inspection strategies effectively which contributes to China's frequent coal mine accidents. The simulation results show that the dynamic penalty control scenario can effectively restrain the fluctuations and make the game stable.	Added multi-players in China's coal mining safety inspection to identify more complex problem and make better solutions

Table 2. 6 Related Research with Similar Topic (Continued)

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
7	Yihui Tian, Kannan Govindan, Qinghua Zhu	A System Dynamics Model Based On Evolutionary Game Theory for Green Supply Chain Management Diffusion among Chinese Manufacturers	2014	System Dynamics	Evolutionary Game Theory	Chinese otomotive manufacturing industry	Describe the mechanism of Green Supply Chain Management (GSCM) diffusion among the manufacturers in developing countries, to establish approriate laws and policies in order to promote GSCM implementation among domestic manufacturers	The subsidies for manufacturer are better than that for consumer to promote GSCM diffusion, and the environmental is awareness is another influantial key factor	Added additional stakeholders that will affect GSCM diffusion systems, such as media groups and NGOs that can raise environmental awareness of both producers and consumers.
8	Budianto	Tuna Fishery Policy Analysis By Using Game Theory Approach (Case Study: Sendang Biru)	2017	System Dynamics	Cooperative Game Theory	Sendang Biru	Develop improvement model of tuna fishery system in the coast of Sendang Biru and to determine the best sustainable scenario to be applied by the local government, fish traders, and fishermen in term of profit achieved	The improvement simulation model for better result is held from 2016 to 2025 with 3 changing variable, local ship limit, number of fishing trip, and tuna trading profit margin.	Further research need to consider foreign ship contribution

Table 2. 7 Related Research with Similar Topic (Continued)

No	Author	Research Title	Year	Method		Research Object	Purpose	Conclusion	Recommendation
				Quantitative	Qualitative				
9	Derirında Setyo Anresnani	Policy Analysis for Financial Technology Peer To Peer Lending Industry: Integration of System Dynamics And Game Theory	2018	System Dynamics	Cooperative Game Theory	Fintech P2P Lending in Indonesia	Identify the variables that affect the Fintech industry in P2P Lending case, analyze the ideal strategy for developing the P2P Lending under certain conditions, and bring up policy alternatives to improve P2P Lending industry performance that can fulfill the needs of the relevant parties	-	-

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CHAPTER 3
RESEARCH METHODOLOGY

This chapter willl be describes the steps and methodological approach that will done in this research. Methodological of this research is utilized as a reference so research can perform systematically with research framework. Research stages consist of data collection, data processing, analysis and data interpretation, conclusion, and suggestion. The phase of this research can be clarified in the flowchart (Figure 3.1) that will be shown in detail as follows.

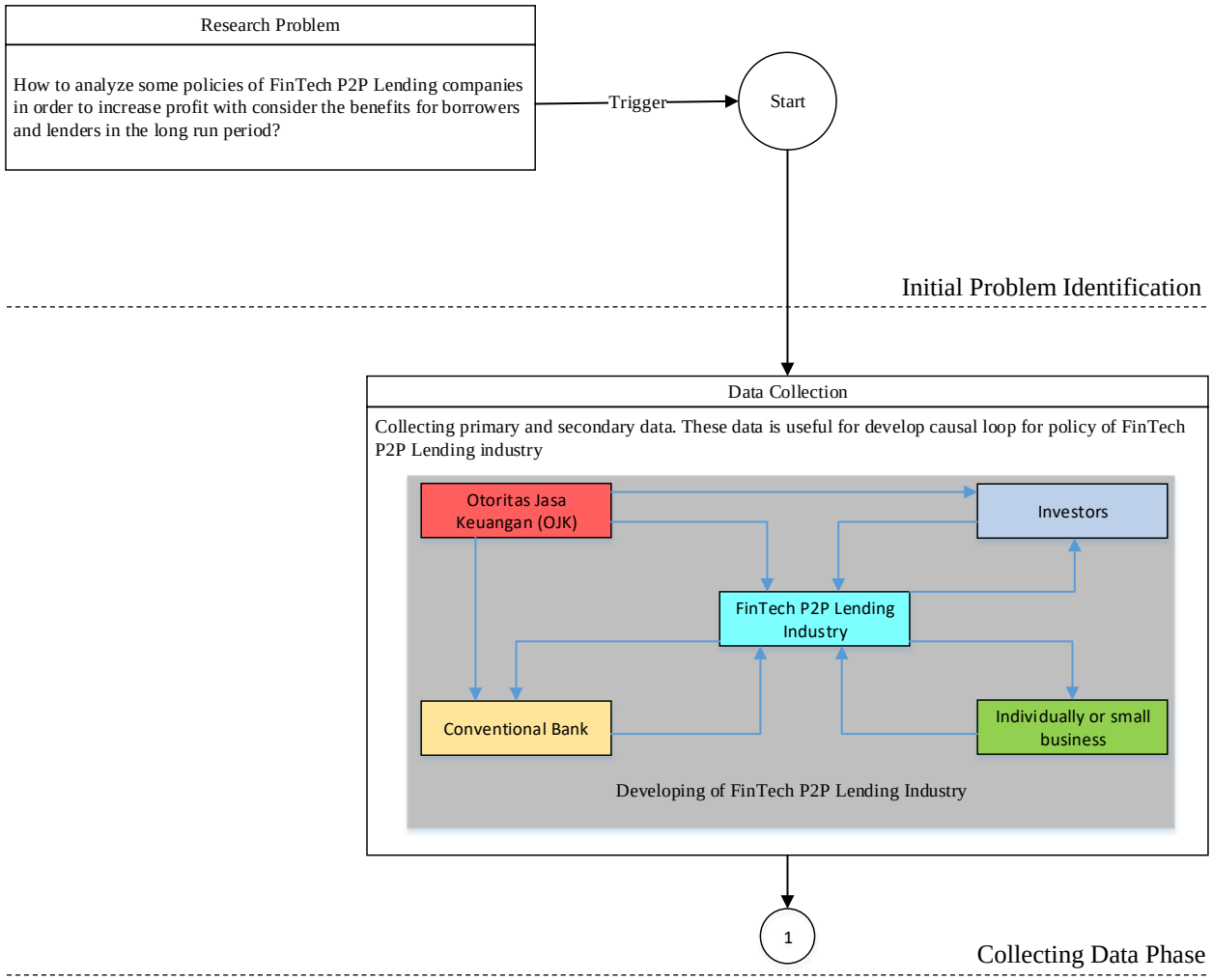

Figure 3. 1 Thesis Processing Flow Diagram

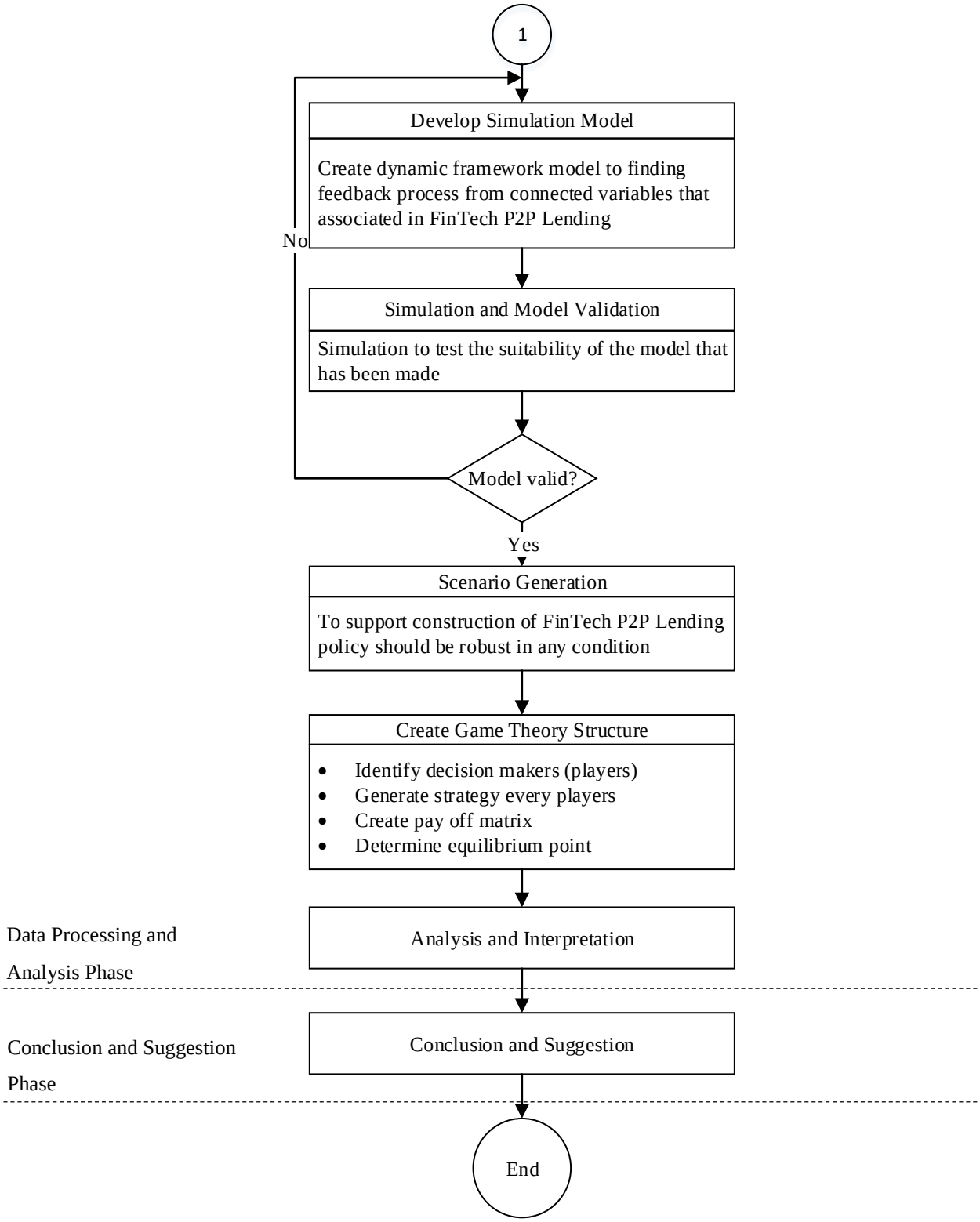

Figure 3. 2 Thesis Processing Flow Diagram (Continued)

3.1 Initial Problem Identification

Identification of research problems is an important step in conducting research. A global perspective on observational objects affects to find more detailed information. The stages of this

phase are identifying and formulating the problem, determining the purpose of the research, selecting the observation of field study, and conducting literature studies and case studies.

In this stage, the problem that will be raised is the development of financial technology, especially P2P Lending which began to advance rapidly but there is no policy that is able to meet the interests of the parties concerned.

3.2 Collecting Data

At this stage data collection is initiated by reviewing some relevant literature as a reference in developing research. The requires data is the primary data obtained by conducting direct observation in the field, such as doing interviews. It also uses secondary data obtained from previous research on financial technology of P2P Lending industry through various sources such as text books, published journals, papers, and also related news.

3.3 Data Processing and Analysis

This stage will conduct when the step in collecting primary and secondary data has been completed. The data obtained will be processed using a predetermined approach. In this research, tools that will be used is simulation with system dynamic then proceed with game theory approach The result of data processing will be used to analyze data and give recommendation that able to fulfill the interest of related parties.

3.4 Conclusion and Suggestion

The last stage of this research is arrange conclusion of the entire research. The conclusion are based on the desired research objectives at the beginning. After that make suggestions as a recommendation of research opportunity further.

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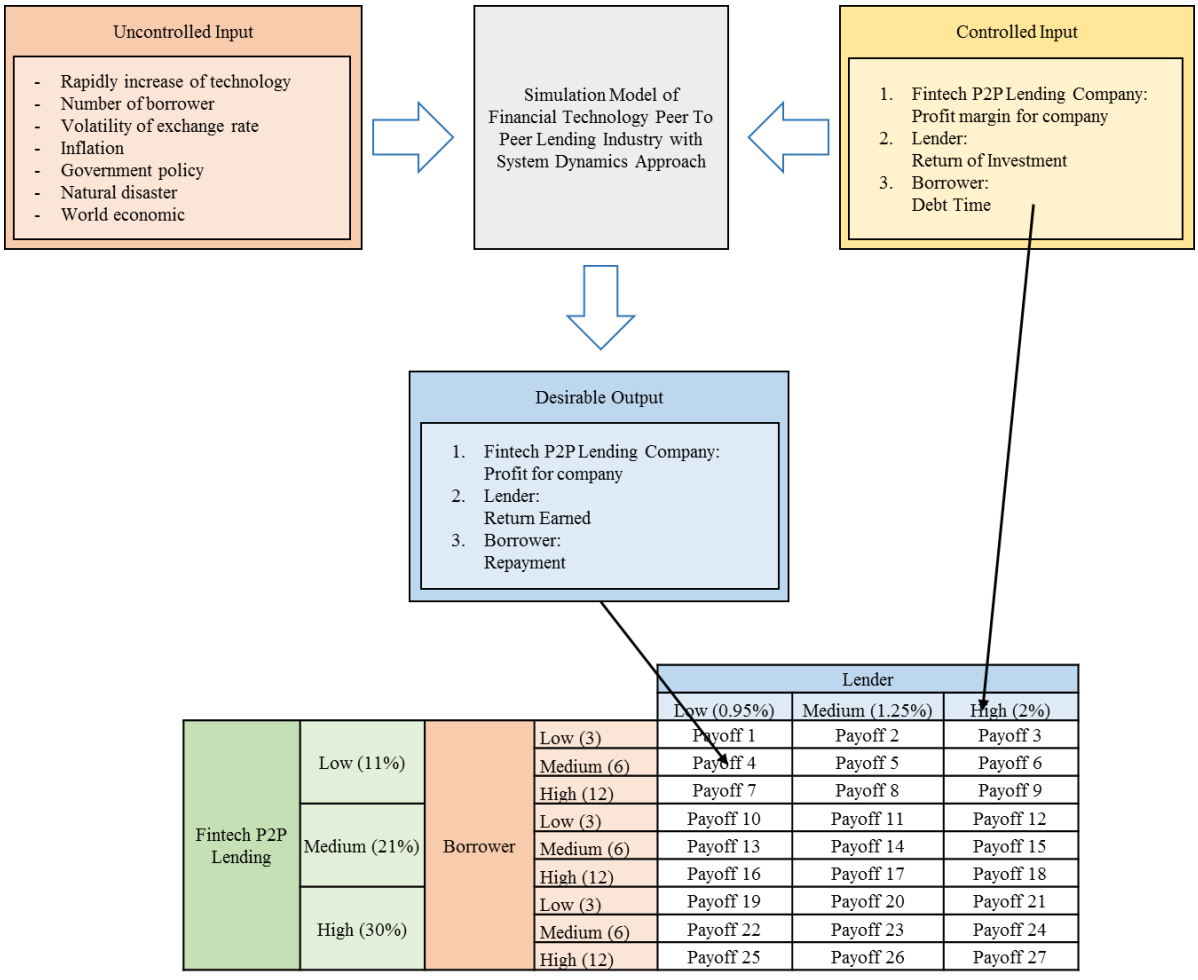
CHAPTER 4
MODEL CONCEPTUALIZATION

This chapter consist of model conceptualization about Fintech P2P Lending. It started by identifying research framework, system modelling and strategic form of the game. In this research, system dinamics simulation is used as a calculator to find payoff in the game theory.

4.1 Research Framework

In this study, the system framework shows the combination of system dynamic and game theory described as follows:



				Lender		
				Low (0.95%)	Medium (1.25%)	High (2%)
Fintech P2P Lending	Low (11%)	Borrower	Low (3)	Payoff 1	Payoff 2	Payoff 3
			Medium (6)	Payoff 4	Payoff 5	Payoff 6
			High (12)	Payoff 7	Payoff 8	Payoff 9
	Medium (21%)		Low (3)	Payoff 10	Payoff 11	Payoff 12
			Medium (6)	Payoff 13	Payoff 14	Payoff 15
			High (12)	Payoff 16	Payoff 17	Payoff 18
	High (30%)		Low (3)	Payoff 19	Payoff 20	Payoff 21
			Medium (6)	Payoff 22	Payoff 23	Payoff 24
			High (12)	Payoff 25	Payoff 26	Payoff 27

Figure 4. 1 Research Framework

The desired output from simulation results in system dynamics is useful as a tool to fill payoff value on game theory. The desirable output on Fintech P2P Lending is the amount of profit earned, for the lender is the amount of return, and borrower is the amount of repayment to be paid. The payoff for each strategy combination is in billion rupiah. The changing variable that will be

test with three condition (low, medium, high) by each player comes from the controlled inputs on the system dynamic. The criteria for the strategy of Fintech P2P Lending is taken from profit margin, lenders from its return of investment, and borrower from long debt time.

4.2 System Modelling

The system on Fintech P2P Lending is conceptually modelled after observing the observation system. Conceptualization is the process of concept formation based on observation symptoms. The conceptualization model is expected to be able to describe the real state in a complete and simple but able to explain the related variables in Fintech P2P Lending. Model conceptualization consist of input and output diagram, causal loop diagram, stock-flow diagram, and identification of variables that interact and affect each other in the system.

4.2.1 Input Output Diagram

Input output diagram is designed to describe the input and output variables of the system schematically. The variables in the input output diagram are classified into uncontrolled inputs, controlled inputs, desirable output, undesirable output and environments. The following is the input output diagram in the determination of the Fintech P2P Lending strategy scenario.

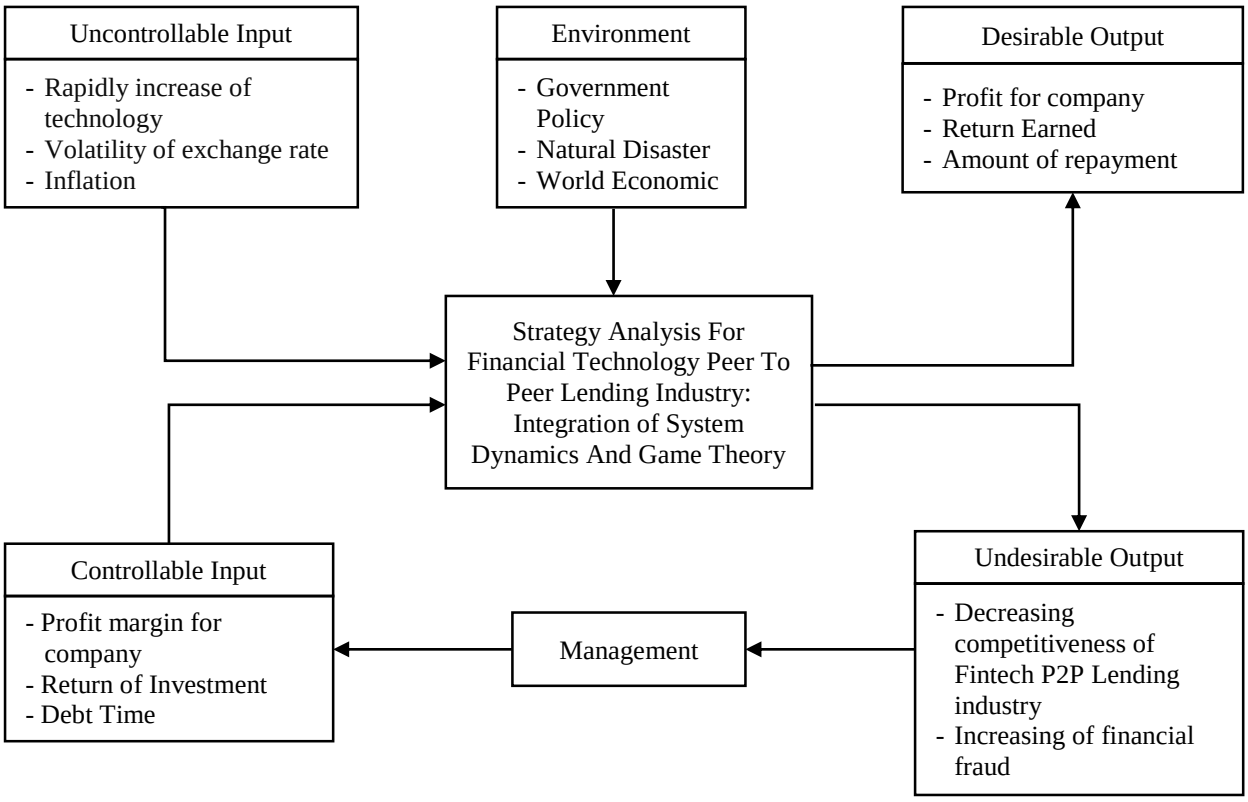


Figure 4. 2 Input Output Diagram

There are several inputs in the determination of strategy scenarios for Fintech P2P Lending which are divided into two types: uncontrolled inputs and controlled inputs. Uncontrolled input in determining strategy scenario of this research are rapidly increase of technology and volatility of exchange rate. As for the controlled inputs include the profit margin Fintech P2P Lending, return of investment, and debt time. For the desirable output in determining strategy scenario are increasing profit of Fintech P2P Lending, return from investment, and amount of repayment to be paid. There are also undesirable output in the strategy scenario including decreasing competitiveness of Fintech P2P Lending industry and increasing of financial fraud.

4.2.2 Causal Loop Diagram

Causal Loop Diagram (CLD) shows the causal relationship connected through the arrow. In addition, CLD is useful to illustrate the interrelationships between variables involved in observational systems and their relationship. The arrows are marked positive showing a straight-line relationship, where the addition of a value to that variable will cause the addition of a value to the variable it influences. While arrows with a negative sign show a correlation that is inversely proportional, where the addition of a value on that variable will cause a reduction in the value of the variable it affects, and vice versa. The following is a causal loop diagram of the determination of the Fintech P2P Lending strategy scenario.

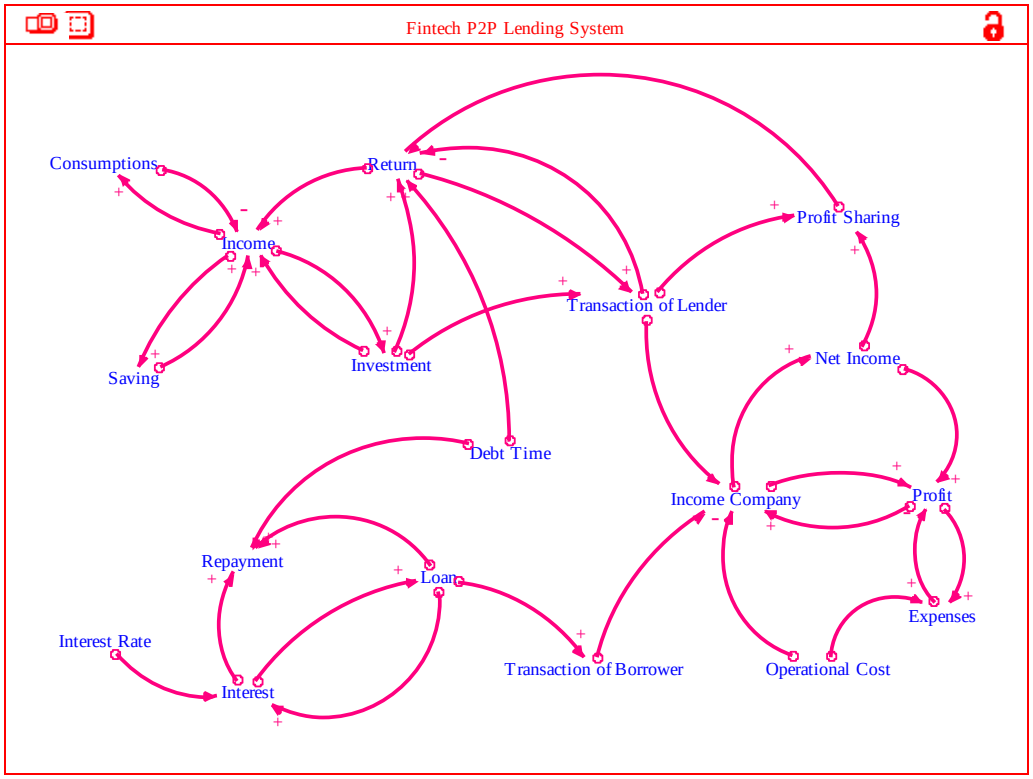


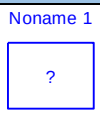
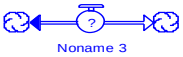
Figure 4. 3 Causal Loop Diagram of Fintech P2P Lending System

4.2.3 Stock and Flow Diagram

Stock and flow diagrams are based on causal loops diagrams in order to illustrate the interactions between variables according to the structure logic in the modelling software used. Modelling of variable interaction on stock and flow diagrams produces several interrelated sectors. The design of stock and flow diagram also consider the purpose of research where the stock and flow diagram can generate influence of policy instruments on observation system.

In stock and flow diagrams, the system is conceptualized as variables with symbols like the following:

Table 4. 1 Symbols in Stella Software

Symbol	Name	Description
	Level/ Stock	Accumulation
	Converter	Parameter
	Flow/Rate	Material movement/activity
	Connector	Carry on information

4.2.3.1 Main Model of System

The main model of the system will show the relationship between the submodel. Here is the main model in the Fintech P2P Lending system:

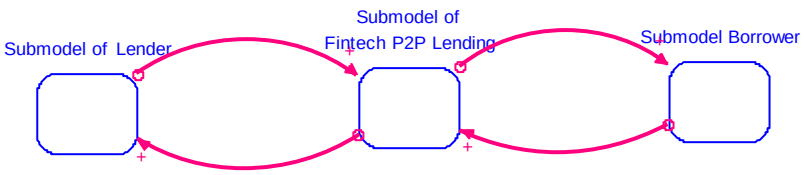


Figure 4. 4 Main Model of Fintech P2P Lending System

Figure 4.4 shows some of the variables that affect a whole system. The variables are displayed in module form from each perspective. The model represents the real condition with the goal according to the research objectives categorized as the level. The inter-submodel variables interact to form a closed loop. Here is a figure of stock and flow diagram Fintech P2P Lending system:

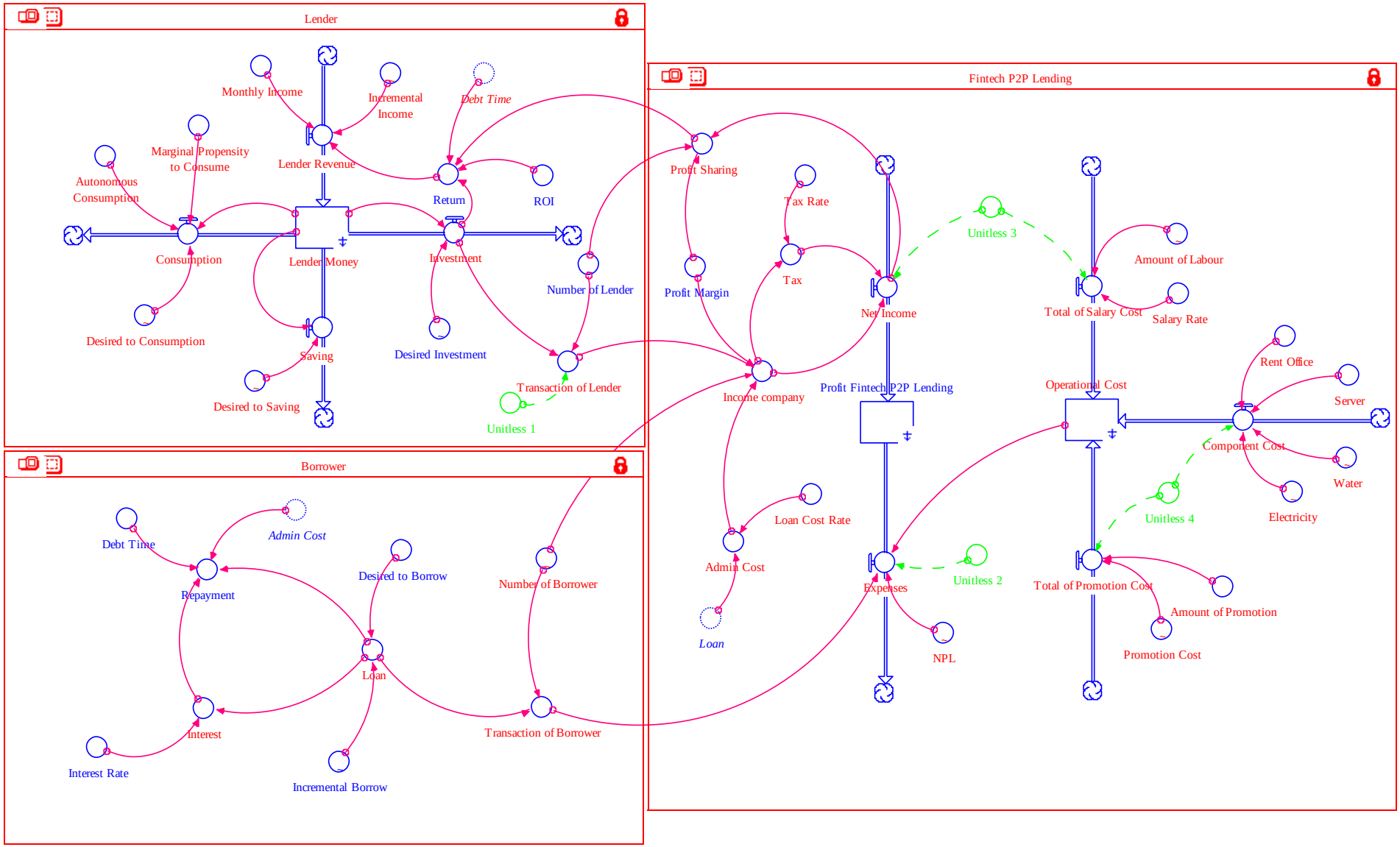


Figure 4. 5 Stock and Flow Diagram of Fintech P2P Lending System

4.2.3.1.1 Verification

According to Harrel et al. (2003), model verification is a step to determine whether the simulation model has represented the conceptual model appropriately. The step to verify is checking for errors that occur on the model and ensure that the model functions in accordance with the logic of the observed system. After that, examine the mathematical formulation and consistency of variable units in the model. The model can be said to be verified if there is no error, so the model can be run to describe the observed system.

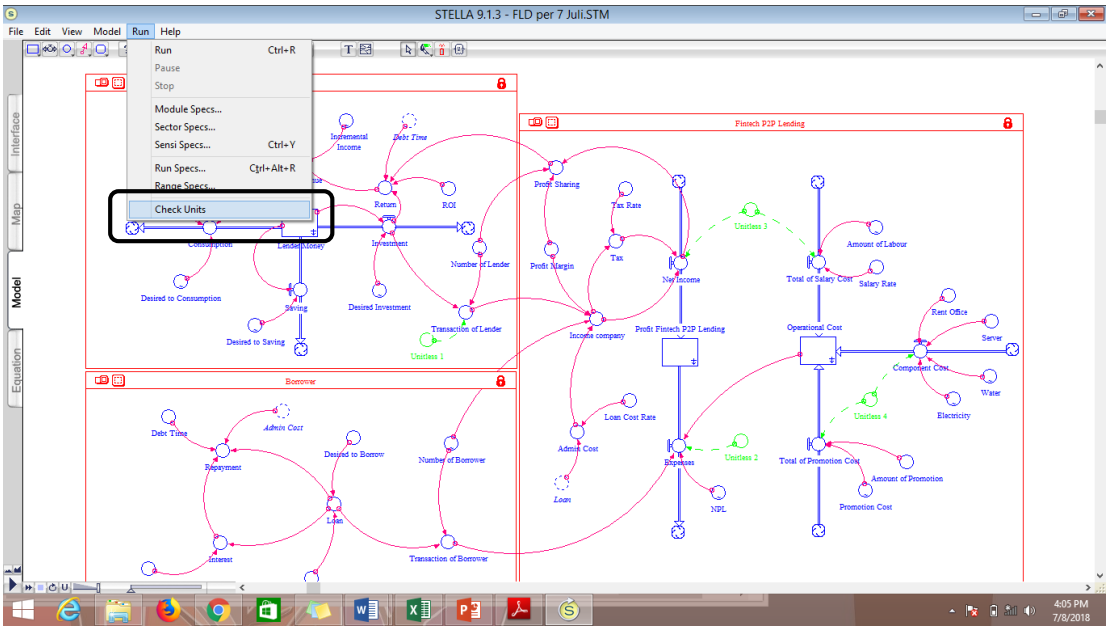


Figure 4. 6 Check Unit

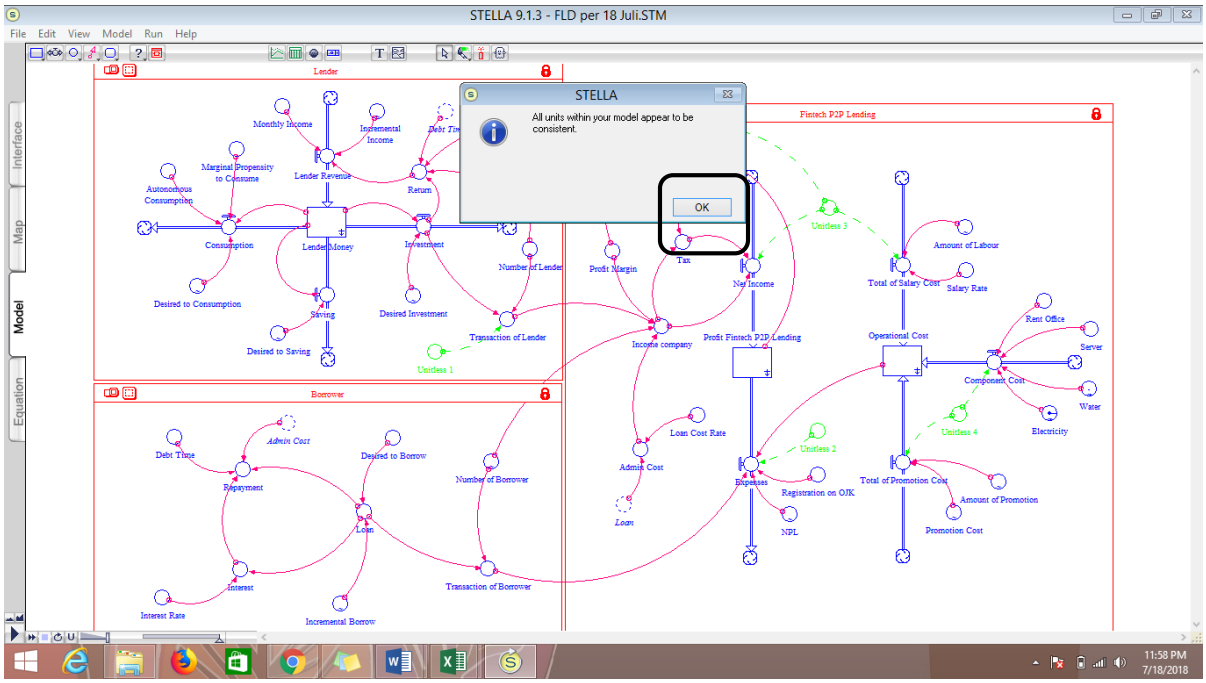


Figure 4. 7 Checking Unit Result of Fintech P2P Lending System

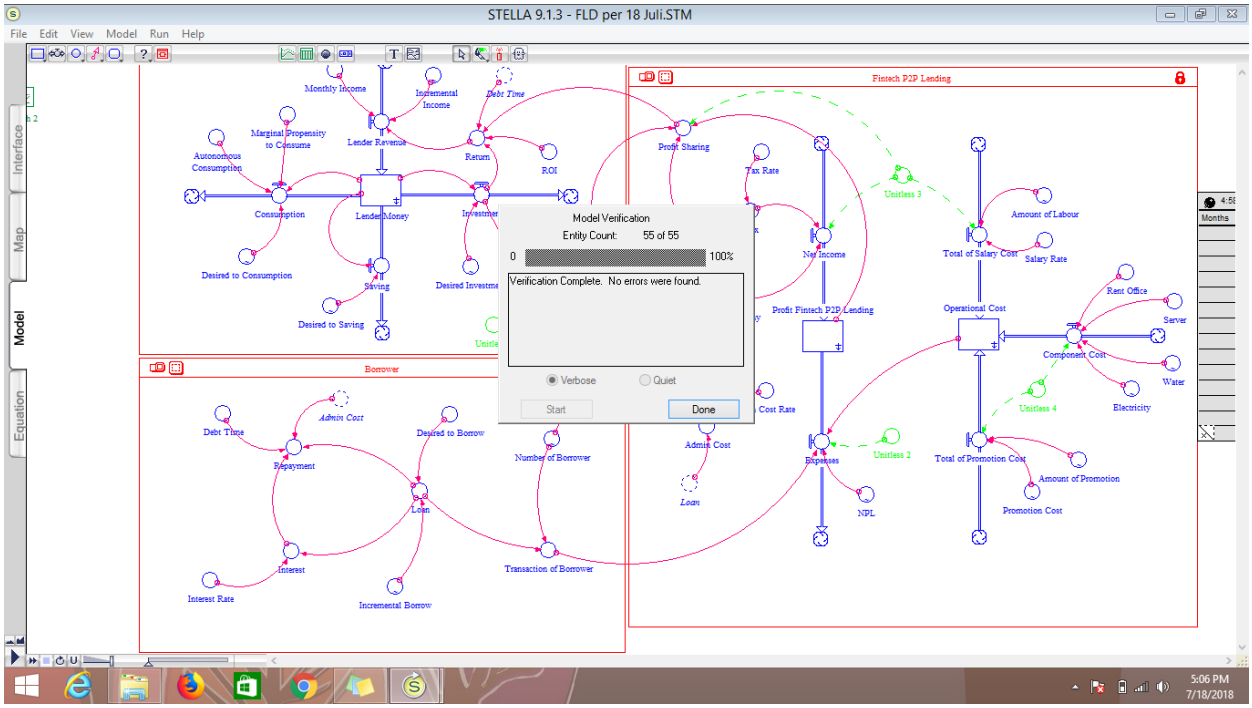


Figure 4. 8 Checking Unit Model of Fintech P2P Lending System

Figure 4.7 dan 4.8 shows that all variables in the model are consistent, so the simulation model is able to accommodate the real system model. Next is to validate the verified model.

4.2.3.1.2 Validation

Model validation is a key consideration in evaluating real condition. Model testing can be done by testing the structure and behavior of the model. Model structure test aims to observe the extent to which the model has been made in accordance with the structure of the real system. This test is done by experts who have been in the business process observation. The main role of using system dynamic is to consider the real systems, hypotheses, and experiences that later will be simulated with existing data. Model makers conduct in-depth interviews to the experts so that the model structure can be valid qualitatively.

Variables that related to the model should be included because it is representations of real systems. Models made in a system dynamic have no boundaries, but are limited only by the boundary adequacy test. If the variable does not affect the goal significantly, then the variable does not need to be included. Model making in this study aims to look at strategies that can be used by related parties so that Fintech P2P Lending can grow with consider the needs of lenders and borrowers. Model limitations have been made when the model is created by testing the variables included in the model.

4.2.3.2 Submodel of Lender

Lender is one of the main variables to analyze the developmental characteristics of Fintech P2P Lending. Lenders are investors who lend money to be processed to the borrower and get benefit from the return. In submodel of lender, there is variable stock of lenders money that has mean as the accumulation of income inflow and also consumption, investment, and savings outflow. Lenders revenue affects the amount of money they have. Revenue consists of three variables such as monthly income, incremental income, and return on investment. Return is influenced by Return of Investment (ROI) which is an agreement with Fintech P2P Lending. As ROI as independent variable, so lender can choose how much ROI that they want. Based on Investree website, one of Fintech P2P Lending (https://www.investree.id/how-it-works/interest-rate-fee), average number of ROI that changeable is divided into three level such as low, medium, and high as follow:

Table 4. 2 Average of Interest Rate per Month

Level	Average Interest Rate per Month
Low	0.95%
Medium	1.25%
High	2%

Consumption flow is influenced by converter of autonomous consumption and Marginal Propensity to Consume (MPC). Autonomous consumption is minimum level of consumption or spending that must take place even if a consumer has no disposable income, such as spending for basic necessities. The average autonomous consumption in Indonesia is Rp 1.095.676 (BPS, 2017). MPC is the portion of extra income that consumers spend, and the average is 0,623 (Fikri, et al., 2014).

Consumption is closely related to the income of the people and the state. So that the amount of consumption is determined by the level of income, increasing income will always be followed by increased consumption. Thus, the relationship between income and consumption is positive (proportional), or mathematically the consumption function can be denoted C = f (Y) (Plengdut, 2013).

The rest of the income that is not consumed by the community will be saved, so the greater the income, the greater the savings. Thus, the relationship between income and savings is positive (directly proportional), or mathematically the saving function can be denoted S = f (Y). In saving, it is influenced by desired saving and lender money (Plengdut, 2013).

For those lenders who have visionary minds, the money they have beside for monthly consumption and set aside for savings, will be projected to invest. Investment is influenced by

desired investment and remaining money. Later the amount of investment will affect the number of returns and transactions of lenders.

This submodel illustrates the simulation of revenue and expenditure from one lender. Revenue is a monthly income that is assumed to be twice the average per capita income of Indonesia in 2017 (BPS, 2017), with an increase in every month. The value of monthly income is as big as Rp 5,988,899. Expenditure divide into portions for each consumption, savings, and investment. To illustrate the transactions of lenders on Fintech P2P Lending, then investments multiple with forecasting of the number of lenders over years. Submodel of lender can be seen in following picture:

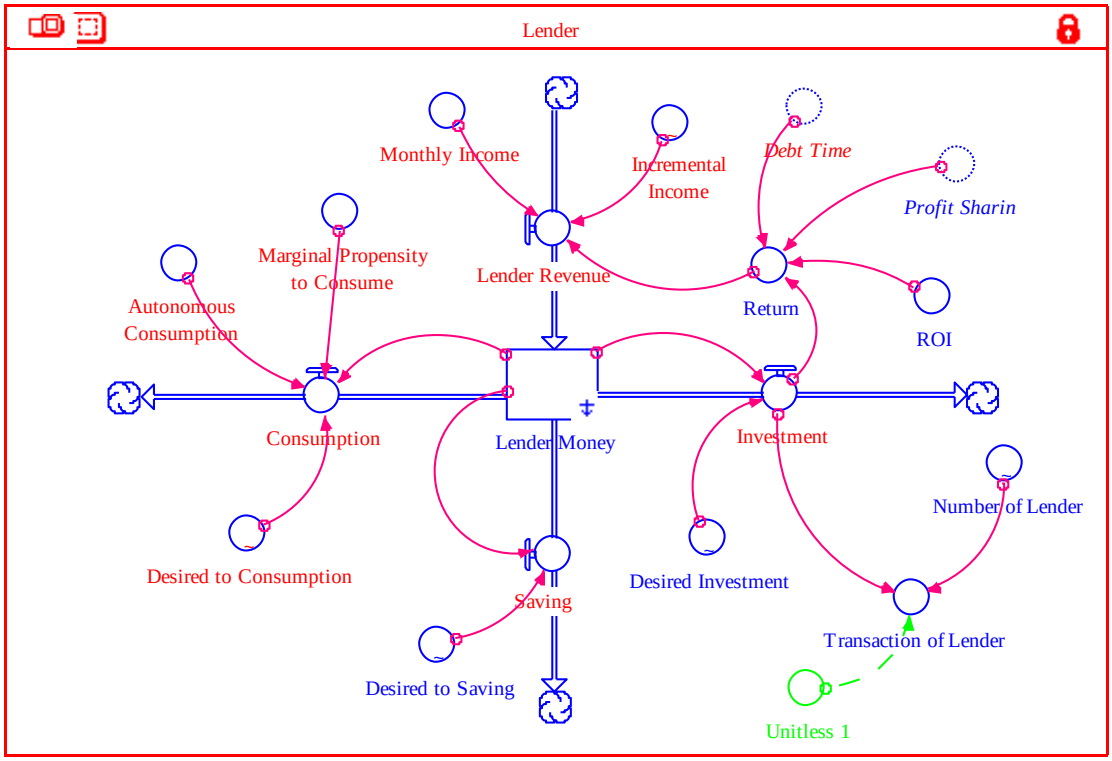


Figure 4. 9 Stock and Flow Diagram for Lender

This submodel is made based on the causal loop diagram. The description and formula for each variable will be explained by Table 4.3 below:

Table 4. 3 Variable Description for Lender

No	Variable	Description	Module
1	Autonomous Consumption	Minimum level of consumption or spending that must take place even if a consumer has no disposable income, such as spending for basic necessities	Converter
2	Consumption	The sum of all personal or state expenditures on consumer goods for a given period.	Converter

Table 4. 3 Variable Description for Lender (Continuous)

No	Variable	Description	Module
3	Marginal Propensity to Consume	The portion of extra income that consumers spend	Converter
4	Lender Revenue	Income that will be obtained by lender	Flow
5	Incremental Income	The rate of increasing income	Converter
6	Monthly Income	Income earned per period	Converter
7	Lender Money	The amount of money held by lenders	Stock
8	Saving	Residual income that has been spent on consumption expenditures.	Flow
9	Desired to Saving	The percentage of saving that people needs from their money	Converter
10	Investment	Investments made by the company, conducted in the form of Assets for the purpose of being used in the future.	Flow
11	Return of Investment	The percentage increase or decrease of an investment over a set period of time	Converter
12	Number of Lender	Amount of lender per month	Converter
13	Desired to Consumption	The percentage of consumption every month from their money	Converter
14	Desire to Investment	The percentage of investment (through the issuance of stock) people needs to maximize profit	Converter
15	Return	The earned money in capacity seeking to increase profit from investment activity with consider the long debt time	Converter
16	Transaction of Lender	Amount of lender transaction	Converter
17	Unitless 1	Unit of measure as info that help to balance the other units	Converter

4.2.3.3 Submodel of Borrower

Borrower is one of the main variables to analyze the developmental characteristics of Fintech P2P Lending. Borrowers are someone who receives something on the promise to return it or its equivalent. On the borrower submodel, there are several variables that influence each other as below:

Table 4. 4 Variable Description for Borrower

No	Variable	Description	Module
1	Debt Time	Limit time to repay the loan	Converter
2	Repayment	Amount of debt to be paid with consider interest and admin cost	Converter
3	Loan	Amount of loan that required by the borrower	Converter
4	Desired to Borrow	A sum of money borrowed by borrowers	Converter
5	Interest	Payments made on the use of some money	Converter
6	Interest Rate	Amount of interest that paid per unit of time or the person must pay for the opportunity to borrow money	Converter
7	Incremental Borrow	The rate of increasing interest to borrow	Converter
8	Number of Borrower	Amount of borrower per month	Converter
9	Transaction of Borrower	Amount of borrower transaction	Converter
10	Unitless 1	Unit of measure as info that help to balance the other units	Converter

On this submodel, desired to borrow is an aspect that to determine how much the loan, which is also influenced by the increased desire to borrow. The submodel simulation from amount of loan to debt repayment is assumed to run one borrower with average loan amount, then

multiplied by the forecast of the number of borrowers to borrow. This will affect income from Fintech P2P Lending.

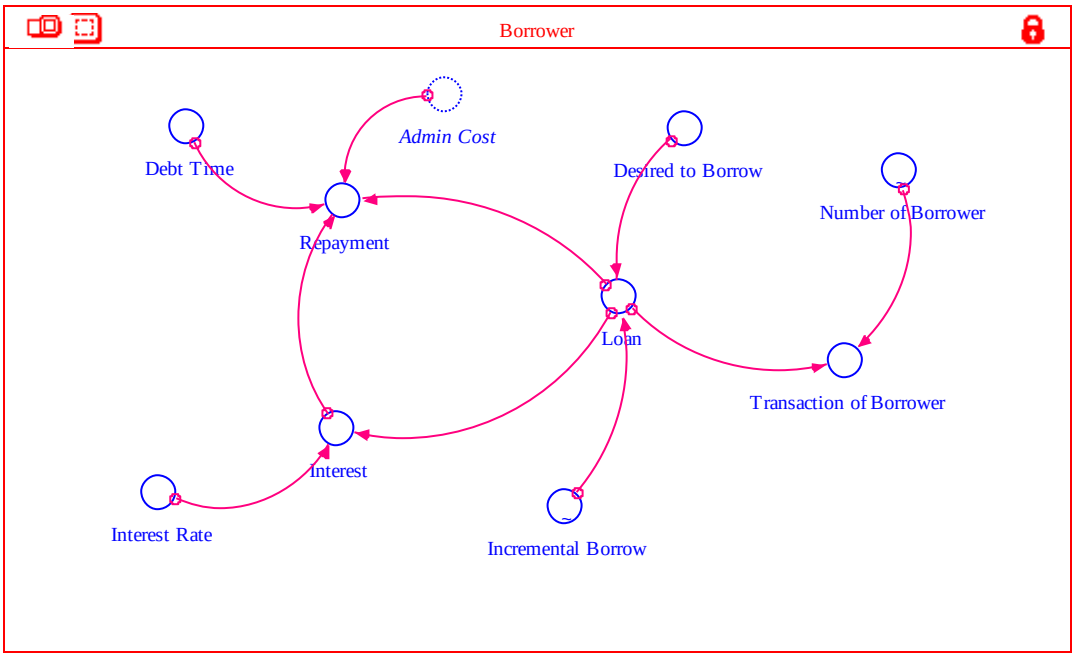


Figure 4. 10 Stock and Flow Diagram for Borrower

The average loan size to be simulated is Rp 2,500,000. The amount of debt from the borrower will be paid with loan interest rates in accordance with the time of return and platform fee. The interest rate is used according to the ROI chosen by lenders. The borrower is entitled to determine the debt time in accordance with the borrower's ability, the option of a payback period of 3 months, 6 months, or 12 months. For the platform fee charged to the borrower based on the average cost at Investree which is 4%, this fee will be the benefit of Fintech P2P Lending.

4.2.3.4 Submodel of Fintech P2P Lending

Fintech P2P Lending is an intermediary that brings together lenders who have the funds to lend to borrowers who need borrowed funds. As an intermediary, Fintech P2P Lending earns profit from platform fees charged to borrowers. Platform fee is an administrative cost to turn the business of the company. The submodel from Fintech is presented in the following picture:

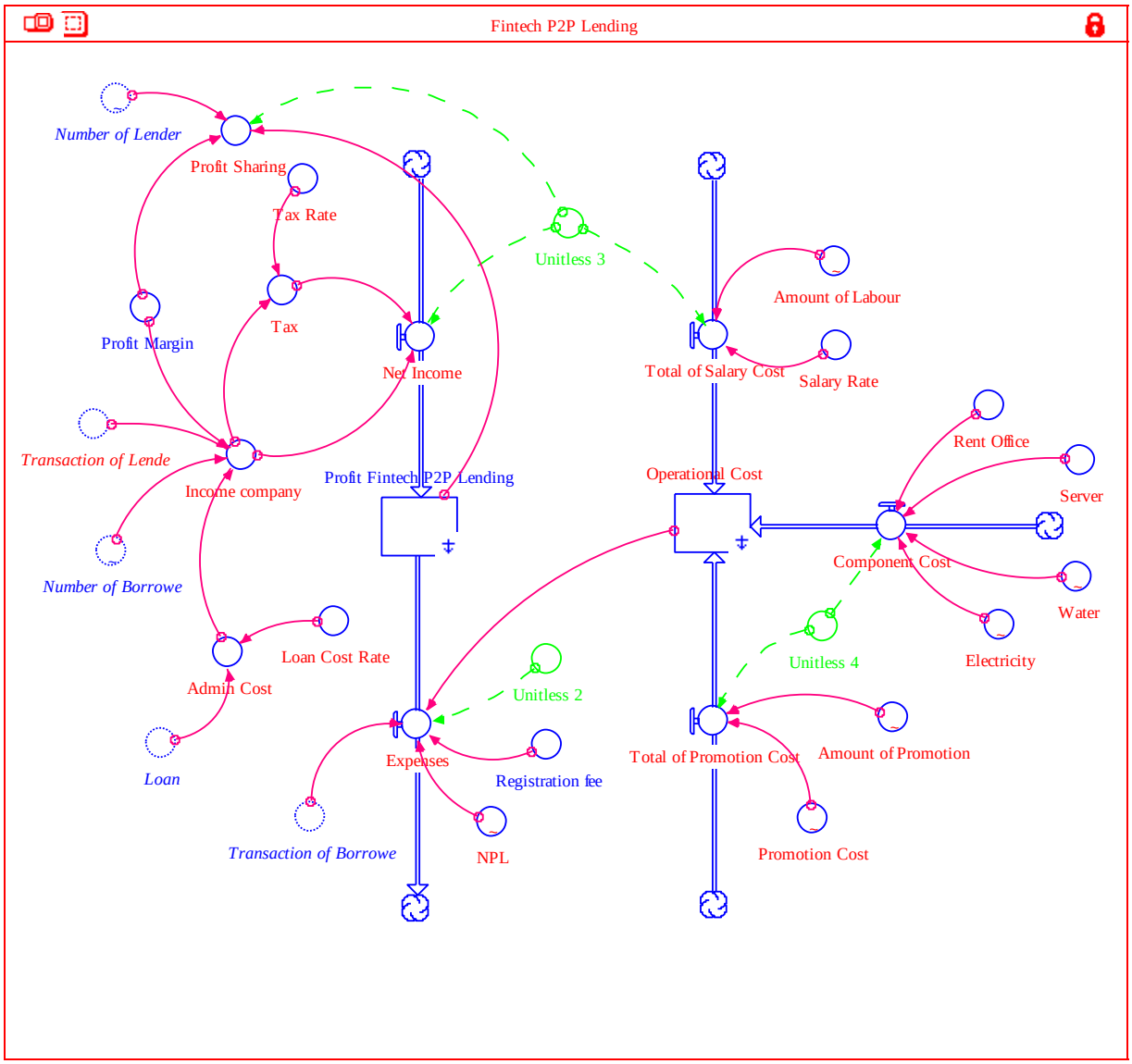


Figure 4. 11 Stock and Flow Diagram for Fintech P2P Lending

Fintech P2P Lending submodel consists of 23 variables, two stocks are profit and operational costs. Profit is influenced by the flow of net income and expenses, net income consists of income minus the tax payable. While the income is obtained from the specified profit margin and administrative costs of the borrower. The results of net income will be divided by the number of lenders who have invested in Fintech P2P Lending. Expenses that determine the amount of profit obtained from the amount of debt that can not be paid by the borrower and operational costs of the company each month. The value to be simulated in this submodel is the average value that increases using the approach of the real condition. Changing variable of this model is profit margin that divide into low (0.95%), medium (1.25%), and high (2%). All variables on Fintech P2P Lending are described in the following Table 4.5:

Table 4. 5 Variable Description for Fintech P2P Lending

No	Variable	Description	Module
1	Operational Cost	Operational costs to be paid by the company to run its business	Stock
2	Total of Salary Cost	Total salary of employees who work	Flow
3	Salary Rate	Average salary received by employees	Converter
4	Amount of Labour	Number of employees that work in the company	Converter
5	Component Cost	Collection of fees to be paid per month	Flow
6	Rent Office	The cost to rent an office	Converter
7	Electricity	Average cost of electricity per month	Converter
8	Water	Average monthly water cost	Converter
9	Server	The price of servers to be paid to run the platform	Converter
10	Total of Promotion Cost	The amount of promotional expenses	Flow
11	Promotion Cost	Average of promotional costs	Converter
12	Amount of Promotion	Number of promotions each month	Converter
13	Tax Rate	Invoiced taxes	Converter
14	Tax	Amount of tax to be paid	Converter
15	Net Income	The positive difference from total revenue less the total cost and estimated income tax	Flow
16	Profit Fintech P2P Lending	Profit earned from the company's business processes	Stock
17	Income Company	The amount of money received by the company as a result of the sale of services	Converter
18	Profit Margin	An indicator of a company's ability to generate net profits.	Converter
19	Admin Cost	The cost given to the borrower for using the services of the company	Converter
20	Profit Sharing	Fintech P2P Lending sharing mechanism with lenders	Converter
21	Loan Cost Rate	Average borrowing cost per borrower	Converter
22	Expenses	Costs incurred to keep the company going	Flow
23	Non-Performing Loan	Problematic loans because borrowers can not pay on time	Converter
24	Registration on OJK	Registration fee to get permission from OJK	Converter

4.3 Strategic Form

The strategic form in game theory is in the form of payoff matrix. In this research, the payoff matrix consists of three players including Fintech P2P Lending, borrowers, and lenders. The game is formulated as below:

Table 4. 6 Strategic Form for Fintech P2P Lending, Borrower, and Lender

				Lender		
				Low	Medium	High
Fintech P2P Lending	Low	Borrower	Low	Payoff 1	Payoff 2	Payoff 3
			Medium	Payoff 4	Payoff 5	Payoff 6
			High	Payoff 7	Payoff 8	Payoff 9
	Medium		Low	Payoff 10	Payoff 11	Payoff 12
			Medium	Payoff 13	Payoff 14	Payoff 15
			High	Payoff 16	Payoff 17	Payoff 18
	High		Low	Payoff 19	Payoff 20	Payoff 21
			Medium	Payoff 22	Payoff 23	Payoff 24
			High	Payoff 25	Payoff 26	Payoff 27

Criteria (low, medium, high) on the lender based on return of investment. For borrowers criteria is determined by the debt time and for Fintech P2P Lending based on the profit margin of the company. The payoff for each strategy combination is in billion rupiah.

CHAPTER 5
GAME THEORY ANALYSIS

This chapter will explain the analysis and interpretation of the data that has been done in the previous chapter by using game theory approach. The best scenario will be a consideration for decision maker and analysis can assist in the preparation of the conclusions and suggestions of subsequent research.

5.1 Game Theory Approach

Game theory is a mathematical approach to formulate a strategy that involves a decision maker with various interests. In this research there are three decision maker that is Fintech P2P Lending, lender, and borrower. Simulation is set for 5 years. The payoff value of each player is determined from the input variables. On this research, the payoff matrix has three players with three strategies. The players involved and their strategies are;

1. Fintech P2P Lending: Profit margin company (low, medium, high)
2. Lender: Return of investment (low, medium, high)
3. Borrower: Debt time (low, medium, high)

More detail, the table below will describe about strategy of each player:

Table 5. 1 Strategy of Fintech P2P Lending

Strategy of Fintech P2P Lending	Profit Margin
Low	11%
Medium	21%
High	30%

The strategy of Fintech P2P Lending is known from expert judgments that apply the amount of profit margin in the business process of the company. Range of profit margin is divided into three parts namely low, medium, and high. Criteria of low is set at 11%, medium set at 21% and high set at 30%.

Table 5. 2 Strategy of Borrower

Strategy of Borrower	Debt Time
Low	3
Medium	6
High	12

For borrower, the strategy that can they choose is the length of time to repay the loan. Duration of debt time is determined based on the usual limit of use, low is defined of 3 months, medium 6 months, and high 12 months.

Table 5. 3 Strategy of Lender

Strategy of Lender	**Return of Investment/month**
Low	0.95%
Medium	1.25%
High	2.00%

For lender, the strategy used is how much ROI per month that they want from investing the funds they have. It is divided into three level, low is 0,95%, medium is 1,25%, and high is 2%.

Based on the designed alternative strategy from each player, alternative scenarios for each strategy combination are made. Each combination of strategy chosen by each player represents one scenario.

Table 5. 4 Strategy Alternative for Each Player

Payoff	**Fintech P2P Lending**	**Lender**	**Borrower**	**Description**
	Profit Margin	Return of Investment	Debt Time	
1	11%	0,95%	3	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 0.95%, and borrower will use a debt time strategy for 3 months.
2	11%	1,25%	3	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 3 months.
3	11%	2%	3	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 3 months.
4	11%	0,95%	6	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 0.95%, and borrower will use a debt time strategy for 6 months.
5	11%	1,25%	6	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 6 months.
6	11%	2%	6	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 6 months.
7	11%	0,95%	12	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of0.95%, and borrower will use a debt time strategy for 12 months.
8	11%	1,25%	12	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 12 months.
9	11%	2%	12	The company will choose a strategy with a profit margin of 11%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 12 months.

Table 5. 4 Strategy Alternative for Each Player (Continuous)

Payoff	Fintech P2P Lending	Lender	Borrower	Description
	Profit Margin	Return of Investment	Debt Time	
10	21%	0,95%	3	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 0.95%, and borrower will use a debt time strategy for 3 months.
11	21%	1,25%	3	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 3 months.
12	21%	2%	3	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 3 months.
13	21%	0,95%	6	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 0.95%, and borrower will use a debt time strategy for 6 months.
14	21%	1,25%	6	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 6 months.
15	21%	2%	6	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 6 months.
16	21%	0,95%	12	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of0.95%, and borrower will use a debt time strategy for 12 months.
17	21%	1,25%	12	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 12 months.
18	21%	2%	12	The company will choose a strategy with a profit margin of 21%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 12 months.
19	30%	0,95%	3	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 0.95%, and borrower will use a debt time strategy for 3 months.
20	30%	1,25%	3	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 3 months.
21	30%	2%	3	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 3 months.
22	30%	0,95%	6	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 0.95%, and borrower will use a debt time strategy for 6 months.
23	30%	1,25%	6	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 6 months.
24	30%	2%	6	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 6 months.
25	30%	0,95%	12	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of0.95%, and borrower will use a debt time strategy for 12 months.
26	30%	1,25%	12	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 1,25%, and borrower will use a debt time strategy for 12 months.
27	30%	2%	12	The company will choose a strategy with a profit margin of 30%, lenders will choose the ROI of 2%, and borrower will use a debt time strategy for 12 months.

With those strategies, the process in the system dynamic model is adjusted for each input value. The combination of strategies will generate numbers and will be used to populate payoff tables like below:

Table 5. 5 Payoff Matrix (Normal Form) of Fintech P2P Lending System

				Lender								
				0,95%			1,25%			2%		
P2P LENDING	11%	BORROWER	3	26278413979	3558474	3567346	26278388113	3558474	3581154	26278323164	3577732	3615871
			6	26275462501	3130515	5210258	26275428717	3130515	5229871	26275343828	3149773	5279233
			12	26265950944	2916536	11532845	26265883450	2916536	11583904	26265713460	2935794	11712918
	21%		3	49325128692	3558474	3727395	49325100181	3558474	3741462	49325028593	3577732	3776829
			6	49321875157	3130515	5401104	49321837910	3130515	5421085	49321744323	3149773	5471373
			12	49311385193	2916536	11842954	49311310732	2916536	11894981	49311123190	2935794	12026442
	30%		3	70066987265	3558474	3956637	70066956130	3558474	3971078	70066877950	3577732	4007384
			6	70063433526	3130515	5674865	70063392835	3130515	5695379	70063290593	3149773	5747007
			12	70051967088	2916536	12290248	70051885652	2916536	12343691	70051680540	2935794	12478729

*** payoff unit is in rupiah**

How to read table payoff is if strategy of Fintech P2P Lending low, borrower low, and lender low, then the payoff for each of them respectively are Rp 26.278.413.979 for Fintech P2P Lending, Rp 3.558.474 for borrower, and Rp. 3.567.346 for lender.

The best solution is determined with Gambit software with using Nash Equilibrium method. In this research, solution for the chosen strategy will compare non-cooperative and cooperative game theory. First, finding best solution with non-cooperative game and then doing cooperative game by changing the normal of payoff matrix into the coalition form. The process of the finding equilibrium point using Gambit Software is shown by Figure 5.1 and the result are shown below:

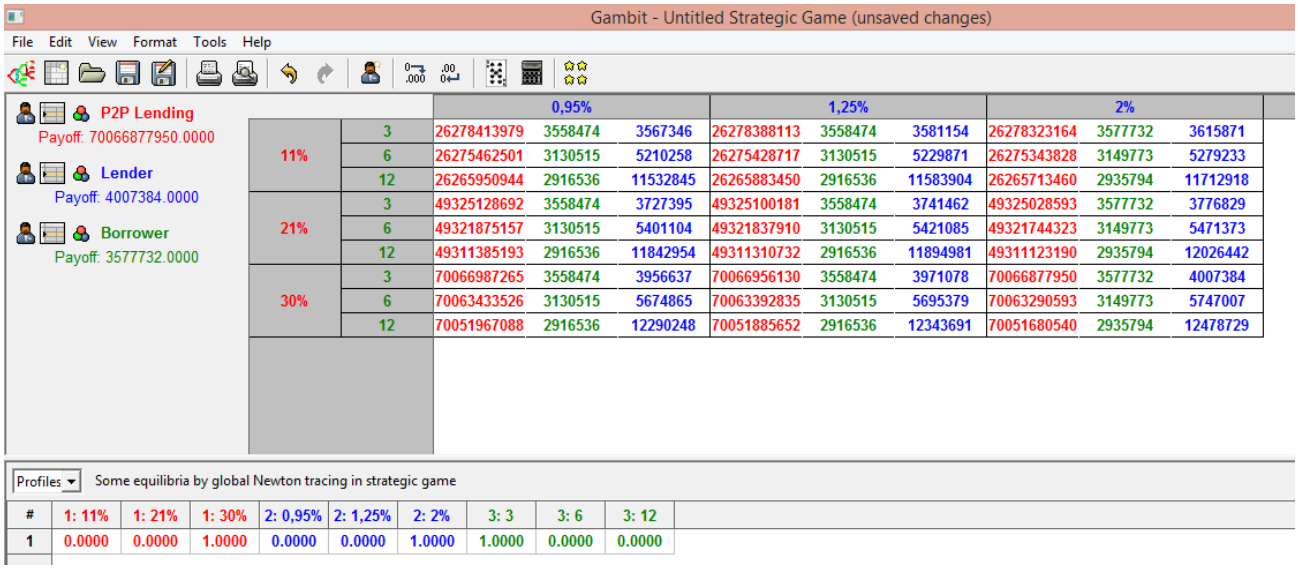


Figure 5. 1 Solution Non-Cooperative in Gambit

Based on Gambit running, it is known that the equilibrium for Fintech P2P Lending, lender and borrower. The results show for Fintech P2P Lending can choose a high strategy that is set profit margin of 30% and borrower choose low strategy with duration of 3 month return period. As for lenders can take the ROI of 2%.

Table 5. 6 Non-Cooperative Nash Equlibrium Point

				Lender								
				0,95%			1,25%			2%		
P2P LENDING	11%	BORROWER	3	26278413979	3558474	3567346	26278388113	3558474	3581154	26278323164	3577732	3615871
			6	26275462501	3130515	5210258	26275428717	3130515	5229871	26275343828	3149773	5279233
			12	26265950944	2916536	11532845	26265883450	2916536	11583904	26265713460	2935794	11712918
	21%		3	49325128692	3558474	3727395	49325100181	3558474	3741462	49325028593	3577732	3776829
			6	49321875157	3130515	5401104	49321837910	3130515	5421085	49321744323	3149773	5471373
			12	49311385193	2916536	11842954	49311310732	2916536	11894981	49311123190	2935794	12026442
	30%		3	70066987265	3558474	3956637	70066956130	3558474	3971078	70066877950	3577732	4007384
			6	70063433526	3130515	5674865	70063392835	3130515	5695379	70063290593	3149773	5747007
			12	70051967088	2916536	12290248	70051885652	2916536	12343691	70051680540	2935794	12478729

*** payoff unit is in rupiah**

However, this result is not the best because this choosen strategy not giving the highest total value from all players. Thus, the cooperative game theory is applied. The first step that must be done to analyze the problem with cooperative game theory is to change the normal form of payoff matrix into the coalition form, then the solution of the game is determine using Nash Equilibrium method. In order to find the highest possible pay off, the payoff of each player needs to be sum, which will be shown below:

Table 5. 7 Utility-Sum Payoff Matrix

				Lender		
				Low (0.95%)	Medium (1.25%)	High (2%)
Fintech P2P Lending	Low (11%)	Borrower	Low (3)	26285539799	26285527741	26285516767
			Medium (6)	26283803274	26283789103	26283772834
			High (12)	26280400325	26280383890	26280362172
	Medium (21%)		Low (3)	49332414561	49332400117	49332383154
			Medium (6)	49330406776	49330389510	49330365469
			High (12)	49326144683	49326122249	49326085426
	High (30%)		Low (3)	70074502376	70074485682	70074463066
			Medium (6)	70072238906	70072218729	70072187373
			High (12)	70067173872	70067145879	70067095063

***payoff unit is in rupiah**

Based on the utility-sum payoff matrix, the highest sum up payoff is Rp 70.074.502.376,it is define that the best strategy is high profit margin for Fintech P2P Lending, low return of investment for lender, and low debt time for borrower. This result shows the shifting choosen strategy from total payoff Rp 70.074.463.066 to Rp 70.074.502.376. This result can be achived by doing coordination between players.

5.2 Sensitivity Analysis

Sensitivity analysis is an analysis performed to find out the effect of the changes that occur on the parameters to the optimal solution that has been achieved. In this research will be use one way sensitivity analysis. The factors to be observed in one way sensitivity analysis is non-performing loan (NPL). NPL occur when the borrower can not afford to pay the loan in accordance with the agreement of amount and time. NPL is one of the key indicators to assess the performance of Fintech P2P Lending. If the NPL rate increases, then it will affect the profit earned company. The NPL values obtained from previous model calculations show graphs like the following:

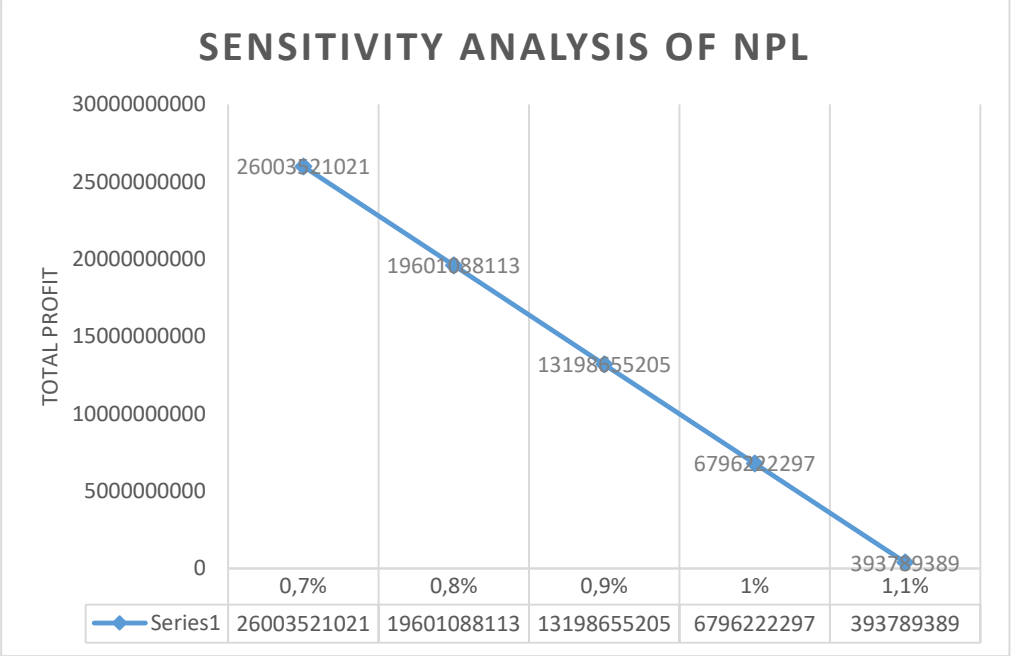


Figure 5. 2 Non Performing Loan Sensitivity

Based on Figure 5.2, it can be seen that any increase in NPL value, it will decrease profit from company. In this case, the company's profit will be negative if the NPL is greater than 1.1%, so there needs to be risk mitigation so that the NPL figure is below 1.1%.s

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CHAPTER 6
CONCLUSION AND RECOMMENDATION

This chapter describes the conclusions derived from a series of research that have been done. It is also discussed about the suggestions needed in the development of better future research.

6.1 Conclusion

From the results of simulations and analysis that have been done, it can be conclude, including:

1. Model of Fintech P2P Lending is made with system dynamic approach that is conceptually and also simulation model. The conceptual model is explained by using a causal loop diagram and the simulation is explained with the stock and flow diagrams. In the simulation, there are three changeable variables used such as profit margin desired by the company, loan repayment time by consumer, and return earned by lenders based on ROI. The numbers obtained in the system dynamic will be the payoff value in game theory to find the best strategy for each player.
2. In game theory, the payoff table of each player will contain the result number from running in the dynamic system model. The best strategy is known by use non-cooperative and cooperative game theory. The result shown the best strategy for each player with non-cooperative game is when the company chooses a high level of profit margin, borrower chooses low level of debt time, and lender chooses high level of ROI. In cooperative game, the best strategy is when the company chooses a high level of profit margin, borrower chooses low level of debt time, and lender chooses low level of ROI.

6.2 Recommendation

The following are suggestions regarding the results of research and sharing sustainability of subsequent research, including:

1. Develop models on system dynamic, so it can be widely seen and detailed how the growth of Fintech P2P Lending in Indonesia.
2. Need further research on the possibility of more complex strategies and consider some player.
3. Integration of system dynamic with game theory can be used in other cases relating to multiple players.

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APPENDIX

Lender_Money(t) = Lender_Money(t - dt) + (Lender_Revenue - Consumption - Saving - Investment) * dt
INIT Lender_Money = 0
INFLOWS:
Lender_Revenue = (Monthly_Income*Incremental_Income)+Monthly_Income+Return
OUTFLOWS:
Consumption = Autonomous_Consumption+(Marginal_Propensity_to_Consume*Lender_Money)+(Desired_to_Consumption*Lender_Money)
Saving = Lender_Money*Desired_to_Saving
Investment = (Lender_Money*Desired_Investment)
Operational_Cost(t) = Operational_Cost(t - dt) + (Total_of_Salary_Cost + Total_of_Promotion_Cost + Component_Cost) * dt
INIT Operational_Cost = (Component_Cost+Total_of_Promotion_Cost+Total_of_Salary_Cost)*Unitless_1
INFLOWS:
Total_of_Salary_Cost = (Salary_Rate*Amount_of_Labour)*Unitless_3
Total_of_Promotion_Cost = (Promotion_Cost*Amount_of_Promotion)*Unitless_4
Component_Cost = (Server+Water+Electricity+Rent_Office)*Unitless_4
Profit_Fintech_P2P_Lending(t) = Profit_Fintech_P2P_Lending(t - dt) + (Net_Income - Expenses) * dt
INIT Profit_Fintech_P2P_Lending = 0
INFLOWS:
Net_Income = (Income_company-Tax)*Unitless_3
OUTFLOWS:
Expenses = ((Transaction_of_Borrower*NPL)+Operational_Cost+Registration_fee)*Unitless_2
Admin_Cost = Loan_Cost_Rate*Loan
Autonomous_Consumption = 1095676
Debt_Time = 3
Desired_to_Borrow = 2500000
Income_company = ((Admin_Cost*Number_of_Borrower)-(Transaction_of_Lender/Number_of_Borrower))*Profit_Margin+(Admin_Cost*Number_of_Borrower)-(Transaction_of_Lender/Number_of_Borrower)
Interest = Interest_Rate*Loan
Interest_Rate = 0.0095
Loan = Desired_to_Borrow+(Desired_to_Borrow*Incremental_Borrow)
Loan_Cost_Rate = 0.04
Marginal_Propensity_to_Consume = 0.623
Monthly_Income = 5988899
Profit_Margin = 0.21
Profit_Sharing = (1/4*Profit_Margin)*(Profit_Fintech_P2P_Lending/Number_of_Lender)*Unitless_3

Registration_fee = 150000000/60
Rent_Office = 5000000
Repayment = (Loan/Debt_Time)+Loan+Interest+Admin_Cost
Return = Investment+(Investment*ROI)+Profit_Sharing+(Investment*Debt_Time/10)
ROI = 0.0095
Salary_Rate = 5000000
Server = 2500000
Tax = Income_company*Tax_Rate
Tax_Rate = 0.1
Transaction_of_Borrower = Number_of_Borrower*Loan
Transaction_of_Lender = (Number_of_Lender*Investment)*Unitless_1
Unitless_1 = 1
Unitless_2 = 1
Unitless_3 = 1
Unitless_4 = 1
Amount_of_Labour = GRAPH(TIME)
(0.00, 10.0), (12.0, 15.0), (24.0, 18.0), (36.0, 20.0), (48.0, 24.0), (60.0, 25.0)
Amount_of_Promotion = GRAPH(TIME)
(0.00, 0.00), (12.0, 5.00), (24.0, 10.0), (36.0, 15.0), (48.0, 10.0), (60.0, 10.0)
Desired_Investment = GRAPH(TIME)
(0.00, 0.258), (6.00, 0.275), (12.0, 0.292), (18.0, 0.305), (24.0, 0.328), (30.0, 0.343), (36.0, 0.375), (42.0, 0.41), (48.0, 0.445), (54.0, 0.475), (60.0, 0.498)
Desired_to_Consumption = GRAPH(TIME)
(0.00, 0.031), (3.00, 0.0309), (6.00, 0.0297), (9.00, 0.0285), (12.0, 0.0273), (15.0, 0.065), (18.0, 0.0252), (21.0, 0.0242), (24.0, 0.0232), (27.0, 0.023), (30.0, 0.0214), (33.0, 0.0206), (36.0, 0.0197), (39.0, 0.019), (42.0, 0.0182), (45.0, 0.0175), (48.0, 0.0175), (51.0, 0.0168), (54.0, 0.0155), (57.0, 0.0149), (60.0, 0.0143)
Desired_to_Saving = GRAPH(TIME)
(0.00, 0.246), (6.00, 0.27), (12.0, 0.29), (18.0, 0.302), (24.0, 0.318), (30.0, 0.333), (36.0, 0.348), (42.0, 0.362), (48.0, 0.385), (54.0, 0.415), (60.0, 0.44)
Electricity = GRAPH(TIME)
(0.00, 1.5e+007), (6.00, 1.5e+007), (12.0, 1.5e+007), (18.0, 1.5e+007), (24.0, 1.5e+007), (30.0, 1.5e+007), (36.0, 1.5e+007), (42.0, 1.5e+007), (48.0, 1.5e+007), (54.0, 1.5e+007), (60.0, 1.5e+007)
Incremental_Borrow = GRAPH(TIME)
(0.00, 0.0114), (6.00, 0.0119), (12.0, 0.0132), (18.0, 0.0147), (24.0, 0.0159), (30.0, 0.0172), (36.0, 0.0185), (42.0, 0.0195), (48.0, 0.0214), (54.0, 0.0239), (60.0, 0.0271)
Incremental_Income = GRAPH(TIME)
(0.00, 0.00), (12.0, 0.01), (24.0, 0.01), (36.0, 0.01), (48.0, 0.01), (60.0, 0.01)
NPL = GRAPH(TIME)
(0.00, 0.007), (3.00, 0.00362), (6.00, 0.00223), (9.00, 0.00138), (12.0, 0.000848), (15.0, 0.000523), (18.0, 0.000322), (21.0, 0.000199), (24.0, 0.000122), (27.0, 7.55e-005), (30.0, 0.00), (33.0, 2.87e-005), (36.0, 1.77e-005), (39.0, 1.09e-005), (42.0, 6.7e-006), (45.0, 4.1e-006), (48.0, 2.6e-006), (51.0, 1.6e-006), (54.0, 1e-006), (57.0, 6e-007), (60.0, 4e-007)

Number_of_Borrower = GRAPH(TIME)
(0.00, 2182), (6.00, 7102), (12.0, 13661), (18.0, 16941), (24.0, 25140), (30.0, 34979), (36.0, 46458), (42.0, 61217), (48.0, 72696), (54.0, 90734), (60.0, 115332)
Number_of_Lender = GRAPH(TIME)
(0.00, 216), (6.00, 1951), (12.0, 3108), (18.0, 3686), (24.0, 5422), (30.0, 6000), (36.0, 6578), (42.0, 8314), (48.0, 9470), (54.0, 12941), (60.0, 19882)
Promotion_Cost = GRAPH(TIME)
(0.00, 250000), (6.00, 1.1e+006), (12.0, 1.7e+006), (18.0, 2.2e+006), (24.0, 2.8e+006), (30.0, 3.3e+006), (36.0, 3.7e+006), (42.0, 4.2e+006), (48.0, 4.5e+006), (54.0, 4.7e+006), (60.0, 5.2e+006)
Water = GRAPH(TIME)
(0.00, 1.5e+006), (12.0, 1.8e+006), (24.0, 2e+006), (36.0, 2.2e+006), (48.0, 2.4e+006), (60.0, 2.5e+006)

Result of System Dynamic

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	11%	0,95%	3
0	Rp0	Rp0	Rp3,496,494
1	Rp105,776,484	Rp1,674,423	Rp3,496,782
2	Rp214,670,775	Rp1,996,534	Rp3,497,070
3	Rp329,190,722	Rp2,069,538	Rp3,497,358
4	Rp451,658,867	Rp2,097,293	Rp3,497,646
5	Rp575,084,393	Rp2,117,493	Rp3,497,935
6	Rp698,752,977	Rp2,136,150	Rp3,498,223
7	Rp821,824,426	Rp2,154,823	Rp3,498,972
8	Rp966,196,481	Rp2,175,096	Rp3,499,721
9	Rp1,130,612,753	Rp2,195,716	Rp3,500,470
10	Rp1,313,737,672	Rp2,216,435	Rp3,501,219
50	Rp10,135,470,422	Rp3,356,928	Rp3,533,946
51	Rp11,052,515,076	Rp3,382,753	Rp3,535,386
52	Rp12,088,714,435	Rp3,408,692	Rp3,536,827
53	Rp13,243,362,840	Rp3,435,438	Rp3,538,267
54	Rp14,515,781,351	Rp3,462,351	Rp3,539,708
55	Rp15,905,291,066	Rp3,479,007	Rp3,541,551
56	Rp17,524,159,644	Rp3,495,942	Rp3,543,395
57	Rp19,371,649,583	Rp3,513,327	Rp3,545,239
58	Rp21,447,023,217	Rp3,531,076	Rp3,547,083
59	Rp23,749,524,447	Rp3,549,104	Rp3,548,927
60	Rp26,278,413,979	Rp3,567,346	Rp3,550,770

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
11%	1,25%	3
Rp0	Rp0	Rp3,504,080
Rp105,776,484	Rp1,678,246	Rp3,504,368
Rp214,670,775	Rp2,002,412	Rp3,504,657
Rp329,190,513	Rp2,076,085	Rp3,504,946
Rp451,658,333	Rp2,104,061	Rp3,505,234
Rp575,083,480	Rp2,124,369	Rp3,505,523
Rp698,751,652	Rp2,143,108	Rp3,505,812
Rp821,822,665	Rp2,161,857	Rp3,506,563
Rp966,194,297	Rp2,182,210	Rp3,507,313
Rp1,130,610,156	Rp2,202,911	Rp3,508,064
Rp1,313,734,668	Rp2,223,713	Rp3,508,815
Rp10,135,450,689	Rp3,369,637	Rp3,541,613
Rp11,052,494,822	Rp3,395,597	Rp3,543,056
Rp12,088,693,642	Rp3,421,670	Rp3,544,500
Rp13,243,341,493	Rp3,448,552	Rp3,545,943
Rp14,515,759,434	Rp3,475,603	Rp3,547,387
Rp15,905,268,564	Rp3,492,361	Rp3,549,235
Rp17,524,136,525	Rp3,509,388	Rp3,551,082
Rp19,371,625,818	Rp3,526,863	Rp3,552,930
Rp21,446,998,777	Rp3,544,702	Rp3,554,778
Rp23,749,499,307	Rp3,562,821	Rp3,556,626
Rp26,278,388,113	Rp3,581,154	Rp3,558,474

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
11%	2%	3
Rp0	Rp0	Rp3,523,043
Rp105,776,484	Rp1,687,803	Rp3,523,334
Rp214,670,775	Rp2,017,134	Rp3,523,624
Rp329,189,991	Rp2,092,500	Rp3,523,914
Rp451,656,998	Rp2,121,037	Rp3,524,204
Rp575,081,193	Rp2,141,616	Rp3,524,495
Rp698,748,332	Rp2,160,561	Rp3,524,785
Rp821,818,249	Rp2,179,501	Rp3,525,540
Rp966,188,822	Rp2,200,054	Rp3,526,294
Rp1,130,603,646	Rp2,220,962	Rp3,527,049
Rp1,313,727,138	Rp2,241,971	Rp3,527,804
Rp10,135,401,159	Rp3,401,580	Rp3,560,779
Rp11,052,443,980	Rp3,427,881	Rp3,562,231
Rp12,088,641,447	Rp3,454,291	Rp3,563,682
Rp13,243,287,906	Rp3,481,516	Rp3,565,134
Rp14,515,704,415	Rp3,508,914	Rp3,566,585
Rp15,905,212,074	Rp3,525,933	Rp3,568,443
Rp17,524,078,483	Rp3,543,189	Rp3,570,301
Rp19,371,566,150	Rp3,560,891	Rp3,572,158
Rp21,446,937,415	Rp3,578,959	Rp3,574,016
Rp23,749,436,183	Rp3,597,307	Rp3,575,874
Rp26,278,323,164	Rp3,615,871	Rp3,577,732

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	11%	0,95%	6
0	Rp0	Rp0	Rp3,075,077
1	Rp105,776,484	Rp2,056,706	Rp3,075,331
2	Rp214,670,775	Rp2,614,252	Rp3,075,584
3	Rp329,169,819	Rp2,778,398	Rp3,075,838
4	Rp451,603,672	Rp2,840,172	Rp3,076,091
5	Rp574,987,938	Rp2,876,370	Rp3,076,344
6	Rp698,611,205	Rp2,905,839	Rp3,076,598
7	Rp821,634,465	Rp2,933,897	Rp3,077,256
8	Rp965,959,778	Rp2,963,732	Rp3,077,915
9	Rp1,130,330,304	Rp2,994,113	Rp3,078,574
10	Rp1,313,410,124	Rp3,024,694	Rp3,079,233
50	Rp10,133,244,284	Rp4,851,577	Rp3,108,015
51	Rp11,050,227,625	Rp4,895,647	Rp3,109,282
52	Rp12,086,363,646	Rp4,939,450	Rp3,110,549
53	Rp13,240,946,756	Rp4,984,307	Rp3,111,816
54	Rp14,513,298,042	Rp5,029,531	Rp3,113,083
55	Rp15,902,738,615	Rp5,060,464	Rp3,114,704
56	Rp17,521,534,157	Rp5,089,972	Rp3,116,326
57	Rp19,368,947,498	Rp5,119,560	Rp3,117,947
58	Rp21,444,241,172	Rp5,149,487	Rp3,119,569
59	Rp23,746,659,229	Rp5,179,740	Rp3,121,190
60	Rp26,275,462,501	Rp5,210,258	Rp3,122,812

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
11%	1,25%	6
Rp0	Rp0	Rp3,082,663
Rp105,776,484	Rp2,060,529	Rp3,082,917
Rp214,670,775	Rp2,620,734	Rp3,083,171
Rp329,169,610	Rp2,786,063	Rp3,083,425
Rp451,603,102	Rp2,848,325	Rp3,083,679
Rp574,986,919	Rp2,884,754	Rp3,083,933
Rp698,609,688	Rp2,914,368	Rp3,084,187
Rp821,632,415	Rp2,942,542	Rp3,084,847
Rp965,957,210	Rp2,972,492	Rp3,085,508
Rp1,130,327,229	Rp3,002,990	Rp3,086,168
Rp1,313,406,547	Rp3,033,689	Rp3,086,828
Rp10,133,219,104	Rp4,869,206	Rp3,115,682
Rp11,050,201,723	Rp4,913,520	Rp3,116,952
Rp12,086,336,995	Rp4,957,560	Rp3,118,222
Rp13,240,919,334	Rp5,002,657	Rp3,119,492
Rp14,513,269,824	Rp5,048,122	Rp3,120,762
Rp15,902,709,578	Rp5,079,251	Rp3,122,387
Rp17,521,504,253	Rp5,108,930	Rp3,124,013
Rp19,368,916,684	Rp5,138,683	Rp3,125,639
Rp21,444,209,406	Rp5,168,773	Rp3,127,264
Rp23,746,626,472	Rp5,199,189	Rp3,128,890
Rp26,275,428,717	Rp5,229,871	Rp3,130,515

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
11%	2%	6
Rp0	Rp0	Rp3,101,627
Rp105,776,484	Rp2,070,086	Rp3,101,882
Rp214,670,775	Rp2,636,966	Rp3,102,138
Rp329,169,087	Rp2,805,278	Rp3,102,393
Rp451,601,673	Rp2,868,776	Rp3,102,649
Rp574,984,368	Rp2,905,789	Rp3,102,904
Rp698,605,886	Rp2,935,767	Rp3,103,160
Rp821,627,276	Rp2,964,238	Rp3,103,824
Rp965,950,771	Rp2,994,478	Rp3,104,489
Rp1,130,319,515	Rp3,025,269	Rp3,105,153
Rp1,313,397,577	Rp3,056,263	Rp3,105,818
Rp10,133,155,865	Rp4,913,552	Rp3,134,849
Rp11,050,136,667	Rp4,958,483	Rp3,136,127
Rp12,086,270,059	Rp5,003,123	Rp3,137,404
Rp13,240,850,457	Rp5,048,826	Rp3,138,682
Rp14,513,198,945	Rp5,094,903	Rp3,139,960
Rp15,902,636,636	Rp5,126,524	Rp3,141,596
Rp17,521,429,130	Rp5,156,639	Rp3,143,231
Rp19,368,839,270	Rp5,186,807	Rp3,144,867
Rp21,444,129,598	Rp5,217,308	Rp3,146,502
Rp23,746,544,172	Rp5,248,137	Rp3,148,138
Rp26,275,343,828	Rp5,279,233	Rp3,149,773

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	11%	0,95%	12
0	Rp0	Rp0	Rp2,864,369
1	Rp105,776,484	Rp2,821,272	Rp2,864,605
2	Rp214,670,775	Rp4,030,891	Rp2,864,841
3	Rp329,128,011	Rp4,567,380	Rp2,865,077
4	Rp451,482,033	Rp4,823,306	Rp2,865,313
5	Rp574,760,866	Rp4,964,111	Rp2,865,549
6	Rp698,262,229	Rp5,057,052	Rp2,865,785
7	Rp821,152,362	Rp5,130,538	Rp2,866,399
8	Rp965,346,742	Rp5,199,679	Rp2,867,012
9	Rp1,129,588,116	Rp5,267,295	Rp2,867,626
10	Rp1,312,539,958	Rp5,334,510	Rp2,868,240
50	Rp10,126,438,101	Rp10,272,152	Rp2,895,050
51	Rp11,043,200,341	Rp10,425,573	Rp2,896,230
52	Rp12,079,106,021	Rp10,574,871	Rp2,897,410
53	Rp13,233,449,866	Rp10,724,811	Rp2,898,590
54	Rp14,505,553,083	Rp10,875,771	Rp2,899,770
55	Rp15,894,736,822	Rp10,997,965	Rp2,901,281
56	Rp17,513,259,302	Rp11,110,027	Rp2,902,791
57	Rp19,360,384,415	Rp11,217,411	Rp2,904,301
58	Rp21,435,375,510	Rp11,322,878	Rp2,905,812
59	Rp23,737,477,251	Rp11,427,800	Rp2,907,322
60	Rp26,265,950,944	Rp11,532,845	Rp2,908,833

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
11%	1,25%	12
Rp0	Rp0	Rp2,871,955
Rp105,776,484	Rp2,825,095	Rp2,872,191
Rp214,670,775	Rp4,038,581	Rp2,872,428
Rp329,127,802	Rp4,577,715	Rp2,872,664
Rp451,481,387	Rp4,835,251	Rp2,872,901
Rp574,759,606	Rp4,977,020	Rp2,873,138
Rp698,260,231	Rp5,070,564	Rp2,873,374
Rp821,149,538	Rp5,144,468	Rp2,873,990
Rp965,343,093	Rp5,213,944	Rp2,874,605
Rp1,129,583,647	Rp5,281,858	Rp2,875,220
Rp1,312,534,672	Rp5,349,356	Rp2,875,835
Rp10,126,391,891	Rp10,313,806	Rp2,902,717
Rp11,043,152,440	Rp10,468,340	Rp2,903,900
Rp12,079,056,347	Rp10,618,717	Rp2,905,083
Rp13,233,398,337	Rp10,769,725	Rp2,906,266
Rp14,505,499,621	Rp10,921,758	Rp2,907,449
Rp15,894,681,346	Rp11,044,914	Rp2,908,964
Rp17,513,201,674	Rp11,157,863	Rp2,910,478
Rp19,360,324,504	Rp11,266,085	Rp2,911,993
Rp21,435,313,191	Rp11,372,359	Rp2,913,507
Rp23,737,412,403	Rp11,478,073	Rp2,915,022
Rp26,265,883,450	Rp11,583,904	Rp2,916,536

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
11%	2%	12
Rp0	Rp0	Rp2,890,918
Rp105,776,484	Rp2,834,652	Rp2,891,157
Rp214,670,775	Rp4,057,833	Rp2,891,395
Rp329,127,280	Rp4,603,616	Rp2,891,633
Rp451,479,770	Rp4,865,213	Rp2,891,871
Rp574,756,451	Rp5,009,417	Rp2,892,109
Rp698,255,224	Rp5,104,491	Rp2,892,348
Rp821,142,457	Rp5,179,452	Rp2,892,967
Rp965,333,942	Rp5,249,774	Rp2,893,586
Rp1,129,572,436	Rp5,318,441	Rp2,894,205
Rp1,312,521,408	Rp5,386,655	Rp2,894,825
Rp10,126,275,641	Rp10,418,905	Rp2,921,884
Rp11,043,031,923	Rp10,576,270	Rp2,923,075
Rp12,078,931,353	Rp10,729,385	Rp2,924,266
Rp13,233,268,664	Rp10,883,110	Rp2,925,457
Rp14,505,365,066	Rp11,037,870	Rp2,926,648
Rp15,894,541,708	Rp11,163,471	Rp2,928,172
Rp17,513,056,604	Rp11,278,678	Rp2,929,696
Rp19,360,173,668	Rp11,389,030	Rp2,931,221
Rp21,435,156,272	Rp11,497,358	Rp2,932,745
Rp23,737,249,096	Rp11,605,087	Rp2,934,270
Rp26,265,713,460	Rp11,712,918	Rp2,935,794

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	21%	0,95%	3
0	Rp0	Rp0	Rp3,496,494
1	Rp125,638,357	Rp1,681,722	Rp3,496,782
2	Rp261,840,967	Rp2,008,923	Rp3,497,070
3	Rp411,126,659	Rp2,084,986	Rp3,497,358
4	Rp575,823,781	Rp2,115,012	Rp3,497,646
5	Rp748,944,478	Rp2,137,063	Rp3,497,935
6	Rp929,776,440	Rp2,157,318	Rp3,498,223
7	Rp1,117,481,165	Rp2,178,151	Rp3,498,972
8	Rp1,336,460,271	Rp2,200,992	Rp3,499,721
9	Rp1,585,461,129	Rp2,224,420	Rp3,500,470
10	Rp1,863,152,110	Rp2,248,110	Rp3,501,219
50	Rp24,527,161,487	Rp3,515,267	Rp3,533,946
51	Rp26,168,296,945	Rp3,542,200	Rp3,535,386
52	Rp27,956,551,918	Rp3,569,802	Rp3,536,827
53	Rp29,891,243,304	Rp3,598,729	Rp3,538,267
54	Rp31,971,714,704	Rp3,628,265	Rp3,539,708
55	Rp34,197,309,767	Rp3,643,629	Rp3,541,551
56	Rp36,690,495,501	Rp3,657,729	Rp3,543,395
57	Rp39,450,574,194	Rp3,673,302	Rp3,545,239
58	Rp42,476,847,622	Rp3,690,270	Rp3,547,083
59	Rp45,768,599,087	Rp3,708,373	Rp3,548,927
60	Rp49,325,128,692	Rp3,727,395	Rp3,550,770

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
21%	1,25%	3
Rp0	Rp0	Rp3,504,080
Rp125,638,357	Rp1,685,545	Rp3,504,368
Rp261,840,967	Rp2,014,807	Rp3,504,657
Rp411,126,431	Rp2,091,545	Rp3,504,946
Rp575,823,199	Rp2,121,795	Rp3,505,234
Rp748,943,482	Rp2,143,955	Rp3,505,523
Rp929,774,993	Rp2,164,294	Rp3,505,812
Rp1,117,479,241	Rp2,185,205	Rp3,506,563
Rp1,336,457,886	Rp2,208,128	Rp3,507,313
Rp1,585,458,292	Rp2,231,641	Rp3,508,064
Rp1,863,148,829	Rp2,255,417	Rp3,508,815
Rp24,527,139,792	Rp3,528,218	Rp3,541,613
Rp26,168,274,670	Rp3,555,289	Rp3,543,056
Rp27,956,529,045	Rp3,583,028	Rp3,544,500
Rp29,891,219,815	Rp3,612,095	Rp3,545,943
Rp31,971,690,582	Rp3,641,774	Rp3,547,387
Rp34,197,284,996	Rp3,657,247	Rp3,549,235
Rp36,690,470,043	Rp3,671,438	Rp3,551,082
Rp39,450,548,017	Rp3,687,097	Rp3,552,930
Rp42,476,820,696	Rp3,704,154	Rp3,554,778
Rp45,768,571,383	Rp3,722,348	Rp3,556,626
Rp49,325,100,181	Rp3,741,462	Rp3,558,474

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
21%	2%	3
Rp0	Rp0	Rp3,523,043
Rp125,638,357	Rp1,695,102	Rp3,523,334
Rp261,840,967	Rp2,029,544	Rp3,523,624
Rp411,125,862	Rp2,107,986	Rp3,523,914
Rp575,821,742	Rp2,138,806	Rp3,524,204
Rp748,940,986	Rp2,161,245	Rp3,524,495
Rp929,771,368	Rp2,181,795	Rp3,524,785
Rp1,117,474,420	Rp2,202,901	Rp3,525,540
Rp1,336,451,907	Rp2,226,031	Rp3,526,294
Rp1,585,451,180	Rp2,249,756	Rp3,527,049
Rp1,863,140,601	Rp2,273,747	Rp3,527,804
Rp24,527,085,334	Rp3,560,767	Rp3,560,779
Rp26,168,218,756	Rp3,588,187	Rp3,562,231
Rp27,956,471,628	Rp3,616,273	Rp3,563,682
Rp29,891,160,851	Rp3,645,694	Rp3,565,134
Rp31,971,630,028	Rp3,675,732	Rp3,566,585
Rp34,197,222,806	Rp3,691,478	Rp3,568,443
Rp36,690,406,129	Rp3,705,899	Rp3,570,301
Rp39,450,482,297	Rp3,721,778	Rp3,572,158
Rp42,476,753,092	Rp3,739,059	Rp3,574,016
Rp45,768,501,823	Rp3,757,481	Rp3,575,874
Rp49,325,028,593	Rp3,776,829	Rp3,577,732

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	21%	0,95%	6
0	Rp0	Rp0	Rp3,075,077
1	Rp125,638,357	Rp2,064,005	Rp3,075,331
2	Rp261,840,967	Rp2,627,218	Rp3,075,584
3	Rp411,103,872	Rp2,794,983	Rp3,075,838
4	Rp575,763,575	Rp2,859,425	Rp3,076,091
5	Rp748,839,218	Rp2,897,770	Rp3,076,344
6	Rp929,621,674	Rp2,929,075	Rp3,076,598
7	Rp1,117,273,740	Rp2,959,498	Rp3,077,256
8	Rp1,336,201,755	Rp2,992,150	Rp3,077,915
9	Rp1,585,152,598	Rp3,025,636	Rp3,078,574
10	Rp1,862,794,258	Rp3,059,521	Rp3,079,233
50	Rp24,524,713,813	Rp5,038,173	Rp3,108,015
51	Rp26,165,781,179	Rp5,083,857	Rp3,109,282
52	Rp27,953,965,798	Rp5,129,788	Rp3,110,549
53	Rp29,888,584,652	Rp5,177,368	Rp3,111,816
54	Rp31,968,981,369	Rp5,225,851	Rp3,113,083
55	Rp34,194,499,609	Rp5,256,140	Rp3,114,704
56	Rp36,687,604,176	Rp5,282,914	Rp3,116,326
57	Rp39,447,597,724	Rp5,310,432	Rp3,117,947
58	Rp42,473,782,292	Rp5,339,381	Rp3,119,569
59	Rp45,765,441,359	Rp5,369,676	Rp3,121,190
60	Rp49,321,875,157	Rp5,401,104	Rp3,122,812

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
21%	1,25%	6
Rp0	Rp0	Rp3,082,663
Rp125,638,357	Rp2,067,828	Rp3,082,917
Rp261,840,967	Rp2,633,706	Rp3,083,171
Rp411,103,644	Rp2,802,660	Rp3,083,425
Rp575,762,952	Rp2,867,595	Rp3,083,679
Rp748,838,107	Rp2,906,173	Rp3,083,933
Rp929,620,018	Rp2,937,626	Rp3,084,187
Rp1,117,271,501	Rp2,968,168	Rp3,084,847
Rp1,336,198,951	Rp3,000,938	Rp3,085,508
Rp1,585,149,238	Rp3,034,544	Rp3,086,168
Rp1,862,790,350	Rp3,068,550	Rp3,086,828
Rp24,524,686,125	Rp5,056,133	Rp3,115,682
Rp26,165,752,690	Rp5,102,069	Rp3,116,952
Rp27,953,936,478	Rp5,148,244	Rp3,118,222
Rp29,888,554,475	Rp5,196,070	Rp3,119,492
Rp31,968,950,308	Rp5,244,803	Rp3,120,762
Rp34,194,467,637	Rp5,275,295	Rp3,122,387
Rp36,687,571,241	Rp5,302,243	Rp3,124,013
Rp39,447,563,777	Rp5,329,924	Rp3,125,639
Rp42,473,747,288	Rp5,359,034	Rp3,127,264
Rp45,765,405,254	Rp5,389,491	Rp3,128,890
Rp49,321,837,910	Rp5,421,085	Rp3,130,515

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
21%	2%	6
Rp0	Rp0	Rp3,101,627
Rp125,638,357	Rp2,077,385	Rp3,101,882
Rp261,840,967	Rp2,649,953	Rp3,102,138
Rp411,103,075	Rp2,821,904	Rp3,102,393
Rp575,761,394	Rp2,888,086	Rp3,102,649
Rp748,835,322	Rp2,927,258	Rp3,102,904
Rp929,615,868	Rp2,959,082	Rp3,103,160
Rp1,117,265,890	Rp2,989,926	Rp3,103,824
Rp1,336,191,918	Rp3,022,993	Rp3,104,489
Rp1,585,140,813	Rp3,056,900	Rp3,105,153
Rp1,862,780,550	Rp3,091,212	Rp3,105,818
Rp24,524,616,590	Rp5,101,314	Rp3,134,849
Rp26,165,681,137	Rp5,147,885	Rp3,136,127
Rp27,953,862,837	Rp5,194,677	Rp3,137,404
Rp29,888,478,677	Rp5,243,125	Rp3,138,682
Rp31,968,872,286	Rp5,292,489	Rp3,139,960
Rp34,194,387,325	Rp5,323,494	Rp3,141,596
Rp36,687,488,505	Rp5,350,884	Rp3,143,231
Rp39,447,478,494	Rp5,378,976	Rp3,144,867
Rp42,473,659,345	Rp5,408,493	Rp3,146,502
Rp45,765,314,541	Rp5,439,361	Rp3,148,138
Rp49,321,744,323	Rp5,471,373	Rp3,149,773

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	21%	0,95%	12
0	Rp0	Rp0	Rp2,864,369
1	Rp125,638,357	Rp2,828,571	Rp2,864,605
2	Rp261,840,967	Rp4,045,011	Rp2,864,841
3	Rp411,058,298	Rp4,586,514	Rp2,865,077
4	Rp575,630,898	Rp4,846,291	Rp2,865,313
5	Rp748,591,438	Rp4,990,196	Rp2,865,549
6	Rp929,240,750	Rp5,085,754	Rp2,865,785
7	Rp1,116,747,362	Rp5,162,270	Rp2,866,399
8	Rp1,335,532,278	Rp5,234,945	Rp2,867,012
9	Rp1,584,341,934	Rp5,306,490	Rp2,867,626
10	Rp1,861,843,653	Rp5,377,938	Rp2,868,240
50	Rp24,517,229,169	Rp10,558,643	Rp2,895,050
51	Rp26,158,051,141	Rp10,717,295	Rp2,896,230
52	Rp27,945,980,007	Rp10,871,745	Rp2,897,410
53	Rp29,880,333,137	Rp11,027,304	Rp2,898,590
54	Rp31,960,454,311	Rp11,184,544	Rp2,899,770
55	Rp34,185,687,225	Rp11,309,059	Rp2,901,281
56	Rp36,678,488,387	Rp11,420,263	Rp2,902,791
57	Rp39,438,161,609	Rp11,526,271	Rp2,904,301
58	Rp42,464,009,919	Rp11,631,014	Rp2,905,812
59	Rp45,755,317,523	Rp11,736,316	Rp2,907,322
60	Rp49,311,385,193	Rp11,842,954	Rp2,908,833

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
21%	1,25%	12
Rp0	Rp0	Rp2,871,955
Rp125,638,357	Rp2,832,394	Rp2,872,191
Rp261,840,967	Rp4,052,707	Rp2,872,428
Rp411,058,070	Rp4,596,862	Rp2,872,664
Rp575,630,194	Rp4,858,257	Rp2,872,901
Rp748,590,064	Rp5,003,132	Rp2,873,138
Rp929,238,569	Rp5,099,299	Rp2,873,374
Rp1,116,744,278	Rp5,176,238	Rp2,873,990
Rp1,335,528,294	Rp5,249,252	Rp2,874,605
Rp1,584,337,054	Rp5,321,100	Rp2,875,220
Rp1,861,837,879	Rp5,392,837	Rp2,875,835
Rp24,517,178,348	Rp10,601,047	Rp2,902,717
Rp26,157,998,443	Rp10,760,850	Rp2,903,900
Rp27,945,925,341	Rp10,916,409	Rp2,905,083
Rp29,880,276,412	Rp11,073,066	Rp2,906,266
Rp31,960,395,439	Rp11,231,409	Rp2,907,449
Rp34,185,626,117	Rp11,356,913	Rp2,908,964
Rp36,678,424,888	Rp11,469,027	Rp2,910,478
Rp39,438,095,573	Rp11,575,886	Rp2,911,993
Rp42,463,941,207	Rp11,681,447	Rp2,913,507
Rp45,755,246,000	Rp11,787,549	Rp2,915,022
Rp49,311,310,732	Rp11,894,981	Rp2,916,536

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
21%	2%	12
Rp0	Rp0	Rp2,890,918
Rp125,638,357	Rp2,841,951	Rp2,891,157
Rp261,840,967	Rp4,071,973	Rp2,891,395
Rp411,057,501	Rp4,622,797	Rp2,891,633
Rp575,628,431	Rp4,888,272	Rp2,891,871
Rp748,586,622	Rp5,035,599	Rp2,892,109
Rp929,233,104	Rp5,133,309	Rp2,892,348
Rp1,116,736,547	Rp5,211,316	Rp2,892,967
Rp1,335,518,301	Rp5,285,188	Rp2,893,586
Rp1,584,324,809	Rp5,357,803	Rp2,894,205
Rp1,861,823,390	Rp5,430,271	Rp2,894,825
Rp24,517,050,496	Rp10,708,039	Rp2,921,884
Rp26,157,865,858	Rp10,870,765	Rp2,923,075
Rp27,945,787,788	Rp11,029,144	Rp2,924,266
Rp29,880,133,663	Rp11,188,592	Rp2,925,457
Rp31,960,247,268	Rp11,349,735	Rp2,926,648
Rp34,185,472,301	Rp11,477,756	Rp2,928,172
Rp36,678,265,035	Rp11,592,183	Rp2,929,696
Rp39,437,929,314	Rp11,701,210	Rp2,931,221
Rp42,463,768,188	Rp11,808,849	Rp2,932,745
Rp45,755,065,884	Rp11,916,987	Rp2,934,270
Rp49,311,123,190	Rp12,026,442	Rp2,935,794

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	30%	0,95%	3
0	Rp0	Rp0	Rp3,496,494
1	Rp143,514,043	Rp1,689,971	Rp3,496,782
2	Rp304,294,140	Rp2,023,192	Rp3,497,070
3	Rp484,868,833	Rp2,103,109	Rp3,497,358
4	Rp687,571,722	Rp2,136,135	Rp3,497,646
5	Rp905,417,639	Rp2,160,747	Rp3,497,935
6	Rp1,137,696,093	Rp2,183,307	Rp3,498,223
7	Rp1,383,570,112	Rp2,207,191	Rp3,498,972
8	Rp1,669,694,863	Rp2,233,589	Rp3,499,721
9	Rp1,994,821,068	Rp2,260,860	Rp3,500,470
10	Rp2,357,620,638	Rp2,288,592	Rp3,501,219
50	Rp37,479,561,481	Rp3,754,666	Rp3,533,946
51	Rp39,772,372,952	Rp3,782,412	Rp3,535,386
52	Rp42,237,472,163	Rp3,811,528	Rp3,536,827
53	Rp44,874,196,305	Rp3,842,628	Rp3,538,267
54	Rp47,681,909,259	Rp3,874,900	Rp3,539,708
55	Rp50,659,974,959	Rp3,887,145	Rp3,541,551
56	Rp53,940,039,641	Rp3,895,743	Rp3,543,395
57	Rp57,521,441,667	Rp3,907,211	Rp3,545,239
58	Rp61,403,518,314	Rp3,921,505	Rp3,547,083
59	Rp65,585,588,333	Rp3,938,122	Rp3,548,927
60	Rp70,066,987,265	Rp3,956,637	Rp3,550,770

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
30%	1,25%	3
Rp0	Rp0	Rp3,504,080
Rp143,514,043	Rp1,693,794	Rp3,504,368
Rp304,294,140	Rp2,029,083	Rp3,504,657
Rp484,868,588	Rp2,109,680	Rp3,504,946
Rp687,571,096	Rp2,142,935	Rp3,505,234
Rp905,416,567	Rp2,167,660	Rp3,505,523
Rp1,137,694,536	Rp2,190,307	Rp3,505,812
Rp1,383,568,041	Rp2,214,270	Rp3,506,563
Rp1,669,692,295	Rp2,240,753	Rp3,507,313
Rp1,994,818,013	Rp2,268,113	Rp3,508,064
Rp2,357,617,103	Rp2,295,935	Rp3,508,815
Rp37,479,537,873	Rp3,767,983	Rp3,541,613
Rp39,772,348,703	Rp3,795,871	Rp3,543,056
Rp42,237,447,254	Rp3,825,128	Rp3,544,500
Rp44,874,170,716	Rp3,856,374	Rp3,545,943
Rp47,681,882,971	Rp3,888,794	Rp3,547,387
Rp50,659,947,953	Rp3,901,154	Rp3,549,235
Rp53,940,011,876	Rp3,909,840	Rp3,551,082
Rp57,521,413,108	Rp3,921,388	Rp3,552,930
Rp61,403,488,928	Rp3,935,766	Rp3,554,778
Rp65,585,558,087	Rp3,952,471	Rp3,556,626
Rp70,066,956,130	Rp3,971,078	Rp3,558,474

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
30%	2%	3
Rp0	Rp0	Rp3,523,043
Rp143,514,043	Rp1,703,351	Rp3,523,334
Rp304,294,140	Rp2,043,835	Rp3,523,624
Rp484,867,976	Rp2,126,153	Rp3,523,914
Rp687,569,530	Rp2,159,988	Rp3,524,204
Rp905,413,883	Rp2,185,000	Rp3,524,495
Rp1,137,690,635	Rp2,207,865	Rp3,524,785
Rp1,383,562,851	Rp2,232,030	Rp3,525,540
Rp1,669,685,856	Rp2,258,727	Rp3,526,294
Rp1,994,810,353	Rp2,286,309	Rp3,527,049
Rp2,357,608,239	Rp2,314,356	Rp3,527,804
Rp37,479,478,616	Rp3,801,452	Rp3,560,779
Rp39,772,287,837	Rp3,829,699	Rp3,562,231
Rp42,237,384,727	Rp3,859,312	Rp3,563,682
Rp44,874,106,480	Rp3,890,925	Rp3,565,134
Rp47,681,816,977	Rp3,923,721	Rp3,566,585
Rp50,659,880,153	Rp3,936,368	Rp3,568,443
Rp53,939,942,171	Rp3,945,278	Rp3,570,301
Rp57,521,341,406	Rp3,957,030	Rp3,572,158
Rp61,403,415,145	Rp3,971,619	Rp3,574,016
Rp65,585,482,145	Rp3,988,546	Rp3,575,874
Rp70,066,877,950	Rp4,007,384	Rp3,577,732

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	30%	0,95%	6
0	Rp0	Rp0	Rp3,075,077
1	Rp143,514,043	Rp2,072,254	Rp3,075,331
2	Rp304,294,140	Rp2,642,139	Rp3,075,584
3	Rp484,844,351	Rp2,814,411	Rp3,075,838
4	Rp687,506,990	Rp2,882,341	Rp3,076,091
5	Rp905,304,409	Rp2,923,627	Rp3,076,344
6	Rp1,137,529,542	Rp2,957,558	Rp3,076,598
7	Rp1,383,346,819	Rp2,991,319	Rp3,077,256
8	Rp1,669,416,498	Rp3,027,874	Rp3,077,915
9	Rp1,994,488,774	Rp3,065,613	Rp3,078,574
10	Rp2,357,235,141	Rp3,103,994	Rp3,079,233
50	Rp37,476,897,876	Rp5,320,461	Rp3,108,015
51	Rp39,769,634,140	Rp5,367,602	Rp3,109,282
52	Rp42,234,655,630	Rp5,415,601	Rp3,110,549
53	Rp44,871,299,645	Rp5,465,994	Rp3,111,816
54	Rp47,678,930,093	Rp5,517,970	Rp3,113,083
55	Rp50,656,910,914	Rp5,545,889	Rp3,114,704
56	Rp53,936,885,905	Rp5,567,086	Rp3,116,326
57	Rp57,518,193,822	Rp5,589,875	Rp3,117,947
58	Rp61,400,172,308	Rp5,615,591	Rp3,119,569
59	Rp65,582,140,315	Rp5,644,059	Rp3,121,190
60	Rp70,063,433,526	Rp5,674,865	Rp3,122,812

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
30%	1,25%	6
Rp0	Rp0	Rp3,082,663
Rp143,514,043	Rp2,076,077	Rp3,082,917
Rp304,294,140	Rp2,648,633	Rp3,083,171
Rp484,844,106	Rp2,822,102	Rp3,083,425
Rp687,506,321	Rp2,890,530	Rp3,083,679
Rp905,303,213	Rp2,932,054	Rp3,083,933
Rp1,137,527,760	Rp2,966,136	Rp3,084,187
Rp1,383,344,410	Rp3,000,020	Rp3,084,847
Rp1,669,413,479	Rp3,036,696	Rp3,085,508
Rp1,994,485,156	Rp3,074,559	Rp3,086,168
Rp2,357,230,931	Rp3,113,067	Rp3,086,828
Rp37,476,867,744	Rp5,338,926	Rp3,115,682
Rp39,769,603,122	Rp5,386,327	Rp3,116,952
Rp42,234,623,695	Rp5,434,578	Rp3,118,222
Rp44,871,266,763	Rp5,485,225	Rp3,119,492
Rp47,678,896,234	Rp5,537,461	Rp3,120,762
Rp50,656,876,049	Rp5,565,592	Rp3,122,387
Rp53,936,849,976	Rp5,586,965	Rp3,124,013
Rp57,518,156,775	Rp5,609,911	Rp3,125,639
Rp61,400,134,092	Rp5,635,781	Rp3,127,264
Rp65,582,100,885	Rp5,664,409	Rp3,128,890
Rp70,063,392,835	Rp5,695,379	Rp3,130,515

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
30%	2%	6
Rp0	Rp0	Rp3,101,627
Rp143,514,043	Rp2,085,634	Rp3,101,882
Rp304,294,140	Rp2,664,896	Rp3,102,138
Rp484,843,494	Rp2,841,380	Rp3,102,393
Rp687,504,645	Rp2,911,069	Rp3,102,649
Rp905,300,217	Rp2,953,197	Rp3,102,904
Rp1,137,523,294	Rp2,987,660	Rp3,103,160
Rp1,383,338,370	Rp3,021,854	Rp3,103,824
Rp1,669,405,907	Rp3,058,837	Rp3,104,489
Rp1,994,476,082	Rp3,097,013	Rp3,105,153
Rp2,357,220,374	Rp3,135,839	Rp3,105,818
Rp37,476,792,069	Rp5,385,373	Rp3,134,849
Rp39,769,525,220	Rp5,433,436	Rp3,136,127
Rp42,234,543,486	Rp5,482,322	Rp3,137,404
Rp44,871,184,171	Rp5,533,613	Rp3,138,682
Rp47,678,811,185	Rp5,586,504	Rp3,139,960
Rp50,656,788,469	Rp5,615,172	Rp3,141,596
Rp53,936,759,718	Rp5,636,989	Rp3,143,231
Rp57,518,063,702	Rp5,660,333	Rp3,144,867
Rp61,400,038,080	Rp5,686,595	Rp3,146,502
Rp65,582,001,814	Rp5,715,624	Rp3,148,138
Rp70,063,290,593	Rp5,747,007	Rp3,149,773

Time	Fintech P2P Lending	Lender	Borrower
	Profit	Return	Repayment
	30%	0,95%	12
0	Rp0	Rp0	Rp2,864,369
1	Rp143,514,043	Rp2,836,820	Rp2,864,605
2	Rp304,294,140	Rp4,061,235	Rp2,864,841
3	Rp484,795,388	Rp4,608,866	Rp2,865,077
4	Rp687,364,351	Rp4,873,554	Rp2,865,313
5	Rp905,037,891	Rp5,021,592	Rp2,865,549
6	Rp1,137,119,653	Rp5,120,791	Rp2,865,785
7	Rp1,382,780,232	Rp5,201,548	Rp2,866,399
8	Rp1,668,695,692	Rp5,279,115	Rp2,867,012
9	Rp1,993,615,757	Rp5,356,046	Rp2,867,626
10	Rp2,356,211,198	Rp5,433,260	Rp2,868,240
50	Rp37,468,750,765	Rp10,992,967	Rp2,895,050
51	Rp39,761,216,214	Rp11,158,125	Rp2,896,230
52	Rp42,225,955,315	Rp11,318,719	Rp2,897,410
53	Rp44,862,305,856	Rp11,480,886	Rp2,898,590
54	Rp47,669,631,941	Rp11,645,503	Rp2,899,770
55	Rp50,647,297,558	Rp11,771,353	Rp2,901,281
56	Rp53,926,937,324	Rp11,878,991	Rp2,902,791
57	Rp57,507,891,257	Rp11,980,448	Rp2,904,301
58	Rp61,389,498,222	Rp12,081,395	Rp2,905,812
59	Rp65,571,078,065	Rp12,184,342	Rp2,907,322
60	Rp70,051,967,088	Rp12,290,248	Rp2,908,833

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
30%	1,25%	12
Rp0	Rp0	Rp2,871,955
Rp143,514,043	Rp2,840,643	Rp2,872,191
Rp304,294,140	Rp4,068,937	Rp2,872,428
Rp484,795,143	Rp4,619,230	Rp2,872,664
Rp687,363,593	Rp4,885,544	Rp2,872,901
Rp905,036,412	Rp5,034,560	Rp2,873,138
Rp1,137,117,306	Rp5,134,376	Rp2,873,374
Rp1,382,776,914	Rp5,215,561	Rp2,873,990
Rp1,668,691,402	Rp5,293,473	Rp2,874,605
Rp1,993,610,502	Rp5,370,715	Rp2,875,220
Rp2,356,204,979	Rp5,448,227	Rp2,875,835
Rp37,468,695,436	Rp11,036,516	Rp2,902,717
Rp39,761,158,815	Rp11,202,877	Rp2,903,900
Rp42,225,895,743	Rp11,364,625	Rp2,905,083
Rp44,862,244,011	Rp11,527,931	Rp2,906,266
Rp47,669,567,725	Rp11,693,689	Rp2,907,449
Rp50,647,230,872	Rp11,820,565	Rp2,908,964
Rp53,926,867,996	Rp11,929,140	Rp2,910,478
Rp57,507,819,126	Rp12,031,463	Rp2,911,993
Rp61,389,423,135	Rp12,133,234	Rp2,913,507
Rp65,570,999,874	Rp12,236,985	Rp2,915,022
Rp70,051,885,652	Rp12,343,691	Rp2,916,536

Fintech P2P Lending	Lender	Borrower
Profit	Return	Repayment
30%	2%	12
Rp0	Rp0	Rp2,890,918
Rp143,514,043	Rp2,850,200	Rp2,891,157
Rp304,294,140	Rp4,088,220	Rp2,891,395
Rp484,794,531	Rp4,645,204	Rp2,891,633
Rp687,361,698	Rp4,915,621	Rp2,891,871
Rp905,032,710	Rp5,067,108	Rp2,892,109
Rp1,137,111,426	Rp5,168,484	Rp2,892,348
Rp1,382,768,593	Rp5,250,754	Rp2,892,967
Rp1,668,680,644	Rp5,329,540	Rp2,893,586
Rp1,993,597,316	Rp5,407,567	Rp2,894,205
Rp2,356,189,373	Rp5,485,829	Rp2,894,825
Rp37,468,556,241	Rp11,146,395	Rp2,921,884
Rp39,761,014,399	Rp11,315,812	Rp2,923,075
Rp42,225,745,845	Rp11,480,492	Rp2,924,266
Rp44,862,088,376	Rp11,646,692	Rp2,925,457
Rp47,669,406,104	Rp11,815,350	Rp2,926,648
Rp50,647,063,015	Rp11,944,835	Rp2,928,172
Rp53,926,693,471	Rp12,055,793	Rp2,929,696
Rp57,507,637,522	Rp12,160,321	Rp2,931,221
Rp61,389,234,062	Rp12,264,191	Rp2,932,745
Rp65,570,802,961	Rp12,369,988	Rp2,934,270
Rp70,051,680,540	Rp12,478,729	Rp2,935,794

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