



Z-Score and Zavgren Models in Implementing Financial Distress Management in Cigarette Companies

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ABSTRACT

Business competition between companies is getting tougher and the trend of the international economy is leading to global competition, thus requiring companies to have strong competitiveness to survive during the COVID-19 pandemic. Based on the results of the pre-study, it was found that at the National cigarette company there was an increase in assets from 2016 to 2017 causing an increase in profit, but the increase in profit was not significant. The purpose of this study was to determine the financial condition of cigarette companies using the Altman Z-score and Zavgren methods. The study consists of 2 stages, namely the calculation of financial distress in companies using the Z-score model and stage 2 for financial distress in companies using the Zavgren model. This research was conducted by taking data provided by the Indonesia Stock Exchange. The sample of this research is cigarette companies listed on the Indonesia Stock Exchange for the 2016 – 2018 period. Companies that are included in the healthy classification are PT. Gudang Garam, Tbk, PT. HM. Sampoerna, Tbk and PT, Wismilak Inti Makmur, Tbk because they have Z Scores of 4.449, 23.82, and 16.06, all of which have Z Scores above 2.9. The financial condition of cigarette companies listed on the Indonesia Stock Exchange (IDX) during the 2016 – 2018 period according to the Zavgren model can be categorized as Healthy because the Pi value is at the upper and lower thresholds. Sampoerna, Tbk and PT, Wismilak Inti Makmur, Tbk because they have Z Scores of 4.449, 23.82, and 16.06, all of which have Z Scores above 2.9. The financial condition of cigarette companies listed on the Indonesia Stock Exchange (IDX) during the 2016 – 2018 period according to the Zavgren model can be categorized as Healthy because the Pi value is at the upper and lower thresholds. Sampoerna, Tbk and PT, Wismilak Inti Makmur, Tbk because they have Z Scores of 4.449, 23.82, and 16.06, all of which have Z Scores above 2.9. The financial condition of cigarette companies listed on the Indonesia Stock Exchange (IDX) during the 2016 – 2018 period according to the Zavgren model can be categorized as Healthy because the Pi value is at the upper and lower thresholds.

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1. Introduction

The COVID-19 pandemic has placed great demands on leaders in various sectors. Business competition between companies is getting tougher and international economic trends are leading to global competition so that companies demand strong competitiveness and the ability to survive during the COVID-19 pandemic. Factors that affect the company's performance are good management and financial planning which must be linked to the company's strengths that aim to take advantage of all existing assets and the company's weaknesses are carried out with the aim of making improvements. In accordance with the Government Regulation of the Republic of Indonesia number 24 of 1998 concerning Annual Financial Information of Companies, it is stated that all companies are required to submit annual financial reports to the Minister.

During the COVID-19 pandemic, many companies went bankrupt. This prolonged crisis is the crisis of a very sharp decline in the rupiah exchange rate. To be able to identify early signs of bankruptcy, companies need to conduct an analysis of their financial condition. The earlier these signs are known, the better for management to be able to take strategies to improve financial conditions immediately [1]. Financial distress is a condition where the company experiences financial difficulties and is threatened with bankruptcy, liquidity problems that cannot be solved without changing the size of the company's operations [2].

The Altman model is used as an early warning against a decline in the financial condition of a company. The Z-Score model uses a certain ratio in predicting bankruptcy risk with an accuracy of 95% a year before the company actually goes bankrupt [3]. Zavgren's model predicts bankruptcy by logit analysis, which results in the probability

of bankruptcy. Zavgren uses this model on several companies that are bankrupt and not bankrupt with the results of the study that the accuracy rate is 82.2% for predicting bankruptcy. This model was also chosen because this model is considered easier in conducting bankruptcy analysis compared to other models.

The tobacco products industry absorbs 5.98 million workers [4], but the national cigarette industry has repeatedly complained about the decline. According to data from the Ministry of Industry, the number of cigarette factories in Indonesia decreased by 80.8% from 2,540 factories in 2011 to 487 factories in 2017. As a result, employment was reduced and cigarette production continued to decline, the Covid-19 pandemic situation has exacerbated the situation, so that more ties must be cut. employee layoffs as a result of the cessation of production. Based on the results of the pre-study, it was found that at the National cigarette company there was an increase in assets from 2016-2018 causing an increase in profit, but the increase in profit was not significant. This is a concern for tobacco companies against bankruptcy. This phenomenon causes research on the management of financial distress in cigarette companies to become an urgency to be carried out. This aims to be able to predict the bankruptcy of the company so that the company can anticipate it so that there will be no layoffs of employees. The researched problem is there was a decrease in profits that occurred in cigarette companies from 2016-2018 and a mismatch in the increase in profits to the increase in total assets. This is the company's concern about bankruptcy. **Aim** This study is to find out the financial condition of cigarette companies affected by the COVID-19 pandemic using the Altman Z-score and Zavgren methods. This research is in accordance with the research roadmap of the Kutaraja Polytechnic on the company's economic focus area. This research is an initial research so it is suitable to propose a research scheme for novice lecturers considering that researchers are just learning in writing research proposals.

2. Method

This research was conducted by taking secondary data provided by the Indonesia Stock Exchange. The sample of this research is cigarette companies listed on the Stock Exchange for the 2016-2020 period, namely PT. Gudang Garam, Tbk, PT. Bentoel Internasional Investama, Tbk, PT. HM. Sampoerna, Tbk, PT. Wismilak Inti Makmur, Tbk.

2.1 Population and Sample

The population is a group that attracts the attention of researchers to study. The population used in this study were all companies on the IDX in the 2016-2020 period. The sample is part of the population that shows several members through the selection process from the population. The samples of this research are cigarette companies listed on the Stock Exchange for the 2016-2020 period, namely PT. Gudang Garam, Tbk, PT. Bentoel Internasional Investama, Tbk, PT. HM. Sampoerna, Tbk, PT. Wismilak Inti Makmur, Tbk.

2.2 Data collection

The technique used in this research is documentation that obtains data by looking at documents and notebooks as well as archives available on the Indonesia Stock Exchange, especially data regarding financial statements and company history.

2.3 Data analysis

There are several data analysis techniques used, namely:

1. Altman model (Z-Score)

This model is used to determine the company's financial condition with the following steps:

 - a. Calculating financial ratios
 - b. Perform calculations with Altman model analysis (Z-Score)
 - c. Interpret the results of calculations or classifications according to the cut-off point that has been determined. From the results of the Z-Score,
2. Zavgren model (logit)

This model is used to determine the company's financial condition with the following steps:

 - a. Calculating financial ratios are:
 - 1) $INV = \frac{\text{Rata-Rata Persediaan}}{\text{Penjualan}}$
 - 2) $REC = \frac{\text{Rata-Rata Piutang}}{\text{Rata-Rata Persediaan (Kas + Surat Berharga)}}$
 - 3) $CASH = \frac{\text{Total Aktiva}}{\text{Quic Aset}}$
 - 4) $QUICK = \frac{\text{Hutang Lancar}}$

$$5) \text{ ROI} = \frac{\text{Laba Operasi Bersih}}{(\text{Total Aktiva} - \text{Hutang Lancar})}$$

$$6) \text{ DEBT} = \frac{\text{Hutang Jangka Panjang}}{(\text{Total Aktiva} - \text{Hutang Lancar})}$$

$$7) \text{ TURN} = \frac{\text{Penjualan}}{(\text{Modal Kerja})}$$

b. Perform calculations with the Zavgren model (logit) with the following formula:

$$P_i = \frac{1}{1 + e^y}$$

Where the power of y is a multivariate function consisting of constants and coefficients from a set of variables, namely the ratio. While e is a natural number with a value of 2.1828. Probability values that are close to 1/1 or 100% are categorized as financial difficulties. This model defines y as follows:

$$Y = 0.23883 - 0.108(\text{INV}) - 1.583(\text{REC}) - 10.78(\text{CASH}) + 3.074(\text{QUICK}) + 0.486(\text{ROI}) - 4.35(\text{DEBT}) + 0.11(\text{TURN})$$

Variable y with a negative value will increase the probability of bankruptcy because it will reduce e^y up to zero, with the conclusion that bankruptcy will occur if the probabilities are generated. At close to 1/1 or 100%. After getting the results of the P_i value, then the existing data is tested again with statistical tools because this model does not have a cut-off point to get a high level of certainty.

The statistical tools used are as follows:

a. Standard Deviation (for $n < 30$)

The standard deviation is the square root of the variance indicating the deviation of the data from its mean value, which is calculated by the formula:

$$SD = \sqrt{\frac{\sum (X_i - \bar{X})^2}{n - 1}}$$

Where:

X_i = i data

n = number of samples

\bar{X} = mean value = $\frac{\sum X}{n}$

b. Interval Range, with 95% confidence level ($\alpha = 0.05$)

3. Results and Analysis

The data used in this study are the financial statements of cigarette companies listed on the Indonesia Stock Exchange during the 2016-2018 period, namely PT. Bentoel Internasional Investama, Tbk, PT. Gudang Garam, Tbk, PT. HM Sampoerna, Tbk, PT. Wismilak Inti Makmur, Tbk which consists of:

- Balance sheet as of December 31, 2016, 2017, and 2018
- Income Statement for the period December 31, 2016, 2017, and 2018

3.1 Altman Z Data Analysis - Bankruptcy Score and Prediction

The purpose of calculating the Z-Score is to warn of financial problems that may require serious attention and provide clues to avoid financial difficulties in the future.

a. Ratio of Working Capital to Total Assets

The ratio used in this assessment variable is a liquidity ratio that can indicate the company's ability to generate working capital from all its assets, so that from this ratio it can be seen the level of liquidity of a company. Net working capital itself is known from the calculation of the difference between current assets and current liabilities. If the results of the calculation of working capital show a negative number, it means that it is likely that the company will have difficulty meeting existing short-term obligations due to the unavailability of adequate current assets to meet short-term obligations that must be paid immediately. The formula for calculating this ratio is as follows:

$$X_1 = \frac{\text{Modal Kerja}}{\text{Total Asset}}$$

The calculation of this ratio is done by comparing the company's working capital with the total assets owned (Table 1). The results of the calculations obtained will describe the ability of the assets owned by the company to generate working capital.

Table 1. Ratio of Working Capital to Total Assets

Company	Year			Average X1
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	0.377	0.307	0.239	0.308
PT. Gudang Garam, Tbk	0.322	0.317	0.337	0.325
PT. HM Sampoerna, Tbk	0.640	0.642	0.623	0.635
PT. Wismilak Inti Makmur, Tbk	0.484	0.571	0.429	0.495

Source: secondary data processed 2021

From the calculation results above, it can be seen that there is 1 company that has decreased its liquidity ratio every year for 3 consecutive years, namely PT. Bentoel Internasional Investama, Tbk. While the 3 companies that experienced fluctuations, namely PT. Gudang Garam Tbk which experienced a decrease in its liquidity ratio from 2016 to 2017, then the liquidity ratio increased again in 2018. PT. HM Sampoerna Tbk, experienced an increase in the liquidity ratio in 2016 to 2017 and decreased in 2018 and PT. Wismilak Inti Makmur, Tbk experienced an increase in 2017 and decreased in 2018.

b. Ratio of Retained Earnings to Total Assets

The ratio used in this assessment variable is a profitability ratio that can assess the level of success of a company to generate retained earnings from all assets owned by the company. In other words, this ratio can show the surplus obtained by a company, so it can be understood that the age of the company also has an effect on this ratio, because a young company is likely to show a small ratio because the company's operating time is still not sufficient to obtain sufficient cumulative profit. Retained earnings are profits from the company's operational activities that are not distributed to investors in the form of dividends, from there it can be understood that the amount of retained earnings listed in the balance sheet is not cash so it is not available for expenditure needs or dividend payments. The formula for calculating this ratio is as follows:

$$X2 = \frac{\text{Laba Ditahan}}{\text{Total Asset}}$$

The results of the calculations obtained will describe the ability of the assets owned by the company to generate retained earnings. From the calculation of the ratio of retained earnings to total assets based on the financial statements published by the company from 2016 to 2018, the results of the calculation of the X2 variable are presented in the form of table 2.

Table 2. Ratio of Retained Earnings to Total Assets

Company	Year			Average X2
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	-0.155	-0.034	-0.041	-0.077
PT. Gudang Garam, Tbk	0.107	0.116	0.113	0.112
PT. HM Sampoerna, Tbk	0.300	0.294	0.291	0.295
PT. Wismilak Inti Makmur, Tbk	0.099	0.294	0.291	0.228

source: processed data results, 2021

Based on the results of the above calculations, it can be seen that there are 3 companies that experience fluctuations in the profitability ratio, namely PT. Bentoel Internasional Investama Tbk, which experienced an increase in 2017 but decreased again in 2018. In addition, PT. Gudang Garam, Tbk also experienced an increase in

2017 and decreased again in 2018. PT. Wisnilak Inti Makmur, Tbk also experienced increased fluctuations in 2017 and decreased in 2018. PT. HM. Sampoerna, Tbk experienced a decline every year from 2016 to 2018.

c. EBIT Ratio to Total Assets

The ratio used in this assessment variable is known as Earning Power of Total Investment which is included in the profitability ratio which measures the company's ability to generate profits or profits from assets owned by the company concerned. The results of the calculation of the ratio of earnings before interest and taxes to total assets can indicate the company's ability to use the capital invested in all assets to be able to generate profits for investors, so that based on this ratio it can also be seen how optimal a company is in using the funds invested by investors. The formula for calculating this ratio is as follows:

$$X3 = \frac{EBIT}{Total Asset}$$

The calculation of this ratio is done by comparing the company's earnings before interest and taxes are deducted (*Earnings Before Interest and Tax*) with total assets owned. The results of the calculations obtained will describe the ability of the assets owned by the company from the investments invested by investors in generating profits so that from the profits obtained, the company can bear the interest that must be paid from these investments.

From the calculation of the ratio of EBIT to total assets based on financial statements issued by cigarette companies in 2016 – 2018 the results of the calculation of the X3 variable are obtained which are presented in the form of table 3.

Table 3. Ratio of EBIT to Total Assets

Company	Year			Average X3
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	-0.103	-0.028	-0.022	-0.051
PT. Gudang Garam, Tbk	0.142	0.156	0.152	0.150
PT. HM Sampoerna, Tbk	0.400	0.392	0.385	0.392
PT. Wisnilak Inti Makmur, Tbk	0.101	0.392	0.385	0.293

Source: Results processed in 2021

Based on the results of the above calculations, it can be seen that there are 3 companies that experience fluctuations in the Earning Power of Total Investment ratio, namely PT. Bentoel Internasional Investama Tbk, which experienced an increase in 2017 but decreased again in 2018. In addition, PT. Gudang Garam, Tbk also experienced an increase in 2017 and decreased again in 2018. PT. Wisnilak Inti Makmur, Tbk also experienced increased fluctuations in 2017 and decreased in 2018. PT. HM. Sampoerna, Tbk experienced a decline every year from 2016 to 2018.

d. Ratio of Market Value of Shares to Total Liabilities

The ratio used in this valuation variable is a ratio that can show the level of solvency that describes the ability of a company to guarantee all of its obligations, in this case all of these obligations are guaranteed by the market value of the company's shares. The stock market value or market capitalization can be calculated by multiplying the volume of shares outstanding in the capital market by the price of each share. The book value of the company's liabilities can be determined by calculating the amount of current liabilities and long-term liabilities borne by the company concerned. In general, companies that have the potential to go bankrupt have a larger proportion of debt than their own capital or in this case the market value of their shares.

$$X4 = \frac{Nilai Pasar Saham}{Total Kewajiban}$$

The calculation of this ratio is done by comparing the market value of the shares divided by the total liabilities borne by the company. The results of the calculations obtained will describe how big the total liabilities that can be borne with the value of the company's shares circulating in the market. From the calculation of the ratio of the stock market value to total liabilities, the results of the calculation of the X4 bankruptcy assessment variable are presented in the form of table 4.

Table 4. Ratio of Market Value of Shares to Total Liabilities

Company	Year			Average X4
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	4,372	2,681	1,744	2,932
PT. Gudang Garam, Tbk	5,257	5,004	6,714	5,658
PT. HM Sampoerna, Tbk	52.483	49,346	38,379	46,736
PT. Wismilak Inti Makmur, Tbk	2,780	49,346	38,379	30,168

Source: Results processed in 2021

Based on the calculation results, there are 2 companies that experienced a decrease in the ratio of the market value of shares to total liabilities. PT. Bentoel Internasional Investama, Tbk, which is one of the companies experiencing a decline in the ratio of market value of shares to total liabilities from year to year. Same thing with PT. HM Sampoerna, Tbk. While the other 2 companies, namely PT. Gudang Garam, Tbk and PT. Wismilak Inti Makmur, Tbk experienced fluctuations in the ratio of market value of shares to total liabilities.

e. Ratio of Sales to Total Assets

The ratio of net sales to total assets is an activity ratio known as the ratio of total assets turnover (Total Asset Turnover), which is a ratio that represents the level of success / ability of a company in using all of its assets to generate optimal sales volume so that the company earns a profit from the sale. In addition, this ratio also describes the effectiveness

of a company in managing the turnover of elements or assets that owned. The size of the profit earned is strongly influenced by the growth of the company. In other words, this ratio measures the company's ability to manage assets such as inventories of raw materials, work in process, or finished goods, which is associated with the level of sales. The formula for calculating the company's total asset turnover ratio is as follows:

$$X5 = \frac{\text{Penjualan}}{\text{Total Aset}}$$

The calculation of this ratio is done by comparing the sales obtained divided by the total assets owned by the company. The calculation results obtained will describe the contribution of each asset owned in creating sales for the company. From the calculation of the ratio of sales to total assets based on the financial statements issued by cigarette companies in 2016 - 2018, the results of the X5 ratio calculation are presented in the form of table 5.

Table 5. Ratio of Sales to Total Assets

Company	Year			X5 . Average
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	1,427	1,438	1,473	1,446
PT. Gudang Garam, Tbk	1,212	1,248	1,385	1,282
PT. HM Sampoerna, Tbk	2,246	2,297	2,290	2,278
PT. Wismilak Inti Makmur, Tbk	1,245	2,297	2,290	1,944

Source: Processed data results, 2021

Based on table 15, there are 2 companies that have increased the ratio *total asset turnover* every year, namely PT. Bentoel Internasional Investam, Tbk and PT. Gudang Garam, Tbk. There are 2 companies experiencing fluctuations, namely PT. HM Sampoerna, Tbk and PT. Wismilak Inti Makmur, Tbk.

Based on the cumulative calculation of 5 bankruptcy indicator variables, the following is the result of calculating the Z-Score value of cigarette companies listed on the Indonesia Stock Exchange from 2016 to 2018 which is presented in table 6.

Table 6. Average Z-Score of Cigarette Companies in 2016-2018

Company	Average X1	Average X2	Average X3	Average X4	X5 . Average	Z Score	Classification
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PT. Bentoel Internasional Investama, Tbk	0.308	-0.077	-0.051	2,932	1,446	2,67174	Gray Area
PT. Gudang Garam, Tbk	0.325	0.112	0.150	5,658	1,282	4,44949	Healthy
PT. HM Sampoerna, Tbk	0.635	0.295	0.392	46,736	2,278	23.8266	Healthy
PT. Wismilak Inti Makmur, Tbk	0.495	0.228	0.293	30,168	1,944	16.0682	Healthy

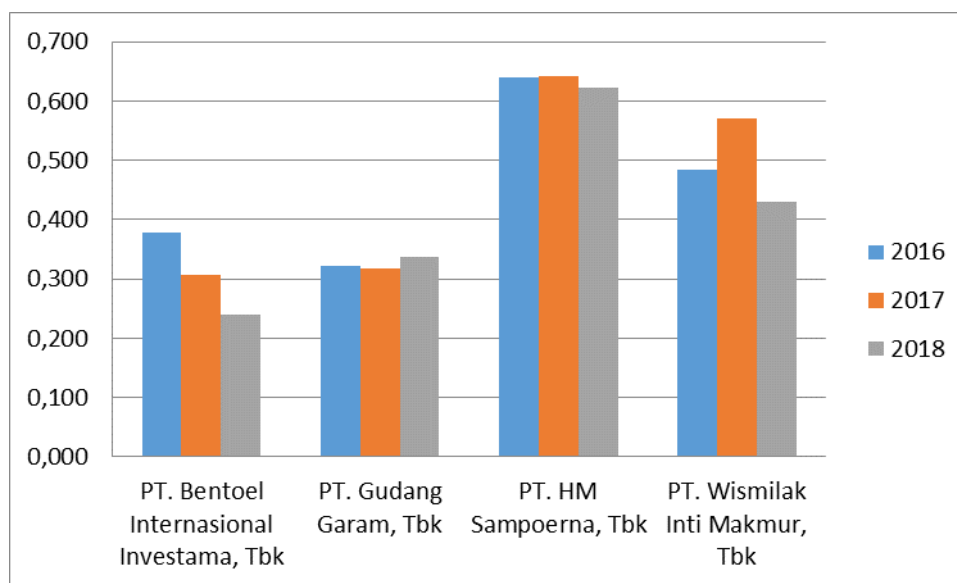
Source: Processed data results, 2021

Based on the table above, there is 1 cigarette company listed on the Indonesia Stock Exchange which is categorized as a gray area. PT. Bentoel Internasional Investama, Tbk has a Zscore value of 2.6717 which is at a value of $1.20 < Z < 2.90$. The company has not been categorized as having financial problems, but the management must be aware of the potential for distress (bankruptcy) that may occur, so that improvements in financial conditions must be carried out immediately.

There are 3 cigarette companies that are in a healthy condition because they have a Zscore value above 2.9. PT. Gudang Grama, Tbk has a Zscore of 4,449, PT. HM Sampoerna, Tbk has a Z Score of 23.83 and PT. Wismilak Inti Makmur Tbk, has a Zscore of 16.0682. With a healthy condition, the company can maintain or improve its financial condition so that it can run more optimally.

In calculations based on balance sheets and financial statements for 2016, 2017 and 2018, the four companies experienced fluctuations in the number of current assets and fluctuations in the number of current liabilities of the company in the last 3 years. The amount of working capital obtained is the difference between current assets and current liabilities. PT. Bentoel Internasional Investama, Tbk and PT. HM. Sampoerna, Tbk, experienced a decrease in the ratio of working capital to total assets because the number of fixed assets increased which was also followed by an increase in the number of current liabilities. In contrast to PT. Gudang Garam, Tbk and PT. Wismilak Inti Makmur, Tbk which experienced fluctuations in the ratio of working capital to total assets because the number of current assets increased which was not so significant to the decrease and increase in the number of current liabilities. This is in line with the theory put forward by Sawir that working capital is the difference between current assets and current liabilities. Basically, the ratio X_{11} is a liquidity ratio that measures the company's ability to meet short-term obligations. The greater the result of this ratio means the greater the funds embedded in current assets. If current assets are less than current liabilities, the result of this ratio will be negative.

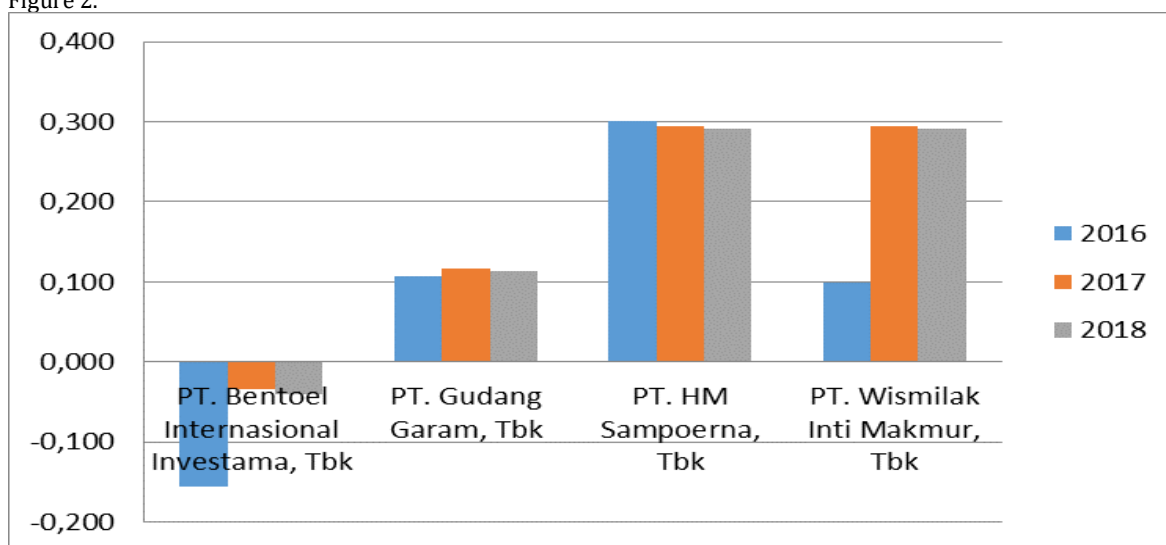
The results of this study support previous research, namely the opinion of Indra Kurniawan and Cahyani Indrawati which states that if current assets are greater than current liabilities, the results of this ratio will be positive. The development of the liquidity ratio of cigarette companies during 2016 to 2018 can be seen in Figure 1.



source: Data Processing Results, 2021

Figure 1. Ratio of Working Capital to Total Assets

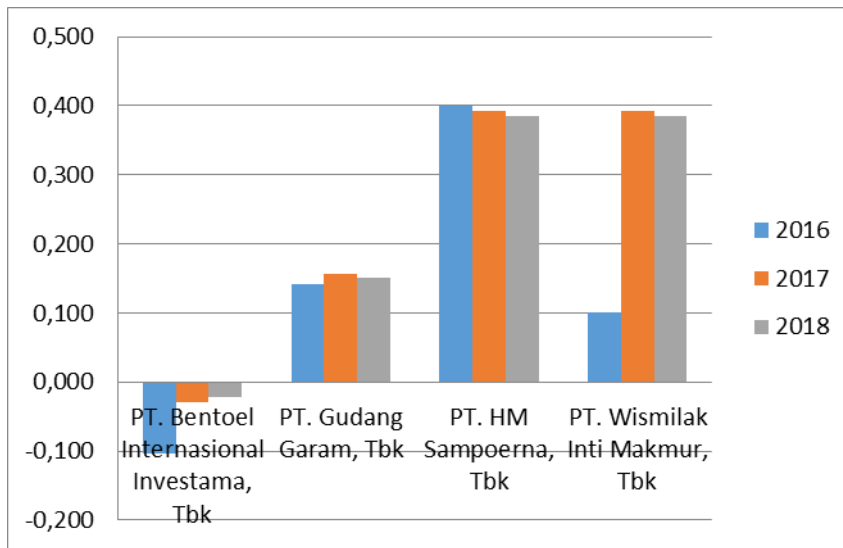
In calculations based on balance sheets and financial statements for 2016, 2017 and 2018, the four companies experienced fluctuations in the amount of retained earnings and the company's total assets in the last 3 years. Total retained earnings at PT. Bentoel Internasional Investama, Tbk experienced an increase even though it was in a loss condition, but this is a good development when compared to the total assets which also increased. This shows evidence that the ratio of retained earnings to total assets in this company has increased. This also happened to the other three companies that experienced fluctuating ratios. According to Yugian Pratama Putra, Dr. Norita, Anisah Firli who researched the same thing in sub-industry companies said that this ratio was intended to measure the accumulated profit during the company's operations, so that the age of the company also affects the ratio, because the longer the company operates, the greater the possibility of increasing the accumulation of retained earnings. The development of the profitability ratios of cigarette companies during 2016 to 2018 can be seen in Figure 2.



source: Data Processing Results, 2021

Figure 2. Ratio of Retained Earnings to Total Assets

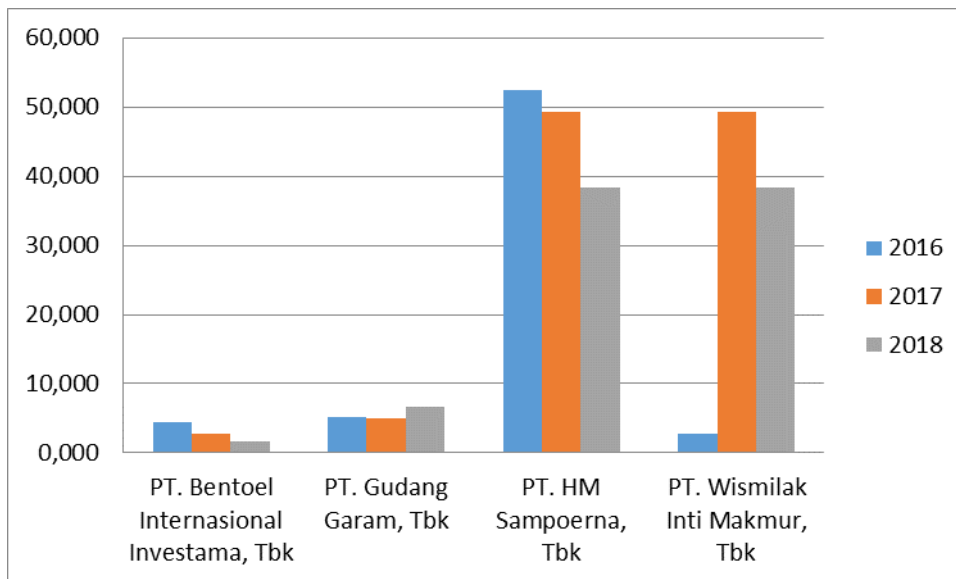
In calculating the ratio of EBIT to total assets, 1 company, namely PT. Bentoel Internasional Investama, Tbk which has increased, this is because the profit before interest and corporate tax has increased even though it is in a loss condition. In contrast to the other three companies, which experienced fluctuations in the value of earnings before interest and taxes on total assets. This is what causes this ratio to fluctuate for the three companies (PT. Gudang Graam, Tbk, PT. HM. Sampoerna and PT. Wismilak Inti Makmur). This is in line with the expert opinion that this ratio intends to engage the company in generating profits by using all its sources of funds (total assets). This ratio can also be used as a measure of how much productivity the use of borrowed funds is. According to Mauli Permata Sari and Irni Yunita who researched the bankruptcy of mineral and metal sub-sector companies that this ratio depends on the value of profit before tax and company interest. Ratio development *Earning Power of Total Investment* cigarette companies in 2016 – 2018 can be seen in Figure 3.



source: Data Processing Results, 2021

Figure 3. Ratio of EBIT to Total Assets

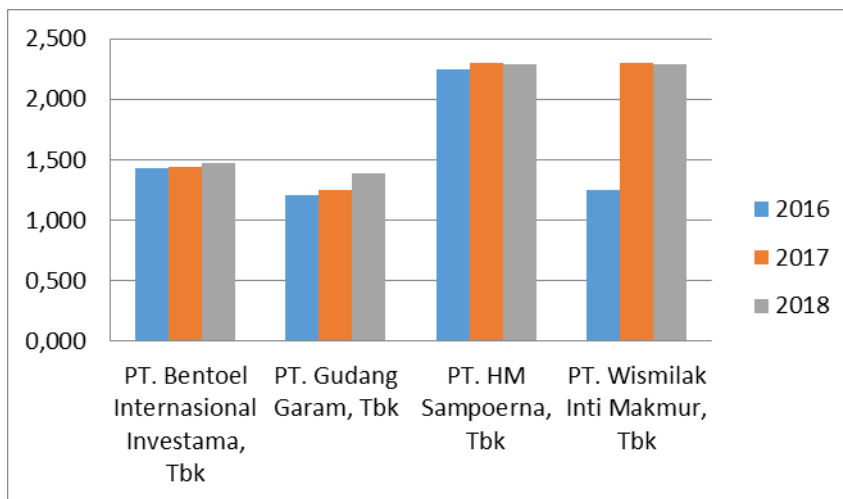
Based on research on the financial statements of the four companies and analysis of the market value of shares and total liabilities, there are 2 companies that experienced a decline in the value of the ratio, namely PT. Bentoel Internasional Investama, Tbk and PT. HM. Sampoerna, Tbk. This is because the total market value of shares has decreased which is not proportional to the increase in total liabilities. While PT. Gudang Garam, Tbk and PT. Wismilak Inti Makmur, Tbk experienced fluctuations because the market value of shares and total liabilities also fluctuated. This is in accordance with the theory which states that Equity is the property of the remainder (*residual interest*) in the assets of a business entity remaining after deducting debt. In a business entity, equity is the right of the owner and is in line with the research of Indra Kurniawan and Cahyani Indrawati who researched pharmaceutical companies. The comparison of this ratio can be seen in Figure 4.



source: Data Processing Results, 2021

Figure 4. Ratio of Market Value of Shares to Total Liabilities

For sales, the four companies experienced an increase so that the sales ratio and total assets of each company also increased. This is in line with the theory that the greater the number of sales and total assets owned, the greater the turnover ratio. Ratio development *Total Asset Turnover* from cigarette companies during 2016 – 2018 can be seen in Figure 5.



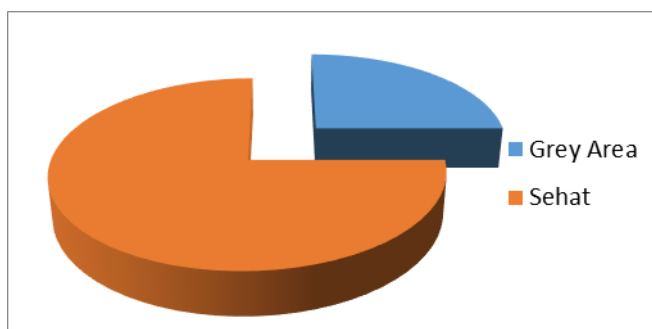
source: Data Processing Results, 2021

Figure 5. Ratio of Sales to Total Assets

The healthy limits of the company's condition analyzed are based on: *cut-off points*. Based on the calculation of the Z value, the results obtained with the following conditions (Winarto, 2006:4 quoting from Douglas R. Emery and D. Finnerty, 1997:884):

- The company is considered to be in an unhealthy condition or has a high probability of bankruptcy if the Z value is less than 1.20 ($Z\text{-score} < 1.20$). There is no company that goes bankrupt because no company has a Z value below 1.2.
- The company is considered in a healthy condition or has a low probability of bankruptcy if Z is greater than 2.90 ($Z\text{-score} > 2.90$). There are 3 companies that have a Z value above 2.9, namely PT. Gudang Garam, Tbk, PT. HM Sampoerna, Tbk and PT. Wismilak Inti Makmur, Tbk
- If the resulting Z value is between 1.20 to 2.90 ($1.20 < Z < 2.90$) it is said that the company is located in the "gray area" which means the company has the possibility to be categorized as healthy or unhealthy companies. Based on the calculation results, there is 1 company that has a Z value of 2.67 which is on the threshold of $1.20 < Z < 2.90$, namely PT. Bentoel Internasional Investama, Tbk.

In general, the classification of cigarette companies listed on the Indonesia Stock Exchange for the period 2016 – 2018 can be seen in Figure 6.



source: Data Processing Results, 2021

Figure 6. Percentage of Financial Position

Zavgren Data Analysis (Logit) and Bankruptcy Prediction

Analysis of the company's financial statements using the Zavgren model (logit) requires four steps. First, a series of seven financial ratios is calculated, secondly each ratio is multiplied by a coefficient, the three values or results obtained are summed together (Y), and the fourth is the calculation of the probability of a company's bankruptcy with the logit probability.

a. INV ratio

Companies that have a higher INV ratio illustrate that the average inventory turnover to net sales is sluggish, resulting in short-term liquidity ratios and increased risk of financial pressure. The formula for knowing the INV ratio is as follows:

$$INV = \frac{\text{Rata - Rata Persediaan}}{\text{Penjualan}}$$

Table 7 is the result of the calculation of the ratio of the INV Ratio for the four cigarette companies listed on the Indonesia Stock Exchange for the period 2016 – 2018.

Table 7. INV Ratio

Company	Year			Average INV
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	0.327	0.307	0.264	0.299
PT. Gudang Garam, Tbk	0.490	0.453	0.400	0.448
PT. HM Sampoerna, Tbk	0.202	0.189	0.156	0.182
PT. Wismilak Inti Makmur, Tbk	0.457	0.490	0.470	0.472

Source: Data Processing Results, 2021

Based on the table above, there are 3 companies that experienced a decrease in the INV ratio, namely PT. Bentoel Internasional Investama, Tbk, PT. Gudang Garam, Tbk and PT. HM Sampoerna, Tbk. However, there is 1 company that experienced fluctuations, namely increasing in 2017 and decreasing in 2018 namely PT. Wismilak Inti Makmur, Tbk.

b. REC Rasio Ratio

Companies that have a higher REC ratio generally indicate that the average receivable turnover relative to the average inventory is relatively slow, resulting in short-term liquidity risk and increased financial pressure risk. The formula for the REC ratio is as follows:

$$REC = \frac{\text{Rata - Rata Piutang}}{\text{Rata - Rata Persediaan}}$$

The following are the results of the calculation of the ratio of the REC Ratio for the four cigarette companies listed on the Indonesia Stock Exchange for the period 2016 – 2018.

Table 8. REC Rasio Ratio

Company	Year			Average REC
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	0.142	0.226	0.321	0.230
PT. Gudang Garam, Tbk	0.049	0.057	0.052	0.053
PT. HM Sampoerna, Tbk	0.150	0.185	0.214	0.183
PT. Wismilak Inti Makmur, Tbk	0.081	0.083	0.089	0.085

Source: data processing results, 2021

Based on table 8, it can be seen that there are 3 companies that experienced an increase in the REC ratio, namely PT. Bentoel Internasional Investama, Tbk, PT. HM Sampoerna, Tbk and PT. Wismilak Inti Makmur, Tbk. While PT. Gudang Garam, Tbk experienced fluctuations that increased in 2017 and decreased again in 2018.

c. Cash Ratio

Companies that have a higher proportion of cash and marketable securities illustrate that the company has a greater capacity to pay off loans that are soon due by using the most liquid assets in overcoming short-term operating problems. The formula is as follows:

$$\text{CASH} = \frac{(\text{Kas} + \text{Surat Berharga})}{\text{Total Aktiva}}$$

Table 9 is a presentation of the results of the calculation of the cash ratio for the four cigarette companies during the 2016-2018 period.

Table 9. CASH Ratio

Company	Year			Average CASH
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	0.024	0.011	0.019	0.018
PT. Gudang Garam, Tbk	0.025	0.035	0.029	0.030
PT. HM Sampoerna, Tbk	0.119	0.174	0.333	0.209
PT. Wismilak Inti Makmur, Tbk	0.045	0.048	0.069	0.054

Source: data processing results, 2021

Based on the table above, there are 2 companies that experienced an increase in the cash ratio, namely PT. HM SAMPOERNA, Tbk and PT. Wismilak Inti Makmur, Tbk, while PT. Gudang Garam, Tbk and PT. Bentoel fluctuated.

d. QUICK Rasio Ratio

Companies that have a ratio *Quick* higher indicates that the company's ability to be more solvent in paying off its soon-to-maturity obligations using liquid assets, resulting in a decreased risk of financial pressure. The formula to find out this ratio is:

$$\text{QUICK} = \frac{\text{Quic Aset}}{\text{Hutang Lancar}}$$

The Quick Ratio value for the four companies is 0 because they have relatively large current debts.

e. ROI Ratio

Companies that have a higher ROI ratio illustrates that the profitability of the company's operating assets is better, resulting in a decreased risk of financial pressure. The formula for calculating this ratio is as follows:

$$\text{ROI} = \frac{\text{Laba Operasi Bersih}}{(\text{Total Aktiva} - \text{Hutang Lancar})}$$

The following (Table 10) presents the ROI ratio for the four cigarette companies listed on the Indonesia Stock Exchange for the period 2016 – 2018.

Table 10. ROI Ratio

Company	Year			Average ROI
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	-0.0002119	-0.000511	-0.000687	0.00
PT. Gudang Garam, Tbk	0.16	0.18	0.17	0.17

PT. HM Sampoerna, Tbk	0.44	0.44	0.45	0.44
PT. Wisnilak Inti Makmur, Tbk	0.13	0.04	0.05	0.07

Source: data processing results, 2021

Based on the table above, it can be seen that the ROI ratio at PT. Bentoel Internasional Investama, Tbk is 0, while PT. Gudang Garam Tbk has decreased every year. While the other 2 companies, namely PT. HM Sampoerna and PT. Wisnilak Inti nMakmur, Tbk fluctuates every year.

- f. DEBT Ratio
The formula is:

$$DEBT = \frac{\text{Hutang Jangka Panjang}}{(\text{Total Aktiva} - \text{Hutang Lancar})}$$

The following is the calculation of the DEBT ratio for the four cigarette companies.

Table 11. DEBT Ratio

Company	Year			Average DEBT
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	0.0410	0.0502	0.0548	0.05
PT. Gudang Garam, Tbk	0.0423	0.0444	0.0416	0.04
PT. HM Sampoerna, Tbk	0.0528	0.0694	0.0648	0.06
PT. Wisnilak Inti Makmur, Tbk	0.0680	0.0815	0.0906	0.08

Source: data processing results, 2021

Based on table 11, it can be seen that there are 2 companies that experienced an increase in the DEBT ratio, namely PT. Bentoel Internasional Investama, Tbk and PT. Wisnilak Inti Makmur, Tbk while the other 2 companies experienced fluctuations, namely PT. Gudang Garam, TBK and PT. HM. Sampoerna.

- g. Turn Ratio

Companies that have a ratio of *Turnover* Higher values indicate that the company can seek assets more quickly to generate sales in order to immediately obtain cash, so that the risk of financial stress decreases. The formula is as follows:

$$TURN = \frac{\text{Penjualan}}{(\text{Modal Kerja})}$$

Table 12. TURN . Ratio

Company	Year			Average TURN
	2016	2017	2018	
PT. Bentoel Internasional Investama, Tbk	3.7832	4.6926	6.1651	4.88
PT. Gudang Garam, Tbk	3.7583	3.9382	4.1110	3.94
PT. HM Sampoerna, Tbk	3.5074	3.5776	3.6760	3.59
PT. Wisnilak Inti Makmur, Tbk	2.5729	2,1080	2.6085	2.43

Source: data processing results, 2021

Based on the table above, only 1 company experienced fluctuations, namely PT. Wismilak Inti Makmur, Tbk, while the other three experienced an increase.

Cumulative calculation of 7 bankruptcy indicator variables (attachment to report), the following are: *summary* from the recapitulation of bankruptcy with the zavgren model for the four cigarette companies listed on the Indonesia Stock Exchange during the period 2016 – 2018 which are presented in the form of tables 13-16.

Table 13. Bankruptcy Recapitulation of Zavgren Model PT. Bentoel International Investama, Tbk

	2016	2017	2018
Y	-0.0374	0.0221	-0.0598
Pi	0.51	0.49	0.51
Lower limit	0.3937	0.3528	0.2965
Upper limit	0.7473	0.8757	1.0195
Condition	Healthy	Healthy	Healthy

Source: Data Processing Results, 2021

Table 14. Recapitulation of Bankruptcy Model Zavgren PT. Gudang Garam, Tbk

	2016	2017	2018
Y	0.1431	0.0485	0.1480
Pi	0.46	0.49	0.46
Lower limit	0.3937	0.3528	0.2965
Upper limit	0.7473	0.8757	1.0195
Condition	Healthy	Healthy	Healthy

Source: Data Processing Results, 2021

Table 15. Bankruptcy Recapitulation Mmodel Zavgren PT. HM Sampoerna, Tbk

	2016	2017	2018
Y	-0.9309	-1.6434	-3.3665
Pi	0.72	0.84	0.97
Lower limit	0.3937	0.3528	0.2965
Upper limit	0.7473	0.8757	1.0195
Condition	Healthy	Healthy	Healthy

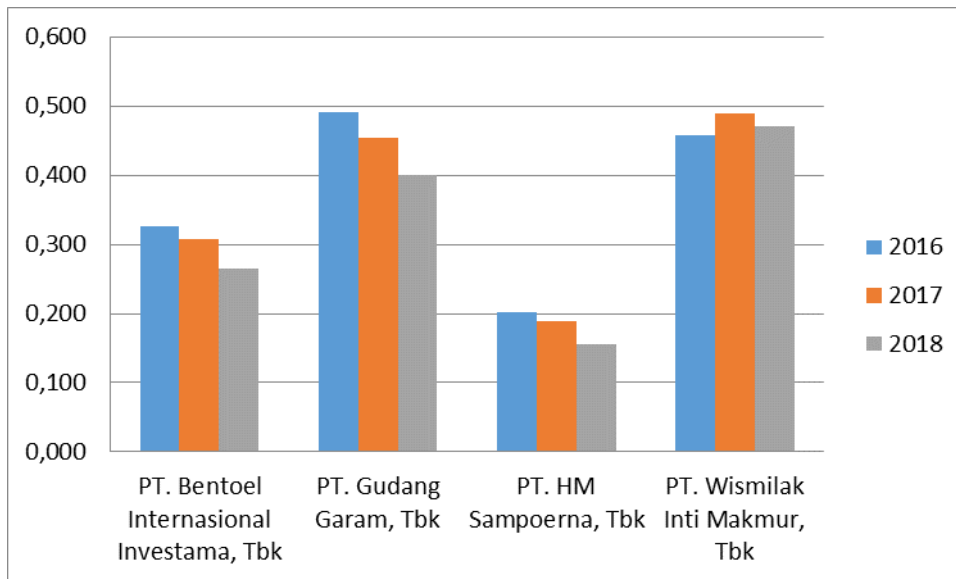
Source: Data Processing Results, 2021

Table 16. Bankruptcy Recapitulation of Zavgren Model PT. Wismilak Inti Makmur, Tbk

	2016	2017	2018
Y	-0.3729	-0.5621	-0.7853
Pi	0.59	0.64	0.69
Lower limit	0.3937	0.3528	0.2965
Upper limit	0.7473	0.8757	1.0195
Condition	Healthy	Healthy	Healthy

Source: Data Processing Results, 2021

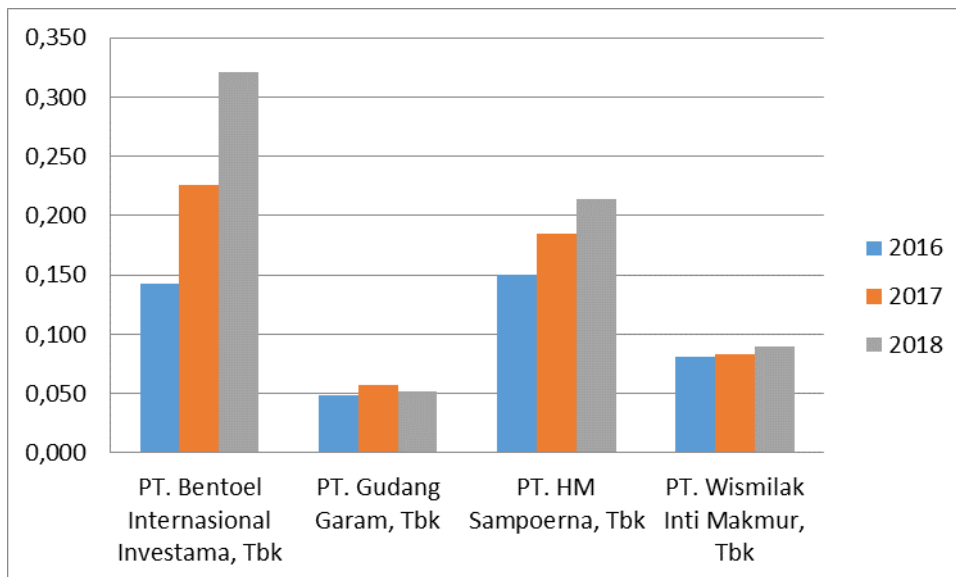
Based on the calculation, for the INV ratio there are 3 companies experiencing a decrease in the ratio due to a decrease in the average inventory. The average inventory to sales greatly affects this ratio. The three companies are PT. Bentoel Internasional Investama, Tbk, PT. HM. Sampoerna, and PT. Gudang Garam, Tbk. While 1 company, namely PT. Wismilak Inti Makmur fluctuated because it had a fluctuating average inventory value. This is in line with the theory and research results which state that a company with a higher INV ratio illustrates that the average inventory turnover to net sales is sluggish, resulting in short-term liquidity ratios and increased risk of financial stress. The development of the INV ratio of the four companies is shown in Figure 7.



source: Data Processing Results, 2021

Figure 7. Graph of INV . Ratio

Things that are far different, the REC ratio of 3 companies has increased because it has a large number of receivables and continues to increase and is directly proportional to the amount of inventory. While the REC ratio fluctuated due to the amount of receivables which also fluctuated. The following is a graphic depiction of the REC ratios of the four cigarette companies (Figure 8).

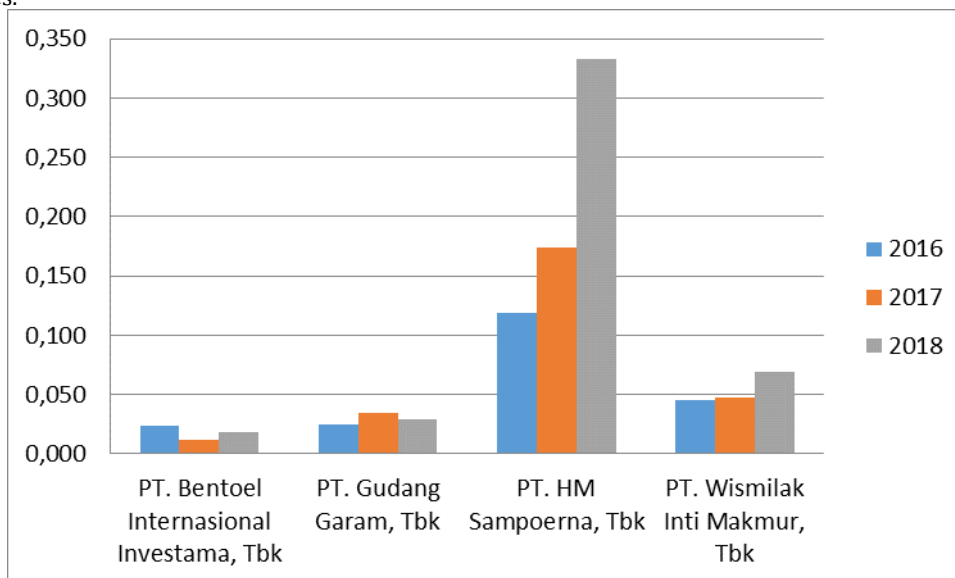


source: Data Processing Results, 2021

Figure 8. Graph of REC . Ratio

CASH ratio, is a comparison between cash and marketable securities and total assets. Based on the theory, a company that has a higher proportion of cash and marketable securities illustrates that the company has a greater capacity to pay off loans that are soon due by using the most liquid assets in overcoming short-term operating problems. Cigarette companies that are registered and researched do not have securities, so the comparison of this ratio is only Cash and Total Assets. So that the value of this ratio there are 2 companies that have increased, namely

PT. HM. Sampoerna, Tbk and PT. Wisnilak Inti Makmur, Tbk. While PT. Bentoel Internasional Investama, Tbk and PT. Gudang Garam, Tbk experienced fluctuations. Figure 9 is an illustration of the Cash ratio in the four cigarette companies.

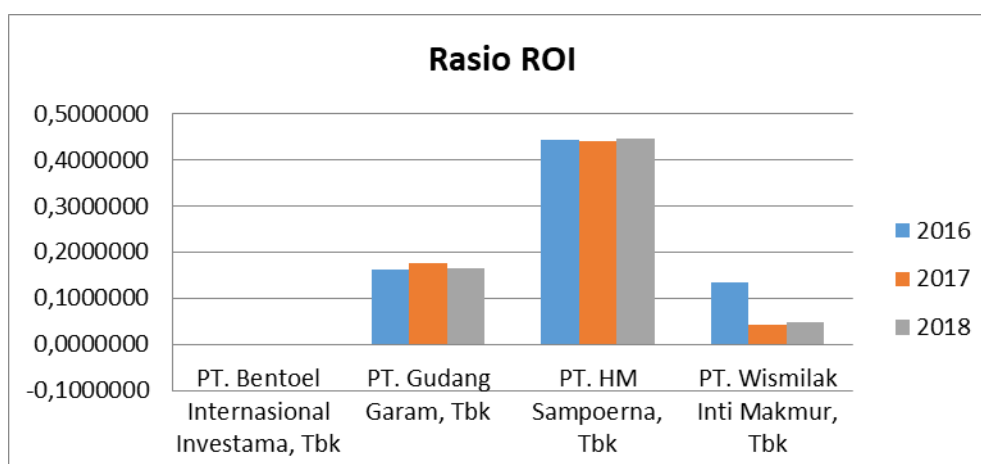


source: Data Processing Results, 2021

Figure 9. CASH Ratio Graph

Cigarette companies listed on the Indonesia Stock Exchange during the period 2016 to 2017 have a relative Quick Asset value of 0, because the four companies have relatively large current liabilities while the quick asset value is also close to 0. So the value of this ratio is 0 for all companies during the 2016 period. – 2018.

For the ROI ratio, PT. Bentoel Internasional Investama, Tbk experienced a ratio value of 0 this is because the company experienced losses. Meanwhile, other companies are volatile because the profit earned every year also fluctuates. Figure 10 is a graphical depiction of the ROI ratio.

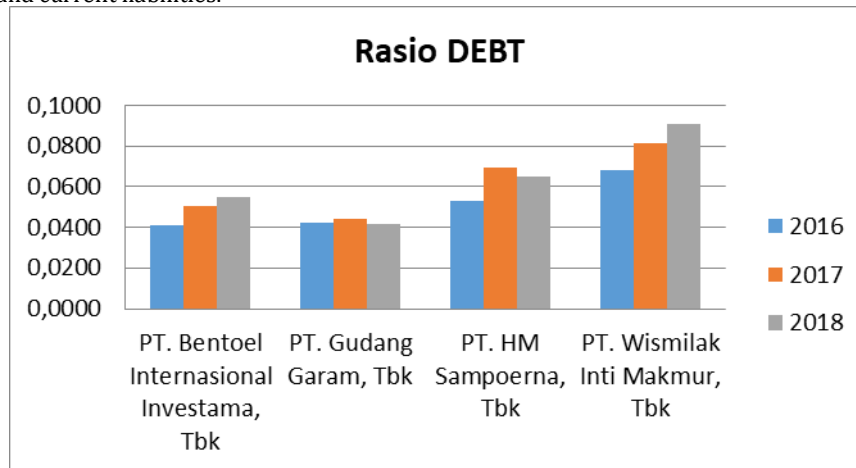


source: Data Processing Results, 2021

Figure 10. Graph of ROI Ratio

The DEBT ratio (Figure 11) and the TURN ratio of each company has increased (for PT. Bentoel Internasional Investama, Tbk and PT. Wisnilak Inti Makmur, Tbk) because long-term debt is relatively less compared to total assets and current liabilities. Different from other companies that experience fluctuations in the ratio value. This is

in accordance with the results of previous studies which state that these two ratios are highly dependent on the value of sales and current liabilities.



source: Data Processing Results, 2021

Figure 11. DEBT Rasio Ratio Graph

Application of the Zavgren model (logit) requires 4 steps (Zavgren 1983):

- A series of seven financial ratios is calculated.
- Each ratio is multiplied by a special coefficient.
- The values or results obtained are summed together (y).
- The probability of the company's bankruptcy is calculated by the logit probability function.

Christine V. Zavgren established a formula for calculating the probability of a company's bankruptcy as follows (Stickney 1996:551):

$$\text{Probability of Company Bankruptcy (Pi)} = \frac{1}{1+e^y}$$

Where : e = 2.718282

By comparing the probability value to the upper and lower threshold values, the four companies and in the 2016 to 2018 period are considered healthy.

4. Conclusion

The conclusion in this study is that the financial condition of cigarette companies listed on the Indonesia Stock Exchange (IDX) during the period 2016 - 2018 according to the Altman Z-Score model can be categorized into 2 criteria, namely Gray Area and Healthy Companies that enter the gray area classification are PT . Bentoel Internasional Investama, Tbk because it has a Z score of $1.2 < Z < 2.9$, which is 2.67174. Meanwhile, companies that are classified as healthy are PT. Gudang Garam, Tbk, PT. HM. Sampoerna, Tbk and PT, Wismilak Inti Makmur, Tbk because they have Z Scores of 4.449, 23.82, and 16.06, all of which have Z Scores above 2.9.

Acknowledgement

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