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Initial Journey of Designing Credit Rating for Micro and Small Enterprises

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Abstract: While credit ratings for big companies and public institutions are available in almost every country, the credit ratings for small and medium enterprises are very rare. Even more, the credit ratings for micro and small enterprises are not available despite their economic contribution in every country. This study aims at providing an initial journey of designing a credit risk model for micro and small enterprises. This study focuses on the exploration of literatures related to credit ratings for small, medium and large corporation as well as for public institution. These credit rating models are used as the basis of developing the credit rating model for micro and small enterprises. After considering the availability of types of data, sources of data and statistical approaches, logistic regression with five groups of independent variables is proposed as the appropriate credit rating modelling.

INTRODUCTION

Credit rating for micro and small enterprises or MSEs is not as interesting as the credit rating for other institutions, mainly government institutions and large corporates. Almost all credit rating agencies, either those who have international as well as national reputation, compete for providing credit rating for government. Standard and Poor, Moody's and Fitch are three among many credit rating agencies that have international reputation that always provide and release the sovereign credit rating. Furthermore, credit rating agencies of each country in the world are also eager to provide credit rating for their own sovereigns.

Those credit rating agencies are also very kin on providing credit rating for large corporates. Those companies seek capital through capital market either in their own countries or in other countries and either through single or multiple countries. Those companies need credit rating when they have to obtain loan as their capital by selling fixed income securities. Their rating is assessed in order to measure their creditworthiness, i.e. their potential ability to fulfil their obligation of fixed income securities issued. The creditworthiness may be assessed through various aspects such as the quality of assets, existing liabilities, the history of repayment of past and current borrowing and business performance as a whole[1].

The eagerness of those agencies, unfortunately, does not happen to providing the similar rating to micro and small enterprises or MSEs. The main reason is money or the size of business. The total credit for MSEs is low[2]. Note that even though the number of MSEs in every country is large, the size of each company is very small. This leads to high cost for providing rating by rating agencies in terms of the percentage of the cost of rating over the revenues of each MSE.

High cost of rating is also the result of the fact that the quality of data on MSEs is very low. This increases the asymmetric information between MSEs and lenders[3, 4]. This condition forces rating providers, including commercial banks, to put effort to collect more various data and information. Furthermore, the data on MSEs tend not to be standardized, lack of industry as well as market share information[5].

MSEs are also unique compared to medium and large corporations. Most MSEs are lack of quality information on their management, lack of collateral and low guarantee[5]. Also, their financial data is insufficient for lender and credit rating agencies to be used in credit scoring model[4].

However, providing credit rating for MSEs are important because of several reasons. They contribute very significantly to the economy all over the world, both in developing and developed countries. For example, the contribution of micro enterprises is rarely exposed. However, small and medium enterprises or SMEs contribute around 40% of total GDP and around 74% of total employees in Japan[2]. Their contribution is certainly higher when the contribution of micro enterprises and SMEs are combined. MSEs become the backbone of economy in most Asian countries, especially in terms of the number of companies and employees[6].

Therefore, it is clear that credit rating is important not only for government institutions and large corporates but also for MSEs. The rating is the key for creditors like commercial banks to decide the creditworthiness of the potential debtors[1]. Good rating is able to predict the probability of default of the debtors by assessing their credit risks[7-9]. Jorion *et al*.[10] argue that a good credit rating is also the reflection of the possibility whether the debtors have future ability, capacity and willingness to fulfil their commitment to pay the principal and interest at every due time. In other words, a proper credit rating will satisfy creditors to provide debt financing to debtors with the expectation of zero or very low nonperforming loan or NPL. A credit rating is also useful for debtors and potential debtors as the information for reviewing opportunities for improvement. By doing so, they enhance the marketability of their debt securities being issued and increase the trustworthiness to creditors and investors to buy their securities[1]. For economy at large, as a result, good rating and good loan performance of MSEs help a country allocate resources more efficiently[8].

In fact, it is not easy to provide a good credit rating. This happens to all kinds of institution, including governments and large corporations and more crucially, MSEs. Becker and Milbourn[1] find out that competition among credit rating agencies may result in different credit rating for the same institution being rated by different credit rating agencies. The competition mainly takes place to large institutions like sovereign institutions that are able to pay high price for the rating service and potentially become bond issuers or debtors with big size.

The quality of rating is also affected by the quality of information. Different types of information and its sources may have different level of quality. The rating may employ either inside information or external information of debtors. Some information may be engineered. For example, financial engineering or window dressing is a common issue for corporations. Furthermore, another challenge is in regard of how diverse information is needed to be involved in assessing the rating. Traditionally, the information is mainly related to financial performance and economic factors. Nowadays, there some efforts to add some information that possibly influence the accuracy of credit rating such as social and environment information[11, 12].

The challenge is much more evident for providing credit rating for MSEs. Besides the obstacles aforementioned, this is the fact that there is so far no any single study on assessing credit rating for micro enterprises group alone or for MSEs as a group of population. There are some studies on credit rating for small and medium enterprises or SMEs, not MSEs. The challenges for assessing credit rating for MSEs are very hard and supposed to be harder than assessing credit rating for SMEs.

The quality of information and the availability of information are common issues[2]. These enhance the asymmetric condition for MSEs that is much more severe than large institutions including corporations. MSEs are also do not have standard information of their industries including market share and competitors. As a consequence, the rating system for large corporations is not applicable for MSEs[5]. Those challenges create another crucial problem, i.e., about the choice of methodology appropriate for the assessment of the credit rating for MSEs.

This study aims at the initial step of designing a credit rating for MSEs. The challenging question to be answered in this study is as follows: what is the model appropriate for assessing the credit rating of MSEs. In order to provide the answer, this study is arranged as follows. The first section is introduction. This is followed by the description of review of previous studies on credit rating. From this, the paper attempts to design a credit rating model for MSEs. This study is ended by conclusion section.

THE REVIEW OF PREVIOUS STUDIES

There are two crucial points of rating, i.e., the level of credit rating and the quality of credit rating. The level of credit rating expresses the opinion on the creditworthiness and the probability of default of fixed income issuer or borrower. The quality of credit rating, on the other hand, expresses the trustworthiness of the credit rating released by the credit rating agency. Most literatures that explain about credit rating mainly see it from the level of credit rating. Therefore, the term of credit rating mainly refers to the level, not the quality, of credit rating.

Practitioners and researchers have similar understanding about credit rating. Credit rating is about credit risk, i.e., the probability of a credit being default. It is also about the creditworthiness of debtors or its fixed income securities to be issued. This credit worthiness is based upon the quality of assets, existing liabilities, the history of loan and repayment from the beginning until maturity and overall business performance of the issuer[1]. There is a possibility that the issuer of bond or borrower is unable to fulfill the repayment of either the principal or interest or both. Thus, this possibility is strongly influenced by the ability of the issuer or borrower to maintain its financial position in such a way that the issuer or borrower may generate cash to fulfill its obligation[7].

Jorion *et al*.[10] argue that a quality credit rating expresses the opinion of future ability, legal obligation and willingness of bond issuer or borrower to make payment timely on principal and interest to creditor or investors. This statement is supported by Choi *et al*.[13] saying that there is a clear correlation between credit rating and the probability of default by the issuer. There is possibility that credit rating of an issuer diminishing over time. However, a high initial credit rating tends to have a low probability of default.

A credit rating is an independent opinion regarding the creditworthiness and probability of default. Credit rating agencies are supposed to provide such an opinion. Most commercial banks also provide an instrument to measure the credit rating for its own existing and potential borrowers. Both credit rating agencies and commercial banks need to maintain their independency in giving the opinion in order to enhance the assurance of the credit granting or bond issuing decision. Without independency, the rating may be bias in reflecting the actual credit risk of the issuers[9, 4, 14].

A credit rating is used by both sides, investors or creditors and issuers or borrowers. In regard of the investors or creditors, a credit rating is useful in deciding whether they will buy the fixed income securities issued. The decision is influenced by their confidence of the quality of the rating as well as their risk preference. In regard of the issuers or borrowers, the rating can be used for at least three folds. Firstly, they may decide whether to issue bond or to borrow a new loan based on the rating released by credit rating agencies. Secondly, they may review the targeted investors or creditors that fit with the credit rating. A high (low) credit rating is preferable for investors or creditors with low (high) risk preference. Thirdly, they may improve the quality of their institutions and information in order to improve the credit rating and, as a result, may be able to obtain loan with lower cost of fund and better terms of credit[1].

What about the quality of credit rating? There are some factors that may affect the quality of rating. Note that the credit rating for large institutions, including government and big corporations, tend to have high quality. This may be the result of high supply and demand for rating business for this segment. Most governments all over the world, especially their department of treasury and large corporations seek loan through capital markets. The only way is by opening themselves to be rated in order to be able to sell their fixed income securities. All big credit rating agencies are willing to compete on getting the opportunities to rate the governments, mainly those of developed countries[1].

A quality rating help lenders, borrowers and economy as a whole allocate resources efficiently[8]. This happens because lending is based on the rational decision. Banks as lenders, for example, can make a proper decision on whether granting loan and, if doing so, what the best credit policies offered. The banks also know the level of credit risk and its consequences[5, 11, 6]. Fixed income investors may also be able to measure the level of credit risk and compare the investment opportunities. Fixed income securities are part of investment opportunities[9].

Note that rating is not permanent[9]. It may change over time depending on the ability of the rated institution to maintain its condition and performance. The improvement may increase the rating and as a result, the price of the security may increase and the cost of fund goes down. However, if the institution cannot maintain or improve the condition and performance, the rating may go down and as a consequence, the price of its fixed income securities decreases and the cost of fund steps up.

Inadequate ratings by credit rating agencies may result in mis-allocation and losses. There is a possibility that a bad rating comes from the lack of competition among credit rating and the lack of competencies rating agencies. Sheng finds an evidence that this, in effect, results in significant losses of 2008 financial crisis.

However, the most concern in this study is not about the credit rating agencies. Instead, the information and the methodology used is the main issue.

High quality rating means the absence of asymmetric information. The information collected and interpreted by credit raters is different from the information acquired and understood by the rated institution[4]. This is one important role of credit raters, i.e. to address the problem of asymmetric information between borrowers or bond issuers and creditors or bond investors[15, 16]. Rating for government institutions and large corporates may be quite easy to minimize asymmetric information. However, this is not the case for SMEs, even more for MSEs. This is due to the facts that SMEs and MSEs suffer several problems that magnify the asymmetric problem. Vink *et al*.[14] argue that a credit rating may not fully reflect the quality of credit risk due to the competition among credit raters. However, this may happen to credit rating for public institutions and large corporations, not to MSEs[14].

Besides the absence of industry classifications, MSEs themselves suffer several problems. They mostly are lack of their own customer knowledge and low literacy of business model. Also, they are lack of business enablers as well as information system such as the data on credit and capital. Most MSEs have low competencies on business and management. This results in low quality of business plan, improper financial report and business information and lack of collateral[5].

Most SMEs have very high profitability, especially in terms of the profit margin. However, their economic size is so tiny that cannot encourage credit raters to jump into their business. However, as Nemoto[2] finds out, most MSEs have low quality financial statement and suffer the time lag of the information. Moreover, MSEs that obtain loan usually are not properly monitored after financing. These situations discourage credit rater and credit provider such as commercial banks, to conduct financing for MSEs[2].

Despite the fact that MSEs face the problem in obtaining credit rating in order to have better financing access, the credit rating for MSEs has two functions. The first function is related to creditors and investors. They need to be convinced with a quality rating in order to decide the financing for MSEs in accord with their risk appetite. Ryo and Hideaki[17] argue that solving problem of adverse selection and window dressing are the most important things in credit rating for MSEs. The second function is related to the MSEs themselves. Banks as creditor may assess the credit risk of MSEs objectively and comprehensively before and during the credit granting[18].

In order to have a quality credit rating, researchers are concerned with three points, i.e., the types of data, the sources of data and the rating models. Noted that credit rating opinion is expressed in terms of ordinal measures, reflecting the current financial creditworthiness of issuers such as governments, firms and financial institutions[4]. Furthermore, a quality credit rating needs to consider the simplicity in those three aspects and, as a consequence, the simplicity in the interpretation[3].

There are various types of data employed by researchers. Gray etc., for example, mainly use financial and industry data. They find several quantitative data that significantly explain the creditworthiness of companies. Similarly, Becker and Milbourn[1] also employ industry data. They are concerned with defining the industry. They come to the conclusion that the use of two-digit industries is appropriate for two reasons. The first reason is related to noise. They argue that using larger industries reduces the noise in market share estimate and, as a result, reducing the measurement error. The second reason is about the distinction. They cannot differentiate the competitive distinction among companies if they use four-digit industry classification[1].

Many research papers on credit rating, however, employ not only financial data but also other types of data. Bouzouita and Young[7] design a rating model that uses not only financial position but also other information, including qualitative factors. This approach is followed by MurciaI *et al*.[8] that employ financial performance, market performance, governance and internationalization. Some data have quantitative nature while others have qualitative nature. Kim and Kim[19] add CSR information to governance data in their credit rating model.

Apart from those types of data, Herzenstein *et al*.[20] are concerned with demographic data. The use of demographic data is quite common. People with different age, experience, education, marital status, etc. are supposed to have different behavior toward risk. Those who belong to the risk lover group tend to have lower rating than those who belong to risk voidance group. In relation to the demographic issues, Zhang put the information on what kind of groups or friendship someone belong to. Different kinds of social network are perceived to have different probability of success in managing MSEs, hence, they have different level of rating[21, 16].

Zhang[16] adds personal information in his credit rating model. He argues that this is important for the ones who manages micro businesses as well as for personal loan. The use of personal information also supported by Sithigh and Siems[12] who uses information such as sincerity, honesty and integrity into rating model.

Nemoto[2] attempts to use bank account information in his model. The bank account information consists of information on business, information on bank transaction and information on financial situation of the company. For the debtor that has a long relation with its bank, the information on bank transaction may contain both performing as well as nonperforming loan[2].

The last type of information that has been accommodated into rating model is ESG, that stands for environment, social and governance[11]. These may be complicated in terms of measurement, since, the data may not be available in most MSEs, especially in developing countries. However, Devale *et al*.[11] find the significance of those variables.

The second point is concerned with the sources of data. The sources depend on the types of data needed in the research. Note that the availability of data is the first concern. This is due to the fact that the data of MSEs are mostly not appropriately available. Most MSEs do not have business documents needed in research. For example, financial reports are mostly not available. If available, they are not audited by public accountant. Business plans, annual plan, business reports and legal status are also unlikely to be available.

Data industries on MSEs is also problematic[5]. Without standard form of industry information, it is difficult to define precisely who their competitors, market segments, substitutes and suppliers. This becomes a problem when analyzing SMEs using some academic approaches such as Porter framework.

Because of those reasons, researchers attempt to overcome the problem by developing alternatives of sources of data. Chi and Zhang at first use classification of industry to start their data collection. This step at least helps researchers to make sure the diversity of data based on the classification that is the best available. The detailed data of each MSEs, however, use different sources of data. They employ data available in banks. This step is workable as long as the population are only those who have had transactions with banks. For those that do not have such transactions are not included in the study.

The use of data available in banks is also employed by Nemoto *et al*.[2]. They argue that there are problem of the quality of financial data provided by MSEs. Most data also suffers the time lag. Also, the monitoring after financing is also a problem. Therefore, they turn into the use of MSEs information available in banks. This approach reduces time consuming in scrutinizing and review the data.

Other studies employ data available in social media. This approach is suitable for a certain type of data. Sithigh and Siems[12] employ this approach to collect the data about sincerity, honesty and integrity. The crucial point in this approach is in choosing the social media platform. They argue that some social media are trustworthy because otherwise the platform will not be used by society and, as consequence, the platform will be absent of transaction. The trustworthiness is built by enhancing the quality of information and the platform always handles and encounters asymmetric information.

The third point is the rating models. Chi and Zhang[18] summarize four statistical models of rating. The first is credit rating models based on parametric methods. There are various techniques on these models. Logistic model is the most famous one. Discriminant analysis is also well known and become one of favorite approaches. They also identify that fuzzy set theory, mixture cure models are among the parametric models.

The second credit rating models are categorized as artificial intelligence methods. They include support vector machine and multiple support vector machine techniques. The models are based on neural network. This is supported by Yang[22] that suggests an incremental kernel method .

The third credit rating models are classified as non-parametric methods. These include rank sum test and rank correlation analysis. Non parametric models are normally used under a limited data available that parametric models cannot be operated. The uses of non-parametric models, however, is considered limited. And the fourth models are grouped as credit rating models based on combined methods.

THE PROPOSED MODEL

In essence, the previous section elaborates three points of credit rating modeling by considering various aspects on MSEs or micro and small enterprises. As shown in Fig. 1, those three points are types of data, sources of data and the credit rating model.

The interaction among those three components are not a one way, linear mechanism. Instead, they are interactive. A proposed credit model may need to be revised or changed if the availability of certain types of data and source of data is a problem. Also, it is possible a certain type of data is available and can be considered, if possible, in developing a certain kind of credit rating model.

Note that MSEs have many forms and status. The forms are defined as legal bodies of the MSEs. Many of them and in certain regions majority of them, are non-formal business entities. They do not have formal license as companies. They may only have permission from neighborhood leaders to run a business. They normally have micro size of businesses, employ only family members with very limited numbers of employees. The rests have legal license in various forms including limited partnership and limited liability companies.

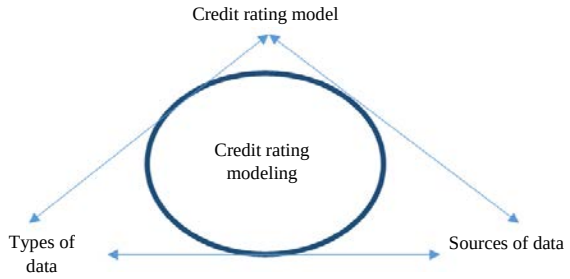

Fig. 1: A proposed credit model

The forms may be related to the quality of how the business entity is governed and managed. Non formal business entities may have significantly different from formal business entities in the way and quality of governance and management. The quality of long term and annual planning, its execution, the job structures, monitoring and reporting are closely related to the governance and management issues. And in many cases, as mentioned in the previous section, the quality of reporting as part of governance and management is a big concern of creditors and fund providers.

The status of MSEs refers to the independence of the business. Majority of them are independent business entities. They do not have formal link such as ownership or business with other companies. Other MSEs have formal relationship with other companies. For example, some MSEs becomes either suppliers or distributors or retailers of large corporations. As suppliers of large corporation and a part of business network, MSEs at least have a niche market. They may sell all or only a fraction of their products to their partner.

Some MSEs become a member of certain organization, mainly cooperatives. Under this membership mechanism, they may not have direct benefit of business. Members of cooperatives such as credit unions, for example, have an opportunity to manage their cash flow by lending to and borrowing from the cooperatives. Other types of cooperatives provide facilities for their members to sell and buy their products. The status, then, may contribute to the growth and sustainability of MSEs. It could be hypothesized that MSEs that have business link with other companies have better chance to grow, survive and sustain.

There may be other factors that affect the growth and sustainability of MSEs. Let say some MSEs do not have business link with other companies that take the role as foster parents. The MSEs may be completely independent. However, the owner-managers have a lot of experience of conducting businesses. They may have been involved in MSEs from their parents that also have MSEs. In some cases, they may have done businesses before developing an MSEs. Some youths sell goods while they are at schools. This experience shapes and prepares them to become entrepreneurs. Therefore, they know how to run a business. As a result, they successfully run MSEs.

Another factor that needs to be considered in developing a model is the availability of data. MSEs that belong to a groups, cooperatives, or association tend have better recorded data than independent MSEs. Those that have a business link with large companies also have recorded data. Commercial banks, especially those who provide micro and personal financing, certainly manage the data of MSEs, especially their customers. Moreover, in many countries, including developing countries, departments and some other public institutions are concerned with MSEs and therefore, collect the data of MSEs. Theses condition give an optimism of the availability of data.

The above conditions lead to an alternative model of credit rating form MSEs. The first thing to consider is the statistical approach. As mentioned previously, the data seem to be available for various MSEs. Therefore, parametric approach is one of the best statistical model to be employed. The statistical model with parametric that is familiar to work on is logistic regression. With this model, the statistical result directly indicate the probability of default or the probability of success of an MSE. This probability can be directly converted into the level of rating. The dependent variable of logistic model, Y_i can be converted into probability of success by following Eq. 1:

$$Y_i = \ln\frac{\rho_i}{1-\rho_i} \quad (1)$$

Where:

Y_i = The dependent variable of company i
ρ_i = The probability of success of company i

from Eq. 1, the probability of success of company i is as shown in Eq. 2:

$$\rho_i = \frac{e^Y}{1+e^Y} \quad (2)$$

The next thing is to identify the independent variables of the logistic regression. Referring to the previous studies as mentioned in the previous section and the condition of MSEs, the proposed independent variables can be classified as follows. The first group of independent variables is company financial matrix. This group consists of financial performance and financial condition of each MSE. The performance matrix include profitability, efficiency and liquidity.

Note that the financial report of MSEs is very limited. It may be hard to expect MSEs to provide Profit and Loss Account properly. However, MSEs at least know the gross profit from their business. Also, they also know how much money they can use for personal concern, not for

business. In academic terms, they may know the cash dividend as the indication of profitability. The higher profit, the higher cash dividend to be collected. Finally, liquidity may be in the form of how much they have to maintain the cash to run the business properly. This can be measured in terms of the ratio of cash to sales.

Besides those three variables, an MSE may also have a chance to success if it can leverage the company to push the growth. Therefore, there are at least three financial matrices that need to be considered, i.e., business growth, business leverage and financial leverage. Business growth indicate the ability of an MSE to compete in the market. This can be indicated by either the growth of assets or the growth of sales. It may be wise to employ the growth of sales because the record or book keeping of sales is generally much better than the record or booking keeping of assets. Also, the growth of sales can be used for MSEs that produce either goods or services.

Business leverage explains to what extent an MSE uses fixed assets. The higher the portion of fixed assets to total assets, the higher is the business leverage. Because total assets consist of fixed assets and working capital, the higher of business leverage can also be measured by how much the portion of working capital compared to total assets used by the company.

Financial leverage represents how much the company currently relies on loan to enhance the capital in order to fulfil the investment and operation of the company. On one side, the use of debt may increase the performance of the company. On the other hand, high amount of debt also increases the risk of the company. Therefore, financial leverage also affects the rating. In relation to financial leverage, coverage ratio is also important to be considered. This ratio is to indicate the ability of an MSE to pay its loan obligation from the cash flow generated from its operation.

Therefore, the company financial matrix may be represented at least by the operational variables as shown in Table 1.

Table 1: Company financial matrix

Variables	Operational definition of variable
Efficiency	Gross profit margin
Profitability	Cash dividend to sales ratio
Liquidity	Cash to sales ratio
Business growth	Growth of sales
Business leverage	Working capital to total asset ratio
Financial leverage	Debt to total asset ratio
Coverage	Operating profit to interest payment ratio

The second group of variables is the company indexes. As shown in Table 2, this group consists of MSE condition that may affect its rating. The variables may be in qualitative or quantitative natures. Both data need to be converted into scale as the measures of each variable. The age of MSE is important because this indicates the maturity and ability of the company in the market. The longer the company exists, the higher is the chance for the company to grow and sustain hence the better is the credit rating.

Table 2: Variables of the company indexes

Variables	Operational definition of variable
Age of the MSE	<2 years
	Between 2-5 years
	Between 5-8 years
	Between 8-11 years
	Above 11 years
Market coverage	Data not available
	Sub-district coverage
	District coverage
	Provincial coverage
	National and international coverage
MSE form	Non formal business entity
	Non formal business entity with limited license from sub-district authority
	Formal business entity, firma or CV
	Formal business entity, limited liability company
MSE status	Independent MSE
	Independent MSE, member of association
	Independent MSE, member of cooperative
	Link to business entity, partially support the business entity
	Link to business entity, fully support the business entity

Market coverage is also important. It is expected that wide market coverage becomes a kind of market diversification because by occupying wide market, an MSE does not rely solely on one location such as only its village. Instead, the MSE may make a balance in fulfilling the various areas of market.

MSE forms and status are included in this group. As mentioned above, business form concerns with the legal standing of the company while business status is about the independence, interdependence, or dependence of the MSE with other business entities.

The third group of variables concerns with governance. These variables are shown in Table 3. The first crucial factor of governance is the availability of document as the basis for organization to manage the business. The documents include how the jobs are distributed, meetings are recorded, operational activities are recorded and business reports are generated. The availability of such documents helps the MSE convince the credit rater that the company is well managed.

The variables of breach of contract and tax record are similar with the variables used by Chi and Zhang[18]. They are about the commitment of a business entity to fulfil regulations and commitment Compared to the variables used by Chi and Zhang[18], these two variables are operationally different. While Chi and Zhang[18] make four categories for some variables, this paper classifies the variables into five levels. In addition, this paper adds other variables that are not used by Chi and Zhang[18] such as financial record.

The fourth group of independent variables is industry matrix. Industry here is defined similar used by Porter in

Table 3: Variables of governance

Variables	Operational definition of variable
Availability of organization document: role, responsibility and authority, minutes of meeting, operational document, business report	Lack of data
	One kind of document is available
	Two kinds of document are available
	Three kinds of document are available
	Four kinds of documents are available
Availability of plan: annual plan, operational plan, long term plan, financial plan	Lack of data
	One kind of document is available
	Two kinds of document are available
	Three kinds of document are available
	Four kinds of document are available
Risk management: staff responsible for managing risk, policy or guideline for risk management practices, risk management as part of plan, risk management process is properly implemented	Lack of data
	One criterion is fulfilled
	Two criteria are fulfilled
	Three criteria are fulfilled
	Four criteria are fulfilled
Involvement of family member in the business	Lack of data
	Core and non-core family members are involved
	Non-core family members are involved
	Core family members are involved
	No family member is involved
Breach of contract	Lack of data
	One breach of contract
	Two breaches of contract
	Three breaches of contract
	Four or more breaches of contract
Tax record	Lack of data or minimum 2 delinquency tax record
	No tax record or 1 delinquency record
	Individual tax delinquency record and latter paid in full
	<3 years tax record without tax delinquency record
	The 3 years or more tax record without tax delinquency record
Financial record	Lack of data or nor financial report
	Partial financial report, just for operational document
	Partial financial annual report
	Full financial report, unaudited
	Audited full financial report

Table 4: Industry matrix

Variables	Operational definition of variable
Industry prospect	Lack of data
	Industry growth is <10% under economic growth
	Industry growth is under economic growth
	Industry growth is more than economic growth
	Industry growth is more than 10% above economic growth
Social network	Lack of data
	Use of social media only for family group and information
	Use of social media only for social information
	Use of social media for business information
	Use of social media for business activities, such as promotion and transaction
Loan experience	Lack of data
	No information on loan to formal entities
	Loan from informal sector, including shark loan
	Loan from formal sector without requirement of creditworthiness of the MSE
	Loan from formal sector with requirement of creditworthiness of the MSE

industry analysis. This consists of a group of companies in the same field and they compete each other, market, supplier, substitutes and potential new entrants.

The variables are not only the industry prospect. These also include the use of social media as the media of business and loan experience as an alternative capital. Some of industry variables, as shown in Table 4, similar to those used by Zhang et al with some adjustments in this study[16]. The adjustment includes the categorization of operational variables. Fifth and the last group of variables are basic information Variables. The variables include sex, age of owners or founders, capability and location of business. This study defines owner and ownership. Owner is defined is the one that initiates the establishment and dominant leadership. A non-formal business entity can be owned by a single owner. A limited company in countries like Indonesia must have at least two owners. For this reason, sex variable is defined as the sex of owner.

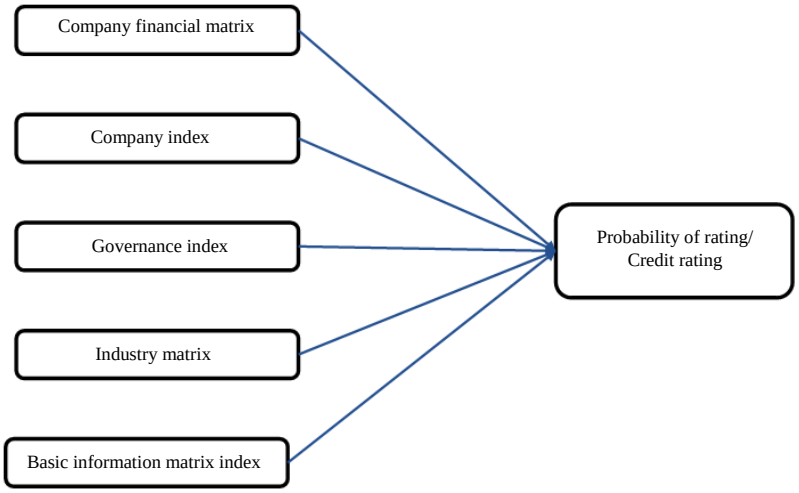

Fig. 2: Generic credit rating for MSEs

Table 5: variables of basic information

Variables	Operational definition of variable
Sex of owner or majority shareholders or owner	Female
	Male
Ownership	Core family ownership
	Core and non-core family ownership
	Non-core family ownership
	Family and non-family ownership
	Non family ownership (Years old)
Age or owner(s) and founder(s)	Average under 20
	Average 20-25
	Average 26-31
	Average 32-37
	Average >37
Education of owner or founder	Average graduate from elementary school or under
	Average graduate from junior high school
	Average graduate from senior high school
	Average graduate from vocational
	higher education such as college
	Average graduate from university,
	t least from bachelor degree
Business experience	Lack of data (Years)
	<1
	<3
	<5
	>5

Ownership is about the number and relationship among owners. It can be single or multiple ownership. In the case of multiple ownership, the owners may come from core family, non-core family or from non-family. These differences may have impact on the business success and hence, the credit rating.

Capability is also important to consider in measuring credit rating. Capability here is defined as education level and experience. High education owner tends to have a strong business orientation and willingness to grow. On the other hand, low education owner tends to focus on the survival of their daily life and no ambition to grow. The similar thing also happens to those with or without business experiences. A business owner with business experience tend to have willingness to make his or her business grow in size compared to those without business experience (Table 5).

Based on the statistical approach and variables as mentioned above, Fig. 2 shows the generic credit rating for MSEs. Figure 2 shows the relationship between various groups of independent variables with dependent variables. Note that the dependent variable is a dummy with the value of 1 for every success MSE and 0 for every failed MSE.

CONCLUSION

It is possible to design a credit rating model for micro and small enterprises, or MSEs with a statistical model. More specifically, a parametric approach with a logistic regression model is very reasonable. This is supported by availability of data of MSEs. Various institutions manage the database of MSEs. Those institutions include commercial banks, statistical bureau and some departments. Some data may be also available in social media.

There is, however, still at least a challenge for conducting a credit rating for MSEs, i.e., the differences among MSEs. For example, MSEs that belong to cooperatives may have significant difference in competitive advantages, business orientation, funding characteristics, borrowing habits, etc., these may lead to different factors that significantly influence their credit rating.

Therefore, it is important to start with a specific group of MSEs to run a statistical model. Every group of MSEs may have a unique credit rating model. If this happens, it

should be fine to have various credit rating model for each MSEs group. If the differences among credit rating model is not significant, a comprehensive credit rating model that represents a model for all MSEs is welcome.

As the title says, this paper is an initial journey. The next step is to find evidence of this model by running a statistical data into the logistic model suggested in this paper. This is the next journey of the design of the credit rating model for MSEs.

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