# BUSINESS PLAN TO DEVELOP SMART LENDING IN CONSUMER FINANCE COMPANIES IN VIETNAM

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**Abstract**

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**Business Plan to Develop Smart Lending for Consumer Finance Companies in**

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Abstract

The thesis is developed with the main research question of how to develop a smart lending system for consumer finance companies in Vietnam?". Currently, consumer lending in Vietnam has been blooming recently. The next stage of development in Vietnam consumer lending market is the application of new technologies to reduce KYC and approval time from days to minutes. This system also allows consumer finance companies to expand the market share by acquiring more customers without the need of opening physical branches or sale channels.

However, smart lending solution is still in early development in Vietnam and not so many consumer financial companies have heavily invested into this solution. In the contrast, they are still relying on manual and traditional lending process whether the customers still have to connect to branches or transaction offices in order to fill application forms and submit.

To develop a smart lending system, it requires strong joint-effort between different government bodies, the strengthen in human resource quality, the advancement of know-how, smoother integration between smart lending system and other banking system, the application of advanced biometric technologies and the leverage of using artificial intelligence and machine learning in credit risk modelling as well as in detecting fraudulent intentions.

Keywords

Smart Lending, Consumer Finance, Big Data, Biometric, Risk Management

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# 1 INTRODUCTION

## 1.1 Research background

Vietnam has been in the process of reforming its banking industry (Leung 2009, 44). Average credit growth of this industry was 13.57% in the last 3 years. Credit growth in 2016, 2017 and 2018 was 10.46%, 16.96% and 13.30% (General Statistics Office 2019). Currently, Vietnam's banking industry is being governed by State Bank of Vietnam (SBV) and system of credit institution is divided into banks, non-bank credit institutions, micro-finance institutions, foreign banks branches, and representative offices of foreign banks (State Bank of Vietnam 2019). The second layer of system of credit institution is further divided into commercial banks, policies bank, cooperative banks, consumer finance companies, leasing companies, etc. At the end of 2018, total asset of overall Vietnam's banking system was VND11,064 trillion, increased by 10.62% compared to 2017 (State Bank of Vietnam 2019). Total regulatory capital was also increased by 12.89% to VND806 trillion. The report also mentioned about the ratio of short-term finding used for medium- and long-term loans that was kept under 30%. Among different entities in Vietnam's system of credit institution, the most profitable entity is consumer finance companies with returns on asset (ROA) and returns on equity (ROE) was stood at 3.02% and 13.83% in the end of 2018. Joint-stock commercial banks only achieved ROA and ROE at 0.76% and 9.88% at the same time. It is captured that ROA and ROE of consumer finance companies were much higher than ROA and ROE of the whole Vietnam's banking system which were stood at 0.70% and 9.06%. Such achievement of consumer finance companies is more impressive since the number of consumer finance companies is only 16 while the number of joint-stock commercial banks is 31 (State Bank of Vietnam 2019).

The main reason for further development of consumer finance companies comes from the fact that Vietnamese people are earning more, evidenced through the growing of middle class (Nguyen, Le, Bui & Ly 2010, 1; PwC 2017, 12). Indeed, it is estimated that the total number of people in middle class who have monthly income more than EUR 473 will be 33 million by 2020 and average income per capita of Vietnamese people will be increased from EUR1,271 to EUR3,087, fostering the demand of products and services (UOB 2018, 3). Consumer lending in Vietnam has been blooming with its growth rate is more than 60% and total consumer lending explore reached EUR47 billion in 2017 (PwC 2018, 14). Consumer lending also accounted for 58% of Vietnam's GDP which is much higher than

average percentage in other countries in ASEAN (Fitch Ratings 2019, 3). Furthermore, consumer lending is still having significant room for further development since banking penetration of the country was 33% which was lower than average ratio of middle-income countries of 60% (Fitch Ratings 2019, 3).

## 1.2 Research objective

The development of consume lending in Vietnam has been facing with some challenges. The first and foremost important challenge is high bad debt ratio. Debt ratio in the country's system of credit institution increased from 1.910% to 2.020% from Quarter 4/2018 to Quarter 1/2019 in which the portion of bad debt cases from consumer lending portfolio is high (State Bank of Vietnam 2019). The strong growth of consumer lending also attracts many players. Currently, there are 16 consumer finance companies in Vietnam. The market leader is FECredit which is son-company of Vietnam Prosperity Joint-stock Commercial Bank (VPBank) with its market share of 50% (Vietnam Investment Review 2019). Other players like Home Credit and HD Saison also consumed significant market size (FiinGroup 2019, 4).

The competition among players in Vietnam's consumer finance market leads to the concern of which these players can reduce the risk appetite, or they agree to give credit to high risk customers. In addition, when there are many players in the market, each player must find new way to grow their lending portfolio. For example, FECredit is now in the digitalization process with the introduction of $NAP which is a mobile application to help the customers to submit consumer loans request online (Vietnam Investment Review 2019). In fact, many Vietnamese people are unable to access to financial services due to some financing barriers, including high cost, far away to location of consumer finance companies or banks, or there is too much paperwork to complete one loan request (Vietnam Investment Review 2018).

To overcome these financing barriers, consumer finance companies should digitize their lending process to make simplifier workflow to the customers. On the other hand, it means that consumer finance companies in Vietnam must develop and implement a smart lending system which help them to approach the customers in the most convenience ways and the time of processing one loan request is minimized as much as possible while the borrower's risk assessment is still being maintained.

## 1.3 Research aim, research objectives, research questions

Consumer finance companies in Vietnam are faced with high bad bet ratio, the competition between current players leads to relaxation in lending policies, and some other financing barriers (i.e. a lot of papers works, the customers are located far away from the branches, and high interest rate). To overcome these challenges, consumer finance companies must design a smart lending system which help them to find good customers and therefore achieving sustainable development in their lending activities. It is also considered as the main aim of the research study.

To support the research's aim above, the first research objective is proposed as collecting necessary understandings about smart lending system. This research objective can be fulfilled through the collection of some successful business case of developing and implementing smart lending system in other countries. The second research objective refers to the evaluation of how smart lending system is applicable in Vietnamese market. This objective is fulfilled through in-depth interviews with some finance experts. The third research objective is designing a business plan in which different parts of smart lending system are proposed along with the implementation plan.

Primary question:

- "How to develop a smart lending system for consumer finance companies in Vietnam?".

Sub questions:

- What is the current situation of consumer lending in Vietnam?
- What smart lending solution is available in the market?
- How consumer finance companies in Vietnam can develop a smart lending system?

## 1.4 Research scope

The research concentrates on Vietnam's consumer finance market. Key topic is about smart lending system development and implementation for the market. In-depth interviews will be conducted during November 2019 with the participation of some finance experts in consumer finance companies in Vietnam.

Before the research study is developed, some limitations are highlighted. The first limitation refers to the choice of in-depth interviews to understand how smart lending system is suitable in Vietnam's consumer finance market. The data which is collected from in-depth interviews is only reflecting individual ideas and it may not be presented for the whole market development. The second limitation refers to the choice of smart lending systems in other countries that may not be suitable for Vietnam in real-life context.

## 1.5 Practical relevance and dissemination

After the research study is conducted and approved, final version will be uploaded into the school's electronic library so that other people can access to use it as reference for their researches. The research study provides key information related to the functions of smart lending system as well as possible implementation plan for consumer finance companies in Vietnam.

The research study may have some dissemination. For example, the interview-based data is highly subjective, or the research study only focuses on smart lending system in consumer finance companies. On the other hand, future research studies can be developed to check whether smart lending system can be applicable for the banks or other financial institutions in Vietnam.

## 1.6 Research methodology

### 1.6.1 Research design

In the study, the process used to achieve resolving aim and objective is as below:

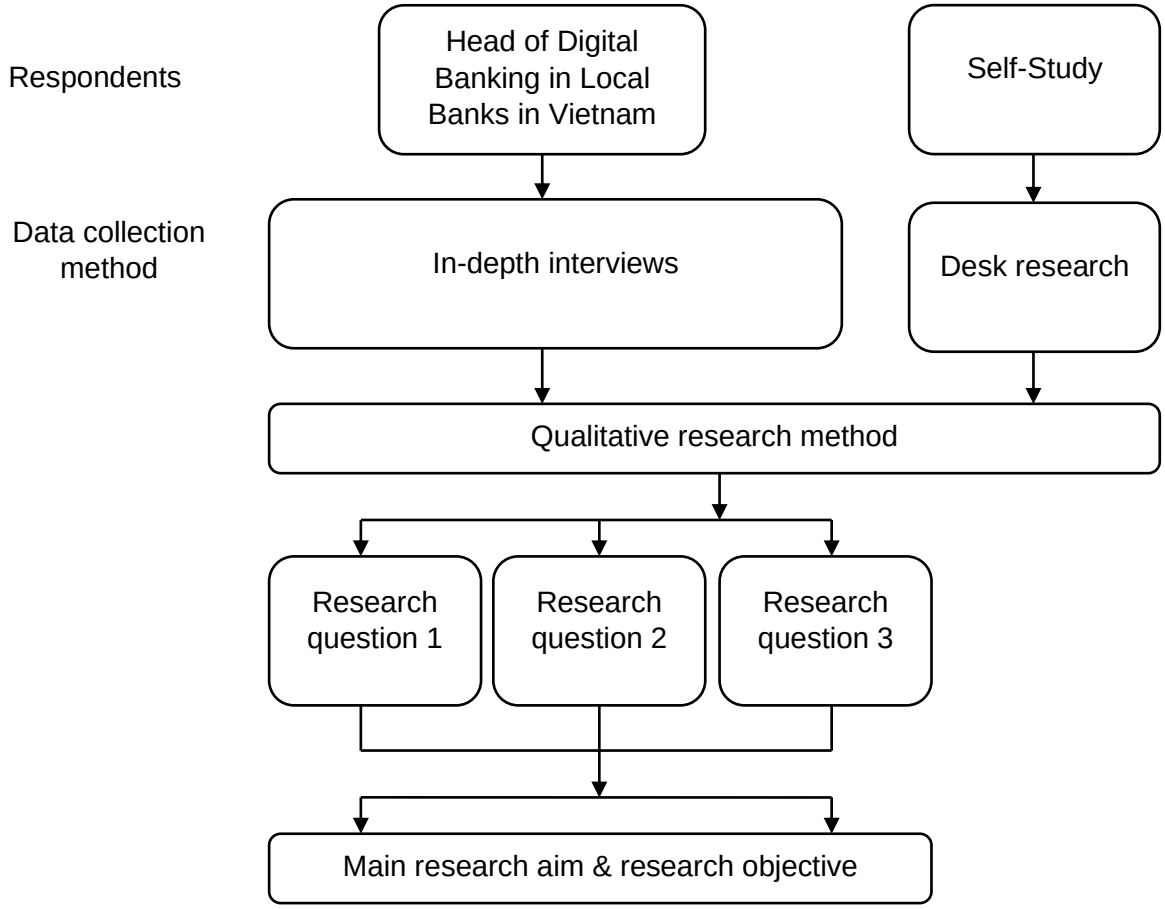


Figure 1 Research framework

A research framework is developed in which 3 research questions will be answered in order to fulfill main research aim and research objective. Qualitative research method will be selected in the research study. It consists of in-depth interviews and desk research. In-depth interviews are conducted with the participation of some experts who are working for different banks in Vietnam. Self-study is conducted to make a desk research. The most important part is to conduct in-depth interviews and the information which is extracted from interview sessions.

### 1.6.2 Research method

There are two research methods, namely quantitative and qualitative. Quantitative method is adopted when the main objective of a research is to evaluate the effect between variables and input data is numerical (Saunders et al.2016). Qualitative method, however, is suitable

if input data is non-numerical and the main objective is to clarify some aspects of social phenomenon or business case study or organizational aspects (Denzin and Lincoln, 2018).

In this study, qualitative method is more suitable. It is because of the author attempts to conduct in-depth interviews with some experts who have good knowledge and experience of Vietnam's consumer finance market. Furthermore, the main objective is to provide a business plan to develop a smart lending system for consumer finance companies in Vietnam. This business plan cannot be based on mathematical calculation but the argument and using primary/secondary data as verification.

### 1.6.3 Data collection

Primary data will be collected from in-depth interviews with some experts in consumer finance companies in Vietnam. Expected sample size for in-depth interviews is 5 experts. According to Dworkin (2012), in-depth interviews demand for at least 5 participants. Moreover, the names of all experts will not be disclosed to avoid the privacy leaked. In this research study, in-depth interviews will be conducted through Internet application-based interview method. It is denoted that some interviews demand the interviews through Skype or some other requires other software such as Zalo, Viber, Telegram or WhatsApp etc. The researcher will book in advance to meet the experts who are willing to join into the interview process. After the interviews are conducted, the researcher will collect key information to provide the analysis. It means that there is no budget required for developing this research study. After the interviews are conducted, the author consolidates the notes during the interviews to identify the similarities and the differences in the experts' answers.

Secondary data refers to the information achieved from books, journals and other reports about smart lending system and current situation in Vietnam's consumer finance market. The researcher will collect the data from the Internet. It consists of journals, document papers, and local newspapers reports to capture current situation of Vietnam's consumer finance, digital lending and how smart lending systems in other countries. All documents which are used in the research study are cited carefully and they will be stated in Reference section.

### 1.6.4 Interview questions development

In this section, interview questions are proposed. There are 7 interview questions to be developed. In which, the first research question is answered through 3 interview questions.

The second research objective is answered through the next 3 research questions while the last research question is addressed by a direct question. Each interview is expected to last 90 minutes. It is summarized in the table below:

Table 1 Interview questions

| Research questions | Interview questions | Expected time to answer for each expert |
|---|---|---|
| What is the current situation of consumer lending in Vietnam? | 1.1. Would you provide the key positive result of consumer lending in Vietnam?<br>1.2. Would you provide the key negative result of consumer lending in Vietnam?<br>1.3. What is your opinion about the next development trend of consumer lending in Vietnam? | 15 minutes |
| What smart lending solution is available in the market? | 2.1. How many banks or consumer finance companies or financial institutions have already implemented smart lending system in Vietnam?<br>2.2. What are the technologies banks or consumer finance companies or financial institutions applied for smart lending system in Vietnam? Let discuss about biometric, big data, credit risk development, chatbot, mobile-based application.<br>2.3. What are your main concerns of smart lending system in Vietnam? | 30 minutes |
| How consumer finance companies in Vietnam can develop | 3.1. Would you please provide your opinions related to smart lending system implementation in for banks or | 15 minutes |

| | | |
|---|---|---|
| a smart lending system? | consumer finance companies or financial institutions in Vietnam? | |
| Total | | 60 minutes |

Table above is developed by the researcher and it emphasizes the questions used in in-depth interview. The first interview question is "Would you provide the key positive result of consumer lending in Vietnam?" and it is designed to answer the research question of what the current situation of consumer lending in Vietnam is. This research question is also answered through asking the experts about the key negative result of consumer lending in Vietnam and about the next development trend of consumer lending in Vietnam. The second research question "What smart lending solution is available in the market?" will be answered through 3 different interview questions to the experts and these interview questions aim to identify how many banks or consumer finance companies or financial institutions have already implemented smart lending system in Vietnam, their technologies used and the main concerns. The last research question "How consumer finance companies in Vietnam can develop a smart lending system?" will be answered through the last interview question and the experts will provide some opinions related to smart lending system implementation in for banks or consumer finance companies or financial institutions in Vietnam.

After the data is collected, content analysis will be utilized in the research study. It will be applied for the primary data which is collected from in-depth interviews with different experts. This analysis requires the identification the similarities and the differences in the experts' opinions. The tendency in the experts' answers is identified and it is based on how many experts provide the same opinions. The, the consolidation of the experts' opinions is made to ensure that all key findings are identified.

## 1.7 Research structure

The research study has 5 sections:

The first section provides some information related to the Vietnam's banking industry and the need of developing new lending system. Research aim, objective, and questions are proposed in this chapter. This section provides scope of the research as well as practical relevance and dissemination.

The second section will explore the concept of smart lending. It consists of business examples of applying smart lending in the global context. The most important part is to examine

the technologies applied for smart lending system. Key technologies will be introduced through a real application in financial institutions in the global context.

The third section discusses about the research methodology. It refers to the choice of research design and research method. This section also explores the types of data that will be collected to achieve research aim, to meet research objectives and to answer research questions.

The fourth section focuses on the analysis of data collected from in-depth interviews with the experts. Content analysis will be applied to detect the similarities and the differences in the experts' opinions.

The last section summarizes key findings in previous chapters. Then, some recommendations will be proposed to help banks, consumer finance companies and other financial institutions in Vietnam's banking industry can develop and implement smart lending system.

# 2 LITERATURE REVIEW

## 2.1 Understanding of smart lending system

Smart lending system is defined by different ways. Accion Insights 2018, 2 defined a smart lending system as a financial technology which are integrated with banking know-how to help the customers to find suitable loans, to allow the customers to download lending applications, to make a decision of a loan request within minutes, to enable the loan repayment through electronic payment system, and to provide the customer service and support through chat and call centre. Other definition of smart lending system was highlighted by Milone 2019, 11 in which it refers to a data-based screening technology and the use of the data to derive financial decisions. The Boston Consulting Group 2018, 1 defined a smart lending system as an electronic machine and software which utilize big data to completely automates underwriting of loans.

Smart lending is very new lending practice which have been developed for the last few years. There are some business examples which prove smart lending system is the future of banking and financial industry. In this section, there are two business examples of successful smart lending system. One is from ThetaRay in U.S. and other is from Alibaba in China. ThetaRay is a smart lending system in New York. The main objective of ThetaRay is to address the main challenge in banking and financial industry that is to increase loan acceptance rates without compromising risk levels. This smart lending system is applied in one bank in US and improved the bank's gross profit by two times while loan acceptance rate was improved by three times, but bad debt ratio was still lower than traditional approval method.

There are also other business examples which proves the success of the smart lending system and it refers to the case of MYBank. During 2019, a success story of using smart lending system in China was published and it refers to online banking which was initiated by Jack Ma, the founder of Alibaba. This smart lending system allows people to apply loan requests through their smartphones. The customers can make a few taps on their smartphones and instantly receive the approval results. This smart lending system has been adopted in MYBank with two core functions, including real-time payment data and risk management system. By July 2019, MYBank has provided credit to more than 16 million small companies in China with total credit outstanding of EUR 361 billions. The success of this smart lending system in MYBank is affirmed through the fact that it has bad debt ratio

around 1% that is much lower than China's average bad debt ratio of 1.74%. The key successful factors of smart lending system in MYBank consists of the tapping on social credit system, the leverage of big data, and the application of technologies. Social credit system has been developed and tested in China to monitor the attitude of the citizen and this data is combined of many small datasets which are extracted from social media, banking account activities, payment system, etc. Big data refers to more than 3,000 variables to be collected per one customer which help risk management tools to verify the creditworthiness of the customer. MYBank also invests into technologies like strong hardware and integrated software functions to perform loan approval process. The approval rate for one customer is four time higher than traditional loan approval process.

## 2.2 Technologies applied in smart lending system

### 2.2.1 Big data

The most common way to describe big data is through its four data characteristics, namely variety, volume, veracity and velocity (Singh, Singh, Garg & Mishra 2015, 4633). In which, variety refers to the difference data sources, volume refers to large amount of data, veracity refers to the high uncertainties of the data or data quality, and velocity refers to the data generation and processing speed (Beyer & Douglas 2012, 1; IBM 2015, 1). Other definitions of big data were provided by other researchers or organizations. For example, big data is defined as very large data amount which cannot be processed through normal data processing tools (Padden 2012, 3). It is also defined as the amount of data with amount exceeding the capability of system to store and to process efficiently (Kaisler et al., 2012). Big data records both structured and unstructured data so that it cannot be processed through traditional software (Demchenko, Grosso & de Laat 2013, 4). Some different types in big data are images, audio, videos, transaction, experiment result and details, data log, data events, etc. (Schroeck, Shockley, Smart, Morales & Tufano, 2012, 11).

To use big data effectively, there are some techniques or system architectures to be utilized. The first one is named as Hadoop Framework (HF) which is defined as open source project for processing big data (Apache Hadoop 2019, 1). The key data processing technique of HF is multiple clustering and different programming models in simple ways. It is being used by many famous global companies like Adobe, Google, LinkedIn, Yahoo, etc. HF framework is illustrated as below:

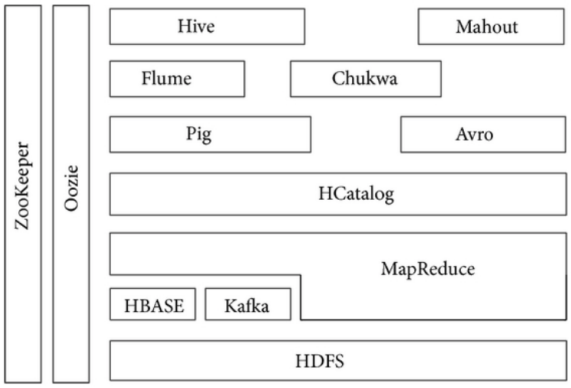


Figure 2 Hadoop Framework

Source: Alexandru, Alexandru, Coardos & Tudora 2016, 1733

The cores of HF are Hadoop Distributed File System (HDFS) and a framework for distributed processing (MapReduce). The objective of HDFS is to avoid the issues during data processing and it is done through the copying of data to different physical data processing equipment. MapReduce consists of two different modules, including Map and Reduce. Map module allows different data part or data issue is processed independently while Reduce module refers to the data consolidation from different data part after Map module process. In addition, HF consists of other important elements. HBase element is used for random read/write operations and this task is processed through either client database or master database or regional database. YARN is other element of HF that is developed to monitor resource allocation and data governance. HIVE is defined as a platform to store the data and data query is based on SQL language. PIG is used in MapReduce and it has more flexible data query compared to SQL and therefore it is suitable with semi-structured data. MATHOUT is machine-learning (ML) algorithms that are used for different stages in HF. AVRO is developed to serialize the data by transforming one program language to another. OOZIE refers to workflow management in HF. CHUKWA is an element which is developed to monitor distributed system resources. FLUME is designed to manage data logs in large scale. ZOOKEEPER is developed to help HF to integrate with other system. Beside of main elements, HF has some drawbacks, including long loading time, no supports to scheduled tasks, and it requires high memory and big storage (Arora & Goyal 2015, 2).

### 2.2.2 Biometric verification

Biometric verification is the second technology which is used in smart lending. It is defined as the techniques which are used to verify a living person through his/her bio-characteristics in bother physiological and anatomic perspectives (Holyst & Pomykala 2011, 418). Key biometric technologies are developed for detecting and verifying fingerprints (FR), hand geometry (HR), retina (RR), iris (IR), face (FAR), signature (SR) and voice (VR) (Lewandowski 2017, 5). However, each biometric technology has strengths and weaknesses. Prabhakar, Pankanti & Jain 2003, 33-42 provided the comparison between these biometric technologies as below:

Table 2 Comparison between different biometric technologies

| Item | FR | HR | RR | IR | FAR | SR | VR |
|---|---|---|---|---|---|---|---|
| Use volume | Large | Large | Small | Medium | Medium | Large | Large |
| Error issues | Dry skin, Soiling, Aging | Hand lacera-tion | Glasses | Lighting condi-tion | Lighting condi-tion, glasses, hair change | Change of sig-nature | Noise around |
| Accuracy | High | High | Very high | Very high | High | Very high | High |
| Acceptabil-ity | Medium | Medium | Me-dium | Medium | Medium | Very High | High |
| Security | High | Medium | High | Very high | Medium | Me-dium | Me-dium |
| Stability | High | Medium | High | High | Medium | Me-dium | Me-dium |

Source: Prabhakar et al. 2003, 33-42

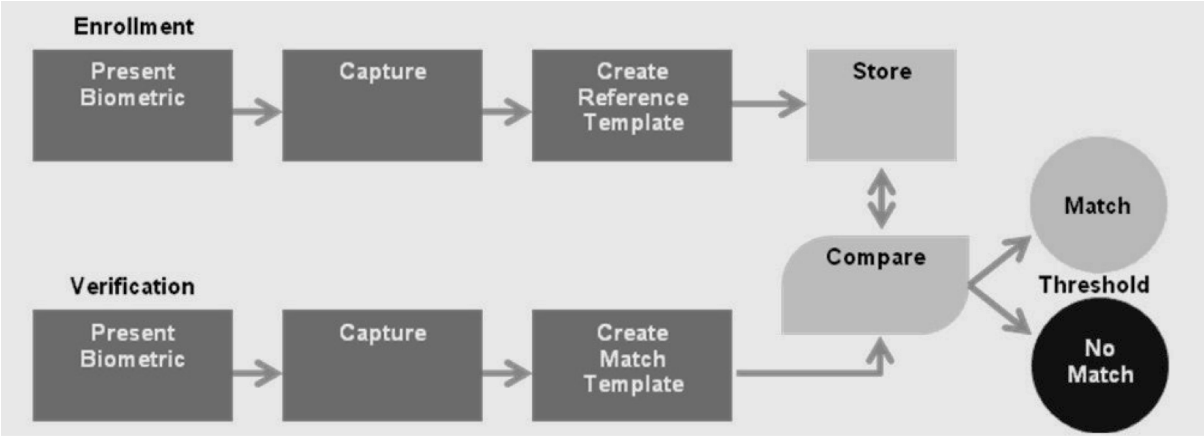


Figure 3: Biometric verification process

Source: Yadav 2013, 124)

Biometric system consists of two parts: one is enrollment and other is verification. Enrollment requires the customers to present their biometrics and they will be captured, marked a reference and stored in the system. Verification process requires the customers to provide the evidence of their biometrics and the system conducts the comparison to return either matched or not matched. Currently, biometrics are applied in many different areas such as checking the employees' background, enhancing transaction security, remote banking solutions, etc. (Yadav 2013, 124). Many giant companies in the globe have been using biometric verification. For example, Samsung allows their customers to use iris scanning to verify transaction, HSBC allows the customers to blink their eyes in front of selfie camera, etc. (KPMG 2019, 2). Consult Hyperion 2017, 1 provided the suitability of each biometric in financial services. It is highlighted that both fingerprint, voice and face are implemented at low cost and easy to deploy. Both biometrics are useful in case of conducting online transactions, accessing to automate cash machine, and remote payments. Other biometric like iris scanning brings high accuracy but it requires specific devices and it is not applicable for individual customers since not all of them have the devices to scan their iris. Consult Hyperion 2017, 2 also highlighted two other biometric technologies for palm vein and finger vein which have better accuracy compared to fingerprint and face of the customers but they both require specific reader equipment so that it is limited in deployment.

### 2.2.3 Risk management with artificial intelligence (AI) and machine learning (ML)

Recently, risk management with the application of AI and ML has been gaining much attention from risk managers (Siddiqi 2019, 11). Empirical evidence from Petropoulos,

Siakoulis, Stavroulakis & Klamargias 2018, 21 confirmed that credit risk forecasting accuracy on 3-years portfolio was much better with Deep Neutral Networks and Extreme Gradient Boosting techniques as supported by ML when comparing to traditional credit risk modeling techniques such as logistics regression or linear discriminant analysis. Khandani, Kim & Lo 2010, 3 emphasized that AI and ML boosted correlation coefficient to 85% and it saved 6%-25% of total credit losses for the banks. The core of AI and ML application in risk management is based on big data whether financial institutions must be relied on big amount of data in different data sources to develop a robust credit risk model (Khandani et al. 2010, 3). The availability of big data allows credit risk modelers to develop more sophisticated models in which input data is analyzed through different layers before it returns the prediction of credit worthiness of the borrowers (Bazarbash 2019, 1).

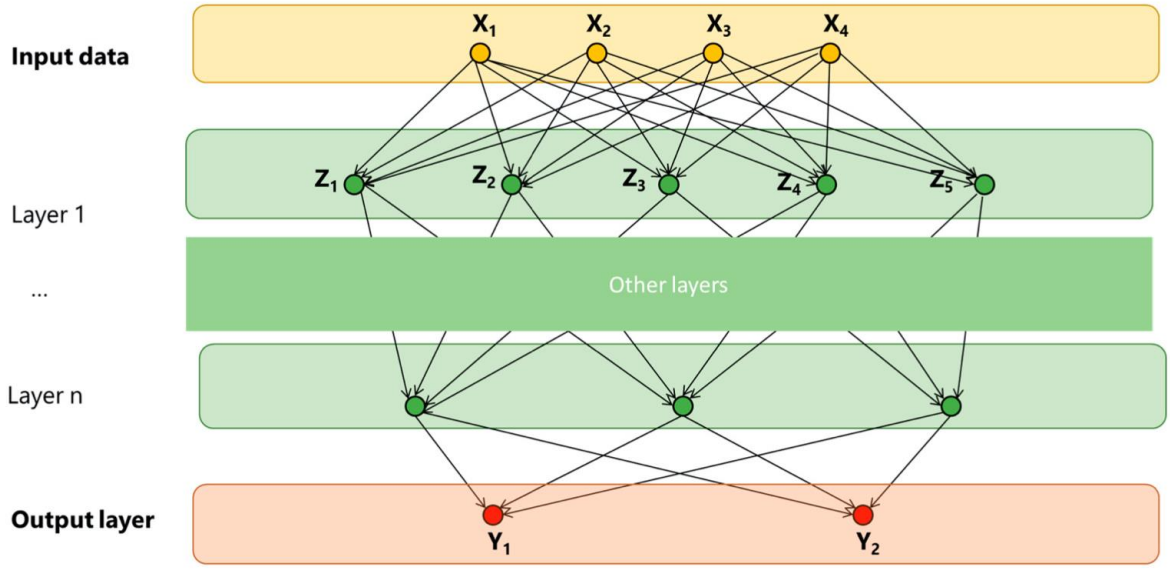


Figure 4: Process of predicting risk factor using AI and

Source: Bazarbash 2019, 23

### 2.2.4 Auto call or chatbot

The next technology which is put into the discussion is auto-call or chatbot. It is considered as a new communication tools in business today (Heo & Lee 2018, 41). It is being applied in different business types, i.e. shopping, goods delivery. The main benefit of chatbot is to allow the companies to keep contact with the customers anytime (Okuda & Shoda 2018, 1).

In real life business, chatbot of Sony Bank is a business example and it was implemented and has been going to the operation since August 2017. The core technology of chatbot is chat screen between chatbot and the customers and script creation screen. To develop chat-bot, Sony Bank gathered all customers' frequent ask questions to a library and used ML to analyze the data pattern. Other technology used in chatbot is thesaurus generation function which is developed to generate better chat conversation based on keywords provided by the customers as well as the similarities between keywords and other keywords in percent-ages.

### 2.2.5 Mobile-based application for agent management and customer self-services

The last technology which is discussed in the research study is mobile-based application for agent management and customer self-services. The customers in banking and financial industry has changed their behavior from visiting to physical branches to online services (BCG 2013, 7). Case studies were examined and it was identified that 40% of the custom-ers use online channels for sales and advice while 60% of the customers use Internet and mobile connection to buy services and to conduct transactions (BCG 2013, 4).

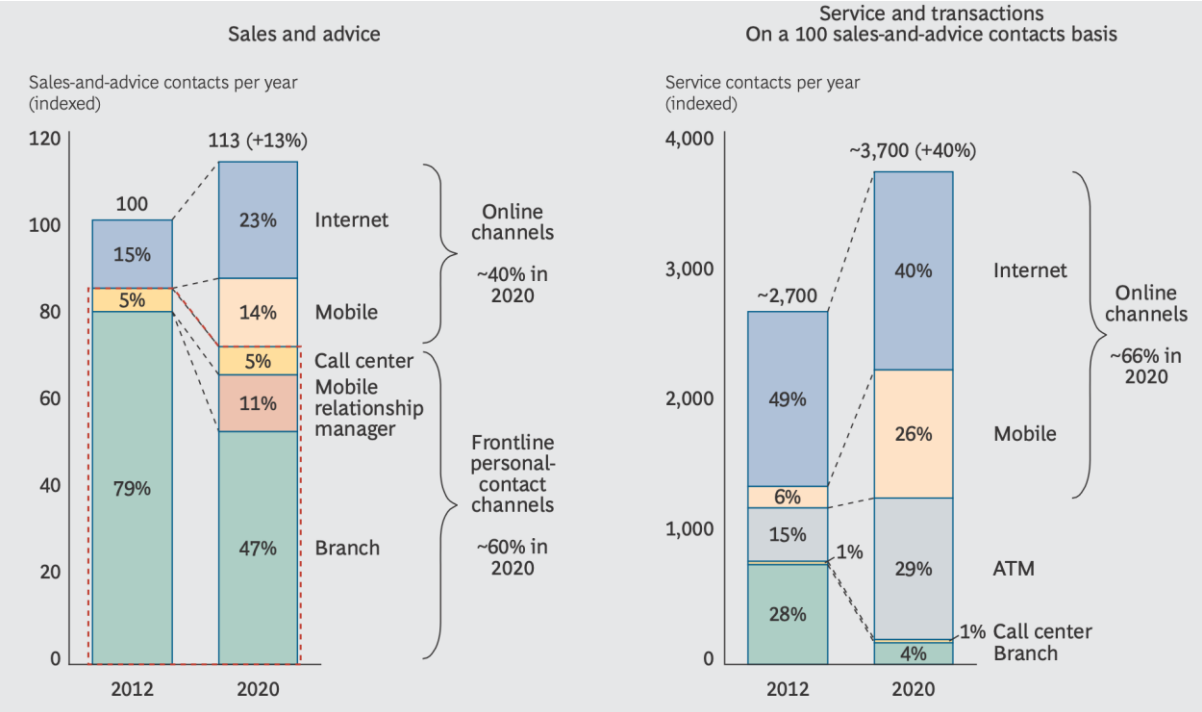


Figure 5: Development trend of customer relationship management in financial industry

Source: BCG 2013, 5

Given to this circumstance, the need of developing mobile-based application for manage customer relationship is becoming importance. For example, a self-lender application is developed with the establishment of digital credit building community which allows the customers to self-apply their loans applications (JPMorgan Chase 2019, 1). The development of this application is not only for retaining customer relationship but also managing the sale agents.

# 3 ANALYSES AND FINDINGS

## 3.1 Key positive results in consumer lending in Vietnam

The first part of this chapter is to explore the key positive results achieved in Vietnam's consumer lending market. This section is addressed through the interview question 1.1 to 5 experts. It is recapped that the experts are working in different consumer lending companies such as FE Credit, Home Credit, MB Shinsei and SHB Finance. They are holding the key roles in term of information technology and innovation centers of these companies. Therefore, they have rich experience in term of the market knowledge and the application of various information technologies to their organizations' operations. Regard the privacy setting, the names of 5 experts will not be disclosed and the researcher utilizes capital letters to name the experts such as Expert A, Expert B, etc.

The first expert (A) said that consumer lending has been blooming in Vietnam recently with about 16 companies. Expert B said that the development of consumer lending in Vietnam is obvious since it brings the more convenience to disburse the loans to requesters in the market. He further addressed that there are 16 companies in the market and biggest company is FE Credit with the market share is expected at 50%. Expert C also confirmed this content. He denoted the participation of foreign investors in Vietnam consumer lending market. For example, Home Credit is 100% foreign invested company while MB Shinsei is the collaboration between a local big commercial bank (Military Bank) and Japanese investors. Expert D highlighted that the presence of foreign investors in the market brings a value to local consumer finance companies since they have better experience in term of developing backend system and the policies related to product development and risk controlling for consumer finance market. Expert E provided some statistics figures related to consumer lending market in Vietnam. He said that FE Credit and Home Credit are now taking the market lead with about 70% of the market share and they appear in almost provinces and cities of Vietnam, offering small unsecured loans the individuals. They are even providing credit card and offering other financial solutions such as payment method, personal insurance services, etc. In fact, the development of consumer lending in Vietnam brings higher financial accessibility to people, especially those who could not fulfill all the requirements from the commercial banks to get a loan (Expert C). Moreover, the consumer finance companies have flexible disbursement amount, ranging from VND 5 million to VND 300 million so that it fits various loan requests. A successful story of FE Credit and

Home Credit is sourced from the fact that both of them focused on the installment to the customers who want to get a financial support when they purchase home appliances and motorbikes. Then they gradually take the market share by expanding to different lending products such as cash loan and credit card. It is said that personal loan for consumption purposes is very high in Vietnam, especially when the country has more than 95 million people and the population structure is quite young so that the demand for consumption is high (Expert A). The development of consumer lending in Vietnam also helps to reduce high financial inclusion, as affirmed by Expert A, B and D. For example, Expert B denoted that the financial inclusion is the government responsibility since the higher financial accessibility will contribute to the economic development of every nation. Currently, only 30-35% of Vietnam's population is able to access financial services provided by the banks and the establishment of consumer lending companies is considered as additional lending channels to help more people in the cities and rural areas to access financial resources and solutions to support them growing life quality (Expert B and Expert D).

## 3.2 Key negative results in consumer lending in Vietnam

Behind of positive results in consumer lending in Vietnam and its role to the economy, it is believed that this lending channel also consists of some negative impacts. Expert C said that growth rate of consumer lending industry has been slowing down recently, despite the growth rate of more than 50% in 2015-2017. He indicated that the growth rate of this industry was less than 20% in 2018 and 2019 due to the cap in credit growth rate set by State Bank of Vietnam. Expert A further shared high growth rate in consumer lending industry is not sustainable since many players try to compete with others and therefore, they lower the lending requirements with relax lending policies, leading to high risk loss. In fact, the lending interest charged for a consumer loan is very high and it is up to 60-70% per year. Expert B provided similar answer as Expert A. He indicated that the high lending interest rate is to compensate with high operating cost and high credit risk exposure of consumer lending companies. He shared the example of FE Credit. This company is the largest consumer lending company in Vietnam and it requires intensive operational structures to maintain the market share in 63 cities and provinces in Vietnam. FE Credit offers consumer lending products to the customers with average lending interest rate of 60% but the company has to deal with high loan loss ratio at 25-30% while the operating cost consumes about 20% of the revenues. Expert B believes that most of the consumer lending is not running

sustainable development strategies and they are relying on high lending interest to compensate for their operations and risks. Other negative result in Vietnam consumer lending market was highlighted by other experts. Expert D indicated that the legal framework for the development of consumer lending is still struggling from the State Bank of Vietnam. This organization takes the responsibility of managing the lending market through regulatory framework but they are not well-prepared and issued timely to drive the market development.

The most important issue in consumer lending market was highlighted by all experts. It refers to the lack of application of information technologies. Expert A said that FE Credit is a subsidiary of Vietnam Prosperity Bank and they are integrated with each other to build an eco-lending system whether the customers can choose between the bank's product or consumer lending company's products. The same thing is replicated in case of Military Bank and MB Shinsei or in case of Viet Capital Bank and VietCredit. However, Expert A indicated the synergy is not always smooth since there is no common system to connect the bank and its subsidiary in consumer lending industry. Expert B and Expert E further highlighted the limitation in information technologies applied in consumer lending companies. They said that all consumer lending companies in Vietnam have already built their lending system but the process is not fully automated. On the other hand, entire lending process in consumer lending companies is still much relied on human interference and it leads to higher operating cost, human error impacts and fraud risks. One common fraud risk refers to a situation of the unethical cooperation between sales and approvals to disburse the loans to unqualified customers or the modification in lending applications and information to fraudulently get the loans. Expert E also said that FE Credit and Home Credit are two-leading consumer lending companies in Vietnam to adopt new technologies into lending business. For example, FE Credit recently introduced $NAP as online tool to help the customers apply the loans without going to the branches or transaction offices of lending company. However, FE Credit faced up with high fraudulent activities since bad borrowers try to apply the loans in cheating ways such as faking the documents or images or fraudulences of other people.

## 3.3 The next development trend in consumer lending market in Vietnam

The next discussion of the chapter is about the next development trends in consumer lending in Vietnam, regard recent positive and negative results. All experts affirmed that the

development of consumer lending is undeniable since it helps more people to access financial solutions from consumer lending companies and banks. The next development of this segment in Vietnamese financial industry was discussed with the experts. Expert A, Expert C and Expert D strongly believed that the next development trend in consumer lending market in Vietnam will be driven by leading technologies that have been recently emerged in other emerging economies such as China. In more detail, Chinese lending companies have fully integrated the lending system with automate functions using big data. It helps them to collect the information of a borrower in different dimensions and deep layers so that the customers do not need to key-in a lot of information during Know-Your-Customer (KYC) process. In fact, traditional KYC process has been transformed to electronic KYC (e-KYC) in which the lending companies utilize both structured and unstructured data from many data sources (i.e. telecom data, government data, e-commerce data) to evaluate the risk level of a borrower. Expert C also highlighted that the application of smart lending system in China is good example for the next stage of development in Vietnam consumer lending market in which consumer lending companies in Vietnam must improve their technologies capabilities to reduce manual process with high risks. Expert D indicated about the role of using technologies in term of operating cost reduction. He shared that the application of information technologies does not require the lending companies to open new physical branches since all lending process is automated online. It refers to virtual banking branches where the customers are able to find the loans in lending applications.

Expert B and Expert E provided other opinions about the next development trends in Vietnam. At first, they highlighted the importance of applying biometric verification into lending process. Expert B denoted that FE Credit is now requiring the customers to use their real picture to detect liveness and risk proven. Expert C mentioned about a business case study of TPBank since this bank is offering LiveBank services whether the customers can go a loan machine to apply for ATM cards or completing loan application forms without going to the branches. Home Credit is also in the process of implementing robot calls with AI supports in tele-sale services as well as collection services. Expert B also mentioned about the development of asset matching model (AMM) which helps small consumer finances in funding resources. He further explained AMM as the connection between commercial banks and consumer lending companies in which commercial banks act like funding providers while consumer lending companies plays the role of sale and after-sale services. This model resolves the weakness in finding large funding resources from

consumer lending companies since the funding resources are extracted from commercial banks. This model requires the participation of credit guarantors from insurance companies as well as a single platform to connect all participators. Expert B said that this model is very successful in China since this country has thousands of small lending companies and these companies are struggling with finding cheap funding resources while risk must be well-controlled. A single platform is developed to connect commercial banks and consumer lending companies in the way of commercial banks post their requirements related to loan disbursement based on their risk appetite and consumer lending companies will find potential customers with respective information. Then, this system conducts a matching between the customers found by consumer lending companies and lending requirements posted by commercial banks.

### 3.4 The application of smart lending system in consumer lending market in Vietnam and main concerns

Given to the development of consumer lending in Vietnam and its future perspectives, it is necessary to identify what the current situation of applying smart lending in Vietnam. All experts stated that the application of smart lending system in consumer lending market in Vietnam is still in early stage. Only big companies like FE Credit is able to develop and to deliver smart lending system to real business. To understand how the application of smart lending system in Vietnam, the researcher took in-depth interviews with Expert C since he provided detail information about how FE Credit develops $NAP system which is known as a smart lending system. The key components of $NAP consist of digital customer acquisition and customer on-boarding process, the application of big data to evaluate the customers (e-KYC). In digital customer acquisition and customer on-boarding process, FE Credit has developed the applications for both its sale agents and its customers. Thus, the customers are able to get consumer loans from FE Credit by two ways: one is directly through sale persons from FE Credit and other is through the mobile-based application. Sale agents will capture the customer information and request to the system using sale agent application while the customers can apply loan requests through client mobile-based application. After the customers' requests are captured into the system, $NAP relies on big data from different data partners in the market to evaluate the risk level of the customers. FE Credit commits that all lending process in $NAP is taken in about 30 minutes which bring the convenience to small borrowers while their operating cost can be decreased due

to the expectation of large number of customers want to apply the loans by themselves and therefore it does not require high investment into sales team.

Although the application of smart lending system is fancy to both consumer lending companies and the borrowers, it has some critical concerns. The first concern is collected from the in-depth interviews with Expert C and E. They argued that the data of a borrower is highly fragmented in Vietnam since different data is stored in different ways. For example, mobile behavior data is captured and stored by telecom companies such as Mobifone, Vinaphone and Viettel. However, tele companies are restricted by selling the data to consumer finance companies and therefore an alternative option is through Application Programming Interface (API) integration in which consumer lending companies sent the data request to telecom to extract the result. On the other hand, consumer lending companies are not able to access into telecom data to make proper data analysis. Expert E also highlighted the weakness in data-related products. He indicated that there are some data providers in the market such as VMG Media and CIC data but they do not have experience in developing more value-added data products although they have good data sources. Expert C said that FE Credit has strong database of existing clients and this company also inherits the data from VPBank's customer-based. However, there is no data consolidation at the group level in which the data from different entities are gathered and effectively utilized.

The second concern in smart lending system applied in consumer lending in Vietnam is highlighted by Expert A as biometric solutions have not been well-developed yet. FE Credit is also taking the biometric verification through the customer image but this company does not have experience in developing algorithms to detect the fraudulent actions from bad borrowers. In simple explanation, the algorithms used in biometric verification requires the developers to have big data related to customer image and other customer biometrics such as finger prints. Customer image can be stored from the customers' social media (i.e. Facebook or Instagram) and it takes time to train and to retrain the system to achieve higher accuracy rate. Expert A also said that facial recognition is not highly security since the solution is based on 2-dimensions detection and it is easily frauded by the customers through simple image. Only TPBank is offering finger print solution but it has not been populated yet. This expert recommends consumer lending companies to cooperate with biometric solutions provided by foreign companies in China or US market since they have longer time of developing the solutions in order to get higher accuracy rate in liveness detection.

The third concern is identified through in-depth interviews with the experts. It refers to the underperformance in customer support during their actual use of smart lending system. While FE Credit developed $NAP without the chatbot or automatic generated chat content solution, Home Credit is still in the development process. It refers to the lack of well synergy between smart lending system and other functions in consumer lending companies. For example, when the customers use $NAP and they meet the application issues, the call center cannot answer their questions properly. Moreover, $NAP utilizes the big data to analyze the customers, leading to the difficult to other functions such as debt collection team to find the customers' information when the customers go to overdue stage. Expert B also highlighted the integration between smart lending system and core-financial solutions used by consumer lending companies in Vietnam. The integration is not always smoothly, and the failure rate is high. He indicated that one consumer finance company advertises that the customers are able to get the loans below 5 minutes, but actual process is taken a day to finish. He further explained the integration between smart lending platform with other lending platforms such as Loan Origination System (LOS). The gap is explained by the fact that LOS was developed for years ago and it gaps with recent functions in smart lending system, leading to longer time in two system integration.

## 3.5 How to implement smart lending system in consumer lending market in Vietnam

The last section of this chapter is to discuss about how to implement smart lending in consumer lending market in Vietnam. Like previous sections, the implementation of smart lending system is put into the discussion with the experts. The experts provided similar and different ideas related to the implementation of this system in Vietnam. The similar idea is that the development of smart lending system requires the cooperation between Vietnamese government bodies (i.e. SBV and Ministry of Finance and Ministry of Technology and Communication) and consumer lending companies. The government must develop a framework to support consumer lending companies to access wider and bigger data owned by different companies to fully evaluate the customers. Data privacy is also a concern and it must be addressed. All the respondents also stated the importance of finding good human resource quality to implement smart lending system such as the AI experts in foreign countries where smart lending system has been implemented for sufficient time.

In addition to similar ideas, the experts provided different viewpoints to the development of smart lending system in Vietnam. Expert A said that smart lending system must be

implemented well if consumer lending companies are able to deliver full set of solutions. It refers to the fact that LOS and core-banking system must be changed to integrate well with smart lending solutions to support the disbursement in minutes. The gap must be filled through the system modifications and change requests. Expert B highlighted the importance of improving risk evaluation techniques since most of credit risk evaluators in consumer finance companies have traditional knowledge in credit risk modelling. In more detail, their credit risk modelling is developed based on logistics regression method and advance credit risk modelling techniques with the application of AI or ML have not yet been popular. Expert C further highlighted the concern related to fraudulent activities from bad borrowers. He perceived that local finance companies have not been ready for different type of fraudulent activities and they must take time to collect the evidence to train their system in detecting fraudulent intention from the borrowers. Expert D recommends the application of different biometric solutions. For example, the customers can use their registered finger print to complete the information to increase the security of the lending process. He also highlighted the importance of face recognition technologies based on 3-dimensions and real selfie photos to help financial companies to early detect riskiness. Expert D requests that the successful implementation of smart lending system is along with the establishment of smart interview. He refused the way of fully automatic approval process. Smart interview can be applied for gray area whether one loan application is either bad or good. Finally, Expert E requires consumer finance companies must develop a unit with responsibilities in applying innovative ideas to smart lending system.

# 4 CONCLUSION

The research study was developed with the main research question of how to develop a smart lending system for consumer finance companies in Vietnam?". To answer this research question, some sub-research questions were proposed, and this this section is developed to summarize the answers for these sub-research questions.

The first sub-research question refers to "What is the current situation of consumer lending in Vietnam?" The answer is that consumer lending in Vietnam has been blooming recently although the growth has been slowing down due to the cap in credit growth rate set by SBV. There are 16 consumer lending companies in Vietnam with strongest market share is belong to FE Credit and followed by Home Credit. This market has been penetrated by foreign players such as Home Credit is 100% foreign owned company and MB Shinsei is formulated under the capital shared between Military Bank and Japanese investor. The next stage of development in Vietnam consumer lending market is the application of new technologies to reduce KYC and approval time from days to minutes. This system also allows consumer finance companies to expand the market share by acquiring more customers without the need of opening physical branches or sale channels.

The second sub-research question refers to "What smart lending solution is available in the market?". The answer is that smart lending solution is still in early development in Vietnam and not so many consumer financial companies have heavily invested into this solution. In the contrast, they are still relying on manual and traditional lending process whether the customers still have to connect to branches or transaction offices in order to fill application forms and submit. FE Credit is the first company in Vietnam in introducing $NAP as smart lending system. However, the integration between $NAP and other backend system is still weak while there are many fraudulent cases happened. Home Credit also introduced chatbot and automatic calling in tele-sale services, but it is still in the development stage with many bugs.

The last sub-research question is how consumer finance companies in Vietnam can develop a smart lending system. The answers for this research question is summarized as the joint-effort between different government bodies, the strengthen in human resource quality, the advancement of know-how through the recruitment of AI experts in developed countries, smoother integration between smart lending system and other banking system (i.e. LOS and core banking), the application of advanced biometric technologies in facial

recognition, finger prints, etc., and the leverage of using AI and ML in credit risk modelling as well as in detecting fraudulent intentions. The issue related to the use of big data is also highlighted as the most important successful factor of smart lending system in consumer lending in Vietnam.

The research study was developed upon on qualitative research method with the inputs from 5 experts. This research method has a main weakness of it is highly subjective since the findings were extracted from the personal viewpoints of the experts. In addition, smart lending has just been recently introduced and developed in Vietnam, therefore, there are not so many reports to verify the answers of the experts. In the future, other researchers must establish a survey with the samples of respondents who use smart lending system to detect their intention of using smart lending system in Vietnam. Quantitative method can be applied after the survey to be conducted to make the findings are less biased.

The researcher would like to propose some recommendations to further improve the effectiveness of using smart lending system in Vietnam. The first recommendation is given to the government of Vietnam. In more detail, SBV must take the regulatory role in developing the legal framework to direct the activities of smart lending in Vietnam. SBV must issue the documents to guide the steps in customer acquisition and disbursement and risk evaluation in smart lending process. The legal framework is developed upon on the consultancy with other central banks in advanced market where smart lending has been implemented for years. SBV must provide the sandbox mechanism so that selected consumer financial companies are able to implement smart lending system. Then, the results which are obtained from sandbox programs are analyzed to help SBV develop certain regulatory framework for entire market.

Other government bodies must be participated into the process. Herein, Ministry of Communication and Information Technology must join into the process and it takes the responsibilities of providing supports to help consumer financial companies in Vietnam to access new technologies in lending system. This ministry must work with telecom companies to develop the data center where all financial institutions can use the API to collect the data related to a borrower. Ministry of Finance should also participate into the process in which it provides the framework for credit guarantee services offered by insurance companies. This insurance product is highly in demand since financial institutions want a safe tool for

smart lending. The development of credit guarantee services is also helpful in the asset matching model.

The second recommendation is proposed to consumer lending companies in using big data. They must develop strong internal Research and Development team to improve and to refine algorithms used in biometric verification and therefore achieving higher accuracy rate in detecting the fraudulent cases. Consumer lending companies must hire AI and biometric experts or purchase existing biometric verification solutions from the suppliers in advanced countries. In addition, consumer lending companies must improve their capabilities in credit risk and fraud modeling with new model development techniques with AI and ML to be applied. The companies should cooperate well with telecom data, e-commerce websites and other data partners to build a group big data to effectively use existing data for cross-sell. Consumer financial companies must invest more into advanced information technologies to further improve the process capability of the server. They may want to implement cloud banking services to increase the computation speed as well as sizing the resources in an effective way. The consumer financial companies may want to invest into more advanced biometric solutions such as finger prints, smart interview and voice print to increase the security. Smart interview has high potential development since consumer financial companies are not able to grab full set of data for each borrower due to the large data gap. Smart interview refers to the system whether all interview questions are automatically generated by the system and it is able to extract and to evaluate micro-expression in customers' face to detect whether the customers are not trustful in providing the answers. Moreover, consumer financial companies in Vietnam must develop other smart system to support smart lending. For instance, they must develop chatbot and automatic content generated by the system to support the customers when they want the support from customer services during the process of using smart lending system. The companies should develop sale agent and train them by ethical working manner to reduce the bad cooperation between sale persons and the customers.

One of the concerns in using smart lending is the discrimination in final decision. There are some examples discriminations made by AI systems. For example, Amazon identified that AI recruiting tool showed a bias in against of women (Reuters, 2018). Volpe (2019) also identified the bias in using AI for lending decision since it adversely affected women and minorities in financial decision. The main reason of this bias refers to the lack of diversity in the industry and the less participation of women in AI development tool (Volpe, 2019).

In this context, it is recommended that consumer finance companies should diversity their workforce in the several ways. The first way is that the companies should recruit AI experts in both male and female group in order to reduce the intentionally discrimination from the trainers and supervisors of AI system. The second way is to enrich the training data to AI system in which both male and female borrowers' profile must be collected equally. State Bank of Vietnam should establish a unit to monitor the bias of AI system used by consumer finance companies in order to identify a discrimination tendency.

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APPENDICES

| Interviewee | Content of answers |
|---|---|
| A | I believe that that consumer lending has been blooming in Vietnam recently with about 16 companies. You know that personal loan for consumption purposes is very high in Vietnam, especially when the country has more than 95 million people and the population structure is quite young so that the demand for consumption is high. However, high growth rate in consumer lending industry is not sustainable since many players try to compete with others and therefore, they lower the lending requirements with relax lending policies, leading to high risk loss.<br><br>In fact, the lending interest charged for a consumer loan is very high and it is up to 60-70% per year. You can see FE Credit is a subsidiary of Vietnam Prosperity Bank and they are integrated with each other to build an eco-lending system whether the customers can choose between the bank's product or consumer lending company's products. The same thing is replicated in case of Military Bank and MB Shinsei or in case of Viet Capital Bank and VietCredit. However, the synergy is not always smooth since there is no common system to connect the bank and its subsidiary in consumer lending industry.<br><br>In the long run, I believe that the next development trend in consumer lending market in Vietnam will be driven by leading technologies that have been recently emerged in other emerging economies such as China.<br><br>Regarding smart lending system, it must be implemented well if consumer lending companies are able to deliver full set of solutions. It refers to the fact that LOS and core-banking system must be changed to integrate well with smart lending solutions to support the disbursement in minutes. The gap must be filled through the system modifications and change requests. |
| B | It is captured that the development of consumer lending in Vietnam is obvious since it brings the more convenience to disburse the loans to |

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| | requesters in the market. There are 16 companies in the market and biggest company is FE Credit with the market share is expected at 50%. However, Vietnam still faces up with high financial inclusion. The financial inclusion is the government responsibility since the higher financial accessibility will contribute to the economic development of every nation. Currently, only 30-35% of Vietnam's population is able to access financial services provided by the banks and the establishment of consumer lending companies is considered as additional lending channels to help more people in the cities and rural areas to access financial resources and solutions to support them growing life quality.<br><br>However, the development of consumer lending in Vietnam is not sustainable. For example, FECredit is the largest consumer lending company in Vietnam and it requires intensive operational structures to maintain the market share in 63 cities and provinces in Vietnam. FE Credit offers consumer lending products to the customers with average lending interest rate of 60% but the company has to deal with high loan loss ratio at 25-30% while the operating cost consumes about 20% of the revenues. I believe that most of the consumer lending is not running sustainable development strategies and they are relying on high lending interest to compensate for their operations and risks.<br><br>In the long run, I think consumer lending companies in Vietnam should apply biometric verification. I also believe that the development of asset matching model (AMM) which helps small consumer finances in funding resources. AMM as the connection between commercial banks and consumer lending companies in which commercial banks act like funding providers while consumer lending companies plays the role of sale and after-sale services. This model resolves the weakness in finding large funding resources from consumer lending companies since the funding resources are extracted from commercial banks.<br><br>Regarding smart lending system, it is important to improve risk evaluation techniques since most of credit risk evaluators in consumer finance companies have traditional knowledge in credit risk modelling. In more |

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| | detail, their credit risk modelling is developed based on logistics regression method and advance credit risk modelling techniques with the application of AI or ML have not yet been popular. |
| C | The participation of foreign investors in Vietnam consumer lending market. For example, Home Credit is 100% foreign invested company while MB Shinsei is the collaboration between a local big commercial bank as Military Bank and Japanese investors. The development of consumer lending in Vietnam brings higher financial accessibility to people, especially those who could not fulfill all the requirements from the commercial banks to get a loan. However, the growth rate of this industry was less than 20% in 2018 and 2019 due to the cap in credit growth rate set by State Bank of Vietnam.<br><br>In the long run, I think Vietnamese consumer lending companies should learn from Chinese lending companies who have fully integrated the lending system with automate functions using big data. It helps them to collect the information of a borrower in different dimensions and deep layers so that the customers do not need to key-in a lot of information during Know-Your-Customer (KYC) process. In fact, traditional KYC process has been transformed to electronic KYC (e-KYC) in which the lending companies utilize both structured and unstructured data from many data sources to evaluate the risk level of a borrower.<br><br>Regarding smart lending system, I am personally worry of fraudulent activities from bad borrowers. He perceived that local finance companies have not been ready for different type of fraudulent activities and they must take time to collect the evidence to train their system in detecting fraudulent intention from the borrowers. |
| D | The presence of foreign investors in the market brings a value to local consumer finance companies since they have better experience in term of developing backend system and the policies related to product development and risk controlling for consumer finance market. FE Credit and Home Credit are now taking the market lead with about 70% of the market share and they appear in almost provinces and cities of Vietnam, |

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| | offering small unsecured loans the individuals. They are even providing credit card and offering other financial solutions such as payment method, personal insurance services, etc.<br><br>However, the legal framework for the development of consumer lending is still struggling from the State Bank of Vietnam. This organization takes the responsibility of managing the lending market through regulatory framework, but they are not well-prepared and issued timely to drive the market development.<br><br>In the long run, I believe that the role of using technologies in term of operating cost reduction will be increased. For me, the application of information technologies does not require the lending companies to open new physical branches since all lending process is automated online. It refers to virtual banking branches where the customers are able to find the loans in lending applications.<br><br>Regarding smart lending system, I strongly recommend the application of different biometric solutions. For example, the customers can use their registered finger print to complete the information to increase the security of the lending process. It is also important to consumer finance companies in Vietnam to apply face recognition technologies based on 3-dimensions and real selfie photos to help financial companies to early detect riskiness. The successful implementation of smart lending system is along with the establishment of smart interview that can be applied for gray area whether one loan application is either bad or good. I do not think smart interview can replace human approval. |
| E | I cannot deny for the development of consumer lending in Vietnam. However, I would like to address the limitation in information technologies applied in consumer lending companies. All consumer lending companies in Vietnam have already built their lending system but the process is not fully automated. On the other hand, entire lending process in consumer lending companies is still much relied on human interference and it leads to higher operating cost, human error impacts and fraud risks. One common fraud risk refers to a situation of the unethical cooperation between |

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| | sales and approvals to disburse the loans to unqualified customers or the modification in lending applications and information to fraudulently get the loans. FE Credit and Home Credit are two-leading consumer lending companies in Vietnam to adopt new technologies into lending business.<br><br>In the long run, I think consumer lending companies in Vietnam should apply biometric verification. I saw some banks and consumer finance companies put a lot of effort to this technology. For example, TPBank since this bank is offering LiveBank services whether the customers can go a loan machine to apply for ATM cards or completing loan application forms without going to the branches. Home Credit is also in the process of implementing robot calls with AI supports in tele-sale services as well as collection services.<br><br>Regarding smart lending system, consumer finance companies must develop a unit with responsibilities in applying innovative ideas to smart lending system. |