

**WEIGHTING MODEL OF INTERNAL RATING SYSTEM
TO CONTROL NON-PERFORMING LOAN AT PT. XYZ (Persero) Tbk**

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Abstract—The effectiveness and the efficiency of controlling and managing credit is become the most important things that need to be considered in bank, due to the function of bank as an intermediation in collecting and disbursement of people money and credit become the largest source of income for the corresponding bank. PT. XYZ (persero) Tbk is the fourth largest bank in Indonesia. As one financial institution that plays an important role in the economical sector of Indonesia, XYZ has to maintain the stability of their performance. In maintaining the stability of their performance, PT. XYZ (Persero) Tbk is completed with a tools called as Internal Rating System (IRS) that could help them in analyzing the feasibility of the potential debtor for the credit approval. However, as the economy fluctuation in Indonesia, PT. XYZ (Persero) Tbk faces a problem related with the increment of the NPL (Non-Performing Loan). It is due to the errors of the company in determining the weighted value in IRS. Where they were giving the same weighting value for a different economical sectors, in fact each economical sector are having a different risk and characteristics. This research would give a proposed solution for PT. XYZ (Persero) Tbk as alternative solution that is new weighting model for IRS by considering the characteristics and risks for each economical sector. Where the implementation of this new weighting model hopefully could help PT.

XYZ (Persero) Tbk in controlling their NPL ratios.

Key Words: Risk Management, Internal Rating System, IRS, weighting model, banking, credit.

I. INTRODUCTION

Considering the importance of capital reserved for the bank, in 1988, BIS (Bank for International Settlement) issued a capital framework concept that is known as the 1988 accord (Basel I). Basel I is designed as a simple standard, which required banks to separate their exposure into a wider class that describes the similarity type of their debtors. This exposure to customers with the same type (such as exposure to all corporate customers) will have the same capital requirement, regardless of any potential differences in the ability of credit payment and the risk that owned by individual customers.

Align with the development of products that is exist in the banking world, BIS has re-enhancing the existing capital framework that is included in the 1988 accord by issuing the new capital framework that is known as Basel II. This Basel II is created based on the standard structure of the 1988 accord that is given the framework of the capital calculation that is to be more risk sensitive, also given incentive to the quality improvement to the risk management at

bank. The framework is based on a forward-looking approach that allows the improvement and the adjustments from time to time. This is to ensure that the Basel II framework can follow market changes and development in risk management. Basel II aims to improve the safety of the financial system, with emphasizing on the calculation of the risk-based capital, the supervisory review process, and market discipline.

PT. XYZ (Persero) Tbk, is the fourth largest bank in Indonesia. As one financial institution that plays an important role in the economical sector of Indonesia, PT. XYZ (Persero) Tbk has to maintain the stability of their performance. However, there are several factors that could influence the stability of bank's performance. They are, the increasing of Non-Performing Loan (NPL), high Net Open Position as well as the negative spread.

In formulating and implementing its risk management policies, PT. XYZ (Persero) Tbk faithfully follows to Bank Indonesia rules for general banks, as well as working in conformity with standards from the Basel committee on banking supervision (notably, the Basel II concept). Managing risk in PT. XYZ (Persero) Tbk covers a scope of all PT. XYZ (Persero) Tbk enterprise activities,

based on needs balanced between business operational functions and their risk management. When such policies and risk management are in balance, risk management will be a strategic partner for business units in achieving optimal results from company operations. Therefore, this paper will examine how the risk management has been implemented in PT. XYZ (Persero) Tbk and how this company could face the issues in the company (i.e. increase of NPL) by using their risk management implementation.

II. BUSINESS ISSUE EXPLORATION

A. Conceptual Framework

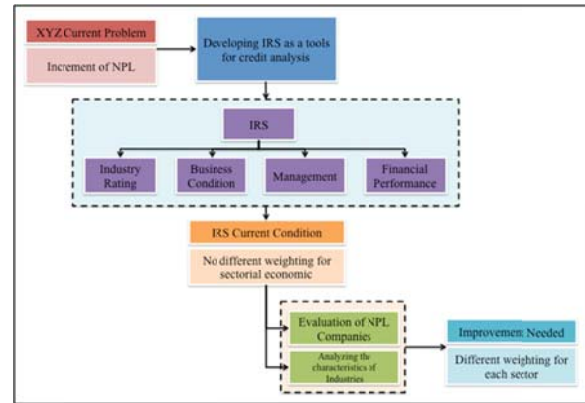


Figure 1. Project Methodology

Based on the analysis, the main issues that currently PT. XYZ (Persero) Tbk faces is the increment of the Non-Performing Loan in year 2010. Based on this condition, has analyzed that there are several factors that cause the increment of the NPL ratio, such as the effect of the economic crisis that is occur in 2008, the behavior of the credit analyst or lack of knowledge of the credit analyst in analyzing their potential debtor, and the error that coming from tools that is used by credit analyst in analyzing the feasibility of the potential debtors. However, based on the interviewed conducted by the researcher, found that the main problem that cause this issue is in the credit process. Because, the effect of the economic crisis that occur in 2008 cannot be used as a reference in improving the performance of the bank, which because the economic crisis could be occur any time and unexpectedly. But, how the company could overcome this effect is the important part for the company.

As we know that credit is the main business that is run by the bank and become the largest source of income for the corresponding bank. So, analyzing the process of credit approval might be beneficial in finding a solution in reducing the NPL ratio. Based on analysis on the process of the credit approval, role of credit analyst and the implementation of credit rating are important in order to explore this issue.

The role of credit analyst is to analyze the feasibility of the potential debtor whether this debtor is eligible or not in credit granted. Based on the interview that has been conducted, in analyzing this potential debtor, credit analyst is supported with a tool that is called as Internal Rating System. Which is a tools or infrastructure that helped

the credit analyst in analyzing the level of risk of the potential debtor. If the tools that they used are having some problem, it is possible that the credit analyst will make a mistake in conducting the analysis.

Because of that reason, this paper will first analyze what is the IRS and what are the components that build the IRS. Based on the analysis, found that IRS was developed from 4 main variables, which are Industry Rating, Management Aspect, Business Condition and Financial Performance. And each of these variables was given some weight that then will be combined to form a rating called Initial Rating. From this rating it will identify what are the level of risks of the potential debtor of this Bank.

However, based on the analysis of IRS there is a drawback that needs to be improved in order to developed a more efficient and better IRS that could help XYZ in reducing their NPL.

The drawbacks of the IRS can be seen from the weighted that is implemented on each variable that is mentioned above. Which there are no difference weights applied for different economical sectors. The one that differentiate the weighting for one industry to another industry is only on the industry rating variables, which the score for this variable is obtain from the calculation of the IRS that has been explained in the previous chapter. But, for the rest of the variable XYZ assume that each industry is having the same characteristics and risks. So they obtained the same weighting for each industry. In fact each sector industry has a different characteristic and risks.

Method of Data Collection and Analysis

The method of the data collection and the analysis process in this paper in finding the best solution that could be used for PT. XYZ (Persero) Tbk, will be followed several steps as listed bellow:

- First of all, researcher will first analyze the step that has to follow in conducting the Unadjusted Rating or CRR (Credit Risk Rating). In which in determining the rating of the company, the credit analyst need to put some ranking on the several variables that has been determined by PT.XYZ (Persero) Tbk. However, those variables are divided into four categories, they are Industry Rating, Business Condition, Management and Financial Aspect. Which each category will then be divided into several variables.
- After that, researcher will then analyzing which are the economic sector in Indonesia that contribute the biggest NPL ratio on PT. XYZ (Persero) Tbk. In order to provide a more detailed solution for PT. XYZ (Persero) Tbk, researcher will select one economic sector that has the biggest contribution NPL ratio at PT. XYZ (Persero) Tbk, then will analyze the sub-sector of this type of sector and choose three biggest NPL contributions at PT. XYZ (Persero) Tbk. This is because each sub-sectors on every economic sector are having a different characteristics and risk. Although they were categorized on the same kind of economic sector, but each sub-sector are having different procedures in running their business.
- After knowing what are sub-sector that will be evaluate in this paper, the next thing that will be done is collecting 30 NPL companies on each sub-sectors that has been selected.
- Next, from those 30 NPL companies, the researcher will then evaluate the NPL factor for those 30 companies by looking at the ranking that were given by the credit analyst in PT. XYZ (Persero) Tbk. The evaluation will be done by looking at the variable that has the lowest ranking given by credit analyst for each NPL companies. By looking at the rankings given credit analyst

can be analyzed NPL factor for each company that being evaluated.

- After the evaluation is finished, based on those evaluation results the researcher will then determine the appropriate weighting for each sub-sector.
- After the new weighting model has been determined, to provide an accurate solution for PT. XYZ (Persero) Tbk, the researcher will then compare the accuracy of the new weighting model with the existing model. The test will be done by taking 20 sample companies that consist of 10 performing-loan companies and 10 non-performing-loan companies, and then tested them by using both model (existing and proposed model), and see which model are more accurate.
- At the end of the chapter, this paper will then discuss the result of the accuracy test between those two models.

In order to simplify the explanation of the process of finding solution for PT. XYZ (Persero) Tbk, the steps that described above is shown in Figure 2.



Figure 2. Data Collection and Analysis Process

Analysis of Business Situation

1. NPL Condition of PT. XYZ (Persero) Tbk

In 2010, improvement in the macroeconomic condition enabled PT. XYZ (Persero) Tbk to improve its loan quality, which was carried out by adopting more comprehensive approach in loan monitoring and recovery as well as improving PT. XYZ (Persero) Tbk settlement and recovery.

Loan restructuring and NPL management for corporate loans was carried out through various initiatives including reduction of interest rates, rescheduling of principal loan

payments, collaboration with strategic investors, sale of loan collateral and non-productive assets, either voluntarily or through auctions.

As a result, PT. XYZ (Persero) Tbk was able to reduce the amount of Corporate NPL by Rp 403 billion in 2010. In 2011, PT. XYZ (Persero) Tbk will continue to implement the strategy conducted in 2010 with reference to the condition of our NPLs. Efforts on NPL settlement will include collaboration with strategic investors, liquidation of loan collateral and sale of debtor's non-productive assets in order to reduce outstanding loans, and execution of Personal Guarantees as well as Corporate Guarantees.

Financial Ratio	2011	2009	2008	2007	2006
Loans to Deposit Ratio (LDR)	70.2%	64.5%	68.6%	60.6%	49.0%
NPL Bruto	4.3%	4.7%	4.9%	8.2%	10.5%
NPL Netto	1.1%	0.7%	1.7%	4.0%	6.6%
NPL Gross	120.6%	120.5%	101.0%	71.9%	55.1%

NPL in 2010 was recorded at Rp 5.8 trillion. The amount includes impaired loans with current and special mention collectability. The success to maintain the level of non performing loan and credit expansion in 2010, have caused gross NPL ratio (parent company), based on GDP, to decline from 4.7% in 2009 to 4.3%. Loss reserve is relatively stable in 2010 when compared to the previous year amounting to Rp 7.0 trillion and the portion of non performing loan loss reserve for substandard, doubtful, and loss collectability has decreased due to improved estimated cash flows that lead to an increase in net NPL ratio from 0.8% in 2009 to 1.1% in 2010.

However, the condition of NPL of the UMN is still can be categorized as not in a good performance. Because, the NPL that they have is still above the standard that BI has given, which is 5%. The NPL condition of PT. XYZ (Persero) Tbk in November 2011 was recorded at Rp ,260 Billion (8.4%), which is better than the previous year that is Rp 2,891 Billion (11.9%). But this condition still cannot be categorized as a good condition because it is still higher than the maximum standard of BI requirements.

Therefore, the NPL condition of PT. XYZ (Persero) Tbk from year 2006 – November 2011 can be seen in Figure 3.

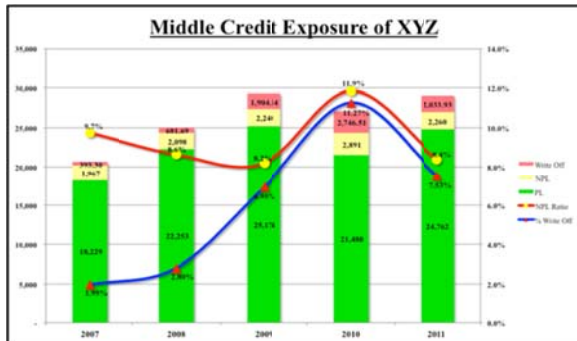


Figure 3. Middle Credit Exposure at PT. XYZ (Persero) Tbk.

By looking at Figure 3, it shows that the highest NPL contribution of XYZ especially on middle business sector is occur in 2010, which is Rp 2,891 Trillion or 11.9%. And also from the graph above, it can be seen that in year 2011, the NPL of XYZ is decreasing. Which is by declining from 11.9% become 8.4%. This condition is not because the condition of the middle business is getting better, but it is more because of the write off that is applied in XYZ (especially middle business) in year 2011. As mention on Indonesia Finance Today Website, which state “the fourth largest bank in terms of loan portfolio, wrote off its non-performing loan (NPL), particularly that from mid-scale enterprise sector of Rp 12 trillion posted in the last three years. The bank therefore can recover its assets of around Rp 886 billion as of June 2011.” (Indonesia Finance Today, 2011).

Therefore, the contributions of the economical sector in Indonesia to the NPL of PT. XYZ (Persero) Tbk are shown in Figure 4.

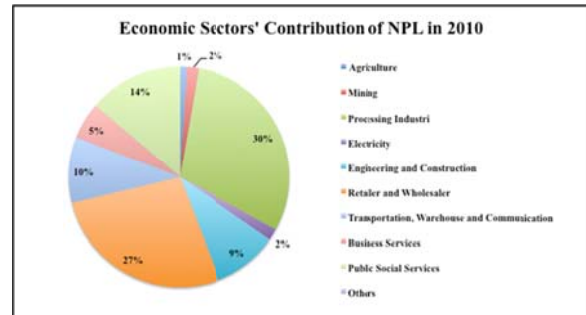


Figure 4. Economic Sector’s Contribution of NPL in 2010

2. Root Cause of the Problem

As one of the big bank in Indonesia, PT. XYZ (Persero) Tbk are expected to keep their financial performance as good as possible, and perform the NPL ratio based on the requirement from Bank Indonesia, which is 5%. But, based on the analysis of the NPL ratio of PT. XYZ (Persero) Tbk, it shows that the NPL ratio of PT. XYZ (Persero) Tbk (especially on middle business) has exceed the maximum limit of the requirement from Bank Indonesia, which is 8.4% in November 2011. This problem could be cause by several things, such as the lack of knowledge of the credit analyst in analyzing the potential debtor, lack of facility that could help the credit analyst in analyzing the potential debtors.

Because of that reason, as one solution to reduce the increment of NPL, PT. XYZ (Persero) Tbk has developed a framework that is used to help credit analyst in analyzing the credit application. That framework is known as Internal Rating System (IRS).

Internal Rating System (IRS) is an important infrastructure in the implementation of credit risk management. By this infrastructure, PT. XYZ (Persero) Tbk may estimated the risk of losses that could be resulted from a failure of debtors in order to fulfill their agreements with bank, as well as to provide the capital allocation in order to cover those losses. Besides that, IRS also applied in loan pricing model, credit limit, credit risk model, and also an important pillar in the proses of approving credit at the time of loan origination, monitoring and credit

recuing. The error in measuring risk model has an impact on the implication of the business of the bank itself, which is a potential loss due to the non-performing loan or the loss of business opportunity because of loose of the good prospects of debtors. Because of that, the accuracy of the model that has been formulated must be tested.

Therefore, IRS is built consisting of 3 main components that combined to make an accurate and useful rating system at PT. XYZ (Persero) Tbk. Therefore, those components are:

- Industry Risk Rating (IRR), which is the level of risk measurement based on macro judgment,
- Customer Risk Rating (CRR), which is a risk level that measure how big is the likelihood of a customer will be default in fulfill their obligation to the bank,
- Customer Credit Rating (CCR), which is a measurement of the risk that stated the level of loss (probability of loss) that will be faced by the Bank in case the customer is fail to fulfill their obligations (in the event of default).

Basically, the implementation of IRS in PT. XYZ (Persero) Tbk has been good and well designed. But, if we take a look closer to the implementation of IRS, there is a drawback that needs to be improved in order to developed a more efficient and better IRS that could help PT. XYZ (Persero) Tbk in reducing their NPL ratio.

The drawback of the IRS can be seen from the variables that are used in implementing the weighted of IRS in order to analyze the capability of the potential debtors to be given the credit agreement. As seen on the previous chapter, that IRS is composed of several variables – Industry Rating, Business Condition, Management, Financial Performance – that then will be weighted to see the capability of the potential debtors.

However, those variables are used for all economic sectors in Indonesia. There are no difference weights to one another industry. The one that differentiate the weighting for one

industry to another industry is only on the industry rating variables, which the score for this variable is obtain from the calculation of the IRR that has been explained in the previous chapter. But, for the rest of the variable PT. XYZ (Persero) Tbk assume that each industry is having the same characteristics and risks. So they obtained the same weighting for each industry. In fact each sector industry has a different characteristic and risks.

From those findings, it can be concluded that the root problem of the increment of the NPL ratio of PT. XYZ (Persero) Tbk is due to the errors in determining the weighted value for the calculation of IRS. This condition then becomes a threat for PT. XYZ (Persero) Tbk in order to reduce their NPL ratio.

III. BUSINESS SOULUTION

To begin the business solution formulation process for PT. XYZ (Persero) Tbk, this chapter would started by the explaining the process of this research in order to find the best solution that suites for PT. XYZ (Persero) Tbk improvement. The explanation of the process in this paper will also include the explanation of the tools that will be used for processing the data and the process of how the data being processed. The result of the processing data will then be analyzed in order to generating the business solution formulation process for PT. XYZ (Persero) Tbk. Finally, the business solution formulation process would be summarized in the form of PT. XYZ (Persero) Tbk improvement target.

A. New Weighting Model

1. Rating Industry

Rating industry for the entire economical sector will be no changes. It is because that the industry rating is having a quite complicated calculation and will be explained separately. In filling the form of FRN, this industry rating will be set automatically when the credit analyst is choosing the sub-sector economy. The weight of rating industry is including the calculation of 6 main criteria, which are:

- Macro-economy factor
- Industry structure
- Industry characteristics

- Industry prospects
- Loan Factors
- Industry's Financial Performance

Therefore, this industry rating is contain of 5 scores, they are:

- 5 - very low risk
- 4 - low risk
- 3 - moderate risk
- 2 - high risk
- 1 - very high risk

Considering this variable has covered several things at once, the weighting for this variable will not change and still given a weight of 5. In addition, if it needed some changes on the weighting for this variable. It needs a separate discussion and analysis that also needed an addition of time.

2. New Weighting Model for Timber and Timber Product Industry

In determining the new weighting model, it needs to do an analysis of key success factors and the factors causing the NPL to the industry concerned. Based on the data collected, it is known that the cause of NPLs of most companies engaged in the timber industry because business conditions are not good, which shown in Figure 5

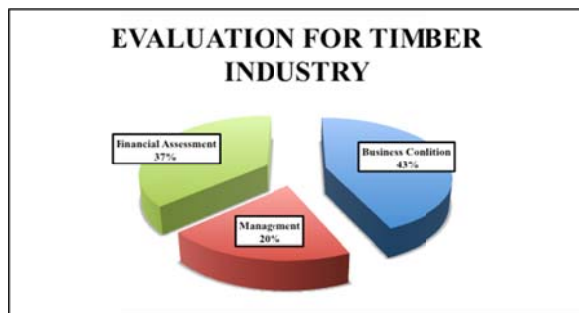


Figure 5. Evaluation Result for Timber Industry

Based on the graph above, it can be concluded that the business conditions for wood

industry has a very important role. Then, for the new weighting model will be more emphasis on the company's business condition variables. Whereas in this case the assessment of business conditions variables is including several sub-variables, such as: market share, marketing aspects and production aspects.

Apart of the above evaluation results, in determining new weighting model also need to be considered some key success factors for this industry. There are four key success factors, including:

- Product and Market Attractiveness
- Vertical Integration
- Diversification
- Operating Management

Based on the four key success factors above, it can be concluded that the production aspect is an important factor in determining the weighting for the wood industry. This is due to the limitation of raw materials available in terms of both quantity and quality. Besides that, the company must own a good quality of machinery as well as the equipment in order to keep the production continuity. Therefore, in determining the new weighting models for the wood industry will be more emphasis on the production aspects.

So, the new weighting model for timber industry is shown in the Table 2.

Table 2. New Weighting Model for Wood & Processing Wood Industry

CATEGORY / VARIABLE	WEIGHT	
	EXISTING WEIGHTING MODEL	NEW WEIGHTING MODEL
INDUSTRY RATING	5	5
BUSINESS CONDITION		
Market Share	1	1
Marketing Aspects	0.5	1.5
Production Aspects	0.5	2.5
MANAGEMENT		
Track Record	1	1
Integrity / Reputation	0.5	0.5
Structure / System	0.5	0.5
Informator Quality	1	1
FINANCIAL ASSESSMENT		
Liquidity		
Current Ratio	1	1
Quick Ratio	1	0.5
Leverage		
Debt to Equity Ratio	2	1
Cashflow		
EBITDA/Debt	1	0.5
EBITDA/Interest	1	0.5
Profitability		
Return on Equity (ROE)	1	0.5
EAT/Sales	1	0.5
Efficiency		
Inventory/Sales	0.5	1
Receivable/Sales	0.5	1
Growth		
EBITDA Growth	0.5	0.25
Sales Growth	0.5	0.25
TOTAL	20	20

3. New Weighting Model for Food, Beverages and Tobacco Industry

For food, beverages and tobacco industry, based on the available data indicates that the NPL factor is mainly because of poor business conditions, this occurs because many companies are engaged in the same kind of industry, so the competition in the industry is considered pretty sharp. This is reflected by Figure 6.

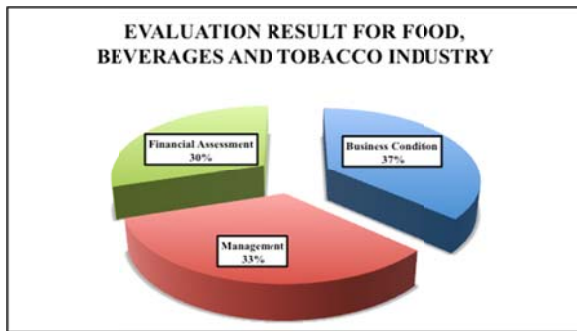


Figure 6. Evaluation Result for Food, Beverages and Tobacco

Based on the graphic above, it can be concluded that the business conditions for the industry food, beverages and tobacco industry has a very important role. Thus, in determining new weighting model will be more emphasize on business conditions, which are market share, marketing aspects and production aspects will be given greater weight.

Also based on the results of an analysis of key success factors, there are five key success factors to consider in determining a new weighting model. Those 5 key success factors are include:

- Market Position
- Diversification
- Raw Material Procurement
- Marketing & Distribution
- Operating Management

By looking at the list of key success factors above, it can be concluded that the marketing strategy is essential for this type of industry. Considering the fierce competition among industry, each company is required to have a good marketing strategy in order to survive. Where the marketing aspect of this assessment include:

- Target Market Segment
- Demand Rate and Stability
- Competition Condition and Marketing Strategy
- Quality of Product and Services
- Product Diversification
- Price and Promotion
- Network Distribution

By looking at the NPL factors and the key success factor for the food industry, beverages and tobacco, then obtained the new weighting model for this type of industry as shown on the table 3.

Table 3. New Weighting Model for Food, Beverages and Tobacco Industry

CATEGORY / VARIABLE	WEIGHT	
	EXISTING WEIGHTING MODEL	NEW WEIGHTING MODEL
INDUSTRY RATING	5	5
BUSINESS CONDITION		
Market Share	1	1.5
Marketing Aspects	0.5	2
Production Aspects	0.5	2
MANAGEMENT		
Track Record	1	1
Integrity / Reputation	0.5	1
Structure / System	0.5	0.5
Information Quality	1	1
FINANCIAL ASSESSMENT		
Liquidity		
Current Ratio	1	0.5
Quick Ratio	1	0.5
Leverage		
Debt to Equity Ratio	2	1
Cashflow		
EBITDA/Debt	1	0.25
EBITDA/Interest	1	0.5
Profitability		
Return on Equity (ROE)	1	0.5
EAT/Sales	1	0.5
Efficiency		
Inventory/Sales	0.5	1
Receivable/Sales	0.5	0.5
Growth		
EBITDA Growth	0.5	0.25
Sales Growth	0.5	0.5
TOTAL	26	20

4. New Weighting Model for Others Industry

There are many industries that belong to other industry. Thus, this paper will discuss the electronics industry as one example of the industry including on this category.

On this globalization time, the development of technology is very important for people daily life. Those companies that are able to produce products with the latest innovations will be able to survive and compete compared with those companies that don't.

Based on the data gathered, the NPL factor for those companies that engaged in the electronic industry is mainly because of the unfavorable business conditions. Which caused by the inability of new companies in producing more innovative products than other competitors. Therefore those NPL factor can be shown in the Figure 6.

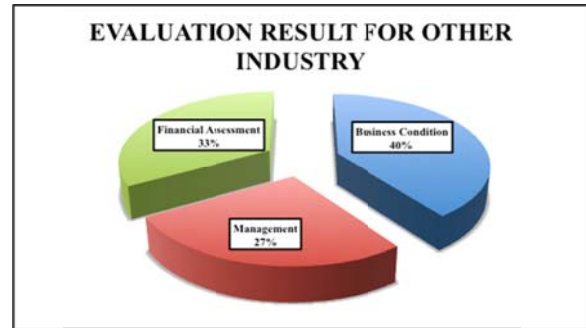


Figure 6. Evaluation Result for Other Industry

In addition, there are five key success factors that also need to be considered in determining the new weighting models. Those key success factors are include:

- Market Position
- Operating Management
- Product Range & Development
- Marketing & Distribution

Of the key success factors above can be seen that the company's ability to create a variety products as well as the company's ability to follow the preferences and needs of customers who are easy to change is one factor that need to be consider in determining the weighting for electronics industry. Therefore, the new weighting models will be more emphasis on aspects of production, which includes the assessment of production capacity, efficiency, quality of human resources and quality of machinery and equipment.

Besides the marketing aspect is also need to be considered, particularly the policy and commitment to advertising in order to create brand image for the products that they produced, the distribution network to ensure availability of products on the market being targeted are also factors to be consider in determining the weighting for this industry. Thus, in the new weighting model it is not only emphasizing on production aspect, but also emphasizing on the marketing aspects.

Beside the marketing and production aspects, the financial aspects also need to be considered.

Which is concerning about the efficiency and the development of

sales. So, for financial assessment especially for efficiency and growth need to be increased.

Based on the explanation above, it obtained the new weighting model as shown on table 4.

Table 4. New Weighting Model for Other Industry

CATEGORY / VARIABLE	WEIGHT	
	EXISTING WEIGHTING MODEL	NEW WEIGHTING MODEL
INDUSTRY RATING	5	5
BUSINESS CONDITION		
Market Share	1	2
Marketing Aspects	0.5	1
Production Aspects	0.5	1
MANAGEMENT		
Track Record	1	1
Integrity / Reputation	0.5	0.5
Structure / System	0.5	0.5
Information Quality	1	1
FINANCIAL ASSESSMENT		
Liquidity		
Current Ratio	1	1
Quick Ratio	1	0.5
Leverage		
Debt to Equity Ratio	2	1
Cashflow		
EBITDA/Debt	1	0.5
EBITDA/Interest	1	0.5
Profitability		
Return on Equity (ROE)	1	0.5
EAT/Sales	1	0.5
Efficiency		
Inventory/Sales	0.5	1
Receivable/Sales	0.5	1
Growth		
EBITDA Growth	0.5	0.5
Sales Growth	0.5	1
TOTAL	20	20

B. Testing the New Model

After determining the new weighting models for the IRS based on the characteristics of each sector industry, then this chapter will do the comparison between the new weighting models with the existing models. Where comparison is intended to find out how accurate the new weighting model is and the ability of the model in differentiates a good and bad credit quality.

In order to analyze and solve problems in this paper, it conducted the following steps:

- Calculating the risk value of each model, which are a new weighting model and the existing models to each debtors that being used until this research is being conducted
- To test the validity of the model in assessing the credit quality by testing the ability of the model in distinguishing the quality of loans (performing and non-performing loans). Testing is done by comparing the estimation of credit quality based on the credit score with the actual risk to credit quality after one year later.

In doing the validation test in measuring the credit quality, there are several principles of testing that is used as follows:

"Test the fit between estimation of credit quality based on the credit score with the actual risk to credit quality after one year later."

For the testing purposes it required a time horizon in order to compare the calculation results with the facts concerning the quality of credit. The test performed with a time horizon of 1 year. The use of this test method provides the accuracy of the estimated value of the credit quality of each model.

Risk value calculation is done in one year, which is in 2010 and compare it with the results of the credit quality of one year later, which is in 2011. By using 20 sample firms for each sub-sectors industry, it will get 20 pieces of the calculation of risk (default risk data set) from each industry. Those 20-default risk value are used to using certain criteria. The result is then will be compared with the condition of the actual credit quality one year later, so it will obtain 20 validated data (validation set result).

From the results of data processing, which is by comparing the estimated calculated risk based on the credit score with the actual credit quality risk after one year later, obtained the level of model accuracy in measuring the quality of credit.

The result of the testing above shows that the existing model is able to accurately predict 10 credit quality (50%) for timber industry, 9 credit quality (45%) for food, beverage and tobacco industry, and 11 credit quality (55%) for others industry. while, new weighting model able to predict accurately 15 credit quality (75%) for timber industry, 14 credit quality (70%) for food, beverages and tobacco industry, and 15 credit quality (75%) for others industry. the failure of the new weighting model in predicting the credit quality is might be because the financial factor of the company that has not being improved. The cash flow of those debtors is still substandard so that the company has not pay the interest of their debt to the bank and need some restructuring by giving waivers of the interest (special rate). Beside that, unfavorable external condition, such as security, social, politics, and other. those factors gave a negative impact to the company performance. On the other hand, this failure also might be because the financial condition of the company that is getting better because of the success of the company in running their operational that cause the changing of the company's rating become a better credit quality.

By comparing the level of accuracy of the predicted result between two models, it shows that the new weighting model have a higher level of accuracy in assessing the credit quality, and it is much more better than the existing model that has been used by PT. XYZ (Persero) Tbk. Therefore, the comparison result of two models can be seen in Table 2:

Table 2. New Weighting Model for Other Industry

Industry	Correctly Predict			
	Existing Model		New Model	
	Amount	Percentage	Amount	Percentage
Timber and Timber Product	19	47.5%	29	72.5%
Food, Beverages and Tobacco	22	55.0%	27	67.5%
Others Industry	19	47.5%	29	72.5%

However, in order to provide a more valid model testing, the data that have been process will be tested again using a statistical approach, which is using chi-square (X²).

Therefore, the result of the Chi-Square for this analysis can be seen as Figure 7.

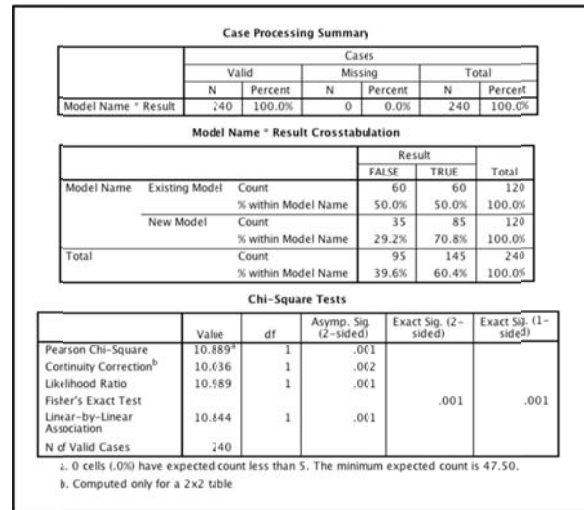


Figure 7. The Calculation Result of Chi-Square (X²) Analysis

By using the level of confidence of 95%, and $\alpha = 5\%$, and the degree of freedom (df) = 1. So, it could generate the result of the X², this result could be generated from the statistical table or using Ms. Excel. Therefore, based on the calculation using Ms. Excel, the result for the table X² is 3.841 (X²_b). And based on the table above it shows that the value of X²_a is 10.889, which is it is bigger than the value of X²_b (3.841), so the H₀ is rejected.

So, because of X²_a > X²_b (10.889 > 3.841), so H₀ is rejected. It can be concluded that there is relationship between the weighting models in IRS with the resulted generated by the model, in which the changes of the model will effecting the value of the result generated by the model. Beside that, from the crosstabulation table it shows that the new weighting model could correctly predict 70.8% (85 out of 120 companies), while for the existing model could correctly predict 50% (60 out of 120 companies). It shows that the new weighting model could predict more accurate than the existing model.

IV. CONCLUSION AND SUGGESTION

A. Conclusion

In determining the appropriate weighting model, it is important to take attention to the characteristics of the industry that could reflected on the key success factor, NPL factor and also risk factor of each industry.

However, as the fourth largest bank in Indonesia, PT. XYZ (Persero) Tbk do not provided with the suitable weighting model in IRS that is used as a tool in determining the feasibility of debtors in credit granting process. It reflected with the increment of their NPL (Non-Performing Loan) Ratio. It is due to the errors of the company in determining the weighted value for the calculation of IRS. Where they were giving the same weighting value for a different economical sectors, in fact each economical sector are having a different risk and characteristics.

Therefore, this paper provides a proposed solution for PT. XYZ (Persero) Tbk by giving the suitable weighting model based on the characteristics of each industry. But, because of the limitation of time, this paper proposed the new weighting model for 3 (three) different industries, which those three industries was picked based on the highest NPL ratio in 2010. Those industries are: wood and wood processing industry; food, beverages and tobacco industry; and other industry (focusing on electronics industry).

Based on the research conducted in this paper, there are several things that can be concluded, they are:

- In determining the new weighting model for Wood and Wood Processing Industry, production aspect is the most important thing and need to be considered. Because based on the data provided, the main NPL factor of this type of industry is because of most companies are having a bad business condition. Also, by looking at the key success factor of this industry show that the production aspect is the most important and need to be considered.

That is why the weight for this variable need to be increased because of the important role of this variable in determining the feasibility of the company in the credit granting.

- For Food, Beverages and Tobacco, marketing and production aspect are variables that need to be considered. Because of a fierce competition among this industry, so by having a good marketing strategy that also supported with a good production strategy will help the company to survive. Because of that reason, in determining the new weighting model for IRS, the production and marketing aspect variable are having significant changes, which is from 0.5 to 2.
- While in determining the new weighting model for other industry (in this case electronic industry), the company's ability to create a variety products as well as the company's ability to follow the preferences and needs of customers who are easy to change is one factor that need to be consider in determining the weighting for electronics industry. Therefore, the new weighting models will be more emphasis on aspects of production, which includes the assessment of production capacity, efficiency, quality of human resources and quality of machinery and equipment. Marketing aspect is also need to be considered, particularly the policy and commitment to advertising in order to create brand image for the products that they produced, the distribution network to ensure availability of products on the market being targeted are also factors to be consider in determining the weighting for this industry. Thus, in the new weighting model it is not only emphasizing on production aspect, but also emphasizing on the marketing aspects.

After the new weighting model is being developed, this research also conducting some testing in order to see the accuracy of the new model in predicting the risk level of the company, and whether any relationship or not between the model and the result generated by the model. The testing is conducting by using a statistical method called Chi-Square

(X2), in which this method could help in determining the relationship between model and result.

Therefore, based on the testing result using a Chi-Square, it shows that there is a relationship between the model in IRS and the result generated by the model. So, any changes on the model would affect on the result generated by the model. And also based on the crosstabulation table it shows that the new weighting model could correctly predict 70.8% (85 out of 120 companies), while for the existing model could correctly predict 50% (60 out of 120 companies). It shows that the new weighting model could predict more accurate than the existing model.

B. Suggestion

There are several weaknesses on this research, which related to limitations and research scope. Therefore, in the following sections will discuss suggestion that could be done by other researcher to explore deeper and more comprehensive about the Internal Rating System (IRS) at PT. XYZ (Persero) Tbk. The suggestions for future research are:

- Determining the parameter or the value of range for each variable, especially business condition and management aspects, that could be used for the credit analyst in determining the rating for the potential debtor. The purpose of this parameter is to avoiding the subjective opinion in assessing the condition of the potential debtors. For example in determining rating for track record variable, the credit analyst could give rating 1 for those debtors that do not have any experience (newbie), rating 2 for debtors with the experience less than 1 year, rating 3 for debtors with 1- 3 years experience, rating 4 for debtors with 3-5 years experience, and 5 for those debtors with experience more than 5 years on the related business.
- Developing a new IRS system, which could help the credit analyst in analyzing the feasibility of the potential debtor as well

as able to determine automatically the risk premium for risk based pricing.

- Developing a new IRS model which could help the credit analyst in analyzing the feasibility of the potential debtor not only from their historical data but also could predict the future prospect of the correspond debtor.

Besides that, this paper could give some suggestions that could be used for PT. XYZ (Persero) Tbk in utilize the usage of the IRS system, those suggestions are:

- To improve the determination of scoring and weighting of IRS on qualitative factors, it requires the improvement of the credit analysts' knowledge both in classical and operational.
- Develop a special committee to handle the reliability and validity of the model and special procedure or decision support system.
- The model that identify in this paper, as the proposed solution for XYZ, will be accurately used in a normal condition and need to be reviewed periodically, which is every 3 months and adjusted with current condition. But, if there is any other special condition (crisis, force majeure, etc.) that affected particular sectors, this new model will need to be reviewed immediately and adjusted based on the condition at that time.

REFERENCES

- Bank Indonesia, 2012, *Sekilas Implementasi Basel II di Indoneisa*. Jakarta: Bank Indonesia. Available From: <http://www.bi.go.id/web/id/Perbankan/Implementasi+Basel+II/>[Accessed: 12 February 2012]
- Bessis, J., 2010, *Risk Management in Banking*, ThirdEdition, West Sussex: John Wiley & Sons Ltd.
- Crouhy, M., Galai, D., Mark, R., 2006, *The Essential of Risk management*, United States of America: McGraw- Hill Companies, Inc.
- Erna, J., 2011, *Adhi karya Proyeksikan Sektor Konstruksi Tumbuh 20%*, Okezone.com News and Enertainment, November 28th, Jakarta: Okezone.com. Available from:

<http://economy.okezone.com/read/2011/11/28/320/535334/adhi-karya-proyeksikan-sektor-konstruksi-tumbuh-20>. [Accessed: 01 March 2012]

Farlex Financial Dictionary, 2012, Non-Performing Loan, The Free Dictionary.com. Available from: <http://financial-dictionary.thefreedictionary.com/Non+Performing+Loan>. [Accessed: 15 February 2012]

Heldman, K., 2005, Project Manager's Spotlight on Risk Management, San Francisco: Harbour Light Press.

Holmes, A., 2002, Risk Management, Oxford, UK: Wiley Company.

Investowords.com The Biggest Best Investing Glossary on the Web, 2012, Globalization. Available from: <http://www.investowords.com/2182/globalization.html>. [Accessed: 15 February 2012]

Investopedia.com, Definition of 'Risk'. Available from:

<http://www.investopedia.com/terms/r/risk.asp#axzz1kMGV4ckF>. [Accessed: 20 February 2012]

Latief, M., 2011, Menteri PU: Sektor Konstruksi Dongkrak Perekonomian!, Kompas.com, July 26th, Banda Aceh: Kompas.com. Available from:

<http://properti.kompas.com/read/2011/07/26/1522283/Menteri.PU.Sektor.Konstruksi.Dongkrak.Perekonomian>. [Accessed: 25 February 2012]

PT. PEFINDO Credit Rating Indonesia, 2010, Rating Methodology untuk Sektor Korporasi (non-financial). Jakarta: PEFINDO. Available from:

http://new.pefindo.com/scrm_korporasi_penyewaan_nmobil.php?. [Accessed: 01 April 2012]

PT. XYZ (Persero), Tbk., 2011, Formulir Rating Nasabah (FRN). Jakarta: PT. XYZ (Persero). Tbk.

PT. XYZ (Persero), Tbk., 2010, Pengantar Review Industry Risk Rating. Jakarta: PT. XYZ (Persero), Tbk.

PT. XYZ (Persero), Tbk., 2010, Langkah-Langkah Review Industry Risk Rating – Prosedur Pengumpulan & Pengolahan Data. Jakarta: PT. XYZ (Persero) Tbk.

PT. XYZ (Persero), Tbk., 2011, Klasifikasi Sektor Ekonomi dan Kaitannya dengan Sektor Unggulan. Jakarta: PT. XYZ (Persero) Tbk.

PT. XYZ (Persero) Tbk., 2011, Review Industry Risk Rating. Jakarta: PT. XYZ (Persero) Tbk.

PT. XYZ (Persero) Tbk., 2011, Laporan Perkembangan Perkembangan NPL pada Sektor Business Menengah (Middle Business) Tahun 2006 – 2011. Jakarta: PT. XYZ (Persero) Tbk.

PT. XYZ (Persero) Tbk., 2010, Annually Report, Jakarta: PT. XYZ (Persero) Tbk., Available from: http://www.bni.co.id/Portals/0/AR_BNI%202010.pdf. [Accessed: 01 February 2012]

PT. XYZ (Persero) Tbk., 2010, Annually Report, Jakarta: PT. XYZ (Persero) Tbk., Available from: http://www.bni.co.id/Portals/0/AR_BNI%202010.pdf. [Accessed: 01 February 2012]

Renault, O., Servigny, A., 2004, Measuring and Managing Credit Risk, United States of America: McGraw-Hill Companies, Inc.