

## THE PREDICTION OF BANKRUPTCY IN THE PULP AND PAPER INDUSTRY COMPANY LISTED IN INDONESIA STOCK EXCHANGE ON 2011-2016 PERIOD USING Z-SCORE ALTMAN, SPRINGATE AND GROVER MODEL

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### ABSTRACT

Finance report information worthwhile to analyze company performance in finance ratios form. Besides that, those finance ratios can be used to determine the prediction of bankruptcy on the company within one period using bankruptcy prediction method such as Altman, Springate, and Grover. Each of these methods has some different formula with different determined bankruptcy value. the objective of this research is to determine and to compare the result of bankruptcy prediction in the pulp and paper company on 2011 – 2016 period using Altman, Springate, and Grover method. This research is using descriptive analysis method and different test method using one-way ANOVA. Based on Altman and Springate method, there are 63% companies which include on bankruptcy category. Based on one-way ANOVA, there are nothing different between Altman and Springate method average result. Whereas, there are some significant different average result between Altman and Grover and Springate and Grover.

Key words: finance report, finance ratios, bankruptcy prediction, Altman, Springate, Grover.

### Introduction

It has been a reality that economic deceleration in Indonesia is occur in the last two years. According to Badan Pusat Statistik, economics growth on 2015 is 4,79% where in 2014 is 5,02 % (www.bps.go.id). Economics growth in 2015 is the lowest within this last 6 years. Indonesia economics weakened comes from many factors including industry sector. Economics weakened in industry sector can be determined from the decreasing of industrial growth rate in the last 5 years (www.kemenperin.go.id)

Economics Growth Table (in percentage)

Year Performance	2011	2012	2013	2014	2015
Industrial rate growth	6,74	6,4	6,1	5,61	5,01

Based on performance report the ministry of industry, 2015

From table above, it can be concluded that from 2011 from 2015, economics growth is decrease from 6,74% to 5,01%.

The deceleration of industrial growth is happened in every sector of industry including pulp and paper industry. In 2015, pulp and paper industry growth are decline 3,02% from previous year and the contribution to whole industry is only 5%. the pulp and paper stock performance in Indonesia stock exchange is also decline as well as the industry growth. In 2013, there is one delisting company from 8 companies listed in this subsector, it was Surabaya Agung Industri Pulp and Kertas Tbk (SAIP).

In this condition, the investors and creditors are required to know the development in the company to determine those infestation loss signal. One of the signal is bankruptcy from financial trouble in divide the profit from investor's capital or fulfill the company obligations to debtors.

Those problems must be an attention to the investor in order to invest capital on the industry, especially in the pulp and paper industry. The prediction of bankruptcy level in the pulp and paper company as an early warning system for the investor in this industry is very important.

There are several models used in order to analyze the bankruptcy prediction, there are Altman Z-score model (1968), Springate model (1978), Zmijewski model (1983) and Grover model (2001). Every model has advantages and weakness. Based on the last research, the results is different with each model that mentioned before. Fatmawati,s research (2012) told that Zmijewski's model is more accurate than Altman Z-score model and Springate model, but Hadi and Anggraeni (2008) told that Altman prediction model is the best predictor between Altman Z-score model (1968), Springate model (1978), and Zmijewski model (1983). Imanzadeh, et al. (2011) predict that Springate model is more conservative than Zmijewski model.

The differences result, pushed researcher to research more about the differences between bankruptcy prediction, Altman Z-score model, Springate model, Zmijewski model and Grover model. This research is using Altman, Springate, and Grover model which has almost the same measurement component ratios. This research is used to know the pulp and paper companies's healthy with desciptive analyzed. This research is also analyzed the different result in every model with Anova test.

## Literature Review

### A. Bankruptcy Theory / Financial Distress

Based on Toto (2011: 332), bankruptcy is a condition where the company is no longer able to fulfill its obligation. This condition is not happened immediately in the company. There is early indication from the company. It can be determined from its financial report. Financial ratio can be used as bankruptcy indicator in the company. Financial distress is a condition where there is incapability of the company to fulfill its matured liabilities such as accounts payable, bank loans, short-term debt.

#### Bankruptcy Prediction Model

Bankruptcy prediction model is a model used to determine the bankruptcy level in the company using financial ratio which give illustration in financial condition and performance in the company. Bankruptcy prediction analysis is the analysis which helps company to anticipate the possibilities of the company suffer a bankruptcy caused by financial problems (Darsono and Ashari, 2004:56). This analysis is a measurement as early warning system whether there are bankruptcy indicators in the company.

There are three bankruptcy prediction models in this research:

#### 1 Altman Z-score Model

Z-score model (Altman) is the score which determined from standard calculation from financial ratio. It also indicates the company bankruptcy possibilities (Supardi, 2001:73). In 1968, Edward I Altman give formula to predict bankruptcy possibilities in the company. Altman research took a sample from the company which had already bankrupt. It was concluded that some financial ratios have bankruptcy predictive power better than the other financial ratios in predict financial distress and bankruptcy. Altman found five financial ratio which can be used to predict the company bankruptcy as known as Z score. According to those financial ratios, Z-score Altman model is proven to classified company in some group according to the bankruptcy possibilities level, whether it is high or low possibilities. Z-score Altman model is capable to predict bankruptcy possibilities until two years before it happened (Darsono, 2004:105). Z score Altman model formula to manufacture stock exchange listed company is:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.99X_5$$

Where:

- X<sub>1</sub> = Capital to Total Asset Ratio
- X<sub>2</sub> = Retained Earnings to Total Asset Ratio
- X<sub>3</sub> = EBIT to Total Asset Ratio
- X<sub>4</sub> = Equity Market Value to Book Value of Debt Ratio
- X<sub>5</sub> = Sales to Total Asset Ratio

#### a) Capital to Total Asset Ratio (X<sub>1</sub>)

In this case, working capital is the difference between current asset and current liabilities. This ratio is one of liquidity ratio which determines the company ability to fulfill short term company liabilities. This ratio formula is:

$$X_1 = \frac{\text{current asset} - \text{current liabilities}}{\text{total asset}}$$

#### b) Retained Earnings to Total Asset Ratio (X<sub>2</sub>)

This ratio analyzes accumulated profit as long as the company is operated. The age of the company influences this ratio because the longer company operate allow to accelerate the accumulated retained earnings. This ratio formula is:

$$X_2 = \frac{\text{Retained earning}}{\text{total asset}}$$

#### c) EBIT to Total Asset Ratio (X<sub>3</sub>)

Earning before interest and tax (EBIT) to total asset are used to analyze the real productivity from the company asset. This ratio determines the company ability in order to produce profit from its asset. This ratio formula is:

$$X_3 = \frac{\text{EBIT}}{\text{Total Asset}}$$

- d) Equity Market Value to Book Value of Debt Ratio (X4)

This ratio is the value of the stock market. The amount of the owned stock multiply with the stock price in the stock market on the closing exchange market. This ratio formula is:

$$X_4 = \frac{\text{listed stock} \times \text{closing price}}{\text{book value of total debt}}$$

- e) Sales to Total Asset Ratio (X5)

This ratio is the ratio of sales. The formula is:

$$X_5 = \frac{\text{Sales}}{\text{Total Asset}}$$

The criteria in the Z-score assessment is if Z score is > 2,99 then the company is still healthy operate, if Z score < 1,81 then the company has potential bankruptcy tendency. If the Z score between 1,81 – 2,99 the company is in the grey area.

## 2 Springate Model

This model developed in 1978 by Gorgon L.V Springate. This model uses four ratios from nine general finance ratios to analyze the prediction of financial difficulties in the company. Springate model formula is (Peter and yoseph, 2011):

$$S = 1,03A + 3,07B + 0,66C + 0,4D$$

Where:

- A = Working Capital to Total Asset  
B = Earning Before Interest and Tax to Total Asset  
C = Earning Before Tax to Current Liabilities  
D = Sales to Total Asset

- a) Working Capital to Total Asset Ratio (A)

Working capital is the difference between current asset to current liabilities. This ratio is one of liquidity ratio to determine company ability in order to fulfill its short-term obligation. This ratio formula is:

$$A = \frac{\text{current asset} - \text{current liabilities}}{\text{Total Asset}}$$

- b) EBIT to Total Asset Ratio (B)

Earning before interest and tax to total asset ratio is used to determine the real productivity of the company asset. This ratio is analyzing the company ability to make profit from its asset. This ratio formula is:

$$B = \frac{\text{EBIT}}{\text{Total Asset}}$$

- c) Earning Before Tax to Current Liabilities (C)

This ratio is accumulated profit after interest before tax. This value indicates the company ability to make profit after its obligation to creditors. This ratio formula is:

$$C = \frac{\text{EBT}}{\text{current liability}}$$

- d) Sales to Total Asset (D)

This ratio is the sales turnover ratio. This ratio formula is:

$$D = \frac{\text{Sales}}{\text{Total Asset}}$$

This result is grouped in two categories. If C > 0.862 then the company operation is healthy. If S < 0.862 then the company is in the bankruptcy category.

### 3 Grover Model

Bankruptcy analysis Grover is a model created from redesigning the research from Altman Z-score model. In 1968, Jeffrey S. Grover used Z-score samples and added 13 new financial ratios. The sample was 70 companies with 35 bankruptcy companies and 35 healthy operated companies from 1982 until 1996. This model formula is (Grover, 2001 in Prihantini, 2013):

$$G = 1,6505X_1 + 3,404X_2 - 0,016ROA + 0,057$$

where:

- X<sub>1</sub> = Working Capital to Total Asset Ratio
- X<sub>2</sub> = EBIT to Total Asset Ratio
- ROA = Net Earning to Total Asset Ratio

a) Working Capital to Total Asset Ratios (X1)

Working capital is the differences between current asset to current liability. This ratio is one of the liquidity ratio to determine the company ability in order to fulfill its short-term obligation. This ratio formula is:

$$X_1 = \frac{\text{current asset} - \text{current liability}}{\text{Total Asset}}$$

b) EBIT to Total Asset Ratio (X2)

Earning before interest and tax to total asset ratio is used to determine the real productivity from the company asset. This ratio is to analyze the capability of the company to make profit from its asset. This ratio formula is:

$$X_2 = \frac{\text{EBIT}}{\text{Total Asset}}$$

c) Return on Asset (ROA)

This ratio is use to determine the effectivity of asset utilization in order to make profit. This formula is:

$$ROA = \frac{\text{Net Income}}{\text{Total Asset}}$$

Grover model is determining the bankruptcy company is when  $G \leq -0,02$ . When  $G \geq 0,01$ . If  $-0,02 \leq G \leq 0,01$ , the company is in the grey area. The disadvantages from those three models is there is no appropriate time period when the bankruptcy is occurred after Z score is determine lower than the standard. These models can't be used as absolute model, because sometime there are different results if we use different object. Nevertheless, bankruptcy prediction model can be used by the company to do prevention policy if it's in the bankruptcy area.

### B. Development Hypothesis

1. H<sub>0</sub> : There are no different on the average of bankruptcy analysis result between Altman Z-score, Springate, and Grover model in a pulp and paper industry company listed on the Indonesia stock exchange.
2. H<sub>1</sub> : There are some differences on the average of bankruptcy analysis result between Altman Z-score, Springate, and Grover model in a pulp and paper industry company listed on the Indonesia stock exchange.

### Research Method

#### A. Research Population and Sample

This research using comparative descriptive analysis. Descriptive method is a method which used to describe problem formulation related to independent variable. Comparative method used to compare every method in order to give bankruptcy prediction, whether this difference is significant or not.

The population in this research is financial report from pulp and paper company listed in Indonesia stock exchange from 2011 to 2016. There are 10 companies, Alkindo Naratama Tbk. (ALDO), Dwi Aneka Jaya Kemasindo Tbk. (DAJK), Fajar Surya Wisesa Tbk. (FASW), Indah Kiat Pulp and Paper (INKP), Toba Pulp Lestari Tbk. (INRU), Kertas Basuki Rachmat Indonesia Tbk. (KBRI), Kedawung Setia Industrial Tbk. (KDSI), Surabaya Industri Pulp dan Kertas (SAIP), PT Suparma Tbk. (SPMA), PT Pabrik Kertas Tjiwi Kimia Tbk. (TKIM). Sampling technique in this research is purposive sampling. Purposive sampling is sampling technique which certain criteria and consideration.

The variables in this research are bankruptcy (Z-score) as dependent variable and bankruptcy prediction as independent variable. Bankruptcy prediction model are Altman, Springate, and Grover model. Each model is categorized as Altman = 1, Springate= 2, and Grover = 3 (nominal data).

Every company is analyzed using those three models with calculated every financial ratio needed for every model. After the result is determined, different test analysis is calculated using one-way anova by SPSS application. One-way anova used to determine the relationship between dependent variable and independent variable which have more than two category (Ghozali, 2009: 62). The category is bankruptcy analysis model, Altman, Springate, Grover. From this different test, it can be found whether there is different significant result between those three-model analysis.

**B. Hypothesis Test**

In order to test the hypothesis in this research, there are several tests such as:

1. Normality Test

Normality data screening is the first step to do multivariate analysis, especially for inherency purpose. If there is a normality, then the residual will distribute normally and independent. The difference between prediction score using real score or error will distribute symmetrically around means value (mean value is zero). To analyze normality is using residual observation. In this research normality test is using kolmogorov-smirnov statistic test. This statistic test is using SPSS application.

2. Homogeneity of Variances Test

In order to use ANOVA statistic test, homogeneity of variance assumption must be fulfilled such as dependent variable must have the same variance in every independent variable category. Homogeneity of variance test is called Levene’s test of homogeneity variance. If Levene test is significant (probability < 0,05) then zero hypothesis is rejected because the group has different variance and contradictive to the assumption. So, the expected Levene test value is not significant value (probability > 0,05)

3. One-way Anova Test

This statistic test used to test the hypothesis in this research, whether there is a different between bankruptcy prediction analysis model. The criteria to make a decision is F test and significance. If calculated F higher than F table or less significant from 0,05, therefore H1 is accepted or there is a difference. Otherwise if calculated F is less than F table or more than 0,05 significant, therefore H0 is accepted or there is no difference between those three models.

**Research Result and Description**

**A. Descriptive Statistic Analysis**

**1. Altman Model Bankruptcy Prediction Result**

According to data from every company financial report, Z-score Altman model is shown on table 4.1.

Table 4.1: Bankruptcy Prediction in Pulp and Paper Company from 2011 -2016 using Altman Model

No.	CODE	2011		2012		2013		2014		2015		2016	
		Score	K	Score	K	Score	K	Score	K	Score	K	Score	K
1	ALDO	3.4244	S	3.8221	S	3.4005	S	3.3015	S	3.5047	S	3.42893	S
2	DAJK					2.5935	G	2.8945	S	0.1547	B	65.5531	S
3	FASW	3.3773	S	1.6874	B	1.6834	B	1.8474	G	0.9603	B	2.3496	G
4	INKP	0.5364	B	0.5885	B	0.7633	B	0.7201	B	0.8004	B	0.84484	B
5	INRU	-1.254	B	-1.640	B	-1.800	B	-1.628	B	-1.965	B	-1.9570	B
6	KBRI	-0.985	B	4.5521	S	-1.677	B	-2.191	B	-2.328	B	3.2566	S
7	KDSI	2.6726	G	3.2175	S	2.3467	G	2.4736	G	1.9480	G	2.60802	S
8	SAIP	0.6036	B	-0.556	B								

9	SPMA	1.4109	B	1.6283	B	1.2033	B	1.4657	B	0.9371	B	1.80311	B
10	TKIM	1.1468	B	1.1333	B	1.0538	B	0.9164	B	0.6982	B	0.7291	B

Note: K=Category, B=Bankruptcy, G=Gray area, S=Healthy

From above table, it can be concluded that almost pulp and paper company is in the Bankruptcy category. From 54 Altman model analyses, there are 34 test in the bankruptcy category, 7 in gray category, and 13 in healthy category. From 10 companies, there is only one company in the healthy category, PT Alkindo Naratama (ALDO).

PT Alkindo Naratama (ALDO) has Z-score above 2,86 every year. Therefore, according to Altman model, it is in the healthy category.

- PT Dwi Aneka Jaya Kemasindo (DAJK) has been listed from 2013. DAJK has fluctuated Z-score from 2013 to 2016. Z-score in the 2013 show grey area category. In the 2016 it shows bankruptcy category.
- PT Fajar Surya Wisesa Tbk (FASW) in 2011 is in the healthy category. In 2012, 2013, and 2015 in the bankruptcy category. In 2014 and 2016 in the grey area category.
- PT Indah Kiat Pulp And Paper (INKP), PT Toba Pulp Lestari Tbk (INRU), PT Suparma Tbk (SPMA), and PT Tjiwi Kima Tbk (TKIM) in 2011 to 2016 are always in the bankruptcy category.
- PT Surabaya Agung Industri Pulp dan Kertas Tbk. (SAIP) from 2011 to 2012 is in the bankruptcy category. Therefore in 2013 this company is declared bankrupt by the court because they can fulfill their obligations. In the end, SAIP is delisted from stock market in October 2013.
- PT Kertas Basuki Rahmat Indonesia Tbk (KBRI) is in the bankruptcy category from 2011, 2013, 2014, and 2015. In 2012 and 2016, they are in the healthy category.
- PT Kedawung Setia Industrial (KDSI) indicate positive Z-score. In 2012 and 2016 they are in the healthy category. The rest of the year, they in the grey area category. After all, KDSI still showing stabil and healthy financial condition. But it must be noted that its decreasing stock value will make lower Altman score.

From the bankruptcy prediction data using Altman model, it can be concluded that form 10 pulp and paper listed companies from 2011 to 2016 (54 test data). The company which in the bankruptcy category is 63% from all the total test.

## B. Springate Model Bankruptcy Prediction Result

According to 54 financial report from 10 listed pulp and paper companies, the Springate bankruptcy prediction model is shown on table 4.2

Table 4.2: Bankruptcy Prediction in Pulp and Paper Company from 2011 -2016 using Springate Model

No.	Code	2011		2012		2013		2015		2016			
		Score	K	Score	K	Score	K	Score	K	Score	K		
1	ALDO	1.0790	S	1.1709	S	1.2168	S	1.1381	S	1.2373	S	1.327527	S
2	DAJK					1.2450	S	1.2761	S	-0.587	B	-3.3984	B
3	FASW	0.7563	B	0.1454	B	0.1808	B	0.5734	B	0.0235	B	0.92889	S
4	INKP	0.2334	B	0.3364	B	0.5113	B	0.4144	B	0.5009	B	0.46812	B
5	INRU	0.1796	B	0.0270	B	0.1551	B	0.1944	B	0.1032	B	-0.1508	B
6	KBRI	-0.3287	B	1.7380	S	-0.3674	B	-0.138	B	-0.386	B	-0.2374	B
7	KDSI	1.3007	S	1.6056	S	1.1517	S	1.2236	S	0.8272	B	1.17752	S
8	SAIP	3.3802	S	-0.5508	B								
9	SPMA	0.6201	B	0.8726	S	0.3618	B	0.9331	S	0.2778	B	1.08692	S
10	TKIM	0.6792	B	0.6414	B	0.5519	B	0.4388	B	0.2676	B	0.27844	B

Note: K=Category, B=Bankruptcy, G=Gray area, S=Healthy

From table 4.2 above, it can be concluded:

- PT Alkindo Naratama Tbk (ALDO) is in healthy category from 2011 to 2016.
- PT Kedawung Setia Industrial is in healthy category from 2011 to 2016 except in 2015 it is in the bankruptcy category.
- PT Dwi Aneka Jaya Kemasindo Tbk (DAJK) in 2013 to 2014 is in healthy category, otherwise in 2015 and 2016 it is in bankruptcy category.

- d. PT Indah Kiat Pulp and Paper (INKP), PT Toba Pulp Lestari (INRU), and PT Tjiwi Kimia (TKIM) are in bankruptcy category from 2011 to 2016.
- e. PT Kertas Basuki Rahmat Indonesia (KBRI) is in the bankruptcy category in 2011, 2013, 2014, 2015, and 2016. But in 2016 it was in the healthy category.
- f. PT Surabaya Agung Industri Pulp and Paper (SAIP) is in healthy category in 2011 and bankruptcy category in 2012. From 2013 to 2016 they were declared bankrupt by the court and no longer listed in stock market.
- g. PT Suparma Tbk (SPMA) has S-score in Springate model is near the lower limit (0,86), it is 0,87 in 2012 and 0,9 in 2014. It is mean that although they are in the healthy category, they still near the bankruptcy category.

According to those result, it is almost all the data in Springate model are in bankruptcy category. From 54 tests, 35 data are in the bankruptcy category (65%) and 19 data are not in the bankruptcy category. This result is the same as Altman model result.

### C. Grover Model Bankruptcy Prediction Result

According to 54 financial report from 10 listed pulp and paper companies, the Grover bankruptcy prediction model from 2011 to 2016 is shown on table 4.3:

Table 4.3: Bankruptcy Prediction in Pulp and Paper Company from 2011 -2016 using Grover Model

No.	Code	2011		2012		2013		2014		2015		2016	
		Score	K	Score	K	Score	K	Score	K	Score	K	Score	K
1	ALDO	0.5027	S	0.5949	S	0.7301	S	0.6788	S	0.7347	S	0.8043	S
2	DAJK					1.2309	S	1.3242	S	-0.3415	B	-0.120	B
3	FASW	0.3984	S	-0.210	B	0.1046	S	0.2047	S	-0.0397	B	0.4907	S
4	INKP	0.1304	S	0.2901	S	0.3671	S	0.2955	S	0.3625	S	0.3829	S
5	INRU	0.1368	S	-0.049	B	0.0077	G	0.1027	S	0.0819	S	-0.109	B
6	KBRI	-0.078	B	0.2638	S	-0.007	G	0.0975	S	-0.2232	B	-0.238	B
7	KDSI	0.6140	S	0.7968	S	0.5987	S	0.6338	S	0.3538	S	0.565	S
8	SAIP	0.5594	S	-0.175	B								
9	SPMA	0.3195	S	0.5608	S	0.1849	S	0.6253	S	0.0782	G	0.6752	S
10	TKIM	0.5702	S	0.6311	S	0.5729	S	0.4283	S	0.2402	S	0.2212	S

Note: K=Category, B=Bankruptcy, G=Gray area, S=Healthy

In the Grover model, earning before tax (EBT) is not calculated in the Grover model formula. Grover model has almost all the data are in the healthy category. From 54 tests, only 10 data are in the bankruptcy category, 3 data in the grey area, and 41 in the healthy category. Therefore, according to Grover model, it is only 18,5% companies are in the bankruptcy category.

Based on Grover model, PT Kertas Basuki Rahma Indonesia (KBRI) in 2011 and 2015, PT Dwi Jaya Aneka Kemasindo (DAJK) in 2015, PT Fajar Surya Wisesa Tbk (FASW) in 2012 and 2015, PT Toba Pulp Lestari (FASW) in 2012, and PT Surabaya Agung Industry Pulp and Paper (SAIP) are in the bankruptcy category. Otherwise INRU in 2013, KBRI in 2013, and PT Suparma Tbk in 2015 are in the grey area. The rest of is are in the healthy category.

### B. Hypothesis Test Result

To determine hypothesis test, first, the result form bankruptcy prediction based on those three models are calculated as shown in table 4.4

Table 4.4: The number of the company with bankruptcy category prediction

No.	Year	Model		
		Altman	Springate	Grover
1	2011	6	6	1
2	2012	6	5	3
3	2013	6	6	0

4	2014	5	5	0
5	2015	7	8	3
6	2016	4	5	3
		34	35	10

In the hypothesis test, SPSS 22 application is used.

1) Normality Test

Normality test result using kolmogorov smirnor method show significant value 0,117 for Altman model, 0,168 for Springate, and 0,069 for Grover. All of it has significant value > 0,06. It means that the data for one-way anova test has normal distribution requirement.

Table 4.5: One sample kolmogorov-smirnov test

		Altman	Springate	Grover
N		6	6	6
Normal Parameters <sup>a,b</sup>	Mean	5.6667	5.8333	1.6667
	Std. Deviation	1.03280	1.16905	1.50555
Most Extreme Differences	Absolute	.293	.277	.312
	Positive	.207	.277	.199
	Negative	-.293	-.238	-.312
Test Statistic		.293	.277	.312
Asymp. Sig. (2-tailed)		.117 <sup>c</sup>	.168 <sup>c</sup>	.069 <sup>c</sup>

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.

2) Homogeneity of Variance Test

According to homogeneity of variance test as shown in the table 4.6. it is concluded that Levene statistic value is 1,673 and significant value is 0,221. The significant value is not significant on 0,05 (sig > 0,05) . therefore, anova assumption is fulfill that the data has the same variance.

Table 4.6: Test of Homogeneity of Variances Bankrupt

Levene Statistic	df1	df2	Sig.
1.673	2	15	.221

3) One-way Anova Test

According to table 4.7, it was concluded that F calculated is 21,312 with significant value is 0,00 (< 0,05). F calculated > F table and significant on 0,05. Therefore, it can be concluded that H0 is rejected. It means that there is different average result between bankruptcy prediction model (Altman, Springate, and Grover model).

Table 4. 7: ANOVA  
Bankrupt

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	66.778	2	33.389	21.312	.000
Within Groups	23.500	15	1.567		
Total	90.278	17			



4) Post Hoc Test

Post hoc test on table 4.8 indicate the average difference between those three models. Altman, Springate, and Grover model has mean difference value is -.167 and 4. This mean that between those three model has an average difference

Table 4.8: Post Hoc Test

	(I) Model	(J) Model	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	Altman	Springate	-.167	.723	.971
		Grover	4.000*	.723	.000
	Springate	Altman	.167	.723	.971
		Grover	4.167*	.723	.000
	Grover	Altman	-4.000*	.723	.000
		Springate	-4.167*	.723	.000
Bonferroni	Altman	Springate	-.167	.723	1.000
		Grover	4.000*	.723	.000
	Springate	Altman	.167	.723	1.000
		Grover	4.167*	.723	.000
	Grover	Altman	-4.000*	.723	.000
		Springate	-4.167*	.723	.000

C. Discussion/Interpretation

1. The Comparison of Bankruptcy Prediction Model

Bankruptcy prediction model is the tools which used to detect whether the company is in healthy financial condition or not. Prediction model such as Altman, Springate, and Grover is model founded by the expert and very common in economics science. In this research for listed pulp and paper company from 2011 to 2016 using Altman, Springate, and Grover model, it was concluded that there is no different result on Altman and Springate. But on Altman, Springate, and Grover models, there is significant difference. According to financial report on listed pulp and paper industry from 2011 to 2016, it was concluded that Altman and Springate model has 34 and 35 from 54 data test which in the bankruptcy category. Otherwise Grover model is only 10 data test which in the bankruptcy category.

Altman and Grover test model are nearly the same but Grover model is very different. It was indicated that the difference in the models' formula will cause different result. In the formula, there are 3 same variables, working capital, and EBITTA (earning before interest and tax to total asset). The characteristic on each model is stock market value and retained earnings on Altman model, EBTTA (earnings before tax to total asset) on Springate model, and ROA on Grover model.

The test result which has the same result on those three models is PT Kedawung Setia Industrial (KDSI) and PT Alkindo Naratama Tbk (ALDO). KDSI and ALDO are analyzed by those three models in the healthy category. This is because those three models have the same characteristic, which is positive income before and after interest and tax. Moreover, stock market value for those two companies indicate an increasing value better than the other sample company.

For the decreasing stock market value and EBT is lower than EBIT such as in INKP, INRU, SPMA, and TKIM, it shows lower Altman and Springate value and in the bankruptcy category. This mean that although sales and company profit are increasing, the company is still in the bankruptcy category based on Altman and Springate model if stock market value and high interest payment.

PT Kertas Nasuki Rahmat Tbk (KBRI) has bankruptcy category except 2012 based on Altman and Springate model. But based on Grover model, they only in the bankruptcy category in 2011 and 2015. The similarity between Altman and Grover because on Altman model, retained earning value for 5 years is minus and also earning before tax except on 2012. On 2012 they are in the healthy category. They difference between Grover and Altman, and Springate because those three models has EBITTA, but Grover model do not have retained earning variable as in Altman and earning before tax as in Springate.

This research result, especially on Altman and Springate model indicate that pulp and paper industry condition is suitable with research object general description that almost listed company has high and increasing sales but has stock value decrease and higher total debt.

## 2 Hypothesis Result Test

Hypothesis test using one-way anova model indicate that H0 is rejected and H1 is accepted. This means that there is an average result difference between bankruptcy prediction analysis using Altman, Springate, and Grover model on listed pulp and paper company in 2011 to 2016.

However, there is no average result difference between Altman and Springate. But there is still a significant difference between Altman and Grover and Springate and Grover. This hypothesis result is suitable with description result between Altman, Springate, and Grover test. The result between Altman and Springate model result is the same and very different with Grover model.

This research result is the same between the previous research by Elvina Wiwit Firma and Meita on 2015. The research was indicated that the bankruptcy prediction result between Altman and Springate is the same. But Zmijewskii model's result is different from Altman and Springate model.

This research indicate that bankruptcy prediction model is some tools to detect the company financial condition. If the category is not suitable with this model formula, this can be determined as an early warning to make a decision. The bankruptcy decision is depend on company internal management or external stakeholders such as commercial and public court as happened in PT Surabaya Industry Pulp And Paper Tbk on 2013.

## Conclusions Research

From this research of bankruptcy analysis model in listed pulp and paper industry on 2011 to 2016 indicate that:

1. The bankruptcy prediction using Altman, Springate, and Grover model are:
  - a. According to Altman and Springate model, almost the listed pulp and paper company in 2011 to 2016 are in the bankruptcy category or in unhealthy financial condition.
  - b. According to Grover model, almost the listed pulp and paper company in 2011 to 2016 are in the healthy financial condition.
  - c. The company which has the same result using those three different models are PT Alkindo Naratama Tbk and PT Kedawung Setial Industry Tbk, with straight five year in healthy condition.
2. According to ANOVA, there are a different bankruptcy prediction analysis result between Altman, Springate, and Grover model. The significant different are between Altman and Grover model and Springate and Grover model. But between Altman and Springate, there is no different result.

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