

## PREFERENCE MODEL FOR THAI LEASING COMPANIES

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### Abstract

In Thailand, the numbers of commercial and non commercial banks have increased which include leasing companies dramatically. Competition in the banking markets is severe. In this paper we concentrate only in Chiangmai province. So the purpose of this paper is to explore which factors are important for customer preference to use service. In this paper, 64 factors are categorized by market mixed (7P) Questionnaires are developed for survey. Neural network, a data mining tool, is used to develop framework for preference. For developing model, C# Programming is used. K fold validation is used to validation this model (90:10). The result of training model is 95%. The first model is called a preference model. It is used to predict if customer selects commercial banks, non commercial banks or leasing companies. When option is made, model would give information on the reasons. The result of prediction is 81%. The benefit of this model is to address the strategy to any provider satisfy customer preference.

**Keywords:** Preference model, Commercial and Non Commercial banks, Leasing companies, Neural Network.

### Introduction

In the past, when people seek for financial assistance, they could only depend on commercial banks. Commercial banks in Chiangmai offer bank loan services. However, this requires several complicated procedures. In some cases, the criteria is not met and the application is denied. This is when people started to recognize the high demand of loan requests and the number rejections. So they addressed the situation by forming credit cooperatives and leasing companies, In other words called "Non-commercial Banks". Due to the rising number of these establishments, they compete by offering customers low interest rates, high loan amount, and fast approvals. However, like Commercial Banks, these establishments also must analyze any risk factors concerned with the customers in order to protect and maintain their businesses. Data mining will be the tool used to create models that is applied from Supervised Neural Network (SNN), preference model means customer preferences and the reasons for choosing commercial banks or non commercial banks. After the models are created and analyzed, the preference model will provide the results in customers' choosing, this analysis result will enable the provider to become more advantage among the competitors in the same business line and to gain substantial market share.

### Theory

#### Market Mixed

This is a research to provide housing service. As a result, it begins with the word 'service'. As for Kotler (2003) and Lovelock & Wright (2007), it could be concluded that the service is an economic activity that one party offers to the other party, not a touchable object but an exchange of money. What customers expect from the service is the value of products, labors, and comfort. According to the state of the source, leasing businesses has grown rapidly and there is a high competition in Thailand. In order to stay ahead, the principle of the marketing mix is introduced to help satisfy the needs of customers. Generally, marketing mix, consists of 4P's which are: Product, Price, Place, and Promotion which are created by E. Jerome McCarthy in the 1960s, the 4P's were introduced to determine a product or brands offering, but in the late '70s marketers acknowledged that the marketing mix needed to include products that are

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services and not just physical things. Then 3 additional elements (called the 7P's) were introduced to the 4P's Principle in 1981 by Booms & Bitner which are: People, Process, and Physical Evidence. The following table below gives a brief explanation of each of the 7 factors Details are as follows:

1. Product is a thing to respond to the demand of human, which could be divided into touchable product and untouchable product. To satisfy customers, the financial institution must try to offer products in concrete in replacement of the service which is an untouchable product.
2. Price is the value of the product in the form of money. Therefore, the price strategy must concern the value which set the value in the product and service exchange. The customers would compare the money they have to spend with the value they receive from the exchange.
3. Place is the topic that has been prioritized because location greatly affects the service selection. In other words, if it takes a few times or close to the community, people will interest in using the service more. In consequence, the setting of place must consider 3 elements which are service characteristics, the necessity of agent in distributing products, and target customers of the business.
4. Promotion is a tool for communication between the service user and service provider. Its purpose is to inform news or persuade customers to select the service, for example, advertisements through radio, billboard, and internet.
5. Employee means the operator who associates with the service users the most. This is the reason why these people an important factor for decision making in selecting the loan service of a financial institute, for example, attention and alertness to give advice, to give equality to all customers.
6. Process is the operation process to impress customers by giving fast and comfortable service, for instance.
7. Physical evidence and presentation are about image of the financial institutions that try to build trust and credibility with customer to return for service again. Additionally, it must provide convenience and clean space.

### **From Literature Review**

Kanokphit; the objective is to study the factors that effect on the customer's decision, satisfaction, and the behavior of choosing to use the services by relying on the method of questionnaire collection. The respondents are those who have already approved the housing loan. In terms of behavior, customers pay more attention to the approved credit line less than 1,500,000 baht with fixed

interest (Fixed Rate). The factors of making decision are that the approved credit line relates to the basic features of the service users. The results of the marketing mix study found that the service user pay most attention to staffs in the bank by that staffs having good human relations, having appropriate dress, and being able to recommend solution to the problems. The objective is to study the factors that affect the decision-making and problems of the customers who use the service by using the method of mailing questionnaire under the principle of mixed marketing. It is found that customers pay attention to prices factor of interest rate, payment duration. The personnel factors are including good human relations, skills and work efficiency. The Product factors are such as the reliability of the bank, the approved credit line, etc. The problems include the lack of variety of loan types, high fees and service fees, inconvenient locations;

Donnapha: The objective is to study to study the factors and problems of the users of the GSB loan service in Mueang District, Chiang Mai Province by using a questionnaire to collect data from customers who use the housing loans of the Government Savings Bank in all 7 branches. By the questionnaires, it is found that customers focus on price factors, including low interest rates and low fees. The personnel factors are such as having good human relations, friendly, reliable, quick to solve problems. The product factors are such as bank security, reputation and image of the bank, loan approval. The problems are such as product evaluation, price documents, price of interest rate, distribution channels, inconvenient parking places, marketing promotion, low relationship.

Dilok: The objective is to study marketing factors by using questionnaires. It was found that the retail customers had focused on products such as service quality, credit limit. The personnel factors are quality of services on and credit line. The personal factors are providing advice, skill on consulting, human relations. The price factors are interest rates, interest-rate changes, fees. The middle range customer focus on the product factors of approved credit line, service, etc. The personnel factors are aspects include providing advice from staffs, enthusiasm, knowledgeable staff etc. The documentation is the creation and presentation of physical evidence such as stability, reputation, having modern equipment.

Thewin: The objective is to study the factors by collecting data from the questionnaires. The result is that the customers have given a high level of importance to all factors of the marketing mix. The highest factors are human relations, credibility, equality, ease of contact with staff, respectively.

Thanawadee: The objective is to study the behavior, factors and problems of the users of the service. The tools used for collecting are the questionnaires. The most factor are the personnel factor of good-natured, knowledgeable, offering solutions, modern technology. The status of the bank is bank security, service reputation. The most common problem is the price, which is the interest rate, the high fee. The product factors are that the insufficient approved credit, the high amount of used documents.

Phattharaphon: The objective is to study the factors, problems and suggestions of service users by using questionnaires to collect data. The study did not use mix marketing method in the grouping of factors. The factors are including low interest rate, the reliability of the bank, the staff uniform, etc. The most common problem is the inability to decide whether the customer will receive the loan or not, the use of the reception from the staff and the advice from staffs.

Rotsanan: The objective is to study the behavioral factors and the satisfaction of users by collecting data from the questionnaires. In analyzing, the results can be divided into 2 groups.

1. Personal factor are based on Chi-square test to correlate factors between gender, age, marital status, education level, occupation, income and approved credit line. The gender, age, marital status do not affect the credit limit.
2. The marketing factors is based on likert-scale and it is appears that the service users pay high level of attention to products, prices, personnel and processes. On the satisfaction side, the customers pay most attention to the interest rate. The second attention is the loan received and the use of staff services.

### **Customer Satisfaction**

Measures how services supplied by providers meet a customer's expectation. If the perceived value of a service is less than the customer's expectation, then that will result to a dissatisfied customer. Therefore, in order to provide businesses with a metric that they can use to manage and improve their products/services, the satisfaction assessment can be done in 3 methods.

Questionnaire: Which is one of the most popular methods because it can be done through several ways such as emails or phone calls. To conduct a survey, the questions can be opened or closed-ended, depending on what information you acquire from your customers, narrow or wide; such as service place, period of time.

Interview: This method needs to use talent and technique of interviewer in order to convince an interviewee to give in honest answers. Also, to conduct this method is timely and costly therefore, you can only reach a few of your targeted customers.

Observation: It is not the most recommended method because to observe customer's behavior, speech, countenance, etc. takes a lot of time and may not be as accurate as the above methods. Therefore it is difficult to assess the satisfaction correctly.

### **Customer Relation Management**

CRM is a management tool that organizations use to understand customer satisfaction and respond to their needs effectively. In addition, CRM can help organizations to gain and maintain best customers to generate profit by:

- providing products/services that fit customers wants and needs.
- offering better customer service.
- helping sales staff to close deals faster.

Therefore, obtaining relationship is important and the strategy depends on gathering information about customers and market trends, with the help of technology and human resources, to better sell and market their products/services. To make sure CRM is being implemented successfully, there are four key principles to look at and they are as follows:

1. Substantial amount of information needs to be kept in a database for easy access as well as to store and view accurate updated data in the future.
2. Technology such as, call center, "contact us" page on company website, and online social channels (Facebook and Twitter) are examples of communication channels that the organization can provide as customer service or after sales service. Technology can also be implemented internally such as; using database to classify customers and to collect useful information.
3. Maintaining relationships externally (customers) and internally (employees) with the organization by listening to their opinions as well as promoting products and services according to the wants and needs of current customers.
4. Evaluating information about current customers is helpful to maintain long-term relationship and improve product/service to meet customers' wants and needs.

## Data Mining

Data Mining is a tool used to analyze and summarize data into useful information by taking relationships and patterns stored in a database. There are several technics to find out results such as decision tree, neural network, clustering, MARS, etc. This research applied the principle of an artificial neural network to design and develop the model.

The artificial neural network is a technique of data mining which is a mathematic model for information processing by connectionist calculation to simulate the neural network of human. NN has the qualification equivalent to a human's brain, in learning and memorization. In other words, the learning originates from the use of data called training set to stimulate NN to learn and when it learns, it memorizes. And later, there is the data that had never appeared before, we can predict what it is (Test set). We can divide into subtopics as follows

The operation of the artificial neural network is to copy the structure of neural cells and the working system by grouping in parallel causing the connection and leading to intelligence. For NN, there are several inputs in the network and will be replaced by mathematic symbols  $x(n)$ . Each input multiple with learning value or weights or  $W(n)$ . The neuron of every unit contains a threshold to set the overall weight of input. Each unit connects and co-operates before computing with a threshold. If the result is more than the threshold, the network will send the output out.

## Learning of Neural Network

We can separate the learning process of the neural network into 3 types as follows:

Type of Learning	Description
Supervised Learning	This type of learning requires input and output data to train the working of the network. Mostly, it employs many training sets and during the training, it receives the real output from the training and the target output will adjust the weight to produce the least errors.
Unsupervised Learning	The learning without instructor will cause the learning of the network itself and the working process is similar to the human's brain as it uses just input data while the output demonstrates in the form of relationships.
Reinforcement	It stems from the use of the two aforementioned types, without an

Learning	instructor, when it studies from the output, the result will be 'yes' or 'not' only.
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The architecture of the Neural Network could be divided into 2 patterns.

Feedforward Network is the architecture that set the data transfer from the input layer into the hidden layer and sends the output layer to the direction of data flow. T-data is processed in the network and will be sent to the same way as input data and continue the Process until the output does not return or even the nodes in the same layer does not connect.

Feedback Network is the architecture that set the data transfer from the input layer into the hidden layer before sending to the output layer where the data flow in the same direction. The data processed in the network will send from input to output until the data return so that the classification of data will be very efficient.

## Research Methodology

Preference Model is the model showing the factors used by the customers in choosing a financial institute that is commercial banks and non commercial banks (credit union, other leasing and our leasing). The objective for developing this model has two reasons. First, For the period of time, which customer use factors for decision to choose other financial institutes. And another objective is the model would prediction probability of each financial institutes. If the output of model prediction is not leasing company, model would show output factors of model prediction which they would be categorized by market mixed. Some factors of leasing company would be adjusted by the output model and simulate by hybrid factors model to show profit which it would be higher than the past. To get data, Questionnaires would be developed. Before developing questionnaire, Factors would be emphasized first. Factors of this model get by literature reviewed which they have discussed in chapter 2. Market mixed theory is used to categorized factors into seven groups (Product, Price, Place, Promotion, People, Process and Physical evidences) as show in Table 1 – 7.

## Product

**Table 1: Product Factors Description**

Factors affecting service selection	Description
1. Service Quality	The service user is impressed and satisfied with the service of financial institution.

2. Loan Credit	The amount of money received from credit application; the higher satisfaction reflects that the service user receives the amount as per requested.
3. Duration of Payment, e.g. 1 year, 10 years	The repayment period to the service provider; the diverse periods shall satisfy the service user such as 3 and 6 months, or one year.
4. Assets for guarantee	The variety of the assets used as collateral such as vehicle, house, farm, and rice field. Some financial institutions allow to use condominium and tractor as the collateral which impresses the service user.
5. No guarantor	It is the loan that asset can be used as collateral, instead of personal surety, which is unavailable sometimes.
6. Non-complex conditions such as documents.	The documents for credit application are simple. For example, pay slip is required by the bank, but not the leasing company.
7. Can increase the loan credit	After a period of installments, if the service user need to spend some money urgently, the service user is able to request the service provider to approve the credit quickly without the complicated process. This satisfies the service user.
8. Variety of installment payment method, e.g. pay interest or reduction of principal and interest	
9. The ratio of loan credit per guarantee	It is to consider the risk by evaluating the credit loan and collateral. The high credit loan with low collateral has higher risk, though it satisfies the service user.

10. Lowest salary criteria for applicants	It is to set the minimum salary rate for credit application which some financial institution do not take into consideration or define in the criteria. It leads to the high satisfaction of the service user.
11. Method of evaluating the guarantee that is standardly appropriate and reliable.	
12. Have additional products such as credit protection plan	It is credit protection, that is the protection of asses used as the collateral. Sometimes, it is high amount of money so the service user is dissatisfied.
13. Allow proxy	In case the borrower is unable to process the loan but needs the money, some financial institution may approve the loan for the satisfaction of the service user.
14. Inspection of Credit Bureau	It is the inspection of the financial institution members to consider the credit of service user. Some financial institutions do not consider this matter which satisfies the service user.

From above table, Product categorized, which it is the first of market mixed theory, means products or services based on responding to customer needs. There has 14 input factors in questionnaire.

## Price

**Table 2: Price Factors Description**

Factors affecting service selection	Description
1. Approved rate of interest	It is the interest approved by the financial institution. The low interest rate shall satisfy the service user such as 1% per month.
2. Charge Rate	It is the expenses for the operation of financial institution that is billed to the service user. If the financial institution would like to have numbers of clients, the

	promotion may be consider, such as free of charge promotion, to satisfy the service user.
3. Expense for evaluation	The expenses such as land inspection expense and cost of asset evaluation to an appraisal company.
4. Various interest types	The amount identifies the diverse premium which the financial institution shall determine the change through time.
5. Appropriate duration of installment payment	It is the installment period to the financial institution. The alternative period shall satisfy the service user as he is able to repay without distress.
6. Calculation of principal and interest reduction	Some financial institution have more options for the service user to repayment with effective rate since the first period, which makes the service user satisfies.
7. Charge for payment in advance	It is the case that the service user has the sum to redeem a mortgage prematurely. If the financial institution does not calculate the high price or calculate for the full period, it will satisfy the service user.
8. Sum of every installment	It is the satisfaction of service user to be confident that he is able to repay for each period as proposed by the financial institution.
9. Appropriate Interest charge when payment delayed	It is the case that the financial institution charges for the fine. The financial institution with low fine rate affects the satisfaction and returning of the service user.

From above table, Price categorized, which it is the second of market mixed theory, means value that customers will receive which it compared to other competitors. There has 9 input factors in questionnaire.

### Place

**Table 3: Place Factors Description**

Factors affecting service selection	Description
1. Location is close to the community	The financial institution that operates near the community such as marker and commercial

	region provides the convenience to the service user which leads to their satisfaction.
2. Easy travel	
3. Convenience for car parking	The available parking will satisfy the service user.
4. Duration of Operation Hour	Most financial institution operates within the official working hours. Any financial institution operates out of the official working hours, such as on the weekend, will facilitate the service user which leads to the satisfaction as the official working hours are not convenient for them.
5. Contact channels, number of branches, for example	The service user is able to contact with the financial institution easily. For example, the financial institution with sufficient branches shall satisfy the service user.
6. Easy for application, everywhere application, online application, easy/convenient	It is unnecessary for the service user to submit credit application at the financial institution office, but via internet. This will satisfy the service user.

From above table, Place categorized, which it is the third of market mixed theory, means consider from the convenience and quantity of customers .There has 6 input factors in questionnaire.

### Promotion

**Table 4: Promotion Factors Description**

Factors affecting service selection	Description
1. Data transfer e.g. sending letter regularly	The financial institution gives notification to the service user such as the due of payment or late payment to avoid the damage to the service user.
2. Advertisement via media such as radio and newspaper.	The financial institution advertises on media such as TV and radio so the service user recognizes the institution and has satisfaction towards the

	service.
3. Allow refinancing	Sometimes, the service user needs money but has financial burden. Any financial institution that allows the service user to re-installment will satisfy the service user.
4. Inform privileges to customers, e.g. free of charge	It is the case that the financial institution would like to increase the profit so the promotion is introduced such as the lower interest and free of charge. The promotion is promoted to both current or former clients which satisfy them.
5. Receive additional privilege for the loan applicant, e.g. special care, fast beneficial information	. The privilege that the financial institution offers to the service user who has the high potential of repayment.

From above table, Promotion categorized, which it is the fourth of market mixed theory, means incentive, recommend, persuade to buy service. There has 5 input factors in questionnaire.

## People

**Table 5: People Factors Description**

Factors affecting service selection	Description
1. The staff gives easy advice, be attentive	Staff of financial institution is well prepared to service the service user such as giving the information immediately which satisfy the client.
2. The staff has knowledge and ability and are reliable.	Staff can provide information to the service user promptly.
3. Have a good human relation.	Staff is friendly and smiling and be ready to service the client.
4. Have a good and polite manner.	Staff is friendly and smiling and be ready to service the client.
5. Follow-up (notice statement of payment)	Sometimes, the service user misses the payment due. The staff shall remind the service user via letter or telephone which satisfies the service user.
6. Treat all	Staff does not give

customers equally.	privilege to the specific client, but service them equally.
7. Staff is responsible for their errors.	When there is a mistake, such as miscalculation or inform wrong information, staff shall show responsibility immediately.
8. Listen to customers' opinions, be open-minded.	Sometimes, staff is careless or makes mistake and the service user comments on that. The staff acceptance of the comment will satisfy the service user.
9. Solve customers' problem rapidly	If the client cannot get to the appointment location or is unavailable at the appointed time, staff proposes the alternative promptly.
10. Have personal contact/be a friend or a relative	

From above table, People categorized, which it is the fifth of market mixed theory, means knowledge and ability of employee. There has 10 input factors in questionnaire.

## Process

**Table 6: Process Factors Description**

Factors affecting service selection	Description
1. Fast service	The period of time since the service user make a contact to receive the money and sign all documents.
2. Fast approval	Some financial institution spend time for approval and notifying the result to the service user quickly, such as two hours from collateral inspection (in case of it is the real estate).
3. Easy steps	The process from submission, appointment, inspection and checking, to approval. All steps require appropriate time and documents.

4. No error service	
5. Provide documents for loan application	Documents for credit application are sufficient and uncomplicated to prepare.
6. Sufficient employees	The sufficient staff are ready to service the service user to save their time.
7. Allow checking progress through internet/telephone	.

From above table, Process categorized, which it is the sixth of market mixed theory, means make the customer impress And loyalty in our services. There has 7 input factors in questionnaire.

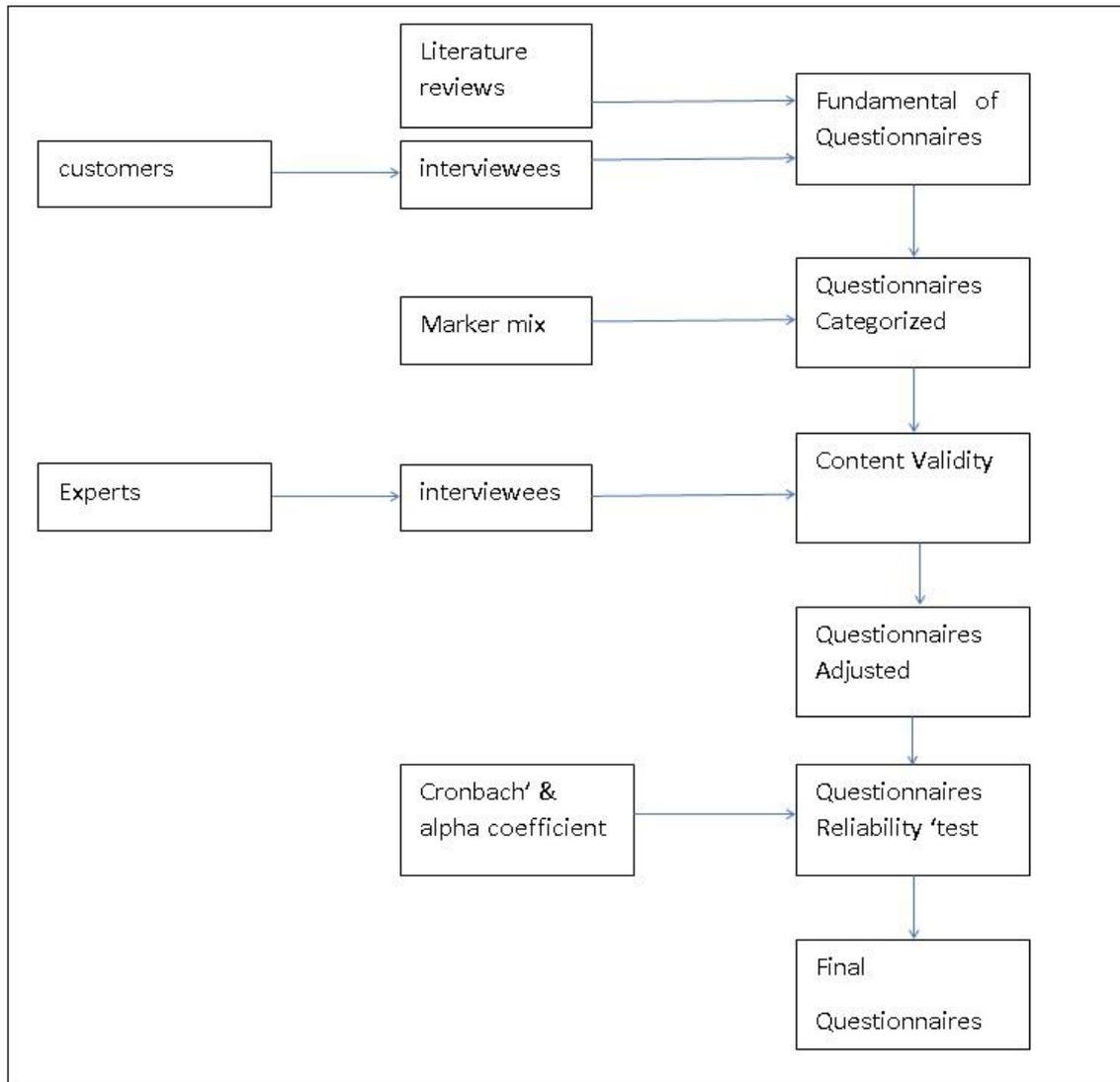
### Physical and Evidences

**Table 7: Physical and Evidences Factors Description**

Factors affecting service selection	Description
1. Stable, good organizational image, good reputation	The financial institution has operated the business and is recognized by the public
2. Modern office tools	There are sufficient computers that have quick processing process.
3. Provide conveniences for	The facilities such as computer, television,

customers.	radio, or books are available for the service user during service use.
4. Space is large, clean, and modern (Office).	
5. Worth for using the service	
6. Participate in society	Some financial institution organize activity to help society such as contribution to the poor and the almshouse in the temple. This affects the image and satisfaction of service user.
7. The executives have a good reputation.	
8. Security system	Security system is implemented such as security guard or equipment and tools for document storage
9. Always develop the organization.	

From above table, Physical and evidences, which it is the seventh of market mixed theory, means appear to the customers' eyes, such as, atmosphere in financial institution, etc. that their will make the customer impress. There has 9 input factors in questionnaire. After that, questionnaire development would explain step by step as shown in figure 1



**Figure 1: Questionnaire Development Stage**

From figure 1, the questionnaire development stage for preference model consists of 5 steps as follow

The primary step is to research from literature reviews. Every questionnaire originates from many documents, ideas, and theories, including suggestions from customers to plan the pathway of the questionnaire.

The second step is to do questionnaire categorization which means to group factors from literature review or related research using market mix principle to group factor.

The third step is the content validity by 4 experts who are experienced and proficient in housing loan from Bank of Thailand, Chiang Mai University Co-operative, Chiang Mai University Kasikorn Bank, and lecturer for Finance and Bank in Chiang Mai

University. They will be interviewed and validate the content of the questionnaire using the Index of objective congruence (IOC) as the tool. Normally, IOC is over 0.5 but if lower or equivalent to 0.5, the questionnaire must be improved.

The fourth step, tested the revised questionnaire with the sample group. The sample group contained 30 samples before performing the questionnaire reliability test by Cronbach & Alpha Coefficient to test the quality of the questionnaire. The result of more than 0.7. In this research, Cronbach & alpha is 0.726. Once we received the factors from the questionnaire, in order to validate the categorization, use the factor analysis or the exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA) In this research, To measure validity, CFA has been used.

Originally, it was a 60-item scale designed to assess individual's opinion about leasing use service followed by service marketing mix. This scale included seven dimensions. To test the measurement model of seven factors leasing service marketing mix and find an acceptable measurement model. To examine the overall fit of the model in this study, the researcher used several fit indices to assess the goodness of fit for the hypothesized models to the data as follows.

1. Chi-Square ( $\chi^2$ ) was the traditional index for identifying overall model fit and refers to the degree of discrepancy between the sample and fitted covariance matrices (Hu & Bentler, 1995). A good fit is indicated by the non-significance of chi-square. The value of chi-square indicated poor fit due to the higher its value, the worse the tested model's fit to the data (Kline, 2005). However, with a large sample size, the chi-square value is always significant and with a small sample size, the probability level is inaccurate (Tabachnick & Fidell, 2007). Therefore, other measures of model fit have been provided.
2. Normed Chi-Square (NC) was another index which reduces the sensitivity of chi-square to sample size (Kline, 2005). By dividing chi-square value by the degree of freedom, the NC value is less than 2, or 3, or even high as 5 indicating a reasonable fit (Bollen, 1989).
3. Root Mean Square Error of Approximation (RMSEA) was the estimates the lack of fit in a model compared with a saturated model representing the degree to which the proposed model is a mis-specified one. The RMSEA value which is zero identified is the best fit and higher values indicate a worse fit. MacCallum, Browne, & Sugawara (1996) suggested RMSEA less than 0.08 to indicate a good fit and RMSEA of between 0.08 to 0.10 to indicate a mediocre fit.
4. Comparative Fit Index (CFI) was used to assess goodness of fit in this study. This index is known as incremental fit, which reflect the relative improvement in the fit of the hypothesized model compared with a null model (assumes that all latent variables are uncorrelated). The CFI value ranged from 0 to 1.00, the closer to 1.00 indicates a good fit. Kline (2005) suggested CFI should be greater than 0.90 indicates a good fit of the model.
5. Non-Normed Fit Index (NNFI) is used in this study. The NNFI value closer to 1.00 indicates a good fit. Hooper, Coughlan, and Mullen (2008) recommended NNFI values more than 0.80 as the threshold. Summary of goodness of fit indices used in this study can be shown on table 8.

**Table 8: Summary of Goodness of Fit Indices and Acceptable Values**

Fit Index	Acceptable Values
Chi-square ( $\chi^2$ )	Non-Significance
Normed Chi Square (NC)	Less than 3.00
RMSEA	Less than 0.08
CFI	More than 0.90
NNFI	More than 0.80

Furthermore, regarding to the parameter estimation, maximum likelihood (ML) estimation was employed using the LISREL program (Joreskog & Sorbom, 1993). This method of estimation is more efficient and unbiased when the data represent multivariate normality (Hair, Black, Barbin, Anderson, & Tatham, 2006). ML is an iterative process in which the observed covariance matrix is contrasted with an implied matrix in order to minimize the distinction between the observed and implied matrices (Netemeyer, Bearden, & Sharma, 2003). By using LISREL on structural equation modeling, it provides the sufficiency information like parameter estimates, goodness of fit indices, and modification index.

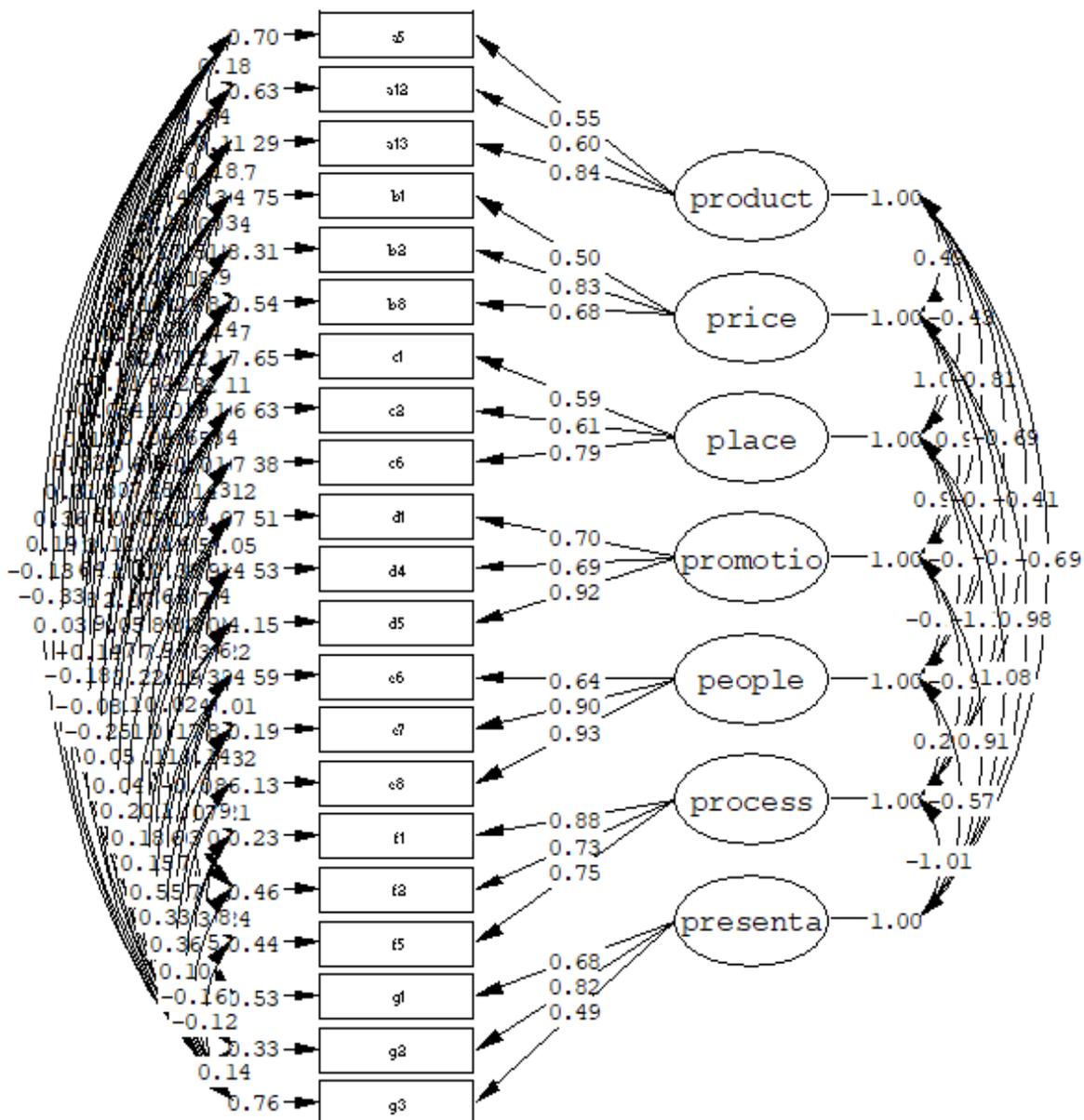
The measurement model analysis provides evidence of construct validity with confirmatory factor analysis (CFA). The findings of the measurement model analysis of seven constructs, consisting of product, price, place, promotion, people, process, and presentation were provided respectively. Examination of the measurement model using confirmatory factor analysis was conducted at an item-level of the intended construct. This method could be used to detect individual items, which may threaten the overall fit of the measurement model. This provides graphic representation, fit indices, and parameter estimates of the measurement model for seven factors leasing service marketing mix (7P)

**Normality Test:** The estimation technique of Maximum Likelihood used in this study assumes that the data follow multivariate normality. The existence of non-normality would affect the accuracy of the parameter estimation by ML. The PRELIS program of LISREL allowed to determine the skewness and kurtosis of the measured factors. The results of the LISREL output showed that the skewness, and kurtosis, and the skewness and kurtosis of the measured factors were mostly non-significant reveal that the normality existed among the factors.

**Measurement model of leasing service marketing mix:** CFA was used to confirm the 7-factors measure of leasing service marketing mix (7P). The CFA of the initial measurement model of

leasing service marketing mix converged, however it gave an unacceptable overall fit. The results showed a significant chi-square value  $\chi^2 = 181957.24$ ,  $df = 1689$ ,  $p < 0.01$ ; the  $NC = 107.73$  indicating a poor fit; although the incremental fit indices showed acceptable fit,  $NNFI = 0.86$ ; however, the  $CFI = 0.86$  and the  $RMSEA = 0.189$  indicated a poor fit. These goodness-of-fit results suggested a respecification of the 7-factor measurement model of leasing service marketing mix. The researcher used the modification index (MI) coupled with conceptual and theoretical considerations, the measured item which showed consistent correlated measurement errors, and deleted some items which showed low factor loading, therefore the correlated measurement error and deleted some items was used to obtain the best fit of the measure. After trimming the problem items, the CFA of the retained 15-item, 7 factors

model of leasing service marketing mix, consisted of 3 items for Product, 3 items for Price, 3 items for Place, 3 items for Promotion, 3 items for People, 3 items for Process, and 3 items for Presentation. The resulting 7-factors model of leasing service marketing mix showed a reasonable fit. There was a significant chi-square value ( $\chi^2 = 25.62$ ,  $df = 17$ ,  $p = 0.082$ ), it was non-significant indicating a good fit. The researcher assessed other indices of fit: the  $NC = 1.51$  indicated a good fit; the incremental fit indices showed a good fit,  $CFI = 1.00$  and  $NNFI = 1.00$ ;  $RMSEA = 0.013$  indicated an acceptable fit. The graphic representation of the adjusted measurement model of seven factors leasing service marketing mix (7P) with standardized parameter estimates are illustrated in figure 3.2



**Figure 2: Seven Factor Model of Leasing Service Marketing Mix**

**Table 9: Result of Confirmatory Factor Analysis of Seven Factors Leasing Service Marketing Mix**

Factors	Factor Loading		t	R <sup>2</sup>	C R	Cronbach's Alpha
	$\alpha$	$\beta$				
<b>Product</b>						<b>0.71</b>
a5	1.0	0.5	-	0.3		
	0	5		0		
a12	1.2	0.6	26.	0.3		
	3	0	97	7		
a13	2.6	0.8	13.	0.7		
	8	4	71	1		
<b>Price</b>						<b>0.72</b>
b1	1.0	0.5	-	0.2		
	0	0		5		
b2	1.7	0.8	26.	0.6		
	7	3	56	9		
b8	1.3	0.6	30.	0.4		
	1	8	26	6		
<b>Place</b>						<b>0.70</b>
c1	1.0	0.5	-	0.3		
	0	9		5		
c2	0.9	0.6	28.	0.3		
	6	1	43	7		
c6	1.4	0.7	31.	0.6		
	0	9	04	2		
<b>Promotion</b>						<b>0.82</b>
d1	1.0	0.7	-	0.4		
	0	0		9		
d4	1.4	0.6	24.	0.4		
	8	9	34	7		
d5	1.9	0.9	32.	0.8		
	3	2	98	5		
<b>People</b>						<b>0.87</b>
e6	1.0	0.6	-	0.4		
	0	4		1		
e7	1.0	0.9	17.	0.8		
	1	0	98	1		
e8	1.2	0.9	15.	0.8		
	7	3	40	7		
<b>Process</b>						<b>0.83</b>
f1	1.0	0.8	-	0.7		
	0	8		7		
f2	1.0	0.7	37.	0.5		
	1	3	14	4		
f5	1.0	0.7	37.	0.5		
	1	5	90	6		

Presentation	0.71	0.735
g1	1.0	0.6
	0	8
g2	1.2	0.8
	5	2
g3	0.7	0.4
	1	9

Furthermore, the composite reliability for a leasing service marketing mix factor was investigated from the squared sum of factor loadings for a variable and the sum the error variance terms of factors linked to the variable. Hence, the composite reliability (CR) of the seven factors model of leasing service marketing mix between 0.71-0.87, for Product is 0.71, for Price is 0.72, for Place is 0.70, for Promotion is 0.82, for People is 0.87, for Process is 0.83, and for Presentation is 0.71, showing good reliability of the measures.

The results of CFA also showed the standardized factor loading of 7 factors of leasing service marketing mix (7P); as follows;

1. Product had the standardized factor loading between 0.55-0.84, It indicated that item a13 was the best importance factor of Product that could account 71% of variance of leasing service marketing mix, and item a5 was the least importance factor of Product that could account 30% of variance of leasing service marketing mix.
2. Price had the standardized factor loading between 0.50-0.83, It indicated that item b2 was the best importance factor of Price that could account 69% of variance of leasing service marketing mix, and item b1 was the least importance factor of Price that could account 25% of variance of leasing service marketing mix.
3. Place had the standardized factor loading between 0.59-0.79, It indicated that item c6 was the best importance factor of Place that could account 62% of variance of leasing service marketing mix, and item c1 was the least importance factor of Place that could account 35% of variance of leasing service marketing mix.
4. Promotion had the standardized factor loading between 0.69-0.92, It indicated that item d5 was the best importance factor of Promotion that could account 85% of variance of leasing service marketing mix, and item d4 was the least importance factor of Promotion that could account 47% of variance of leasing service marketing mix.
5. People had the standardized factor loading between 0.64-0.93, It indicated that item e8 was the best importance factor of People that could account 87% of variance of leasing

service marketing mix, and item e6 was the least importance factor of People that could account 41% of variance of leasing service marketing mix.

6. Process had the standardized factor loading between 0.73-0.88, It indicated that item f1 was the best importance factor of Process that could account 77% of variance of leasing service marketing mix, and item f2 was the least importance factor of Process that could account 54% of variance of leasing service marketing mix.
7. Presentation had the standardized factor loading between 0.49-0.82, It indicated that item g2 was the best importance factor of Presentation that could account 67% of variance of leasing service marketing mix, and item g3 was the least importance factor of Presentation that could account 24% of variance of leasing service marketing mix.

And then it was used to test the reliability of each factors with Cronbach's alpha coefficient, Cronbach's alpha values more than 0.70 were considered satisfactory (Nunnally, 1978). Finally, the seven factors model of leasing service marketing mix had Cronbach's alpha coefficient between 0.709-0.873, showing acceptable Cronbach's alpha coefficient.

In the fifth step, used the complete questionnaire with the sample group. The final stage is to use the questionnaire with those who are interest in select the loan service or those who are already the customers of the financial bank. The duration is 1 March 2018 – 31 July 2018. After collected questionnaires, 901 of commercial banks, 702 of credit union, 837 of other leasing and 533of leasing company in ChiangMai.

## Experimental

This paper is to develop model predicting the results of selection to use the services of financial institutes by using artificial neural network. This model will determine whether the loan request for customer information will be approved or not. The input data will be the data obtained from all questionnaires and the output will be divided into 4 classes. The results of the model are divided into 4 types; banks, cooperatives, other leasing, and a leasing company in Chiang Mai Province. The structure of the model and the prediction results will be as shown in the table 10.

**Table 10: Model Predicting The Results of Selection to Use The Services of Financial Institutes by Using Artificial Neural Network Structure**

Model	Input layer	Input node	Output layer	Output node	Hidden layer	Hidden node
NN	1	68	1	4	1	8

For test model, the result of prediction shows that Accuracy is 95%. But when test on web, the result of prediction is 76%.

Here are some examples of prediction results.

1. In the case that the prediction result is "a leasing company in Chiang Mai Province", the model will show no reason.
2. In the case that the prediction result is "a financial institute which is not a leasing company in Chiang Mai Province", the model will present the prediction result as shown in Figure 5.2 and the reasons and recommendations. Such presentation will be adjusted in the third model further.



**Figure 3: Result for Model 1 Prediction**

From above, Model predicts to Commercial bank and then show the reason why customer would be select commercial bank service as shown in table 11.

**Table 11: Factors Suggestion For Adjust Leasing Company' Factors**

Marketing Mixed Type	Factors	Commercial Bank (Weight)	Leasing Company (Weight)
Product	Loan Credit	0.62	0.37
Price	Charge Rate	0.5	0.19
Place	Convenience for car parking	0.6	0.17
Promotion	Data transfer e.g. sending letter regularly	0.1	0.22
People	Treat all customers equally	0.20	0.18
Process	Fast service	0.09	0.22
Physical and Evidence	Participate in society	0.09	0.14

From above, this table show about factors model prediction with the first by market mixed categorized which customer would be select commercial bank and factors of leasing business. In Product, Price and Place criteria of commercial bank, they have more weight than leasing company. So if leasing company want higher profit than past, they can change weight and simulate in hybrid factors model for simulate output. But In Promotion, Process and Physical and evidence criteria, they have lower than leasing company. So it means that leasing company should change or not do anything.

### Conclusion

The result has shown that accuracy from test on web is 81%. but it has lower than test for training .because the amount of data is used for training model not enough and This paper has used for only in leasing business in Chiang Mai ,Thailand. So in the future, Researcher would try to improve efficiency by cutting factors which it should be more efficiency or not.

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