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# A CONCEPTUAL MODEL OF CREDIT SCORECARD IN PRODUCTIVE LOAN

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**Abstract:**

This study is aimed to discuss variables involved in credit scorecard assessment for granting agricultural credits. To get the variables, authors approached with the synthesizing method or Knowledge Synthesis Method from 25 papers related to the credit scorecard development in SMEs and Agriculture. This study used 5 C's of credit concept to group related variables and eliminated which are not. It is found that from the five aspects of 5C's, the character aspect consists of management, relationship, credit history, good corporate governance (GCG), behavior, and innovation. The capacity aspect consists of liquidity, profitability ratio, indebtedness degree, repayment history, activity ratio, financial growth, and expense ratio. The capital aspect consists of one indicator, namely capital structure. The conditioning aspect comprises of external factors of PESTEL, industry, and scope of a region in terms of monitoring. The collateral aspect consists of one indicator, which is a guarantee. All of these indicators will be a basic determinant of variables to appraise credit risk quality of a borrower in the agriculture sector. The limitation of this study is the scope limitation of conducting literature synthesize in particular papers which are related to appraising borrowers who are proposing productive loan, particularly in SMEs and the agriculture sector. The finding of this study will be useful for financial institutions that are responsible for developing assessments for borrower candidates in SMEs or the agriculture sector. Further process of research is eligible to be conducted, either qualitative or quantitative, in order to validate and improve the findings in this paper.

**Keywords:**

Credit Scorecard, SMEs, Agriculture, Productive Loan, Indicators, 5C's Of Credit

## Introduction

Financial inclusivity has been a critical aspect for the growth of economy. As defined in PP 82 2016 about National Strategic of Financial Inclusivity (SNKI), financial inclusivity is a condition that every member of society have an equal access towards formal and qualified financial services which on time, seamless, and secure with affordable price according to the needs and capacity in order to increase the wealth of society.

Indonesia has experienced significant improvement in financial inclusivity trends. Based on the Official Press Conference of Financial Service Authority (OJK) from 2017 to 2019, the Financial Inclusivity Index of Indonesia in 2013 was only 59,74%, while Financial Literacy Index was 21,84%. Up to 2019, the Financial Inclusivity and Financial Literacy has increased for 27,54% and 74,13% respectively.
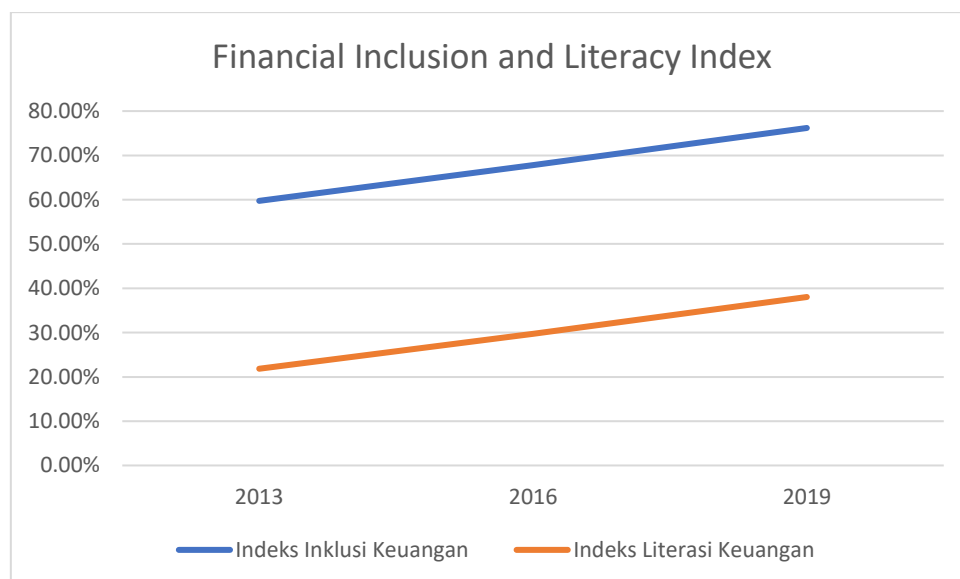


**Figure 1: Financial Inclusion and Literacy Index**
Source: SP/07/DKNS/OJK/I/2017 & SP/58/DHMS/OJK/XI/2019

The significant increase is not apart from the emerges of Fintech or Peer-to-peer (P2P) Lending platforms which mostly target the unbanked people in Indonesia. Fintech Lending contribute to the coverage expansion of Indonesia's "Credit Invisible" (PwC Indonesia, 2019). At least, 70% of the users of Fintech Lending comes from the unbanked people – including individuals and SMEs – which previously had no access to financial services.

One of the major contributors of unbanked people is agriculture sector. While 27,33% of workforce in Indonesia work in agriculture industry (Badan Pusat Statistik, 2019). Moreover, only 48,9% of workforce people in Indonesia have access to bank account, while the rest of them are still categorized as unbanked people (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2017). Obviously, this specific target has become a huge potential market for P2P players. Within the 164 players which registered in OJK, at least three P2P are focus their target market in agricultural sectors.

A credit risk assessment process become an important process for P2P in conducting their business process. P2P platforms do not only act as a marketplace that match borrowers' loan needs to the financing capital provided by lenders, they also act as a credit bureau to analyze a potential borrower's credit history and assess the risk of a loan (PwC Indonesia, 2019).

The purpose of this study is to find important variables need to be included as indicators in a credit scorecard in assessing creditworthiness of borrowers who propose productive loan, mainly in SMEs and agriculture sectors. The study uses 5C's of credit as the basic concept in determining the variables.

This study used knowledge synthesis method to gather variables from 25 of previous journals which discussed credit scoring in SMEs or agricultural studies. A knowledge synthesis summarizes all pertinent studies on a specific question, improves the understanding of inconsistencies in diverse evidence, and define future research agenda (Kastner, et al., 2012).

The variable gathering started from journal screening process. The journal screening consists of picking up literatures which discuss about credit scorecard development in productive loan, particularly the literatures which deepen their topics on Small and Medium Enterprises (SMEs) and agricultural sectors. The searched literatures include Agricultural Finance Review journals, Finance and Economics journals, Credit and Banking journals, and Management Research Review journals that are found to use both quantitative and qualitative methodology in developing credit scorecard which the variables are relevant with the principle of 5 C's of credit.

Afterwards, the variable gathering continued with variable selection and grouping process. This phase covers variable reviews and selection based on the 5 C's of credit principle. The variables which irrelevant with the principle were eliminated by authors. Following the selection process, authors classifying all of the relevant variables based on the characteristics of each variables and grouped those variables into relevant dimension within the 5 C's of credit principle.

A conceptual model is produced at the end of this paper. The conceptual model can be used for further studies or development of credit scorecard in productive loan. Furthermore, the findings from this paper will also essentials in improving quality of financial inclusion in Indonesia.

## Literature Review
The literature review is divided into five sections based on the concept of 5 C's of credit, which are character, capacity, capital, condition, and collateral. Each of the section contains a further explanation about the variables that construct each section. A conceptual framework mapping will be available to indicate the research position of this study.

### *Character*
Character aspect assessed for granting credits rests on traits such as honesty, reasonableness, acumen, industriousness, integrity, attitude, and commitment (Bhatt, 2012). Granting loan cannot be separated from character aspect, since it always related to human behavior either the borrowers are individual or a legal entity (which is represented by its board of commissioners and directors). This aspect appraises how borrowers would respond when others component of

C's will turn bad. Therefore, character is put as the most prominent factor when banks or other financial institutions conduct preliminary assessment towards the borrower candidate.

Bhatt (2012) stated that character of borrowers depicted in two ways:

a. Disclosing of business affairs with the banker (loan grantor)
b. Use of funds for the purpose approved

Character aspect comprises of seven variables which include:

### Management Behavior

Such as habit in banking (Bandyopadhyay, 2007) and transactional behavior records (credit history, incidents, integrity, and transparency) in obtaining credits (Caracota, Dimitriu, & Dinu, 2010).

### Credit History

Such as payment behavior of borrowers (Sbârcea, 2008), default rate (Ono, Hasumi, & Hirata, 2014), borrowing from other financial institutions (Limsombunchai, Gan, & Lee, 2005), repayment history (Ellinger, et al., 1991), amount of loan repaid and borrowed (Onyunecheya & Ukoha, 2007).

### Management

Such as management experience (Saygili, Saygili, & Isik, 2019), management education (Limsombunchai, Gan, & Lee, 2005), and the firm age (Ono, Hasumi, & Hirata, 2014).

### Good Corporate Governance

Includes business legality of the borrowers (Gool, Verbeke, Sercu, & Baesens, 2011), audited or non-audited financial report (Ogler, 1970), and the documentation process within the operation (Ellinger, et al., 1991).

### Innovation

The higher capability to make innovations, the lower credit risk of the borrowers will have (Zhang, He, & Zhou, 2013).

### Loan Purpose

Loan purpose means the main objective of borrowers in obtaining the credits (Gool, Verbeke, Sercu, & Baesens, 2011).

### Relationship

Which means the relationship related with how good relationship the borrowers with the bank or financial institutions which the borrowers borrowed the money (Ono, Hasumi, & Hirata, 2014).

### Capacity

Capacity does not only include legal status of borrower to enter into contract, rather it highlights the capability of business or person to generate sufficient cash flows to repay the loan (Bhatt, 2012). In productive loan context, providing a stable high profit in financial data is not sufficient enough to meet the capacity aspect. In fact, profit does not always reflect positive growth of cash. Sales or revenues for companies commonly comes on account which cause delay cash inflow to the company. In practice, it even needs to look deep into their bank

statement, since it gives real picture of their financial condition. Furthermore, mitigation plan when the forecast does not go as planned also important to be analyzed for the loan grantors (Bhatt, 2012).

Based on journal synthesizing which has been conducted by authors, capacity aspect has seven variables involved to indicate the rate of credit risk, which are:

### Liquidity
Such as current liquidity (Sbârcea, 2008), quick and current ratio (Zhang, He, & Zhou, 2013), and net cash cycle (Hu & Ansell, 2007).

### Profitability Ratio
Such as profit margin ratios (Caracota, Dimitriu, & Dinu, 2010), return on asset (ROA) (Zhang, He, & Zhou, 2013), and return on equity (ROE) (Hu & Ansell, 2007).

### Indebtedness Degree
Such as coverage ratio (Min & Lee, 2008), debt-to-EBITDA ratio (Altman, Esentato, & Sabato, 2018), and debt-to-asset ratio (Ziari, leatham, & Turvey, 1994).

### Repayment History
Such as repayment punctuality (Ogler, 1970), clarity of payment source (Stover, Teas, & Gardner, 1985), and repayment capacity (Ellinger, et al., 1991).

### Activity Ratio
Such as receivable collection period (Caracota, Dimitriu, & Dinu, 2010), total asset turnover (Zhang, He, & Zhou, 2013), and payable turnover (Hu & Ansell, 2007).

### Expense Ratio
Expense ratio is a part of profitability measurement in a common-size income statement. A common-size income statement is an income statement in which each item is expressed as a percentage of sales (Gitman & Zhutter, 2012). However, the expense ratio measures from the perspective of expense incurred within the financial period (Ellinger, et al., 1991).

### Financial Growth
Which includes sales growth, EBIT growth, operating income growth, payroll growth (Hu & Ansell, 2007), and earning trend (Ellinger, et al., 1991).

## Capital
Bhatt (2017), stated in his research that capital aspect often referred as net worth it is the financial factor which provides the ability to overcome unanticipated losses. Capital also referred to the amount of capital contributed by the owner into the operation indicates his/her commitment running the business. Capital aspect has one variable which is involved to indicate the rate of credit risk, namely Capital Structure. Capital structure includes ratios which measure the structure of owner's fund compared with borrowed money involved in operating the business. The variables found are debt-to-equity ratio (Limsombunchai, Gan, & Lee, 2005) & equity-to-asset ratio (Ellinger, et al., 1991).

## Condition

Any business activity greatly impacted by surrounding conditions or commonly called as external factors. The external factors include competitive conditions, technology, demand for the product, regulations and economic changes (Bhatt, 2012). Further, it can be referred with PESTEL analysis concept. The dimensions consist of political, economic, social, technological, ecological, and legal aspect (Rothaermel, 2019). Even these aspects are uncontrolled by borrowers, it will affect either direct or indirect to the borrower's business activity. The conditions the borrower is operating under can have a major influence on credit quality (Baiden, 2011). Thus, external factors are inevitably in assessing loan proposal. Loan grantors may approach with different types of model to analyze the external factors.

Based on journal synthesizing which has been conducted by authors, condition aspect has three variables involved to indicate the rate of credit risk, which are:

### PESTEL

Such as price volatility & climate effects (Castro & Garcia, 2014), pollution aspect & demographic location of borrowers (Mittal, Gupta, & Jain, 2011).

### Industry

Relates with the conditions within the borrower's industries which might be different in each type of industry. There are numbers of journals that included industry variables such as Sbârcea (2008), Castro & Garcia (2014), and Ono, Hasumi, & Hirata, (2014).

### Region Scope

Here is defined as the location distance between the borrower's business operation and the loan grantors branch or headquarter office (Onyunecheya & Ukoha, 2007).

## Collateral

Collateral refers to the asset or security which the borrower may charge or pledge against the loan (Bhatt, 2012). In a situation which borrowers cannot settle its loan, collateral will hold a vital role in solving the default. Collateral goods should be liquid, which mean that the collateral is easy to be sold and be converted to cash. Therefore, the easier the collateral be converted to cash, the better quality of collateral.

Based on journal synthesizing which has been conducted by authors, collateral aspect has one variable which is involved to indicate the rate of credit risk, namely Guarantee. This include the quality of guarantee (Sbârcea, 2008), presence of guarantor (Bandyopadhyay, 2007), and the value of guarantee (Amelie & Allen M., 2001).

## Discussion

Based on the literature review and knowledge synthesis from 25 previous studies which had been conducted by authors, there are five important major factors that should be included as the indicator of credit risk scorecard, which in line with the concept of 5C's of credit. The five major aspects – which consist of character, capacity, capital, condition, and collateral – are constructed from every variable which had been used in the previous.

The first major factor is character. The character aspect assess' the behavior and the response of borrowers when other component of C's will turn bad. This aspect is derived into seven major variables which consist of behavior, credit history, management, good corporate governance (GCG), innovation, loan purpose, and relationship. The better character of borrower, the lower credit risk they would have.

**Table 2: Character Variables (Author's Analysis)**

| Character | | |
|---|---|---|
| **Variables** | **Number of Each Variables** | **Number of Significant Variables** |
| Management | 36 | 9 |
| Credit history | 8 | 2 |
| Relationship | 7 | 3 |
| Behavior | 6 | 4 |
| Loan purpose | 6 | 0 |
| GCG | 3 | 1 |
| Innovation | 1 | 1 |
| **Total** | **67** | **20** |

Author synthesized variables related with character dimension and its derivation. From table 1, character dimension has 67 variables and 20 variables (30%) among them are classified as significant variables related with credit risk quality in each journal. Within the 25 journals, number of management variables dominated character dimension with 36 or 53% from the total variables. Along with the total number variables, the number of significant variables for character dimension also dominated by management with 9 variables or 13% from total character variable. This followed by behavior variable which has four variables which classified as significant variable in determining credit risk of borrower.
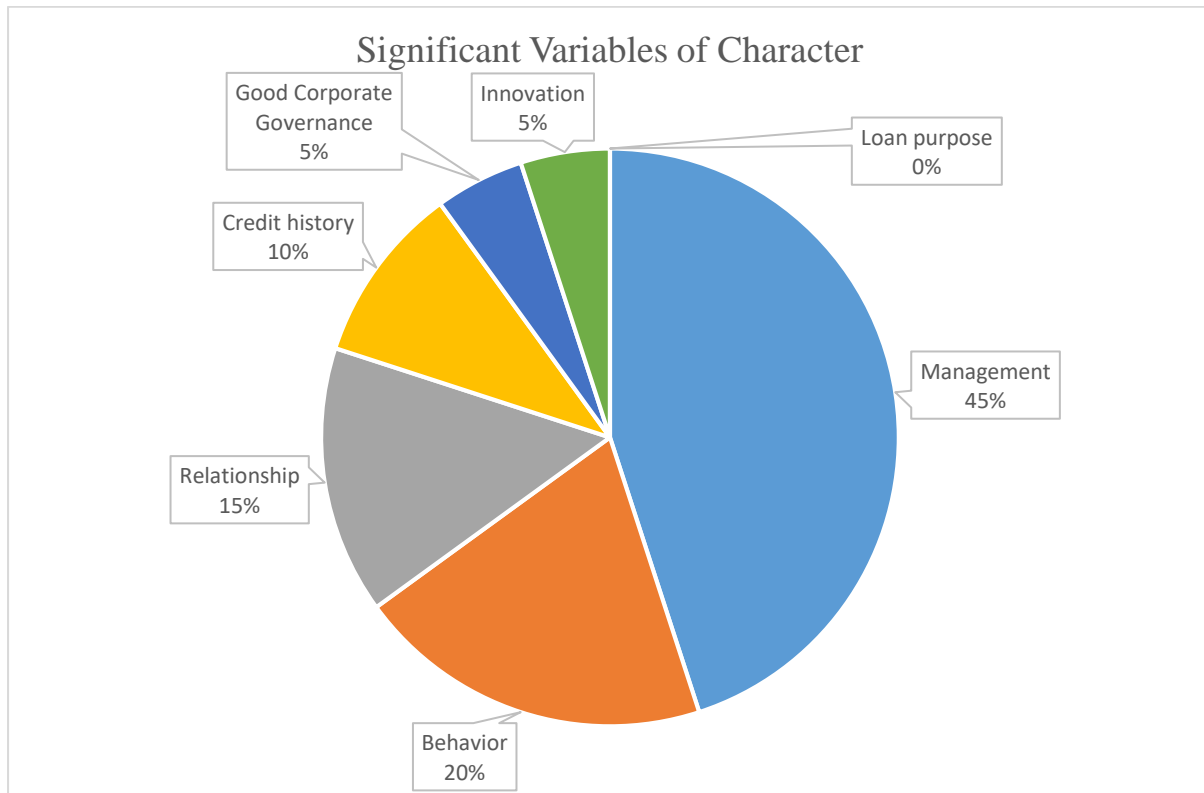
**Figure 2: Significant Variables of Character (Author's Analysis)**

Furthermore, authors analyzed the number of significant variables within the significant variables of character aspect. As figure 2 shows, from the total of 20 significant variables, management, behavior, and relationship dominate the number of significant variables with 45%, 25%, and 15% respectively.

The second major factor is capacity. Capacity is the indicator of borrower's ability to repay their loan by their own cash. It is determined dominantly by financial ratios of the borrowers. Liquidity, profitability ratio, indebtedness degree, repayment history, activity ratio, expense ratio, and financial growth become main variables to construct the capacity aspect.

**Table 2: Capacity Variables (Author Analysis)**

| Capacity | | |
|---|---|---|
| **Variables** | **Number of Each Variables** | **Number of Significant Variables** |
| Liquidity | 50 | 9 |
| Indebtedness Degree | 42 | 5 |
| Profitability Ratio | 41 | 6 |
| Activity Ratio | 13 | 3 |
| Repayment History | 7 | 4 |
| Financial Growth | 5 | 0 |
| Expense Ratio | 3 | 0 |
| **Total** | **161** | **27** |

Author synthesized variables related with capacity dimension and its derivation. From table 2, capital dimension has 161 variables and 27 variables (17%) among them are classified as significant variables related with credit risk quality in each journal. Within the 25 journals, number of liquidity sub-group variables dominated capacity dimension with 50 variables or 31% from total variables, and it followed with the indebtedness degree and profitability sub-group variables which consist of 42 and 41 variables respectively.
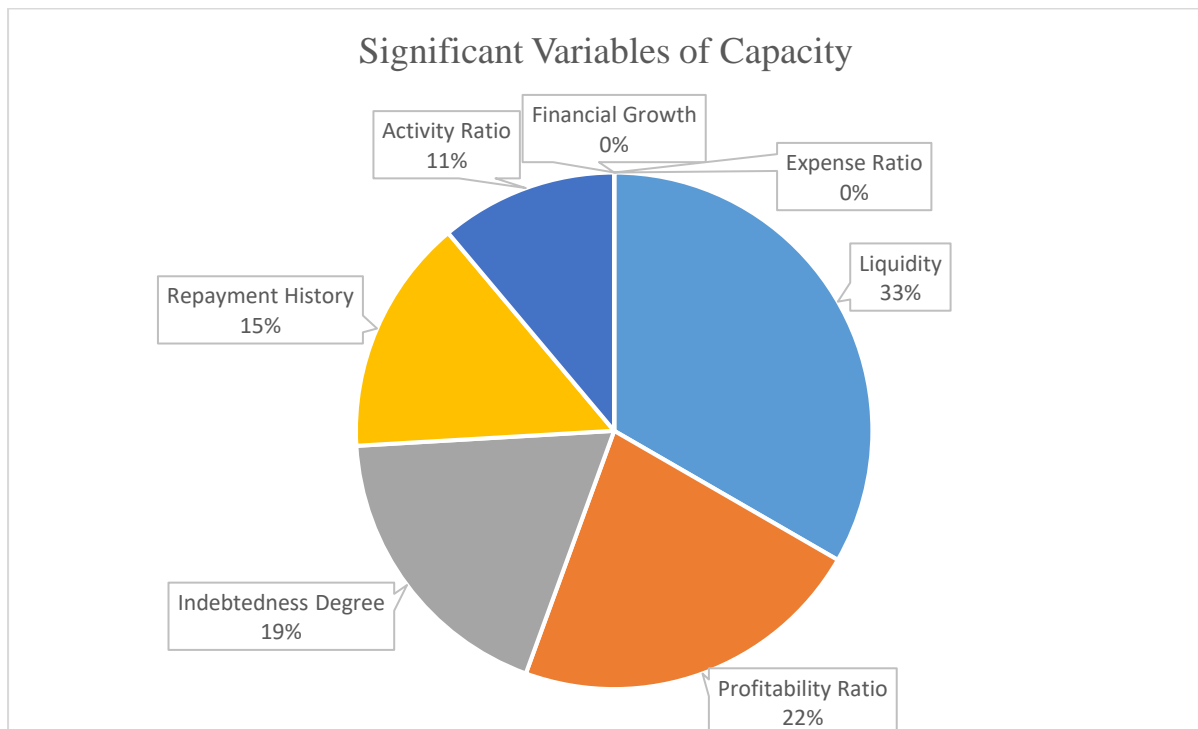


**Figure 3: Significant Variables of Capacity (Author's Analysis)**

Furthermore, author analyze the probability of significant variables among the variables provided related with capacity aspect. As figure 3 shows, from the total of 27 significant variables, liquidity, profitability, and indebtedness degree ratio dominate the significant variables for 33%, 22%, and 19% respectively from the total variables. The rest of it consist of payment history and activity ratio have 15% and 11% respectively. While expense ratio and financial growth do not have any significant variables found in the 25 related studies.

The third major factor is capital. Capital aspect looks at the proportion of borrower's owned wealth which is contributed into the business operation compared with the proportion of money they borrowed. The rule of thumb the maximum of a lender is willing to contribute the money into the operation of borrowers is 75 percent compared to the owners 25 percent or debt-to-worth ratio of three to one (Donaldson, 1986). Capital aspect consists of one type of variable which is capital structure. Capital structure itself comprise of ratios used by previous study that measure the proportion of owner's equity, such as debt-to-equity ratio and equity-to-asset ratio.

**Table 3: Capital Variables (Author's Analysis)**

| Capital | | |
|---|---|---|
| **Variables** | **Number of Each Variables** | **Number of Significant Variables** |
| Capital Structure | 20 | 8 |
| **Total** | **20** | **8** |

Author synthesized variables related with capital dimension and its derivation. From table 3, capital dimension, and the related sub-group, capital structure, has 20 variables and 8 variables or 40% among them are classified as significant variables related with credit risk quality in each journal.

The fourth major group is condition. Condition aspect consider external factors will influence the business activity of borrowers even though the factors might uncontrolled by borrowers. This aspect comprises of PESTEL analysis, industry, and region scope.

**Table 4: Condition Variables (Author's Analysis)**

| Condition | | |
|---|---|---|
| **Variables** | **Number of Each Variables** | **Number of Significant Variables** |
| PESTEL | 26 | 9 |
| Industry | 18 | 7 |
| Region Scope | 4 | 2 |
| **Total** | **48** | **18** |

Author synthesized variables related with condition dimension and its derivation. From table 4, condition dimension has 48 variables and 18 variables, or 37,5% among them are classified as significant variables related with credit risk quality in each journal. Within the 25 journals, number of PESTEL sub-group variables dominated condition dimension with 26 variables or 54% from total variables, and it followed with the industry variables which consist of 18 variables or 37,5% of total variables. This shows that to determine borrower's condition, analyzing PESTEL borrowers is the most common measurement.
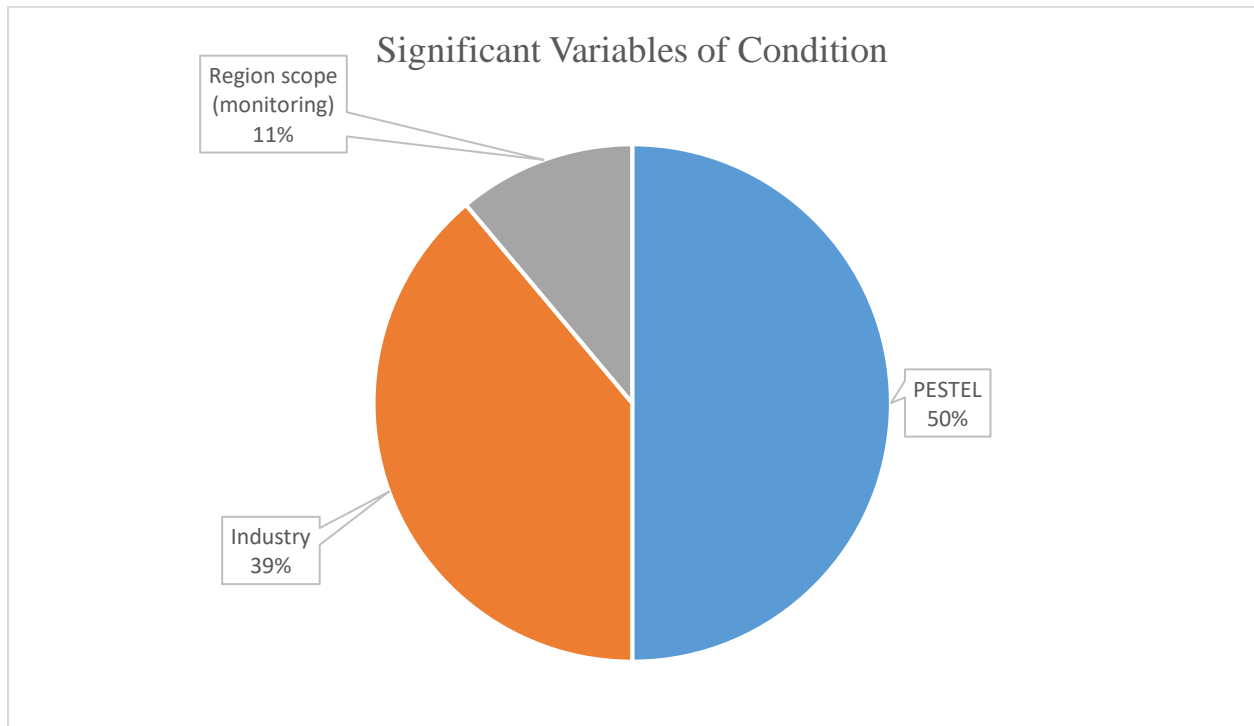
**Figure 4: Significant Variables of Condition (Author's Analysis)**

Furthermore, from the total of 18 significant variables 50% of them is PESTEL variable and considered has significances with quality of credit risk. As it showed in figure 4 PESTEL is followed by industry and region scope variables which contribute 39% and 11% respectively from the total significant variables.

The last major factor in determining credit risk of borrowers is collateral. Even though collateral might not be counted as the borrower's resource to pay their loan, it will perform as a cushion when the other C's do not perform well. Collateral should be liquid or easy to be converted to cash.

**Table 5: Collateral Variables (Author's Analysis)**

| Collateral | | |
|---|---|---|
| **Variables** | **Number of Each Variables** | **Number of Significant Variables** |
| Guarantee | 16 | 2 |
| **Total** | **16** | **2** |

Author synthesized variables related with collateral dimension and its derivation. From table 5, collateral dimension, and the related sub-group, guarantee, has 20 variables and 8 variables or 12% among them are classified as significant variables related with credit risk quality in each journal.

### Table 6: Journal Studied for the Synthesized Literatures

| Author(s) | Data Set | Methodology | 5 C's Dimensions |
|---|---|---|---|
| Sbârcea (2008) | Agriculture granted loan in 2006, 2007, 2008 during the Farmer Programs which developed by several banks in Romania | Empirical analysis towards the credit risk outlook during the Farmer Programs (2006-2008) | Character, capacity, capital, collateral, condition |
| Castro and Garcia (2014) | Monthly data from December 2005 to November 2012 of exposures and default loans in biggest rural bank in Colombia | Generalized Linear Model (GLM) based on a structural default risk model | Condition |
| Mittal, Gupta, & Jain (2011) | 2,864 India micro enterprises that had bank loan between 31 January 2007 and 31 January 2009 | Neural Network - Multilayer perceptron (MLPs) procedure | Capacity, condition, collateral |
| Saygili, Saygili, & Isik (2019) | 125 SMEs operating in Turkey | Regression Analysis | Character & capacity |
| Budimir & Aralica (2013) | Croatian crafts industry which was financed in the beginning period of financial crisis (2008-2010) and over the five year of the ongoing financial crisis (2008-2013) | Logistic Regression | Character, capacity, capital, & condition |
| Orgler (1970) | 75 bad loans & 225 good loans of several banks in East Coast states, United States | Multivariate Regression Analysis | Character & capacity |
| Caracota, Dimitriu, & Dinu (2010) | Financial information (2007-2008) of 113 companies which funded by bank in Romania | Logistic Regression | Capacity |
| Gool, Verbeke, Sercu, & Baesens (2011) | Bosnia-Herzegovinian microlenders from | Logistic Regression | Character, capacity, capital, & condition |

| Author(s) | Data Set | Methodology | 5 C's Dimensions |
|---|---|---|---|
| | January 2001 to November 2008 | | |
| Emel et al. (2003) | Loan applications of 82 companies in a Turkish commercial bank | DEA, Regression, Discriminant Analysis | Capacity & capital |
| Min and Lee (2008) | 103 actual bankruptcy cases of firms in Korea | DEA, Regression, Discriminant Analysis | Capacity & capital |
| Zhang et al. (2013) | 187 Chinese high-tech listed companies | Regression (Cox Model) | Character, capacity, capital, condition & collacteral |
| Ono et al. (2014) | 819 SME questionnaire results from Japanese firm bank database | Regression | Character, capital, condition, & collateral |
| Altman et al. (2018) | 14,420 Italian SMEs which include 520 defaulted firms | Logistic Regression | Capacity & capital |
| Frame, Srinivasan, & Woosley (2001) | 200 largest U.S. banking organizations | Cross-sectional Regression | Capacity & condition |
| Hu & Ansell (2006) | 195 well-performed companies and 51 distressed companies in U.S. retail industry from 1994 to 2002 | Naïve Bayes, Logistic Regression, Recursive Partitioning and Artificial Neural Network, and Sequential Minimal Optimization (SMO) | Character, capacity, capital, condition, & collateral |
| Limsombuchai, Gan, & Lee (2005) | 14,383 good loans and 2,177 bad loans of Bank of Agriculture and Agricultural Cooperative (BAAC), Thailand | Logistic Regression and Artificial Neural Network (ANN) | Character, capacity, condition, & collateral |
| Ziari, Leatham, & Turvey (1995) | Loan applications of Canada's Farm Credit Corporation from 1981-1983 | Discriminant Analysis | Capacity & capital |
| Ellinger, Splett, & Barry (1992) | 87 credit scoring models of agricultural banks in U.S. | Product-moment correlation coefficient and Kendall tau and | Character, capacity, capital, & collacteral |

| Author(s) | Data Set | Methodology | 5 C's Dimensions |
|---|---|---|---|
| | | Spearman correlation coefficients | |
| Barry & Ellinger (1989) | St. Louis & Louisville Farm Credit Banks portfolios | Multiperiod Simulation Model | Capacity |
| Stover, Teas, & Gardner (1985) | 44 Agricultural lending officers from 39 midwestern banks in U.S. | Ordinary Least Squares (OLS) regression | Character, capacity, condition |
| Ellinger et al. (1991) | 734 Agricultural Banks in 19 States in U.S. | Qualitative analysis using questionnaire | Character, capacity, capital, condition, & collateral |
| Bandyopadhyay (2007) | Data of 900 borrowers in agriculture sectors who got financed by a large Public Sector bank in India from 1992 to 2007 | Logistic Regression | Character, capacity, capital, condition, & collateral |
| Onyenucheya & Ukoha (2007) | 90 smallholders agricultural loan beneficiaries of Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) | Semi-log regression model | Character, capacity, & condition |
| Jouault, et. al. (2011) | 756 loans from a French Bank: CIC-Banque SNVB | Binomial logit regression | Capacity & collateral |

**Conclusion**

Based on the discussion above, it can be concluded that there are five major aspects that should be involved in assessing credit risk quality of a borrower. The five major aspects are following the 5 C's of credit concept which comprises of character, capacity, capital, and collateral. Furthermore, in each major factor, there are derivations which construct the whole concept of 5 C's of credit. The findings of this research, as depicted in figure 5, can be used as a basic conceptual model for financial institutions or peer-to-peer lending to develop credit scorecard in assessing borrowers who propose productive loan. Furthermore, the finding of this research will also contribute to the increase of financial inclusivity in Indonesia.
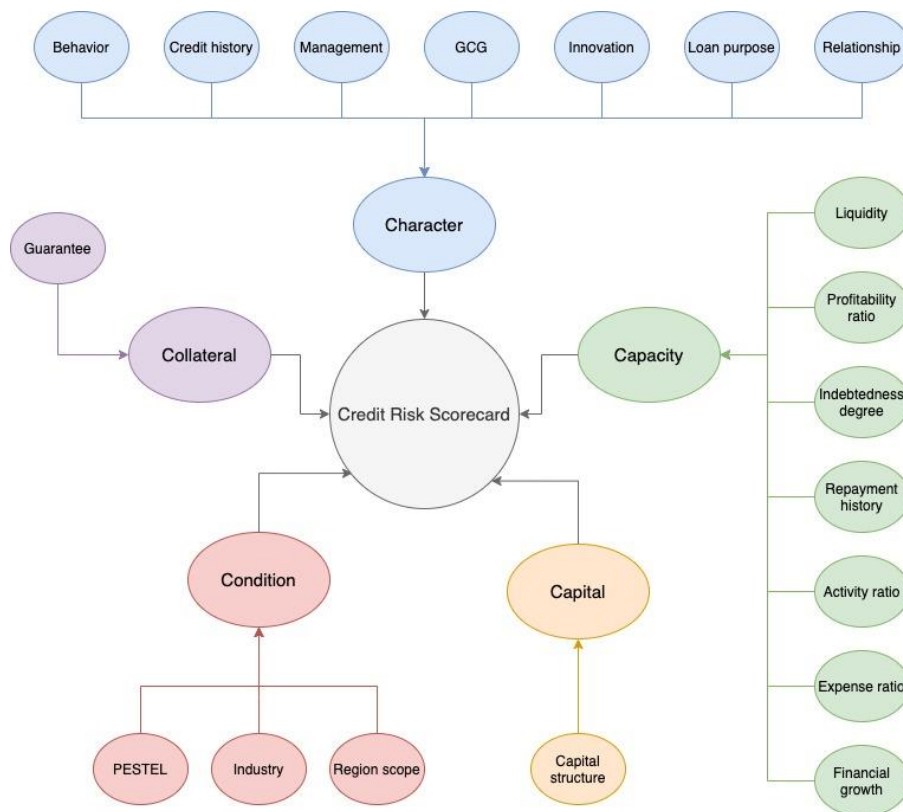
**Figure 5. Research Conceptual Model. (Author's Analysis)**

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